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# The four horsemen of the Apocalypse: new narrative evidence on economic, currency, banking and sovereign crises

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**The four horsemen of the Apocalypse: New narrative  
evidence on economic, currency, banking and sovereign  
crises**

Soutenue par

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## Abstract

Over the last 50 years, developing and emerging markets have displayed more hectic growth patterns than advanced economies: their business cycle is twice as volatile, and they were exposed to twice as many financial crises. This dissertation studies how the two phenomena are related. I consider this question through several theoretical and empirical literature reviews and an empirical and narrative study of economic, currency, banking and sovereign crises between 1970q1 and 2020q1 for 54 countries worldwide. I notably provide a comprehensive econometric dating of business cycles using Markov-Switching Models. I develop a narrative methodology to treat IMF archives and apply it to (i) date candidate currency (and sovereign) crises and (ii) study the shocks and vulnerabilities at the origins of crises.

Differences in growth volatility are not explained by a higher frequency of recessions but by higher intrinsic volatility during these phases. Financial crises contribute 2 times more to aggregate volatility in less advanced markets. These countries are indeed highly exposed to multiple crises episodes occurring during recessions and associated to drastic economic losses. The more markets are developed, the lower the probability for crises to spill-over through the economy and multiply. Currency crises are frequent and central events. They play a critical role in driving business cycle volatility in non-advanced markets (roughly 50%). I study the history of Argentina to question the origins of complex crises. I identify three types of shocks and six key vulnerabilities that fuel the credibility gap and precipitate trust debacles, economic collapse and financial crises.<sup>1</sup>

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<sup>1</sup>The Banque de France funded part of this research under a CIFRE grant. While writing the dissertation, I worked as a summer intern at the International Monetary Fund, on a project not directly related with my own research. The views expressed in this work do not represent these institutions. Moreover, given the close relationship between my work and the IMF, this work is no other voice and opinion than my own.

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## Abrégé

Au cours des 50 dernières années, les marchés en développement et émergents font état de chemins de croissance plus mouvementés que les économies avancées : leurs cycles d'activité sont deux fois plus volatiles et ils ont été exposés à deux fois plus de crises financières. Cette thèse étudie comment les deux phénomènes sont reliés. Pour répondre à cette question je développe plusieurs revues de littératures théorique et empirique. Je combine des études empiriques et narratives pour dater les crises économiques, de change, bancaires et souveraines entre 1970t1 et 2020t1 pour 54 économies en développement, émergentes et avancées. En particulier je fournis une datation économétrique exhaustive des cycles d'activités en utilisant des modèles à changement de régime Markovien. Je développe également une méthodologie narrative pour traiter les archives du FMI. Je fournis deux applications de mon approche narrative et développe un cadre d'analyse pour (i) dater des potentielles crises de change (et souveraines) et (ii) étudier les chocs et vulnérabilités à l'origine des épisodes de crises.

Les différences de volatilité de la croissance entre pays ne sont pas expliqués par des récessions plus ou moins fréquentes mais par une volatilité intrinsèquement plus élevée dans ces régimes. Les crises financières contribuent deux fois plus à la volatilité totale dans les marchés les moins développés. Ces pays sont en effet extrêmement exposés à des crises multiples : durant des récessions, plusieurs marchés financiers rentrent en crise et les pertes économiques sont drastiques. Plus les marchés sont développés, plus la probabilité pour une crise de se multiplier est faible. Les crises de change sont très fréquentes, quel que soit le type de pays. Ce sont des événements cruciaux qui jouent un rôle clef dans la volatilité des marchés moins avancés (environ 50 %). J'étudie l'histoire des crises argentines pour questionner l'origine des crises complexes. J'identifie trois types de chocs et six vulnérabilités centrales qui renforcent le manque de crédibilité et précipitent débauches de confiances, effondrements économiques et crises financières.<sup>2</sup>

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<sup>2</sup>La Banque de France a financé une partie de ces travaux sous une bourse CIFRE. J'ai réalisé durant la fin de ma thèse un stage de deux mois au Fond Monétaire International sur un sujet non directement relié à ma thèse. Les opinions exprimées dans ces travaux ne sauraient en aucun cas représenter ces institutions. De plus, au vu de la proximité de mes travaux avec le FMI, ceux-ci ne représentent nulle autre chose que ma seule opinion.



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## Résumé

*Nota Bene : L'ensemble de cette thèse, est rédigée en anglais. Les pages qui suivent sont en français. Elles introduisent et résument mes travaux. Je donne les références aux chapitres/sections pour guider le lecteur francophone qui voudra s'aventurer plus loin. L'introduction en anglais (page xxxv) offre une illustration plus détaillée et colorée de mes travaux. Un ensemble d'encadrés de couleur structure plus globalement toute la dissertation. Ils me permettent de mettre en exergue : les principales **questions de recherche** que je pose ; les **méthodologies** économétriques et narratives que j'utilise et développe ; les **faits stylisés** et les **épisodes** de ma **base de données** que j'étudie, identifie et discute et enfin les principales **contributions** et **résultats** de mes travaux.*

*Cette pratique – d'encadrés et de couleurs – n'est certainement pas courante dans la littérature et sera sans aucun doute vouée à disparaître dans un futur processus d'aseptisation académique. Au regard des libertés de format que me semblait offrir une dissertation, j'ai souhaité mettre en oeuvre ces pratiques de rédaction moins conventionnelles en économie en espérant apporter au lecteur des outils pour guider, structurer et faciliter la lecture.*

Pour classer les pays en termes de développement des marchés (figure 2 page xxxvii), je fais référence au niveau de revenu tel que classifié par la Banque Mondiale. J'utilise la classification de 1995, ou la première disponible, telle que ce proxy indique : marchés en développement = bas revenus et revenus intermédiaires inférieurs ; marchés émergents = revenus intermédiaires supérieurs ; marchés avancés = hauts revenus.

### Narration, motivation, introduction

En cherchant un titre pour cette thèse, l'image des *quatre cavaliers de l'Apocalypse* semblait amusante. Dans cette dissertation, j'étudie comment la plus grande volatilité économique des marchés émergents et en développement est liée à leur plus grande exposition à des crises financières (de change, bancaires et souveraines). Le quadruplet de chevaux apparaît donc comme une illustration colorée des quatre crises que je manipule (récession économique et trois crises financières): (1) sur le cheval blanc de la conquête, les crises économiques mènent la danse, pourchassant les gains économiques passés. (2) Les crises de change, souvent associées à des attaques spéculatives d'investisseurs étrangers, suivent sur le cheval rouge de la guerre. (3) Chevauché par les crises bancaires, le cheval noir de la famine suit. Durant ces épisodes, banques et institutions financières peinent à respecter leur exigences de bilan et affament tout le système en réduisant l'accès à des liquidités. (4) Sur le pâle cheval de la mort qui clôt la marche, les crises souveraines mettent souvent un terme à des obligations existantes, voire marquent la résiliation temporaire de l'accès aux marchés financiers internationaux.

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Et l’analogie se confirme dans mes résultats. Quand un pays subit les quatre crises – une caractéristique des marchés émergents et en développement – c’est le système économique et financier tout entier qui s’effondre. Assez rapidement, l’intérêt réel, et soudainement moins amusant, de la métaphore apparaît : ces quatre voyants rouges sur la tableau de bord d’un pays signalent avant tout, pour une grande partie de la population, la crainte de lendemains *apocalyptiques*. Ces épisodes dramatiques sont associés à des hausses du chômage, des pertes de richesse, des hausses de la pauvreté etc. Ainsi, garder ce jeu de mot accrocheur comme titre est avant tout un rappel de la réalité souvent triste qui se cache derrière les figures et chiffres de cette thèse.

Deux faits stylisés sont à l’origine de ces travaux. Quand on les compare aux marchés avancés sur les 50 dernières années, les marchés émergents et en développement (1) ont une croissance plus volatile et (2) ont été plus exposés à des crises financières. Sans trop de surprise, ces faits stylisés sont reliés. Cependant, la façon dont ils s’expliquent l’un l’autre est une source récurrente de discussions, débats et idées dans la littérature. La liste des déterminants fondamentaux qui se cachent derrière la relation entre volatilité économique et crises financières est en effet longue. Ma recherche s’inscrit dans ce programme de recherche global. Au cours de mon PhD, on m’a glissé l’idée d’obtenir une théorie des crises. Ou, en révisant les attentes à la baisse, celle de pouvoir identifier qui des perturbations économiques ou financières étaient les plus dommageables pour la croissance et la volatilité. Aboutir à une théorie des crises est selon moi une tâche impossible. On peut identifier des schémas économiques et/ou financiers qui se répètent, les tester et les discuter. Cependant, quel que soit le type d’épisode que l’on considère, il y a des liens bien plus subtils et profonds entre ces facteurs et une myriade d’autres déterminants : de la nature des systèmes politiques et légaux aux explications sociales et culturelles. Ces sources d’hétérogénéité sonnent bien souvent le glas de la validité externe d’une théorie trop large.

Pour poser les premières pierres en vue d’une théorie plus globale des crises, il me semblait donc important de dresser le bilan, de la manière la plus complète possible, des faits stylisés et considérations qui caractérisent les épisodes de crises. A partir de nombreuses références à la littérature en macroéconomie et finance internationale, j’identifie les principaux déterminants de la volatilité économique, des cycles d’activités et des crises financières. Je contribue ensuite à cette même littérature en combinant des méthodes économétriques et narratives pour construire une base de données trimestrielles de crises économiques, de change, bancaires et souveraines pour 54 pays entre 1970 et 2020. À partir de cette nouvelle base de données, je développe une taxonomie des épisodes de crises et quantifie leur rôle dans les différences de volatilité économique entre pays. Enfin, j’explore les liens causaux qui relient crises financières et économiques en identifiant, à l’aide d’une nouvelle méthodologie narrative, les chocs et vulnérabilités à l’origine des crises complexes. Je conclue la dissertation en identifiant les prochaines étapes pour cette recherche sur les épisodes de crises.



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## Chapitre 1 – Considérations théoriques sur la volatilité, les cycles et les chocs

Les chemins de croissance diffèrent grandement entre pays. Si tous traversent des récessions, celles-ci varient grandement. Qu'il s'agisse de récessions soudaines et abruptes ou de renversements de tendance plus doux, certaines entraînent des pertes permanentes quand d'autres marquent le début d'une longue période de stagnation. Comprendre l'origine de ces fluctuations pour mieux les maîtriser et minimiser leurs conséquences négatives sur la croissance a animé de nombreuses discussions dans la littérature en macroéconomie et finance internationales. Le chapitre 1 prend état et structure ses principales contributions concernant (1.1) les déterminants structurels et conjoncturels de la volatilité de la croissance et (1.2) les déterminants des fluctuations correspondant aux fréquences des cycles économiques (2 à 12 ans).

Dans la première partie du chapitre, j'identifie ainsi trois axes principaux de taxonomie des déterminants que la littérature entremêle dans ses études. [1.1.1 :] Un ensemble de facteurs internes propres à chaque pays : leur niveau de développement, la structure de leur économie, leurs institutions, normes ou d'autres facteurs socio-politiques. En particulier, la dépendance à certains produits – en général du secteur primaire – est un marqueur clef de volatilité. [1.1.2 :] Un ensemble de chocs et facteurs externes/exogènes aux pays pouvant provenir de catastrophes environnementales ou de perturbations sur les marchés internationaux – financiers et des matières premières<sup>3</sup>. Les chocs régionaux, globaux et, plus particulièrement, les phénomènes de contagion sont des déterminants importants de la volatilité économique. [1.1.3 :] Un dernier ensemble de déterminants relate comment les facteurs financiers liés à la globalisation et la libéralisation financières façonnent la croissance et sa volatilité. Du cycle financier global au développement des marchés domestiques, cette littérature converge vers les crises financières comme manifestation primordiale des excès de volatilité économique. Ces déterminants fondamentaux n'expliquent cependant qu'une partie des différences de volatilité entre pays.

Dans la deuxième partie du chapitre, je me concentre sur les facteurs identifiés pour justifier les différences de fluctuations à la fréquence des cycles économiques (entre 2 et 12 ans). [1.2.1 :] Deux approches principales s'opposent pour expliquer les différentiels de volatilité entre petites économies ouvertes. Les marchés moins avancés seraient plus volatiles car (1) ils sont relativement plus exposés à des chocs de productivité permanents qui génèrent plus de volatilité ou car (2) ils sont plus fréquemment victimes de fluctuations du taux d'intérêt auquel ils se financent sur les marchés internationaux, lesquelles sont amplifiées par des frictions financières. [1.2.2 :] Dans l'ensemble, le vainqueur de ce débat ne semble être ni l'une ni l'autre de ces approches en particulier. La sentence irrévocable rendue par la littérature pointe plutôt les frictions (financières tout particulièrement [cf 1.2.3]) comme un élément essentiel dans la magnification des chocs quels qu'ils soient.

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<sup>3</sup>Pour une économie ne représentant qu'un acteur relativement 'négligeable' sur un marché, ces chocs sont exogènes. Un pays n'est pas tout le temps négligeable.

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Dans l'ensemble, cette revue de littérature identifie les facteurs financiers et internationaux comme des clefs importantes pour comprendre les différentiels de volatilité. Un marqueur fort des cadres conceptuels qui justifient ces disparités est la notion de **choc**. Ces événements imprévus viennent perturber le système économique et financier. Ils impliquent souvent une mise à jour soudaine de l'information à disposition des agents et peuvent susciter des actions plus ou moins conséquentes. Au-delà des bruits blancs, les processus non-linéaires en offrent une illustration reconnue et répandue.

## Chapitre 2 – Cycles économiques et non-linéarité : les faits

Après les considérations conceptuelles et théoriques qu'amène la précédente revue de littérature, le chapitre 2 détaille le cadre de l'étude empirique qui fait le coeur de cette thèse et la base des prochains chapitres. Il s'intéresse ainsi à la datation empirique des **cycles économiques**. Ces derniers sont des représentations conceptuelles des motifs qui émergent des séries temporelles macroéconomiques et financières. Ces cycles capturent les fluctuations autour d'une tendance de long terme et agissent comme proxy pour l'ensemble des dynamiques répétitives inhérentes au système. Dans la première partie du chapitre, je détaille plus amplement la méthodologie de datation des cycles (2.1) et présente la base de données – un panel non cylindré de **54 pays (15 marchés en développement, 15 marchés émergents et 24 marchés avancés) entre 1970t1 et 2020t1** (2.2). Dans la deuxième partie j'analyse et compare les principales caractéristiques de la croissance, sa volatilité et des cycles économiques. Je dresse quatre blocs de faits stylisés (2.3) et quantifie la contribution des fluctuations cycliques économiques à la volatilité totale de la croissance (2.4).

Un cycle économique, c'est avant tout l'alternance d'expansions, i.e de croissance plus forte qu'en moyenne, et de récessions, i.e. de croissance à l'inverse plus faible et souvent négative. [2.1.1 :] Deux approches s'opposent dans la littérature pour dater les points de retournement, i.e. les dates auxquelles une économie passe d'une expansion à une récession et inversement. D'un côté, l'approche algorithmique définit *une règle ad hoc* pour identifier et filtrer ces épisodes. De l'autre, l'approche paramétrique estime un processus non-linéaire qui correspond le mieux à la série temporelle étudiée. [2.1.2 :] Je suis cette seconde approche car elle permet une plus grande flexibilité dans l'identification des disparités de dynamiques et de magnitudes des retournements entre pays<sup>4</sup>. J'utilise un modèle à changement de régime Markovien, où chaque série temporelle de croissance est modélisée par un processus stochastique univarié auto-régressif à deux régimes. [2.2 :] Cependant, si cette approche capture mieux la nature fluctuante des expansions et récessions entre pays, elle est plus exigeante en données. Ainsi des 81 pays initialement testés, seuls

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<sup>4</sup>En simplifiant, l'approche algorithmique définit un retournement si un seuil de 0% de croissance est passé sur une certaine fenêtre. On ne peut attendre rationnellement de chaque récession dans un pays en développement à forte croissance qu'elle soit associée à des pertes en niveau de production. Les ralentissements et inversions de tendance mineurs contredisent d'emblée une telle hypothèse.

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54 restent dans l'échantillon au coeur de cette dissertation (figure 2 page xxxvii). Les marchés en développement (émergents) sont 75% (24%) plus volatiles, en moyenne, que les marchés avancés (tableau 1 page xli).

L'estimation des modèles à changement de régime Markovien permet d'obtenir plusieurs types d'information: les caractéristiques des cycles économiques estimés, la datation des épisodes d'expansion et de récession et la contribution des cycles économiques à la volatilité économique totale. [2.3.1 :] Les processus stochastiques estimés par pays pour capturer les cycles économiques offrent deux types d'informations principales: les probabilités de transition et la croissance moyenne par régime (tableau 2 page xlii). En moyenne, il n'y a aucune différence de dynamique entre groupes de pays: 4,0% d'aléa de rentrer en récession et 28,8% d'en sortir. Seules les différences de magnitudes des changements de régime expliquent les disparités de cycle. En moyenne et par trimestre d'expansion, les marchés en développement (émergents) croissent 40% (25%) plus vite que les marchés avancés. Mais en récession, chaque trimestre est 2,6 (2) fois plus coûteux. [2.3.2 :] L'estimation des modèles permet également de dater sur les séries temporelles les épisodes d'expansion et de récession. J'analyse ces épisodes sous quatre axes de taxonomie: la durée, l'amplitude totale (la *sévérité* dans le cas des récessions), la pente et le rebond<sup>5</sup> (tableau 3 page xliii). En moyenne, pour tous les groupes, les expansions durent 7 ans et les récessions 1 an et demi. Les expansions sont plus rapides dans les marchés moins avancés mais en moyenne les gains cumulés sont similaires<sup>6</sup>. Les récessions, en revanche, sont deux fois plus sévères dans les marchés moins avancés. Les pertes par trimestres sont 2,8 (1,8) plus rapides dans les marchés en développement (émergents). Cependant, et à rebours des marchés avancés, moins le pays est développé plus il rebondit fort après une récession. Dans l'ensemble, les cycles économiques des marchés avancés sont plus homogènes et moins amples. [2.3.3 :] Ce qui différencie principalement les marchés les moins avancés, c'est la présence de récessions graves, associées à des pertes totales supérieures à 10% du PIB. Il y en a 8 (5) fois plus dans les marchés en développement (émergents). [2.4 :] Enfin, quand on compare les décompositions de volatilité économique totale (cycle et résidu) entre groupes de pays, la grande majorité des disparités provient de volatilité en récession. La volatilité économique associée au cycle est plus importante dans les marchés moins avancés.

L'analyse des cycles économiques pointe assez uniformément vers les récessions les plus coûteuses comme source et marqueur de volatilité. C'est une caractéristique régulière et reconnue des crises financières qui apparaissent donc comme le prochain point à étudier.

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<sup>5</sup>Je capture dans cette dissertation la 'force' du rebond économique en considérant la croissance trimestrielle dans l'année qui suit la fin d'une récession relativement à la moyenne en expansion.

<sup>6</sup>Ce qui suggère des effets de compositions gommés par la moyenne.

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### Chapitre 3 – Crises financières, entre théorie, empirique et narration

Une **crise financière** est un épisode durant lequel un marché financier est poussé aux limites de son fonctionnement, souvent au milieu de hausses de l'incertitude et de la spéculation. Elles résultent de chocs ou d'informations nouvelles qui fragilisent certains agents en révélant vulnérabilités et incohérences. De fait, les crises financières sont toujours associées à des changements drastiques pour certains participants des marchés touchés. Dans cette dissertation, je considère trois types de crises financières que le chapitre 3 définit et détaille : (i) les crises de change souvent associées à des pertes importantes de la valeur externe d'une monnaie ou à des interventions sur les réserves ou les taux pour protéger cette valeur d'attaques spéculatives. (ii) les crises bancaires sont des épisodes durant lesquels des hausses des difficultés financières des participants commencent à poser des risques systémiques. Elles entraînent notamment des interventions des offices de régulation et supervision et/ou des fermetures d'institutions. (iii) Les crises souveraines sont des épisodes durant lesquels les autorités souveraines d'un pays se trouvent dans l'incapacité ou la non-volonté de rembourser (tout ou) partie de leurs obligations existantes. Les défauts souverains sont associés à des ruptures de contrats obligataires. Je résume tout d'abord la littérature théorique pour définir et identifier les déterminants communs de ces événements (3.1). Je fais ensuite référence à la littérature empirique pour définir les règles et sources que j'utilise pour dater les crises (3.2). Le cas des crises de change est important tant elles sont fréquentes et diverses, en particulier car la littérature converge moins facilement sur une datation commune. Je contribue à la littérature en développant une nouvelle base de données narratives de crises de change qui englobe les datations existantes et des citations d'archives du FMI (3.3).

Les crises financières sont aussi diverses que fréquentes ; elles tendent à se succéder les unes aux autres et ont le plus souvent des conséquences économiques importantes. Elles sont, de fait, des objets de prédilection pour la littérature. [3.1.1 :] Conceptuellement, la théorie s'accorde à identifier pour chaque événement un ensemble de (i) chocs et/ou fluctuations importantes, (ii) des hausses soudaines et sévères des contraintes sur les marges de décision d'agents systémiques et (iii) des interventions publiques importantes et le plus souvent un changement de trajectoire dans la conduite des politiques économiques et financières. [3.1.2 :] Quel que soit le type de crise, la littérature théorique développe deux lignes principales pour expliquer leur occurrence et leurs liens possibles avec l'activité économique : (3.1.2.1) Dans l'approche "des fondamentaux", une crise survient lorsque des perturbations/fluctuations trop importantes pressurisent des vulnérabilités et frictions existantes, et, en s'amplifiant, mènent le système au point de rupture. Une intervention est nécessaire pour régler l'incohérence et ajuster l'économie en accord avec son nouvel état. (3.1.2.2) L'approche "auto-réalisatrice" repose sur le fait que les épisodes de crises sont associées à moult incertitudes et spéculations. Une crise peut survenir si assez de participants l'anticipent et ajustent le reste de leurs décisions en accord avec ces peurs. Si le phénomène prend de l'ampleur, les actions peuvent ricocher et devenir systémiques, quels que soient les fondamentaux initiaux. [3.1.3 :] Comme les crises financières se **multi-**

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**plient** souvent, je présente les possibles canaux de transmission et vulnérabilités structurelles discutés par la littérature. [3.1.4 :] Au regard (i) de l'importance des chocs et des non-linéarités dans les approches théoriques et (ii) de mon utilisation des modèles à changement de régime Markovien, je détaille plus particulièrement la littérature qui applique ces approches aux crises financières. [3.2.1 :] La datation empirique des crises financières peut être pensée dualement avec, d'un côté, l'identification de fluctuations importantes dans des variables agrégées et, de l'autre, l'identification et la caractérisation des interventions et changements politiques. Plus particulièrement je détaille les approches et sources derrière la base de crises financières de cette dissertation : (3.2.2) crises de change, (3.2.3) crises bancaires et (3.2.4) crises souveraines. [3.2.5 :] Au regard de l'importance des phénomènes "auto-réalisateurs" dans la littérature théorique sur l'origine des crises financières, je détaille les approches empiriques qui leur font écho.

Dans l'ensemble, la littérature empirique complète la datation algorithmique des crises par des narrations plus ou moins détaillées de l'évènement. Elle converge autour d'une identification/narration commune pour les crises bancaires et souveraines, mais, sans doute au regard de leur nature plus variée, pas pour les crises de change. Je présente, dans la dernière partie du chapitre, la méthodologie qui conclue la construction de la base de données narrative des crises de change. [3.3.1 :] L'approche narrative forme une branche de l'économie, plus fréquente en histoire économique, qui gagne en puissance en macroéconomie et finance internationales. Elle exploite et traite des sources textuelles pour caractériser certains événements ou analyser le rôle de la communication de l'information dans les développements économiques et financiers. J'identifie les éléments clefs qui sont discutés et présentés dans les principales approches narratives et les structure en trois blocs : source(s), angle d'approche et méthodologie [cf guide p. 80]. J'applique cette méthodologie aux épisodes de crises de change qui sont désignés par les différentes approches de la littérature empirique. [3.3.2 :] Pour cela, je définis plus précisément les crises de change et (i) les agents et transactions qui y sont fréquemment impliqués, (ii) les facteurs qui commandent au fonctionnement des marchés du change et (iii) les principaux changements de politiques qui y sont associés. Ce cadre conceptuel permet de guider la lecture des sources textuelles pour identifier les marqueurs d'une crise de change. [3.3.3 :] La principale source textuelle que j'utilise dans ces travaux sont les archives du Fond Monétaire International, notamment les publications *article IV*. [3.3.4 :] Je définis les principaux éléments identifiés dans le guide page 80 et traite, à partir de plus de 320 archives et citations associées, 250 épisodes potentiels, identifiés avec les approches algorithmiques. Je traite également un sous-ensemble de crises souveraines, et plus rarement bancaires, pour lesquelles une datation trimestrielle du début des crises était manquante.

Sur l'ensemble des pays, la base de données inclut, en parallèle des **239 expansions** et des **200 récessions**, **124 crises de change**, **52 crises bancaires** et **36 crises souveraines**.

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## Chapitre 4 – 50 ans de crises, taxonomie et contributions à la volatilité économique

Le chapitre 4 présente les faits stylisés de la base de données de crises financières et analyse les principaux messages qui peuvent être dérivés quand on la combine à la base de cycles économiques du chapitre 2. Associer les crises économiques et financières entre elles se révèle particulièrement intéressant pour comparer les marchés en développement, émergents et avancés entre eux. En effet, moins les marchés sont avancés plus ils sont sujets à des crises multiples qui cumulent une récession, une crise de change et au moins une autre crise financière. De manière générale, deux axes de taxonomie des épisodes de crises sont des facteurs différenciant entre groupes: la **concomittance au change** ou “currencité” et la **multiplicité** d’une crise<sup>7</sup>. La première fait référence à l’occurrence ou non d’une crise de change – les plus fréquentes – au cours de l’épisode. La seconde sépare les crises doubles ou triples, des crises financières simples. Les premières sont un marqueur saillant des dernières décennies des marchés moins avancés. Je présente, tout d’abord les principales caractéristiques des 50 dernières années de crises pour les 54 pays de mon échantillon et discute les différences d’exposition aux crises financières suivant le niveau de développement des pays, leur appartenance régionale (pour capturer des phénomènes de contagion), et la dépendance (ou non) à des matières premières (un facteur de vulnérabilités et de volatilité identifié dans le premier chapitre) (4.1). J’associe ensuite les bases de données de cycles économiques – i.e. des épisodes d’expansions et de récessions – et de crises financières – i.e. les trimestres de début de crise par type. En considérant les crises comme des épisodes (et non plus comme des points dans le temps), je peux ainsi discuter et comparer le séquençage des crises économiques et financières et identifier les crises multiples. Je continue l’analyse des épisodes de crises en utilisant les niveaux de taxonomie développés dans le deuxième chapitre : durée, sévérité, pente et rebond (4.2). Je croise les axes de taxonomie des crises financières d’une part et économiques d’autre part pour identifier les épisodes associés aux fluctuations les plus importantes (4.3). Je conclus le chapitre en quantifiant et comparant la contribution des différents épisodes de crises à la volatilité économique pour les marchés en développement, émergents et avancés (4.4).

Si l’on regarde la distribution des crises, tous types confondus, sur les 50 dernières années (figure 3 page xlix), il apparaît assez clairement qu’elles frappent par vagues augmentant, toutes les décennies, en nombre et en combinaison. [4.1.1 :] En identifiant 9 épisodes principaux j’identifie les caractéristiques communes de certains groupes de crises : déterminants régionaux, fragilités et régimes de change, complexification et contagion financières etc. [4.1.2 :] Quel que soit le groupe de pays, les crises de change sont les événements les plus fréquents. A l’inverse des crises bancaires, uniformément réparties entre groupe, les crises souveraines marquent tout

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<sup>7</sup>La *currencité* est définie par épisode de récession suivant qu’il soit (0) sans crise de change, (1) avec uniquement une crise de change ou (2) avec une crise de change et au moins une autre crise. La *multiplicité* d’un épisode de récession est défini par le nombre total de crises financières qui lui est associé (entre 0 et 3).

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particulièrement l'histoire récente des marchés moins avancés. Parmi les régions les plus marquées, l'Amérique du Sud et latine ainsi que l'Afrique et le Moyen-Orient sont particulièrement exposés aux crises de change et souveraines. L'Europe centrale et de l'Est est, pour sa part, relativement plus sujette à des crises bancaires et moins aux crises de change et souveraines. C'est l'Asie qui semble avoir le plus souffert de crises de change. Les pays avancés forment un groupe homogène [4.1.3 :] Les marchés en développement ont une probabilité annuelle de crise de change / bancaire / souveraine de 8,4 / 3,9 / 4,4% contre 6,7 / 3,2 / 2,4% pour les marchés émergents et 5,4 / 1,9 / 0,7% pour les marchés avancés.

L'intérêt de combiner les bases de données de cycles et de crises financières est de localiser les crises les unes vis-à-vis des autres. A partir de trois critères de temporalité, je groupe les crises financières avec des épisodes du cycle. [4.2 :] Dans un premier temps j'associe une crise à une récession, si elle commence pendant celle-ci, la précède ou la suit d'un an. J'utilise le reste de la section pour analyser les principaux messages que le séquençage des crises par épisode identifie, traiter les cas particuliers et discuter de la localisation des crises vis-à-vis des retournements économiques (les changements de régime). [4.2.1 :] Comme expliqué précédemment, les crises se supplantent souvent les unes aux autres (figure 4 page li). Je définis la **multiplicité** d'un épisode de crises comme le nombre de crises qui se signale positivement (économique, de change, bancaire, souveraine). Les marchés avancés sont sensiblement plus exposés aux crises simples (1 type de crise financière). Pour les marchés moins avancés, la situation est nettement inversée : les crises multiples (doubles et triples) représentent 47% du total. Les crises souveraines des marchés émergents ne se signalent par exemple jamais seules. Et, comme pour les marchés en développement, les crises triples marquent au fer rouge l'histoire récente de ces pays. L'encadré de la page 115 détaille le séquençage de ces épisodes complexes et la nature des pays et époques à laquelle elles se sont manifestées. [4.2.2 :] La grande majorité des crises financières est associée à une récession économique (tableau 5 page lii). Seules les crises de change forment une exception notable à cette observation. Les crises de change sont moins univoquement associées à des perturbations économiques agrégées de grande ampleur. Cela est dû au fait qu'une dévaluation ou une intervention en temps de crise peut permettre de réaligner la valeur du marché ou les anticipations sur un 'bon' équilibre et de débloquer des dynamiques expansionnistes. Cette observation est particulièrement avérée pour les marchés avancés, dont la moitié des crises de change est associée avec les 25 premières années de l'échantillon et, entre autre, la construction Européenne. Les quelques épisodes de crises bancaires ou souveraines en expansion sont le plus fréquemment expliquées par des facteurs socio-politiques. [4.2.3 :] Dans l'ensemble, la majorité des crises débute dans l'année avant/après le début de la récession. Dans les marchés plus avancés, elles se produisent relativement plus fréquemment après la première année de récession. Un nombre important de crises de change se signalent dans l'année qui suit la sortie d'une récession.

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Le second avantage majeur à grouper les crises par épisode est de pouvoir identifier celles qui sont associées aux récessions les plus graves. Ces dernières, comme l'a illustré le chapitre 2, identifient les marchés moins avancés. [4.3.1 :] Les récessions sont, en moyenne, 60% plus coûteuses en croissance par trimestre et 2 trimestres plus longues quand elles sont associées avec au moins une crise financière. Les marchés en développement ont des récessions coûteuses quand elles arrivent seules (-5,7% de pertes cumulées en moyenne), cependant les crises doublent leur sévérité. Pour les marchés émergents, les crises financières ne sont pas associées à des gains plus importants en moyenne mais l'économie met plus de temps à recouvrer les pertes. Dans les pays avancés, quand une crise financière se signale, la récession est à la fois plus longue et coûteuse. (tableau 6 page liii). [4.3.2 :] Les disparités régionales sont particulièrement intéressantes si l'on compare les groupes par exposition aux crises financières. Les pays d'Amérique latine, du Sud, d'Afrique et du Moyen Orient affichent, en présence de crises financières ou non, des récessions coûteuses. C'est également une caractéristique fréquente des marchés moins avancés dépendant des matières premières. Les pays asiatiques souffrent des crises financières car elles allongent les récessions et coupent les effets de rebond. Dans les pays d'Europe centrale et de l'Est, les crises financières sont associées à des récessions plus pentues et suivies par des périodes de croissance deux fois plus lentes qu'une expansion moyenne. [4.3.3 :] Si l'on compare les épisodes de récession suivant les axes de taxonomie des crises financières **currencité** et **multiplicité**, les disparités entre groupes de pays sont saillantes. Les crises économiques simples, i.e. les récessions sans troubles financiers, sont coûteuses et transitives (longues) dans les marchés en développement (émergents). Elles deviennent plus fréquentes et moins coûteuses quand les marchés se développent. Dans les marchés moins avancés, les récessions sans crises de change sont, à elles seules, déjà coûteuses. Une crise de change seule n'amplifie pas les pertes significativement. Seulement, très fréquemment, elles sont associées à d'autres crises financières et la sévérité et la durée des récessions augmentent. Uniformément, plus les crises se multiplient, plus elles sont associées à des récessions longues, sévères et pentues et à des rebonds faibles.

Pour conclure cette étude des caractéristiques phares des crises qui expliquent les disparités de volatilité économique entre groupes de pays, j'exploite la décomposition de la variance des modèles à changement de régime Markovien utilisée dans le chapitre 2. [4.4.1 :] Le constat est sans appel. Les crises financières, et la volatilité des récessions qui leur sont associées, expliquent 2,2 (1,8) fois plus la volatilité totale des marchés en développement (émergents) relativement aux marchés avancés. [4.4.2 :] Les décompositions de la variance associée aux cycles économiques confirment les résultats précédents : ce qui gonfle les disparités entre pays, c'est le fait que les récessions associées aux crises financières sont bien plus intenses (et non pas relativement plus fréquentes). [4.4.3 :] Pour conclure l'analyse du rôle des *crises de change* et de la *multiplicité* des épisodes de crises, la décomposition identifie des résultats centraux (tableau 7 page lvi): Les **crises de change** sont associées à la moitié de la volatilité cyclique des marchés moins avancés (un quart pour les marchés avancés). Dans les marchés en développement, les crises



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de change seules sont une condition nécessaire mais pas suffisante pour générer de la volatilité. Dans les marchés émergents, elles sont une condition nécessaire et suffisante de volatilité. Dans les marchés avancés, les crises de change sont une condition non-nécessaire mais suffisante de volatilité cyclique<sup>8</sup>. Quand les marchés se développent, la **multiplicité** des crises importe moins pour la volatilité des cycles économiques. Dans les marchés en développement, les crises économiques et financières se combinent et se multiplient fréquemment, générant de fait des excès de volatilité. Dans les marchés émergents, les crises économiques simples sont volatiles et coûteuses en tant que telles. Mais des crises financières multiples intensifient la sévérité des récessions et l'amplitude des fluctuations. Dans les marchés avancés, les crises financières ne génèrent relativement que peu de volatilité supplémentaire. La majorité de la volatilité de leurs cycles économiques n'est pas liée aux crises financières.

Après ces quatre premiers chapitres, si des doutes persistaient encore, il est maintenant évident que notre histoire est une histoire de crises. Quand on regarde ces différents épisodes avec plus de granularité : par niveau de développement, région, dépendance aux matières premières, occurrence d'une crise de change, multiplicité des crises financières ; un ensemble de marqueurs identifient ceux qui amplifient la volatilité économiques, notamment au regard des deux derniers facteurs dans les marchés moins avancés. Seulement, cette base de données et ces résultats n'informent, au-delà des faits stylisés et quantifications adjacentes, que peu sur les mécanismes et les causes précises de ces crises multiples. Pour fournir plus de détails, il faudrait soit plus de données quantitatives, soit repenser la méthodologie narrative et les informations que l'on peut extraire des archives du FMI. Le dernier chapitre entreprend ainsi de poser les bases qui permettront d'analyser les chocs et vulnérabilités à l'origine des crises.

## Chapitre 5 – Chocs et vulnérabilités à l'origine des crises, l'exemple argentin

Après avoir détaillé les principales caractéristiques théoriques (chapitres 1 et 3) et empiriques (2 et 4) des différences de volatilité économique et d'exposition aux crises financières, le dernier chapitre de la thèse s'intéresse avec plus de précision aux mécanismes aux origines des crises. D'un côté, la théorie nous offre un ensemble d'hypothèses, cadres conceptuels, déterminants, facteurs, mécanismes, définitions qui nous permettent de structurer notre pensée, connaissance et compréhension des phénomènes. De l'autre, l'empirique permet d'illustrer les principaux faits à considérer, de tester les principales hypothèses et d'identifier les points à éclaircir. En ce qui concerne les crises, elles sont associées quelle que soit l'approche, à une hausse de **l'incertitude**.

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<sup>8</sup>Une autre façon de lire ces 4 lignes est de dire que les crises de change, génèrent de la volatilité dans les marchés en développement quand elles sont accompagnées d'autres crises financières (et c'est fréquent) ; dans les marchés émergents, qu'il y ait ou non d'autres crises financières ; et dans les marchés avancés, seules, les crises de change créent de la volatilité cyclique, mais au même titre que les autres crises financières et sans que les effets de combinaison importent grandement.

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En tant que telle, l'incertitude est un moteur important de tout système économique et financier. Il y a de nombreuses sources d'incertitudes dans le futur d'un agent : sur les dynamiques économiques, les actions d'autres agents, les tendances de fond de la société etc. Selon s'ils anticipent ou non de meilleurs futurs, des agents décideront ou non de se positionner sur un marché. Cette incertitude, qui crée le besoin d'un lieu d'intermédiation, peut donner lieu à des phénomènes extrêmes très souvent associés à des crises plus globales : paniques, débauches de confiance, peurs auto-réalisatrices etc. Capturer ces sentiments ou "*esprits animaux*" au sens de Keynes est difficile tant les données chiffrées d'anticipation sont rares sur de grands échantillons. Pour comprendre l'origine des crises, il est donc important de pouvoir identifier les éléments qui ont pu amener les principaux acteurs à agir vers la crise, de comprendre quelles ont pu être leurs motivations. Il semble également difficile de capturer l'origine des crises multiples – le marqueur le plus saillant des pays volatiles – en se limitant à un agrégat macroéconomique (le PIB) et trois types de crises financières. Aussi le chapitre 5 définit un cadre, à partir des sources et de la méthodologie narratives du chapitre 3 (p. 80), pour étudier l'origine des crises multiples (5.1). J'utilise l'Argentine pour illustrer ma méthodologie et identifier les 3 types de chocs et 6 vulnérabilités qui se combinent dans les vagues de crises argentines. Je discute tout particulièrement le rôle de la cohérence et des sentiments (confiance...) (5.2). Le.la lecteurice intéressé.e pourra se référer à la dernière section du chapitre pour une histoire détaillée des 5 épisodes de crises traversés par le pays entre 1990 et 2019. Cette histoire économique inclut, à partir d'archives du Fond Monétaire International, une description factuelle datée et citée des évènements, chocs et vulnérabilités clefs, ainsi qu'une narration du déroulé des épisodes (5.4).

Sur les 50 dernières années, quand un pays rentre en récession, il a, en moyenne, une chance sur deux que la situation dégénère en crise financière. Cependant, la temporalité en tant que telle n'est pas une preuve de causalité. Il est probable que la crise financière découle de la même perturbation que la récession. Sans que l'une ne cause l'autre, elles peuvent toutes deux émaner du même choc ayant contraint différentes vulnérabilités et déclenché les divers mécanismes (inter-reliés) qui mènent aux crises économique et financière. Si l'approche empirique présente s'est intéressée à un agrégat économique et trois marchés, un des messages répétés par cette dissertation est que les crises sont diverses et complexes dans leur origine et séquençage. Étendre l'approche empirique à l'ensemble des facteurs possibles est une vaste tâche. L'approche narrative développée dans le chapitre 3 offre, à mon avis<sup>9</sup>, une alternative méthodologique capable d'offrir des éléments de réponse. [5.1.1 :] Pour espérer comprendre l'origine d'une crise et comparer les caractéristiques associées entre épisodes, il faut disposer d'un cadre assez vaste pour capturer les principaux éléments identifiés par la littérature théorique: (1) les chocs et nouvelles qui viennent perturber le système, (2) les vulnérabilités et frictions qui le sapent, (3) les agents et les décisions/actions qui transmettent les fluctuations. (figure 5 page lviii :) Dans le

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<sup>9</sup>Évaluer la tâche la plus vaste entre la collection et l'analyse d'une grosse base de données et la lecture et l'analyse d'un large volume d'archives est une question fondamentalement subjective.

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temps, un pays est décrit par des caractéristiques fondamentales et structurelles qui définissent ses limites, place et exposition au reste du monde. En soi, il peut être représenté (simplifié) par un ensemble de sphères inter-reliées – nominale, souveraine, financière, réelle, socio-politique – qui couvrent l'ensemble de l'activité qui fait s'adapter et évoluer le pays. Les crises sont des épisodes au cours desquels le système est poussé au bord de l'effondrement par des circonstances imprévues. Elles sont des moments de grandes incertitude et spéculation sur les futurs possibles. Durant les crises, des chocs initiaux se magnifient alors qu'ils se répandent dans l'ensemble du système économique et financier. Les perturbations pressurisent des vulnérabilités existantes et révèlent incohérences, frictions et fragilités. De fait, en temps de crise, les marges de décision des agents se trouvent fortement contraintes et assombries. Les crises sont la source de décisions drastiques et de réactions politiques fortes, pour le meilleur comme le pire. [5.1.2 :] Avec ce cadre (simplifié), j'illustre à partir du guide de la page 80, comment j'identifie les trois principaux objets d'intérêts (chocs, vulnérabilités, décisions). J'utilise à nouveau les publications du FMI pour l'étude narrative (consultations *article IV, Recent Economic Developments*, rapports associés à des programmes ou publiés par l'*Independent Evaluation Office*). Dans le cas argentin, au vu de l'importance du rôle du FMI dans l'origine et le déroulé des crises des années 90, j'étudie également la communication du Management pour capturer les biais de narration des documents (cf histoire des crises Argentines, page 197). Comme la question posée dans ce chapitre dépasse les seuls facteurs des crises de change développés dans le chapitre 3, je discute également de manière plus complète la méthodologie de surveillance et de reporting qui guide les documents. Je détaille le cadre conceptuel précédemment introduit pour identifier et structurer :

- (1) Les déterminants et facteurs structurels: géographie, facteurs internes (institutions, normes, démographie et développement structurel), facteurs externes (développements commercial et financier, libéralisation et globalisation).
- (2) Le système économique, financier et socio-politique ainsi que les agents, sujets, crises clefs des sphères nominale, souveraine, financière, réelle et socio-politique.

[5.1.3 :] Pour finir de cocher les cases manquantes de mon guide des approches narratives: (5.1.3.1) J'illustre le cadre conceptuel avec un épisode de crises argentin entre 2012 et 2014. (5.1.3.2) Je définis les questions posées aux sources lors de la lecture active, la méthodologie et le format final de la description des crises. La section 5.4 détaille les 5 épisodes de crises qui marquent les 30 dernières années: 1995, 1998:2002, 2012:14, 2015:16, 2018:19.

L'Argentine offre une étude de cas très intéressante que je détaille dans la deuxième partie du chapitre. Depuis les années 1980, le pays a subi une très grande variété de crises: hyperinflation, change, bancaire, souveraine, politique etc. [5.2.1 :] Entre 1990t1 et 2019t4 – l'échantillon de la base de données – l'Argentine a subi 7 récessions, 5 crises de change, 3 crises souveraines et 2 crises bancaires. Tous les 10 ans, les crises s'agglutinent et secouent gravement le pays. Dans l'histoire argentine, le déroulement d'un épisode de crises est clef pour comprendre l'origine de l'épisode suivant. Les choix et mesures politiques mises en place pour parer aux vulnérabilités précédentes peinent souvent à résister au temps ou sapent d'autres sphères, secteurs ou agents

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du système. Quand le pays se remet d'un épisode de crises, ces limitations se combinent avec d'autres vulnérabilités sous-jacentes. Quand le système fait face à des développements inattendus, ces nouvelles faiblesses forment souvent le terreau des prochaines crises. [5.2.2 :] Les chocs qui s'imisent derrière les différents épisodes peuvent être regroupés en trois catégories principales : (i) des chocs de financement externe, (ii) des chocs aux revenus de change et (iii) des chocs de confiance et échecs politiques. Dans la période qui précède les crises, une combinaison de ces perturbations mettent en exergue six vulnérabilités fondamentales : ( $\alpha$ ) des marchés financiers domestiques superficiels et peu développés, ( $\beta$ ) un secteur des exportations faible et peu diversifié, ( $\gamma$ ) des besoins fiscaux instables, ( $\delta$ ) la stabilité des ancrages nominaux, ( $\epsilon$ ) des institutions fragilisées et de l'incertitude politique, ( $\zeta$ ) un contrat social affaibli. [5.2.3 :] Si tous les chocs et vulnérabilités ne se signalent pas à chaque épisode, des régularités et différences apparaissent entre les deux décennies de crises. Dans l'ensemble, chaque crise est une combinaison de ces chocs et vulnérabilités qui viennent augmenter et révéler **le manque de cohérence du système** (figure 6 page lix). [5.2.3.1 :] Un épisode de crises culmine quand ce manque de cohérence est trop grand et que les différences entre les considérations de certains agents et la réalité sont irréconciliables. Toutes les crises font états de chocs et de vulnérabilités externes qui fragilisent les secteurs touchés. Et qui, par manque de développement et de diversification, se répandent dans l'économie. Très fréquemment, les perturbations révèlent des incohérences entre les politiques fiscales et monétaires voulues ou viennent contraindre le maintien de stabilité des mandats existants. La conduite des politiques économiques est régulièrement chamboullée par des annonces ou des scandales qui floutent la confiance des agents. La fragilisation du contrat social, traduite par la montée de la pauvreté et des inégalités, réduit d'autant plus les soutiens politiques aux réformes et gestions de crises qu'elle suscite également des troubles sociaux plus ou moins importants. [5.2.3.2 :] Si l'on compare les vagues de crises et les épisodes entre eux, les facteurs externes (chocs i. et ii. et vulnérabilités  $\alpha$  et  $\beta$ ) se manifestent univoquement derrière chaque crise en accentuant les pressions et déséquilibres externes. Pendant la première vague de crise, ces fluctuations ont été plus ou moins absorbées – dans la limite de leur crédibilité – par le plan de convertibilité. Pendant la seconde vague, les perturbations et fragilités externes ont précipité les crises en ralentissant, de manière répétée, la croissance. Ces chocs et développement se combinent à des rigidités et de l'incertitude politique pour causer les récessions. La rareté des capitaux étrangers et des ressources de change accentuent les pressions sur la balance des paiements: le change est le détonateur 'facile' du système argentin, la crise qui permet d'évacuer la pression (et de rassembler les agents). Chaque vague est marqué par une contrainte forte sur un axe du bloc politique (iii.,  $\gamma$  et  $\delta$ ): dans les années 1990s la sphère nominale avec le plan de convertibilité et dans les années 2010 la sphère fiscale en raison d'une éviction prolongée des marchés internationaux couteusement interrompue. La multiplication et répétition des crises sur les deux vagues résultent des vulnérabilités et chocs internes (iii.,  $\epsilon$  et  $\zeta$ ). L'incertitude politique, les scandales et les annonces surprises/ratées sont des caciques des mois qui précèdent les élections majeures autour desquelles coagulent les crises. A la fin de chaque décennie de crises,

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quand le contrat social est le plus mal en point, c'est également le théâtre des réclamations et des mouvements sociaux de grande ampleur. [5.2.3.3 :] Au delà du cas argentin et des limites que la validité externe impose, ma lecture des archives du FMI me permet, avant d'avoir mis au propre les crises associées, d'énoncer un ensemble de facteurs récurrents dans d'autres épisodes : (i) la qualité des données (quantitatives) et de l'information (qualitatives) ; (ii) l'importance des transmissions et contagions régionales ; (iii) les catastrophes et le changement climatiques et (iv) le contrat social et les inégalités.

De manière plus générale, si le chapitre 5 ne s'intéresse qu'à l'Argentine, il a avant tout comme vocation d'introduire le cadre conceptuel qui permettra de traiter d'autres crises. Certaines de ses conclusions, en ces temps de pandémie et de transformations sociales profondes, restent, je l'espère, éclairantes.

### **Conclusion, ouverture, narration**

Dans cette dissertation, j'aborde les relations entre la volatilité économique et les crises financières. Pour développer cette problématique, je conduis plusieurs revues des littératures théorique et empirique sur la volatilité économique, les cycles d'activités et les crises financières. J'utilise des modèles non-linéaires pour mesurer, dater et discuter les cycles économiques entre marchés en développement, émergents et avancés. Je développe un guide pour structurer les éléments clés des approches narratives qui gagnent du terrain en macroéconomie et finance internationales. J'en propose une première application pour dater les crises de change. Je construis une nouvelle base de données incluant les datations des cycles économiques et crises de change, bancaires et souveraines pour 54 pays entre 1970t1 et 2020t1. Je développe une taxonomie des épisodes de crises et identifie les marqueurs des épisodes qui contribuent aux disparités de volatilité économique. Je propose une deuxième application de la méthodologie narrative pour étudier les chocs et vulnérabilités à l'origine des épisodes de crises à partir d'archives du FMI. Après avoir rédigé une histoire détaillée des 5 derniers épisodes de crises argentins, j'identifie et discute le rôle de l'incertitude et du manque de cohérence global dans la mise en place des crises majeures.

Cette dissertation illustre les relations entre la volatilité économique et les crises financières par trois principaux résultats. **(1)** Les différentiels de volatilité économique entre groupes de pays s'expliquent par des fluctuations plus intenses en récession dans les marchés les moins avancés, et non pas par des récessions plus fréquentes ou plus longues. Quand les marchés se développent, les fluctuations économiques, *en tant que telles*<sup>10</sup>, s'atténuent. Les marchés en développement et émergents sont 5 et 8 fois plus exposés à des récessions graves entraînant des pertes supérieures à 10% du PIB. **(2)** Les crises de change sont des événements fréquents.

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<sup>10</sup>Comprendre *sans complications financières majeures*

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Seules, elles ne génèrent que peu de volatilité additionnelle. Dans les marchés émergents et avancés, leur fréquence en fait cependant des contributrices importantes à la volatilité. Elles sont trop rares seules dans les pays en développement pour importer. A l'inverse, seule, une crise bancaire ou souveraine contribue fortement à la volatilité dans les marchés en développement et avancés, par intensité dans le premier cas et par fréquence dans le second. Elles sont trop rares, seules, pour importer dans les marchés émergents. **(3)** Moins un marché est avancé, plus il est exposé à des épisodes de crises multiples. Durant ces épisodes, une crise bancaire et/ou souveraine vient supplanter une crise de change alors que la panique s'empare des marchés et que les pertes économiques culminent. Ces épisodes sont à l'origine de l'essentiel des différentiels de volatilité entre groupes: Par rapport aux marchés avancés, ils sont 5 (4) fois plus fréquents dans les marchés en développement (émergents) et 4.3 (2.1) fois plus intenses. Je complète ensuite ces observations et résultats par une analyse historique détaillée des cinq épisodes de crises qui ont émaillé les 30 dernières années en Argentine. J'identifie trois chocs et six vulnérabilités qui contribuent à augmenter et révéler le manque de cohérence du système.

Un titre alternatif à cette dissertation aurait pu être *quatre crises et un enterrement*, j'ai préféré pouvoir illustrer ma thèse d'une xylographie d'Albrecht Dürer publiée à Nuremberg en 1498 (*Les quatre cavaliers de l'Apocalypse*, page xxxiv). Le tragique de la réalité des crises méritait la référence au *Nouveau Testament*. De plus l'afficher au côté de la sérigraphie de Banksy de 1974 qui clôt la dissertation (*Crisis as usual*, page 246) illustre mieux, s'il fallait en douter, la permanence des crises. C'est d'ailleurs un commentaire récurrent quand une personne me demande mes thématiques de recherche : "je ne devrais pas peiner à trouver du travail." Ce n'est cependant pas pour une promesse quasi-perpétuelle de travail que je me suis penché sur ces crises ; c'est avant tout parce qu'elles représentent pour beaucoup des craintes et des pertes réelles. Essayer de contribuer à notre compréhension des crises, même si à petite échelle, semblait un bon départ, et ce sera, je l'espère, cela de moins à débroussailler pour les prochains. Que mes nièces et neveux, à qui est dédiée cette thèse, n'y voient pas là une invitation. Iels m'ont si fréquemment demandé ce que je faisais. Heureusement, iels ne m'ont encore jamais répondu que je n'aurais pas de mal à trouver du travail. Iels ont bien plus souvent préféré une moue dubitative. La dernière partie de la conclusion, page 243, illustre en partie (en anglais) ce que sera ma prochaine réponse à leur question.

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À Baudoin, Loan, Aliénor, Awen, Kélyan, Aela et Loris

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A l'horizon l'humeur est grise et le ciel est toujours bouché  
Je suis une enfant de la crise, j'ai fait mes armes à ses côtés  
J'ai tout connu: les grands sommets, la possession, la décadence  
J'ai pris le temps de rêvasser je crois, j'ai perdu la cadence

Quand les murs se sont effondrés, nous avons cru pour un instant  
Enfin, enfin maîtres du monde, l'humilité de l'Occident  
Les Glorieuses n'avaient laissé que de la poussière et des cendres  
On nous apprenait à monter, pas à descendre, pas à descendre.

Toi là-bas, ne sens tu pas dans l'air  
J'entends monter les voix  
Le monde est à refaire  
Loin là-bas tout est si loin derrière  
Ne te retourne pas  
Le monde est à refaire

extrait de *Les enfants de la crise*, Melissmell



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En abordant ces remerciements, l'émotion ne manque pas. Le soulagement, à l'idée d'écrire les dernières lignes de cette thèse, non plus. Il s'agit là d'un long chemin, marqués par de nombreuses crises (5 déprimés, 1 dépression et 1 burn-out), et, il y a moins d'un an, j'avais abandonné l'idée de finir. Évoquer les difficultés et troubles mentaux associés aux thèses me semble important. Je ne cherche pas à susciter l'empathie mais on parle encore trop peu de ces maux alors qu'il faudrait, pour mieux les prévenir, les désacraliser. Il y a des thèses qui se passent bien mais il y en a un nombre non négligeable qui, pour plein de raisons potentielles, se passent mal<sup>11</sup>. Ces remerciements sont donc d'autant plus importants que je ne serais pas en train d'écrire ces lignes si je n'avais pas été entouré aussi chaleureusement par tant de personnes. Le mot est peut être trop courant et usuel dans notre langage pour porter tout ce que je voudrais lui faire dire, mais à toustes, merci!

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<sup>11</sup>Pour appuyer ces dires, voici un article de la revue Nature sur le sujet.

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**Point final.**



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*The crisis of the concept of crisis  
is the beginning towards a theory of crises*

*Sur la crise,* EDGAR MORIN (2020)

## The four horsemen of the Apocalypse



Albrecht Dürer (1498)

# Introduction

## Some motivation

### A first taste of narrative economics

When I first thought of a title for this dissertation, referring to *the four horsemen of the Apocalypse* felt amusing<sup>12</sup>. In this work, I explore how we can relate higher business cycle volatility in emerging and developing markets (EM/DM) to their higher exposure to financial crises (currency, banking, sovereign) when compared to advanced markets (AM). The quadruplet of horses was thus a colorful illustration of the four crises in my hands (economic crisis/recessions and the 3 financial ones). It made for a catchy pun that might sell well.

Indeed, each crisis can ‘easily’ be paired with a horse: (i) On the white horse of conquest, economic crises – recessions – lead the way, chasing after past economic gains. (ii) Currency crises, often involving speculative attacks by foreign investors, follow on the red horse of war. (iii) The dark horse of famine comes next mounted by banking crises, episodes during which banking institutions suffocate to meet balance sheet requirements and starve the whole system by reducing access to liquidity. (iv) Finally, on the pale horse of death that brings up the rear, sovereign crises often act as an irreversible end to existing obligations and sometimes as a temporary end to participation on world financial markets.

And the analogy goes on to meet my findings. When a country experiences the four crises together, a key characteristics of emerging markets and developing economies over recent history, this is associated with a collapse of the entire economic and financial system. Quickly though, the real, and suddenly less amusing, interest of this metaphor follows: what appears as four red signals on a dashboard is in reality associated to many persons in our societies fearing *apocalyptic* tomorrows. These drastic episodes are associated with increases in unemployment rates, losses in wealth, increase in poverty, etc. Hence if I decided to keep this "catchy pun" as a

---

<sup>12</sup>The four horsemen of the Apoaclypse is an allegory in Christian faith, whereas, four figures, heralded by an angel, bring the end time upon the world

title, I did so to keep a reminder of the sad reality too often hidden behind numbers and figures in this dissertation.

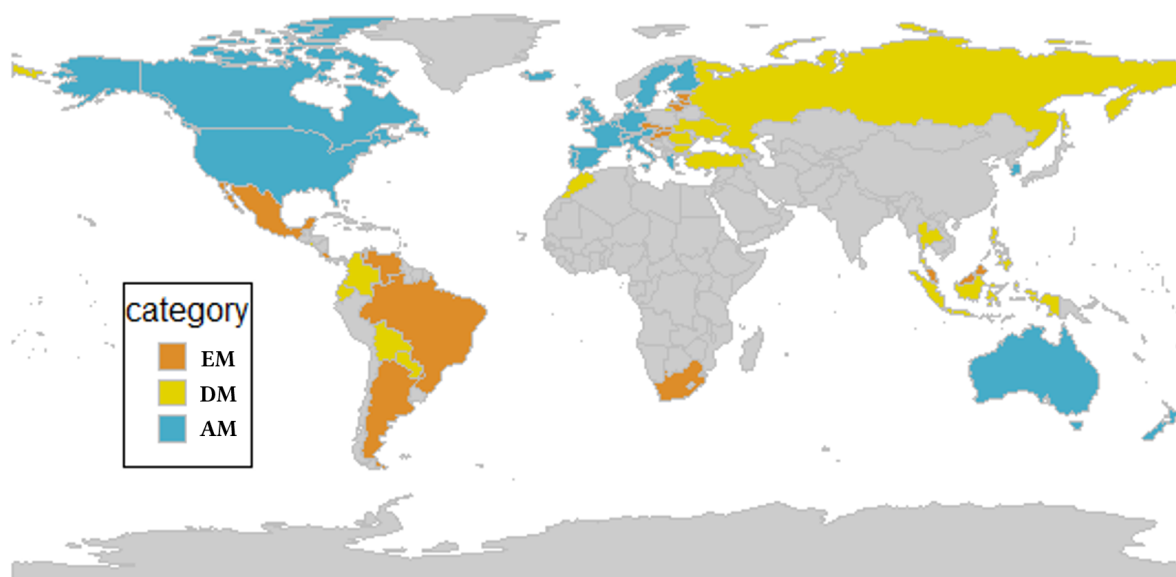
**Two stylized facts** make for the start of this dissertation. When compared to advanced markets over recent history, developing and emerging markets:

- (1) face more volatile output growth patterns,
- (2) have been much more exposed to financial crises.

That these two facts are related makes for no surprise. How they are related, however, makes for a recurring source of discussions, debates and ideas in the literature. There are indeed numerous views on potential fundamentals hiding behind the relationship between economic volatility, business cycles and financial crises. My research takes roots in this broad research area. Over the course of my PhD, someone once mentioned the idea of having a theory of crises. Or, with revised expectations, that of making a claim on whether economic or financial shocks and developments are the most harmful to volatility and growth. Making claims on a theory of crises is, to me, an impossible goal. There are indeed recurring economic and financial patterns that we can identify, test and discuss. Yet, whatever the type of episode we consider, there are far more deep intricacies between these factors and a myriad of other determinants – from the political and legal system to more social and cultural explanations. These sources of heterogeneity often act as limits to the external validity of a broad-aim theory.

In this dissertation, I felt the first step towards a theory of crises was to take stock, as comprehensively as possible, of key considerations and stylized facts on crises episodes. Using numerous references to the international macroeconomics and finance literature, I highlight the key identified determinants of economic volatility, business cycles and financial crises. I then contribute to the literature by combining econometric and narrative methodologies to construct a quarterly database of economic, currency, banking and sovereign crises episodes for 54 countries over 1970-2020. Figure 2 presents the countries covered throughout the dissertation. I sort countries based upon their income classification (measured in 1995 when cross-country data availability is at its highest). I further discuss and compare results and patterns across income-groups by referring to developing, emerging and advanced markets.

Using the database, I develop a taxonomy of crises episodes and quantify the role of crises in driving growth volatility. Finally, I explore some of the key causal links between economic and financial crises. To that end I use a novel methodology on narrative contributions to explore the shocks and vulnerabilities that make for the costliest crises. I conclude this dissertation by describing the next steps for this research on crises episodes. I now open the discussion by shedding light on how my historical hindsight might contribute to the current debate on the preferred policies to avoid financial crises.

**Figure 2:** Database coverage by country group

**Emerging Markets (EM), Developing Markets (DM), Advanced Markets (AM).**

Countries are allocated in country groups based on their income level classification in 1995 or available (source: *World Bank*). **EM** correspond to upper middle income economies, **DM** correspond to lower middle and low income economies, **AM** correspond to high income economies.

### A recent illustration of why this topic matters

The recent pandemic offers a good illustration as to why studying recent episodes of crises can prove useful. As the COVID shock contaminated countries and economies worldwide, uncertainty about future prospects increased. With an increasing death toll comes fear. With contradicting signals and information comes indeterminacy. The COVID shock acted as both a supply and demand shock and depressed economic activity in levels never seen since the 1929 Great Depression.

For many countries today, the question is about what do to in front of this unforeseen situation to prevent economic losses from accumulating too quickly and to prevent financial crises from blooming? Governments have undertaken large fiscal stimulus and finance these measures with increased (external) borrowing. Central Banks have loosened monetary policy and started unconventional monetary policies, inter alia, to tame liquidity risks on financial markets. To decrease pressures on the financial markets, macro-prudential policies have been adjusted, e.g. decrease in capital requirements, change in collateral requirements, repos...

National authorities worldwide, along with international institutions and the economic and financial press, have been continuously debating the best policies to avoid this health-associated economic crisis from triggering financial crises. Yet, most in this situation is new. A year



earlier, the debate on the next crisis was a very different one. As the New York Times wrote on Septemebr 9th 2019: *“a hard to predict financial crisis is the most probable source of the next downturn”* (“Recessions have become rare and more scary”). As history, even recent, highlights: the narration of ongoing developments always hints at the ghosts of past economic and financial troubles. Understanding better how economic and financial crises intertwine over recent history can prove an interesting source of insights. This dissertation aims at building tools (database and methodology) to understand whether economic or financial shocks/fluctuations matter most and to shed light on the role of policy decisions in preventing/precipitating events.

### Some fundamental concepts to set the scope

Before moving on to my detailed contributions, I believe it is important to define the key concepts around which my research revolves. Four main elements underline my approach of crises:

- **Shocks** are unexpected events or experiences that disrupt suddenly the current economic and financial system. These shocks are diverse and conditional on the point of view that is considered. For agents in a country this can take the form of a surprised policy announcement (monetary/fiscal shock), a natural disaster or exogeneous changes on world financial markets (external shocks). Shocks often entail an abrupt update of agents’ information set and form the first triggers to agents’ actions and decisions. Non linear processes are a common illustration of shocks.
- **Cycles** are conceptual representations of recurring patterns in macroeconomic and financial time series. In practice, cycles are often meant to capture fluctuations around a long run trend. Cycles illustrate the underlying dynamics of the economic and financial system and what unfolds as sectors, agents and policy makers interact to a changing environment. These fluctuations are also a key illustration of the feedback effects that maintain the whole system together.
- **Uncertainty** is a key cog of the economic and financial system, for better as for worse. There are many sources of uncertainty for an agent: over the economy and current dynamics, over others actions, over the real underlying trends etc... Because agents think of better futures, they decide to invest and plan ahead. Should they expect bad futures, fear might build up and trust shatter. Expectations and uncertainty are key drivers of markets’ functioning. In some cases, this is captured by the essential role of risk aversion, panics, and self fulfilling mechanisms.
- **Crises** are episodes in time during which the system is brought to the edge of collapse by unforeseen conditions. Crises are times of heightened uncertainty and speculation about potential futures. During crises, initial shocks magnify as they spillover the economic system. Perturbations come to pressurize existing vulnerabilities and inconsistencies. Hence, crises often constrain agents’ policy space and are the source of drastic decisions and policy reactions.

## Key questions

The key take-away from this introductory motivation of my research – on the links between economic volatility, business cycles and financial crises – can be summarized in the following **research questions**:

### Research Questions: what to expect?

#### On economic volatility and business cycles:

- What are the key characteristics of business cycles worldwide?
- What is the role of business cycle fluctuations in driving differences in volatility between emerging, developing and advanced countries?

#### On economic and financial crises:

- How do economic – recessions – and financial crises interact? What are the key characteristics of crises episodes worldwide over the last 50 years?
- What is the role of financial crises in driving differences in volatility between emerging, developing and advanced countries?

#### On the origins of crises:

- Economic versus financial shocks and vulnerabilities: what can narrative elements teach us on the shocks and vulnerabilities at the roots of crises?
- What is the role of credibility and confidence in the unfolding, sequencing and transmission of crises episodes?

## A walk through this dissertation

With the context now in mind, the introduction next guides the reader through the main chapters of this dissertation. Overall I place particular emphasis on identifying and articulating main **methodologies**, **stylized facts**, **results** and **contributions**.

### Theoretical considerations on volatility, business cycles and shocks

The first chapter of the dissertation takes stock of the literature's discussions on the determinants of differing growth **volatility** experiences. I start with a broad approach on the structural determinants of volatility. The candidates can be split into three main groups: (1) country-specific/structural factors, (2) international/external factors and (3) financial factors. If the first group is important and can interact with the others, the majority of the literature agrees to discuss international and financial determinants. This stance can be justified by the increases in trade and financial development, globalisation and liberalization over the last 50 years. Overall,

this first bout of literature makes the point that, to understand the determinants of differences in volatility, I will need an approach that encompasses international and financial factors.

If fundamentals are key to grasp the general framework with which to consider volatility, they only make for part of the picture. Part of the fluctuations that make for total volatility manifest repeatedly at a business cycle frequency (inbetween 2 and 12 years). In the second part of the first chapter, I narrow my approach to business cycle related volatility. I discuss the international macroeconomic and finance literature on theoretical explanations of differences in volatility among small open economies. Two main views cohabitate to explain emerging economies' higher volatility: (1) these countries are exposed to more permanent productivity shocks which generate more fluctuations and (2) these countries are exposed to foreign interest rate shocks that magnify as financial frictions dictate the economy's evolution. Overall the debate on which story won the race leads to mixed conclusions. Nevertheless a major aspect of this literature relates to the fact that financial frictions are essential elements in order to capture EMDEs' macroeconomic fluctuations. This comforts, at the business cycle level, the conclusions of the first part of the literature. After these reviews, I decide to bring some of these concepts to the data. The second chapter discusses the empirical datation of business cycles and key stylized facts worldwide.

### **The empirical datation of business cycles – MSM and the facts**

In this dissertation, I focus on fluctuations occurring at a business cycle frequency. **Business cycles** are a key object of an entire branch of the macroeconomic literature. Most of the research has aimed at understanding the main transmission mechanisms driving business cycle fluctuations. I do not speak to this literature. Instead, I draw upon the literature discussing the empirical datation of business cycles.

The dominant view aims at dating real GDP's turning points, that is quarters at which a country moves from one regime, e.g. expansion, to another, e.g. recession. Two main approaches oppose on how we should treat the time series:

1. **the algorithmic method** dates potential turning points by identifying local extrema (i.e. point that are lower/higher than the two before and after). Candidates are then filtered to ensure a minimum duration for and the alternance of regimes
2. **the parametric method** estimates the best fit for a non-linear data generating process in the observed time series. Estimates provide information on both regimes' characteristics and the time series' dynamics

The first approach can be seen as applying an ad hoc rule to a broad set of countries, irrespective of observable differences in business cycle patterns. To that end, part of my contribution is to use **Markov Switching Models** (MSM) to study business cycle fluctuations worldwide.

**Methodology – on Markov switching models**

Markov Switching Models fit a non-linear Markovian data generating process to observed time series of real GDP growth rates. The true data generating process is inferred by maximizing the likelihood.

Assuming a Markovian data generating process for output growth enables characterizing expansion and recession growth regimes (average growth, transition probabilities).

The estimation process also evaluates the probability for each quarter to be associated to a given regime. This ensures a precise datation of business cycles turning points in accordance with the underlying data generating process.

My motivation for using a non-linear approach is both empirical and theoretical. Empirical because it allows fitting a more comprehensive model to a various panel of countries and experiences. Theoretical because non-linear processes are key elements of the literature to study uncertainty, indeterminacy and self fulfilling mechanisms.

**Table 1:** Descriptive Statistics - real GDP and BC volatility

group	EM	DM	AM	AME	Asia	CEE	LSA	WE	WC
nb of countries	15	15	24	3	7	13	10	17	4
nb of obs.	1738	1646	4682	501	1073	1261	1118	3311	802
avg $\sigma_{\Delta g}^2$	1.34	1.88	1.09	2.11	1.54	1.77	1.32	1.02	0.95
std $\sigma_{\Delta g}^2$	0.46	1.19	0.42	1.39	0.26	1.16	0.55	0.39	0.39

The table presents a set of descriptive statistics for the unbalanced panel of countries over 1970q1–2020q1. Descriptive statistics include, by country groups, the *number of countries*, the *number of available quarters of observations*, the average *avg* by country group of the variance of the growth rates time series  $\sigma_{\Delta g}^2$  as well as the standard deviation for the values of the variance inside the group.

Groups include income groups:

**EM - Emerging Markets**, **DM - Developing Markets**, **AM - Advanced Markets**.

And regional groups: Africa and the Middle East (AME), Asia, Central and Eastern Europe (CEE), Latin and South America (LSA), Western Europe (WE) and Western Countries (WC).

I use Markov Switching Models on historical time series of real GDP for an unbalanced panel of 81 countries over 1970q1 - 2020q1. Estimations converge in 54 cases. Overall there are 15 emerging, 15 developing and 24 advanced markets. Africa and the Middle East is the less represented continent. Table 1 presents the main descriptive statistics for the countries in the sample based on income group and region. Developing (emerging) markets are 75% (24%) more volatile than advanced markets. Regional heterogeneity supports the view that emerging and developing markets form a heterogeneous group of countries when compared to advanced occidental economies.

From the estimations, I derive three main sets of **stylized facts** and **results**. I first compare growth regimes' characteristics. Table 2 presents the average, over each group, for the average growth by regime and the transition probabilities to enter and to exit a recession.

**Table 2:** MSM estimations - Regime Analysis

(in %)	Mean $g_{Exp}$	Mean $g_{Rec}$	rsdls	P(Enter Rec)	P(Exit Rec)
<b>Emerging Markets</b>					
avg	1.20	-2.01	0.989	4.24	27.6
std	0.255	1.87	0.336	3.17	20.1
nb	15	15	15	15	15
<b>Developing Markets</b>					
avg	1.35	-2.69	1.33	3.99	31.6
std	0.579	2.54	0.881	2.31	15.6
nb	15	15	15	15	15
<b>Advanced Markets</b>					
avg	0.963	-1.02	0.870	3.89	27.9
std	0.390	0.706	0.379	1.66	13.5
nb	24	24	24	24	24

I denote *avg* the average over the country group, *std* the standard deviation inside the group and *nb* the number of countries in the group.

*Mean  $g_{Exp}$*  is the average real growth per quarter in expansion, *Mean  $g_{Rec}$*  in recession. *rsdls* denotes the standard error of the variance left unexplained by the data generating process, a.k.a. how much the fit missed. Finally *P(Enter Rec)* and *P(Exit Rec)* represent, respectively, the probability to move from an expansion/recession to a recession/expansion.

Three key **stylized facts** can be identified in this table:

#### Stylized Facts 1 – on growth regimes

- Business cycle dynamics is the same, on average, between country groups: countries face a probability of 4% to enter a recession and 28.8% to exit one.
- If expansions are 40%(25%) stronger in DM(EM) than in AM, recessions are 2.6(2.0) times costlier in the former.
- The main differences in volatility stem from the intensity of the fluctuations during recessions not from the frequency of the regime changes.

Thinking a step ahead, this means that if we are to design policies to minimize fluctuations they should aim to boost the macro-economic stabilizer and reduce frictions that might amplify the shocks. Nevertheless policies aiming at the prevention of economic crises (i.e. affecting the probability of occurrence) seem like a less urgent target. As the information on growth regimes concentrates on the inferred underlying characteristics of our time series, I then detail the key

characteristics of the expansion and recession episodes I date in the sample. Table 3 presents the key characteristics of each phase by country group.

**Table 3:** Business Cycle characteristics by phase - MSM estimations - Results

	Expansions				Recessions				
	time (% of obs.)	amplitude (%)	duration (q.)	slope (%)	time (% of obs.)	amplitude (%)	duration (%)	slope (q.)	rebound (%)
<b>All Countries (54c.)</b>									
avg	84.44	29.90	27.54	1.17	15.56	-5.36	5.94	-1.24	4.70
std	10.96	25.57	19.68	0.75	10.96	6.11	5.16	1.54	4.13
nb	54	243	243	243	54	204	204	204	197
<b>Emerging Markets (15c.)</b>									
avg	81.54	31.00	25.69	1.23	18.46	-7.24	6.72	-1.42	5.40
std	13.15	23.55	17.26	0.56	13.15	7.56	5.40	1.41	4.97
nb	15	55	55	55	15	47	47	47	43
<b>Developing Markets (15c.)</b>									
avg	85.58	33.52	25.36	1.52	14.42	-8.26	5.55	-2.29	6.28
std	13.17	28.22	20.97	1.01	13.17	7.48	5.33	2.52	5.38
nb	15	55	55	55	15	42	42	42	40
<b>Advanced Markets (24c.)</b>									
avg	85.53	27.94	29.21	1.00	14.47	-3.54	5.77	-0.79	3.88
std	7.65	25.22	20.05	0.63	7.65	3.93	5.00	0.73	2.95
nb	24	133	133	133	24	115	115	115	114

This table presents the average by type of episode and by country group of key characteristics of expansion and recession episodes.

*time* represents the percentage of the quarterly observations in total observations. *amplitude* denotes the cumulated gains/losses experienced over the episode (inbetween through-peak). *duration* denotes the number of quarter in given regime. *slope* denotes the average growth per quarter. *rebound* corresponds to the gains cumulated in the year following the end of a recession.

*avg* stands for the average and *std* for the standard deviation of a given variable over the sample of episodes considered.

**Three stylized facts** can be identified in this table. The results are in accordance with the predictions from the estimates.

#### Stylized Facts 2 – on business cycle phases

- On average, expansions last 7 years (28 quarters) and recessions 1 year and a half (6 quarters). All country groups behave similarly.
- Emerging and developing markets outpace advanced counterparts in both phases. Whereas **expansions total similar cumulated gains (+30%)** for all country groups, **recessions are twice as costly for EM and DM than for AM.**
- Business cycle volatility is higher in developing than in emerging than in advanced markets. BC differences stem from wider magnitudes of regime changes, not from the dynamics.

Because the bulk of the difference emanates from recessions, I study the distribution of key characteristics across groups to uncover factors of heterogeneity. I derive two new stylized facts on recessions worldwide.

### Stylized Facts 3 – on recessions

- **Developing & emerging markets are 8 & 5 times more likely to experience recessions associated with drastic cumulated output losses (larger than 10% of GDP).**
- Advanced markets are more prone to experiencing shorter and milder recessions. Stagnations are a recurrent feature, even if present in other groups.

Finally I use Markov switching model properties to decompose output growth variances. I identify the contributions of business cycle fluctuations, and associated characteristics, to aggregate volatility.

### Results – variance decomposition and determinants of volatility

- **The bulk of volatility differentials stems from volatility within recession phases, not from expansions and only moderately from the residual random walk component.**
- *In the words of Aguiar and Gopinath (2007), persistent growth shocks explain more total volatility in emerging and developing than in advanced markets when compared to unexplained transitory shocks (1.5 and 1.3 times more respectively).*

What chapter 2 identifies is that the distinctive markers of emerging and developing markets' business cycles is the prevalence of recessions associated to drastic losses and often long duration. It is tempting to see in this pattern the mark of financial crises. Given chapter 1's hindsight, I succumb to the temptation in the following chapter.

## Financial crises: theory, empirics and narrations

Because **financial crises** are a keystone of this dissertation, chapter 3 provides an extensive theoretical and empirical literature review of the topic. I concentrate on currency, banking and sovereign crises. My first aim is to identify a clear definition of crises. Overall a financial crisis could be defined as an episode during which a financial market (foreign exchange, bank/private liquidities, sovereign debt) undergoes a heightened period of perturbation/stress/uncertainty that can be linked (or not) to deteriorating fundamentals. The situation pressurizes bottlenecks and existing frictions/vulnerabilities overall in the economic and financial system. The turn of events can also reveal inconsistencies in said system. Some (key) agents suffer from constrained

policy space and are often forced to make, unexpected, drastic policy changes.

The theoretical literature identifies two main stories as to what gives rise to financial crises:

(i) the fundamentals story and (ii) the self-fulfilling story.

(i) The economic and financial system is characterized by structural fragilities, deficiencies and/or inconsistencies. Frictions inherent to some key transmission mechanisms of the system can amplify external shocks and fluctuations. This pressurizes existing vulnerabilities and threatens the whole system (negative feed-backs). Frictions and/or policy frameworks can also (or not) dampen part of the shocks/fluctuations (positive feed-backs). A crisis will then occur on different grounds.

a. Because shocks/ fluctuations are too large for the whole system to adapt. The policy-stance of agents in a particular sphere of the economy has to change to evacuate some of the systemic pressure,

b. Because the initial, even if small, shock gets amplified through different transmission channels. More and more agents in the system get affected as frictions generate bottlenecks where pressures concentrate and vulnerabilities reveal. The limitations of existing frameworks are thus questioned and loopholes behind fundamental deficiencies reveal.

(ii) Economic and financial systems rely upon markets to function. Agents confronts the market with a set of policy rules in mind, determining her actions. They formulate these decisions against the set of information at their disposal in the current state of the world and given their knowledge of the structure of the economic and financial system (rational expectations). It is possible that, due to different structural characteristics or frictions, some agents come to expect somber futures more easily. If agents' implication in the market is large enough or given particular market settings, their expectations matter/express at an aggregate level. At that point, other agents might understand and react to this new information (heterogeneity is a source of information). Whatever the market, if fears are too strong, there is a chance for it to destabilize the whole system. Note that this particular mechanism works not because fundamentals are bad. Self-fulfilling crises fatal blow the economic and financial system because they create lethal interruptions/fluctuations in the liquidity on particular financial asset markets. Self-fulfilling crises are thus episodes we can consider as a toss-of-a-coin away from having been avoided.

The last essential element from the theoretical literature relates to the **multiplicity** of crises, namely the fact that, often, financial crises come as pairs or triplets. I discuss in detail this layer of my taxonomy of crises in the later parts of this chapter.

The initial aim of my dissertation is empirical. Yet, if I spend so much time on theoretical considerations, it is out of empirical interest. A key contribution of my research is the use of



narrative elements to study crises episodes. As such, these literature reviews are meant as tool-boxes on key mechanisms/sequencing useful when treating IMF archives. Some of this research might help decipher more easily the framework that guided the writers at the time of writing. I then turn to the discussion of the datation of currency, banking and sovereign crises. I first take stock of the empirical contributions and identify the key sets of variables/rules to date each type of crisis. For banking and sovereign crises, the approaches converge around a list of criteria. For currency crises, various methodologies oppose. Often the literature validates/filters the initial set of signals by identifying small narrations that explain the birth of a given crisis. In the case of currency crises, these narrative insights have rarely been used to analyze and treat episodes.

Narrative approaches are not new, especially in economic history. Over the last decade, they have been gaining momentum, in the (international) macroeconomics and finance literatures, with the seminal contributions of Robert Shiller, Christina and David Romer.

#### Methodology – on the narrative approach

Narrative contributions rely upon archives work to identify key elements in the sequencing of particular episodes. The treatment of the documents allows the researcher to shed light upon key characteristics to answer a broader research question.

The fundamental of narrative approaches is reading. The source often entails insider's or analytical considerations on the sequencing of events. Because the sources often detail in their own words key motivating factors, current textual algorithms fail at identifying the same level of information an informed reader would reach.

The sources discuss the topics of interest shortly after their unfolding. They provide an insider's view on the motivations that drove associated economic and financial developments.

There is yet only few articles that give narrative contents a good chair at the table. As such I felt an interesting side contribution of my literature review would be to make a proposal for a detailed check-list of what future narrative contributions should include.

#### Contribution – a go-to-guide for future narrative contributions

- a **The source:** The source of the documents that will be read is the first element to discuss. It is the raw data behind any narrative contribution. Source documents are written by agents from a different time/perspective, with a different approach than the one driving the research. Their value must be acknowledged by agents worldwide. Hence it is important to identify the signals this information carry to mention, discuss

and treat associated biases.

- b **The angle of attack:** The documents considered are often long and might address a broad range of topics. It is important to define, in the "words" of the research, what will drive the approach to the data. A narrative contribution should define the key concepts that will drive the analysis, identify an initial set of cases to consider. It should also define the questions that guide the approach and link the broad research question with the practical information covered in the documents.
- c **The methodology:** Given the source and the initial scope of the study, the narrative approach should finally describe the methodology applied when reading actively the documents. The methodology has to clearly state the theoretical factors and developments the researcher should be looking for and recording when reading. The methodology acts as the bridge between the research scope and the raw data: identifying, given the literature and the questions, what are the main objects and quotes of interest. Methodologies allow to extract/date shocks, taxonomize episodes, analyze the role of narrations/key factors...

Narrative elements are widely available for sovereign and banking crises, less so for currency crises. Indeed if the theoretical literature on currency crises is renowned for her many types of models, the empirical literature doesn't pale in comparison. Nevertheless few comprehensive narrative databases exist on currency crises. Existing research, either makes narrative elements a minor player or they use inconsistent sources. My dissertation contributes to the literature by creating a consistent and comprehensive narrative database of currency crises.

In my narrative work, I focus on key publications from the International Monetary Fund: article IV and related publications. These documents are of particular interest to my research (to me) for several reasons:

- (i) Given her mandate, currency crises as disruptions of the international monetary system are of key importance for the IMF
- (ii) The IMF conceptual framework is backed by a serious methodology, that borrows from academic literature and years of experience
- (iii) The source allows for a comprehensive coverage and analysis of episodes
- (iv) The reports are written by economists, well sourced and recognized for their seriousness at the time/shortly after the events of interest
- (v) The documents are considered as a reference view worldwide and media-wide (from press articles to academic research).
- (vi) The IMF view has evolved over time to accomodate to a complexifying international environment
- (vii) Thanks to former professional experiences, I have, as a researcher, an insider's view on the work of 'insiders' – the IMF and the French central bank – towards the creation and the

publication of these documents. I also benefit from an advanced familiarity with working with these publications.

To build my database of currency crises, I identify 250 episodes during which at least one signal from 6 in the literature was triggered. I then apply my go-to-guide to develop a conceptual framework to study currency crises. In a nutshell, when reading IMF archives I ask the following questions: **Can we classify the episode as a currency crisis? What are the key factors determinants that justify making this claim?**

#### **Contribution – a narrative database of currency crises**

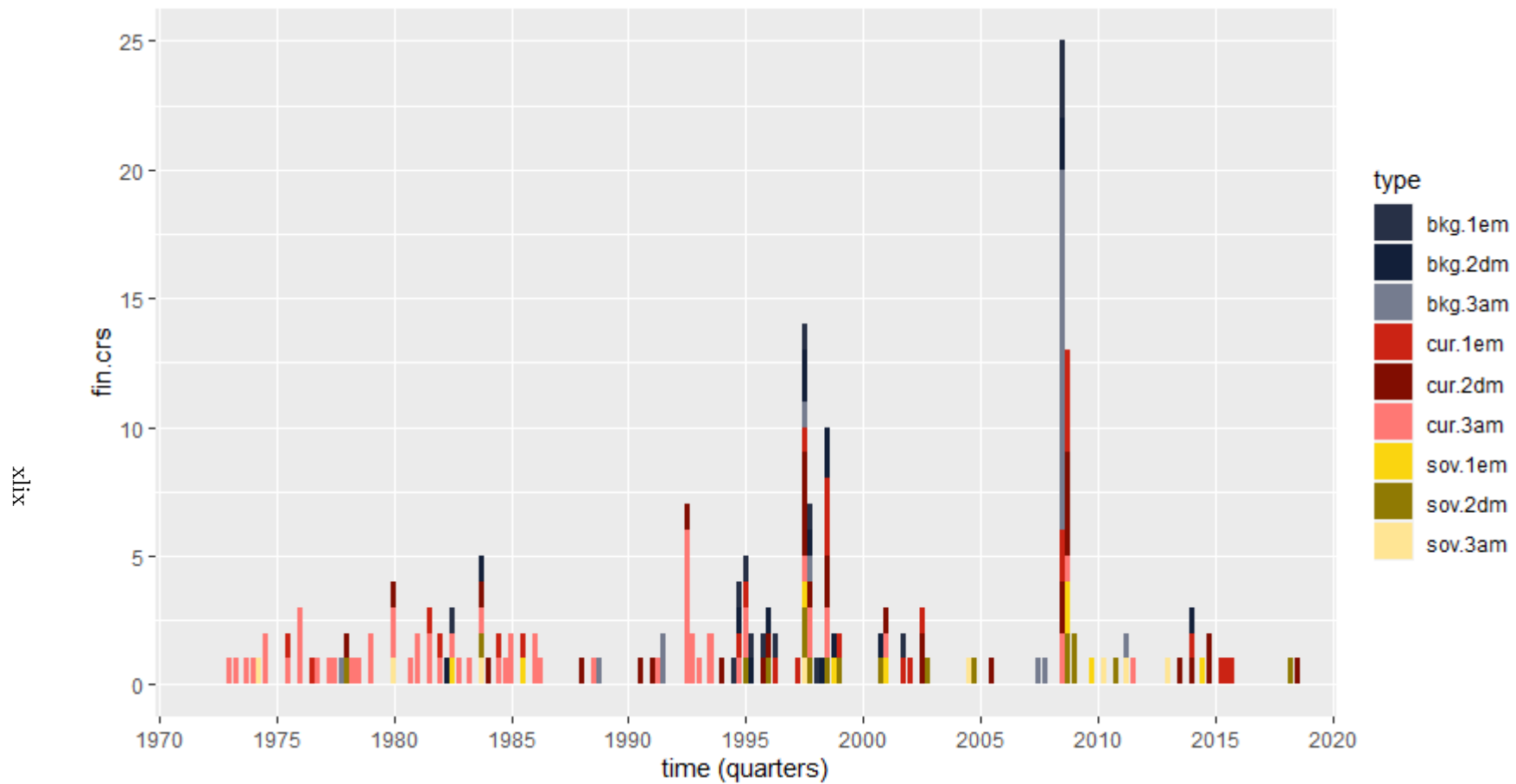
**Definition:** A currency crisis occurs when substantial pressures accumulate on forex markets due to agents sharing conflicting views as to what the actual value of a currency should be. The pressures unveil the inherent vulnerability/inconsistency/indeterminacy of the present situation. This, in turn, forces a marked change in the policy course of an agent(s) or a substantial adjustment in prices – re-valorization. This action can solve the issue and align agents considerations on a new path for the currency. It can also prove insufficient to tame divergences and lead to a resurgence of troubles.

In the theoretical literatures discussing the exchange rate and the forex market, I identify key mechanisms/events along 3 lines: key agents and transactions, factors behind forex markets and key policy changes. Overall these elements help ensure a comprehensive and efficient active reading. For the 250 episodes signaled, I read over 300+ documents and ended up with 136 currency crises over 70 countries for an unbalanced panel covering 1970q1-2019q4. I provide narrative quotes from IMF archives to justify my choices. Because recent literature has also discussed broader definitions of sovereign crises (*fiscal crises*) or because some dates might have been missing at a quarterly frequency, I review an additional set of 30 sovereign and banking candidate episodes using a similar narrative methodology.

#### **50 years of crises: elements of taxonomy and contributions to volatility**

Having discussed extensively the gearwheels of the database, I then start using it in chapter 4. I start with a discussion of the historical distribution of crises to identify waves of crises and get the first sense as to what might have mattered in the past. Figure 3 presents the distribution of financial crises over the last 50 years for the sample considered. I identify nine periods during which there were frequent occurrences/combined crises.

Figure 3: 50 years of crises



The graphic displays the number of financial crises by quarter and country groups.

The sample includes the unbalanced panel of 54 countries

sov... correspond to the number of **sovereign debt crises**, cur... for **currency crises** and bkg... for **banking crises**.

...1em means the crisis occurred in an **Emerging Market**, ...2dm in a **Developing Market** and ...3am in an **Advanced Market**

This historical overview allows me to take stock of key crises episodes: the European and small open advanced economies troubles with the exchange rate (1972–1986 ; beginning of the 90's), the repeated episodes of contagious complex crises in emerging and developing markets (beginning of the 80's, mid 90's, end 90's) ; the Global Financial Crises and the European sovereign debt crises (2008–2012) ; finally there are relative tranquil times during which crises seem to lie low. I thus retain three layers of consideration that future explorations on causality should take into account: regional factors, contagion and spill-overs ; common and various issues with the currency ; multiple crises and debacles. The first element is covered in my database using regional, income or commodity classifications (act as proxy for regional crises and crises that might have spillover to similar markets). For the second element, my narrative database provides numerous intel on the nature of currency crises. Finally I make multiplicity a keystone of my approach to crises.

My database allows to take stock of key stylized facts on countries worldwide:

**Stylized Facts 4 – As markets develop, exposure to crises falls... especially for sovereign crises**

**Advanced markets are less likely to encounter any type of crisis** than emerging and developing markets (1.2/1.5 less likely for currency, 1.5/2 for banking, 3/6 for sovereign crises.)

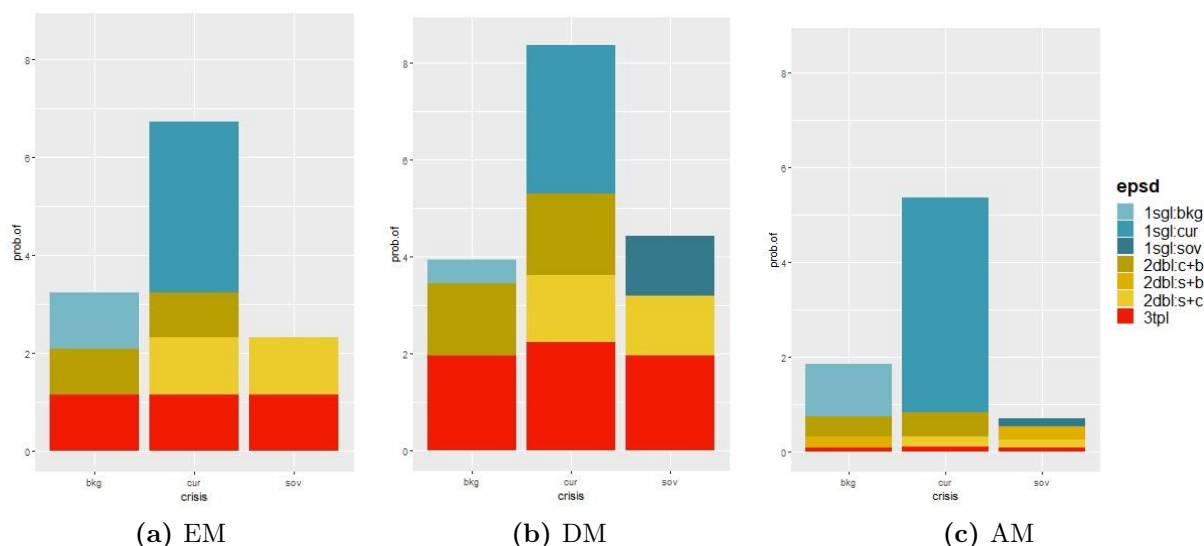
**Currency crises are frequent crises** for all countries (2 to 3 times more than sovereign and banking crises), for different reasons. **Developing markets are the more exposed** (8.4%), emerging markets follow (6.7%), advanced markets close (5.4%). Country groups display different types of currency crises. On average, commodity exporters are 78% more likely to experience a currency crises than non-commodity exporters.

**Banking crises are evenly distributed** across the sample with an average of one crisis per country, regardless of the grouping criterion. Advanced markets displaying often longer time series they are over the sample, less likely to encounter one. Nevertheless AM banking crises are mostly recorded around the GFC. Other cases include inter alia the Nordic crises beginning of the 90's.

**Sovereign crises** mark a pronounced difference between advanced markets and their emerging and developing counterparts (3/6 times bigger –  $0.7 < 2.3 < 4.4\%$ ). Defaults have been a **key characteristics of the recent history of developing and emerging markets**. Serial defaulters (e.g. 3 events for Argentina and Turkey) boost the results in Africa and the Middle East and in Latin and South America, but default is a widespread disease. Defaults in advanced markets include those associated to the 2012 European crisis and past financing issues in the 70/80's.

To precise my definition of multiplicity, I first need to aggregate the databases on economic and financial crises from chapters 2 and 3. Economic crises are defined as periods in time, whereas financial crises are defined as points in time. I thus use a combination of three rules to associate different crises given their place over the business cycle. In particular, financial crises are associated to a recession if they occur simultaneously, if she precedes the regime switch and under some conditions if she follows closely enough the end of a recession. When studying the sequencing of episodes, I pay particular attention to occurrences of double-dips and transitive expansions (defined as lasting less than 1 or 2 years respectively). Creating these crises episodes provides two initial hindsight on the nature of financial crises: (i) how do crises sequence and combine ? (ii) when do financial crises start ?

**Figure 4:** Annual probability of facing a financial crisis by country group, type and multiplicity



EM = Emerging Markets, DM = Developing Markets, AM = Advanced Markets, Crises are grouped by multiplicity, i.e. the number of different types of financial crises involved: **single crisis episodes**; **double crises episodes** and **triple crises episodes**.

When I associate financial crises with economic crises, I change the perspective I use to look at the database. I move from considerations on events in times to a discussion of episodes of crises. This entails constructing a sequencing, by episode, of all the major crises that might have started over the episode. I define an episode **multiplicity** based on the number of crises involved: (0) plain expansions, (1) single economic crises/single financial crises in expansion, (2) economic crisis and one financial crisis – cur, bkg, sov – (3) economic and two financial crises – cur+sov, cur+bkg, sov+bkg – and (4) all four crises. Figure 4 presents, by country group, the annual average probability to face a given type of crisis, among banking, currency and sovereign crises. Episodes are classified according to multiplicity, for example the red bar represents the

role of triple financial crises in the occurrence of crises.

#### Stylized facts 5: On economic and financial crises' interactions

- In advanced markets, financial crises often occur alone (60% of banking crises and 84% of currency crises). Sovereign crises are an exception as 75% of the events are multiple.
- For emerging and developing markets, the picture is very different:
  - For banking and sovereign crises, multiple crises episodes make for the large majority of cases: roughly two thirds of the episodes for emerging markets three fourth for developing markets.
  - Currency crises are predominantly part of multiple crises episodes: 48/63% of emerging/developing markets crises.

Having studied the nature of crises worldwide, I then take stock of how financial crises relate to the business cycle. Table 5 presents the distribution of financial crises by type, country group and regime.

**Table 5:** Number of Financial Crisis by type, regime and country group

(nb of)	episodes	<i>sov.crs</i>	<i>cur.crs</i>	<i>bkg.crs</i>
Developing Market - Expansion	12	3	10	2
Developing Market - Recession	26	15	24	14
Emerging Market - Expansion	9	0	5	5
Emerging Market - Recession	24	10	24	9
Advanced Market - Expansion	28	1	23	1
Advanced Market - Recession	49	7	39	21

episodes denotes the number of expansion/recession episodes associated with a crisis over country groups. *xxx.crs* indicates the total number of crises experiences in a given regime for a given group (*xxx*= *sov.crs* for sovereign crises, *cur.crs* for currency crises and *bkg.crs* for banking crises.)

Overall, and in accordance with naive expectations, I observe that crises are very often associated with a recession. Currency crises in advanced markets form the main exception to this trend, with a third of currency crisis happening during an expansion. This is a salient illustration of the dominant view – until beginning of the 90's – of an "overall expansionary effect of a depreciation on output" and benefits from currency crises. I discuss in detail the specific banking and sovereign crises that occur in expansion. The sequencing of episodes also provides interesting information on the location of financial crises with respect to regime switches. In emerging and advanced markets, sovereign crises often trigger after a few quarters in recession. There are also some events that are simultaneous to the switch. In developing markets, sovereign

crises occur broadly in the two years surrounding the entry in recession. Currency crises are predominantly found in the first year of recession and the two quarters preceding the entry. In advanced markets, currency crises are more broadly distributed before and after the recession's start. In emerging and developing markets, banking crises occur mainly -2:+3 quarters around the switch. In advanced markets, banking crises occur broadly in the two years surrounding the entry in recession.

Another advantage of considering the database from the point of view of crises episodes and not of crises dates is that I am able to pair financial crises with economic crises, and the characteristics that define them: **severity** – cumulated losses – **duration** – the number of quarters in recession – **rebound** – the relative strength of growth in the year after the end of a recession versus the average during expansion. Table 6 presents the key descriptive statistics comparing recession episodes without and with at least a financial crisis. One message stems out of this table and confirms previous observations: what matters with crises is their intensity, i.e. severity and steepness.

**Table 6:** Recessions and Financial Crises - MSM estimations - Results

	Recessions $\cap$ No crisis				Recessions $\cap$ Crisis episode			
	Duration	Severity	Steepness	Rebound	Duration	Severity	Steepness	Rebound
<b>All Countries</b>								
avg	5.22	-3.93	-0.97	1.09	7.13	-6.94	-1.50	0.99
std	4.71	1.27	5.82	0.69	6.21	6.37	1.77	0.62
nb	102	102	102	97	98	98	98	96
<b>Emerging Markets (15c.)</b>								
avg	7.55	-7.70	-1.26	1.10	6.00	-6.85	-1.56	0.95
std	5.82	8.84	1.34	0.78	5.02	6.39	1.48	0.62
nb	22	22	22	19	25	25	25	24
<b>Developing Markets (15c.)</b>								
avg	3.13	-5.69	-1.93	1.27	7.23	-9.85	-2.55	1.04
std	1.25	6.81	2.14	0.96	6.86	7.70	2.76	0.64
nb	15	15	15	14	26	26	26	25
<b>Advanced Markets (24c.)</b>								
avg	4.91	-2.24	-0.66	1.05	7.68	-5.39	-0.88	0.98
std	4.54	3.02	0.78	0.60	6.45	4.99	0.57	0.62
nb	65	65	65	64	47	47	47	47

The table presents, for **emerging**, **developing** and **advanced** markets, the *average* and *standard deviation* of four characteristics from the taxonomy of recessions – **duration**, the number of quarters – **severity**, the real gdp cumulated losses – **steepness**, the loss per quarter – **rebound** the strength of growth in the year after the recession relative to the average in expansion.

**Four key results** can be taken from this table:



**Results – some insights on multiple crises**

1. Recessions are on average 60% costlier when associated with at least one financial crisis. They are on average 2 quarters longer, thus cumulating to, almost, twice as important losses. Moreover on average recessions associated with financial crises are not followed by a stronger rebound.
2. Emerging markets experience steeper recessions when confronted with financial crises (-1.62 versus -1.22 per quarter in recession). If these recessions are not necessarily longer or costlier on aggregate, they are followed by milder rebounds. This highlights two elements. First, emerging market recessions are, by essence costly because they are longer. Second, when confronted, on top, with financial crises, the country recovers less than normally after the recession.
3. Developing markets display the worst performances. When experiencing both economic and financial crises, the episodes are twice as long and around 40% costlier. This translates into twice as important (very high) cumulated losses. Moreover, crises seem to have some persistent effects as the rebound is slower after a crises episode.
4. Advanced markets do not entail significantly higher losses when confronted with a financial crisis. Recessions associated to financial crises are 2 quarters longer and are not associated to strong rebounds. As such cumulated losses are 2.5 times bigger in presence of financial crises. Once they enter a recession with a financial crises, advanced markets struggle with exiting the recession and bouncing back.

Overall, aggregating facts and results on economic and financial crises, **four main messages can be derived:**

1. **The wide majority of financial crises associate with recessions and more or less important losses.** Recessions matter not because they are more frequent in less developed markets, but because they are more intense. Financial crises triggering during expansions are broadly currency crises and, in a minority of cases banking and sovereign crises, associated with exogenous, often political, developments.
2. **Currency crises**, by themselves, are frequent but not associated with major economic losses. In more advanced markets, they are more likely to trigger during expansions. This expansionary feature of currency crises illustrates the ability of an external adjustment to evacuate accumulated pressure and allow the reallocation of liquidity and resources. In less advanced markets, currency crises are more likely to create panics and spillover to other financial markets. In developing markets, this feature is particularly salient as currency crises rarely come alone. When they trigger, other financial crises follow. The exceptions are the results of shifts in market sentiment and external shock, e.g. the GFC.
3. **Banking and sovereign crises**, impact country groups variously. In advanced markets, banking crises are more likely to trigger alone. They sometimes associate with sovereign

crises, mainly after the GFC. Advanced markets are the only countries in my sample to experience double sovereign and banking crises. In less advanced markets, banking crises supplement other currency and/or sovereign crises. In emerging markets, sovereign crises never come alone and banking crises rarely do.

4. **Multiple crises involving at least a currency crisis** are a key characteristics of developing and emerging markets. Double and triple crises episodes are numerous and repeatedly associated with acute and/or longer recessions. The less advanced the market, the more likely are multiple crises. The more advanced the market, the more likely are ‘simple’ economic recessions.

The final element that the Markovian dated business cycles provide is, as in the previous chapter, a decomposition of output growth variance based on different types of regimes considered. The decomposition allows me to capture the relative contributions of specific episodes, i.e. defined according whatever layer of the database is preferred. I first concentrate upon the exposure to currency crises, *currenciety*, and the accumulation of crises, *multiplicity*.

**On currenciety:** Currency crises are associated with **half of business cycle volatility in emerging and developing markets, against a fourth in advanced economies**. In developing markets, currency crises by themselves do not generate a lot of volatility. Nevertheless they very often associate with other crises and a huge share of BC volatility. In emerging and advanced markets, single currency crisis episodes contribute the same amount to BC volatility, nevertheless, when crises cumulate, the contribution to volatility increases more in less advanced markets. **In developing markets, currency crises are a necessary but non sufficient source of volatility. In emerging markets, currency crises are a necessary and sufficient source of volatility. In advanced markets, currency crises are non-necessary but sufficient source of volatility**<sup>footnote</sup>Another way of reading the last four lines is to say that, in DM, currency crises generate volatility only when they are accompanied by other crises (and it is frequent). In EM, they generate volatility irrespective of another crisis triggering. In AM, by themselves, currency crises generate volatility but as other financial crises and irrespective of combination effects..

**On multiplicity:** As markets develop, **multiplicity matters less for BC volatility**. Multiple crises are associated with one half of business cycle volatility in developing markets, one third in emerging markets and one eighth in advanced markets. As crises multiply, they become relatively less costlier in emerging markets than in advanced markets. In developing markets, whatever the multiplicity, crises are at least 3 times more intense than in advanced markets. **In developing markets, economic and financial crises combine to generate excessive volatility. In emerging markets, simple economic crises are already an important source of losses and volatility. Multiple financial crises demultiply intensity to gen-**

erate important macroeconomic volatility. In advanced markets, financial crises by themselves are not a key supplementary factor of volatility. Multiple crises episodes are the only type of recession episodes for which the contribution to BC volatility is bigger in DM/EM when compared to AM, respectively 5.5 and 3.6 times bigger.

Table 7 presents the variance decomposition for developing, emerging and advanced markets when I separate episodes based on the sequencing of economic and financial crises.

**Table 7:** Business cycle volatility decomposition by type of crisis episode and country group

	BC		expansions		recessions			
	volat.	$\sigma_{bc}^2$	$\sigma_{nocrs}^2$	$\sigma_{crs}^2$	$\sigma_{nocrs}^2$	$\sigma_{cur}^2$	$\sigma_{bkg sov}^2$	$\sigma_{mtpl}^2$
DM	1.23	1.51	0.17	0.00	0.37	0.05	0.21	0.70
			11.36	0.33	24.46	3.34	14.18	46.32
EM	0.91	0.83	0.08	0.03	0.29	0.14	0.04	0.25
			9.70	3.62	34.42	16.85	5.03	30.39
AM	0.58	0.34	0.04	0.00	0.15	0.06	0.06	0.03
			11.92	0.64	44.30	16.95	17.71	8.48
DM/AM	2.12	4.48	0.95	0.51	0.55	0.20	0.80	5.46
EM/AM	1.57	2.45	0.81	5.65	0.78	0.99	0.28	3.58

BC volatility 'volat. =  $\sigma_{bc}$ ' and variance  $\sigma_{bc}^2$  is decomposed as the sum of components reflecting volatility associated with six given types of episode: ( $\sigma_{nocrs}^{2\ exp}$ ) simple expansions ; ( $\sigma_{crs}^{2\ exp}$ ) expansions with financial crisis ; ( $\sigma_{nocrs}^{2\ rec}$ ) simple recessions ; ( $\sigma_{cur.only}^{2\ rec}$ ) recessions with currency crises only, ( $\sigma_{bkg|sov}^{2\ rec}$ ) recessions with banking &/or sovereign crises and ( $\sigma_{mtpl}^{2\ rec}$ ) multiple crises (at least a currency crisis).

For each country group, the first line gives the values of each component. The second line gives the share of bc volatility each episode type identifies with. The darker the shade, the more frequent the event.

The bottom part of the graph gives the relative (EM or DM vs AM) contributions to bc volatility (columns 4:8). Columns 2/3 give the relative volatility/variance.

I consider six types of episodes: (i) *Simple* expansions, no financial crisis ; (ii) Expansions with financial crisis ; (iii) *Simple* recessions, no financial crisis ; (iv) Recessions with a currency crisis only ; (v) Recessions with a banking and/or a sovereign crisis/es, but no currency crisis ; (vi) Multiple crises, with at least a currency crisis. Columns 4 to 8 give the share of each type of episode to the aggregate. The darker the color, the higher the contribution to BC volatility.

Several conclusions can be taken from the present variance decomposition. I also discuss the results of the variance decomposition when conducted over a different layer of the taxonomy: multiplicity and the occurrence of a currency crisis.

**Recessions, currency crises, financial complications, multiple crises and volatility differentials:**

**Simple economic recessions** are important contributors to BC volatility worldwide. As market develop, they represent a bigger share of BC volatility as they become frequent enough to drive down the average intensity of fluctuations during recessions (the build-up of stabilizers and feed-back mechanisms). Simple recessions are 4.3/2.2 times more intense in developing/emerging relative to advanced markets.

**Currency crises entail frequent fluctuations in emerging and advanced markets**, similar to the intensity of simple economic recessions. In these countries, currency crises by themselves do not generate additional volatility relative to simple economic crises. In developing markets these episodes are both relatively less frequent and intense to generate significant volatility. The panic often contaminates other financial markets or the shifts in market sentiments fail to drive the country onto a good equilibria.

**Banking and sovereign crises** entail intense fluctuations whatever the country group. By themselves, they prove a **significant source of volatility in developing and advanced markets**. In the former because they are acute, in the latter, because they are frequent and relatively more intense (1.5 times vs simple recessions). In emerging markets, they occur too little to matter significantly (5% of BC volatility).

In developing and emerging markets, banking &/or sovereign crises frequently associate with currency crises. **Multiple crises episodes drive the bulk of volatility differentials across groups**. These episodes are 5/4 times more frequent in developing/emerging markets and 4.3/2.1 times more intense than in advanced markets.

In chapter 4, I constructed my crises episodes based on the temporal sequencing of cycles and financial crises' datations. If this proves sufficient to draw many informative conclusions, little can effectively be said on issues of causality. Chapter 5 discusses a narrative methodology to shed some light on this topic.

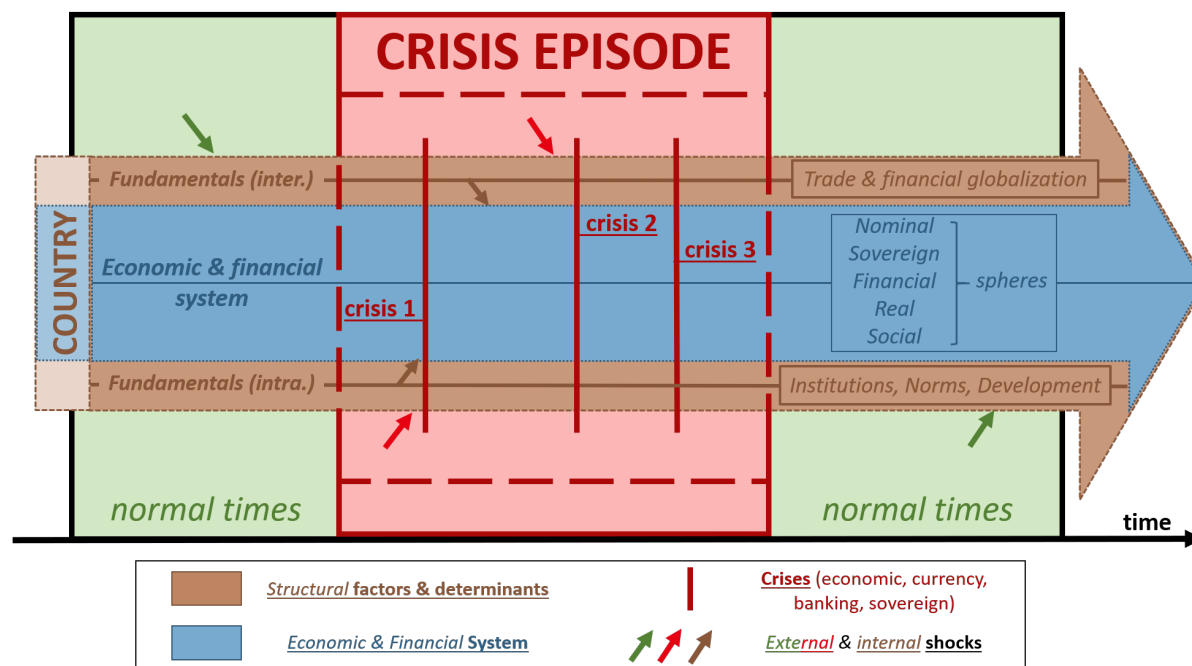
**Explorations into causal links – pedestrian and narrative highlights**

Chapter 5 builds upon the database, methods and results from the first four chapters to explore notions of **causality**. Given the particular role of multiple crises in driving volatility differentials, I am interested in understanding what gives rise to these costly episodes. I provide a second application of my go-to-guide and develop a methodology to answer specific questions related to

the origin of each crises episode using IMF archives. The methodology relies upon a conceptual framework illustrated in figure 5.

**Figure 5:** Crises episodes: a first look

The schematic identifies a crisis episode in time (x axis). It represents how a changing economic and financial system (blue), shaped by internal and external fundamentals (brown) is exposed to shocks (red/external and darker brown/internal). At times, financial and economic crises signal (red bars).



In time, a country is characterized by a set of structural/fundamental characteristics that define its limits, place and exposure to the rest of the world. In itself, the country can be represented as a set of interrelated (simplifying) spheres – nominal, sovereign, financial, real, socio-political – that cover most of the activity that make the system adapt and evolve. **Crises** are episodes in time during which the system is brought to the edge of collapse by unforeseen conditions. Crises are times of heightened uncertainty and speculation about potential futures. During crises, initial shocks magnify as they spill over the economic and financial system. The perturbations come to pressurize existing vulnerabilities and inconsistencies. Hence, crises often constrain agents' policy space and are the source of drastic decisions and policy reactions.

In chapter 5, I concentrate my analysis on three main questions.

#### Research Question

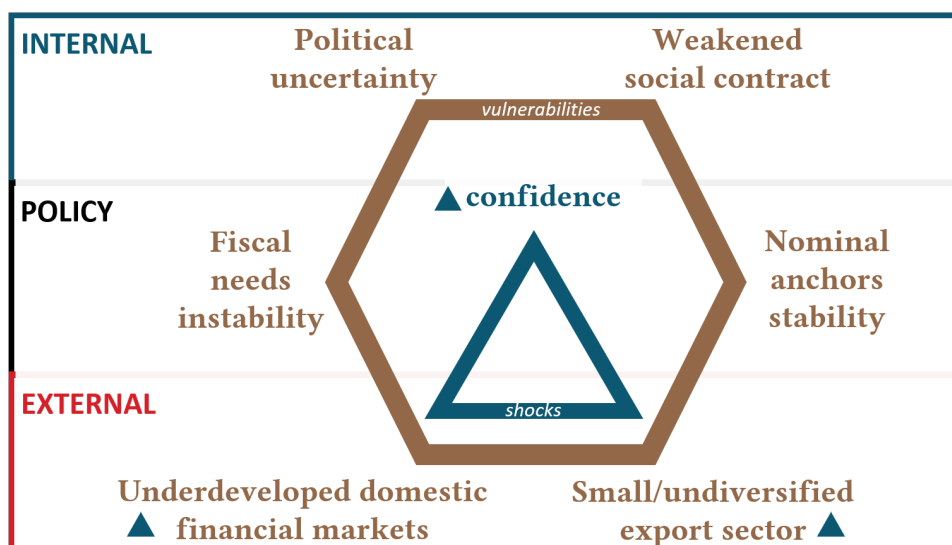
What kind of shocks precede and trigger costly and multiple crises episodes?

What vulnerabilities characterize the economies as they enter a crises episode?

What is the role of credibility and confidence in the unfolding of crises?

As an illustration, I detail extensively the case of Argentina as the country had 7 economic, 5 currency, 3 sovereign and 2 banking crises inbetween 1990q1 and 2019q4. I detail the rise, transmission, unfolding and resolution of 5 crises episodes. I pay particular attention to identifying how the crises transmitted to the different spheres of the economy (monetary, sovereign, financial, real, socio-political). I discuss the key events and major policy decisions that characterized crises and their unfoldings. Argentina's crises are the result of a combination of three main shocks and six main vulnerabilities, represented in figure 6.

**Figure 6:** Shocks and vulnerabilities fueling the credibility gap before Argentina's crises



Shocks (blue triangle) include: (i) political failures and **confidence** shocks ; (ii) external **financing** costs and (iii) forex revenues/**trade** shocks. Vulnerabilities are represented on the brown hexagon. Internal vulnerabilities include ( $\alpha$ ) **political** uncertainty ; ( $\beta$ ) weakened **social** contract. Policy vulnerabilities include ( $\gamma$ ) **fiscal** needs instability ; ( $\delta$ ) **nominal** anchors stability. External vulnerabilities include ( $\epsilon$ ) low domestic **financial** markets development and ( $\zeta$ ) small and undiversified **trade** sector.

Throughout Argentina's crises, confidence and uncertainty play a determining role in economic decelerations and recessions or directly in the burst of financial crises. Considerations and confidence in the currency/sovereign/future/economic prospects/social progress vary across agents. The magnitude and scope of these dissensions determine whether the current policy conduct is credible. When the CREDIBILITY GAP widens too much or too quickly, the country experiences crises. All crises in Argentina's history are associated with episodes of important confidence losses, panics and sudden stops. Since the end of the currency board, trust in the currency is the most frequent and easiest trigger. In turn, trust in the sovereign has been a determinant feature as the government was often confronted with a need for external financing. External exposure and dependency further constrained firms' and agents' in economic prospects. Whereas the weakening of the social contract shook the trust in the political and redistributive systems. During episodes of heightened stress and confidence losses, banking institutions and

financial markets were confronted with sudden confidence losses in the value of Argentine assets.

Over each wave of crises, the **credibility gap** widens as governing institutions' management of economic developments becomes inconsistent and highly criticized. After each crisis episode, part of the confidence in the system remains persistently eroded. When the next series of imbalances and external shocks start pressurizing existing vulnerabilities, constraints on agents' policy spaces accumulate. Future economic prospects are deemed somber by firms and households, confronted with stalling poverty and inequality. At the eve of major elections, political scandals and/or populist announcements weaken confidence and increase dissensions. When confidence first cracks, usually on forex and/or financial markets, troubles and confidence losses soon spillover agents and spheres. Until elections are over, policy interventions fail to convince agents. Social turmoil and market volatility alternate and fuel upon another. Once the situation cumulates, a drastic ideological and policy change is needed to tame the wave and reset the credibility gap. A new governing authority coordinates agents on a new alternative plan supposedly aimed at better crisis management and reforms to address structural concerns, notably on poverty and inequality.

## Main contributions

In this dissertation, I contribute to the literature on several fronts by studying how financial crises and economic volatility relate.

### Contributions

#### Methodological and literature elements

- I provide detailed theoretical and empirical literature reviews on the determinants of economic and business cycle volatility and on financial crises.
- I provide a comprehensive discussion of existing methods to date economic and financial crises.
- I highlight the broad coverage, literature-wise, of the role of financial frictions and discontinuities as determinants of crises.
- I contribute to the growing literature on narrative contributions by developing a go-to-guide for economists interested in this approach. This dissertation provides two applications.

#### On business cycles:

- I use Markov switching models to date business cycles at a quarterly frequency for an unbalanced panel of 54 countries over 1970q1-2020q1.
- I derive a set of stylized facts on business cycles by income, region and commodity group. I discuss the role of frequency and amplitude as drivers of volatility.

- I show that business cycle fluctuations explain the higher share of aggregate volatility in emerging and developing versus advanced markets. I identify these episodes as being associated to protracted and very costly recessions.

#### On financial crises:

- I create a new database of currency crises backed by narrative quotes.
- I discuss key historical episodes of crises to identify patterns and key determinants of financial crises. I compare country group's historical experience of financial crises.
- I then relate financial crises to economic crises and develop different layers of my taxonomy of crises. In particular I explore key characteristics of episodes according to currency, multiplicity, severity, duration, rebound.
- I decompose output growth variance to provide estimates of the contribution of financial crises to differences in volatility between groups. I replicate the results to study which layers of the taxonomy have the best explanatory power. Multiplicity and the exposure to currency crises are the first determinants to consider for differences in volatility.

#### On causality:

- I develop a methodology that allows for the narrative identification of the key triggers and vulnerabilities behind costly crises episodes.
- I use the methodology to case study the particularly numerous financial crises in the history of Argentina. I identify a polygon of vulnerabilities/constraints that have exposed the country, when faced with frequent external shocks, to inconsistencies and crises.
- I use my narrative quotes on currency crises to quantify the role of self-fulfilling mechanisms.

I derive three main results

#### Key results

- Volatility differentials are explained by the intensity of fluctuations in recessions, not by the frequency of growth reversals. Economic fluctuations are *per se* more volatile in less advanced markets. They stabilize and repeat more frequently as markets develop.
- Currency crises are frequent events. They do not generate additional volatility by themselves, but remain important, as frequent, contributors to volatility in emerging and advanced markets. In developing markets, they are, by themselves, too rare and mild to matter. On the contrary, banking and sovereign crises, by themselves, contribute signifi-



cantly to volatility in developing and advanced markets. Out of intensity for the former and frequency for the latter. Their rarity prevents a significant contribution in emerging markets.

- Multiple crises form the most striking difference across country groups. When crises multiply, they contribute strikingly more in less developed markets (46/30 vs 8.5% in developing/emerging vs advanced markets). Financial crises matter for business cycle volatility because, in less advanced markets, panics often spillover from forex markets through to other markets. When financial crises multiply, intense fluctuations provoke acute losses.

## A policy perspective and why these issues matter

Economic volatility differentials have been driven by the higher occurrence of complex multiple crises that entail acute economic losses. Currency crises are a key and frequent manifestation of confidence losses that often spillover to other financial markets. The credibility gap stems from differing signals from national authorities' stated objectives, their effective actions and their perception by market participants. During crises episodes, the wedge widens to the point where only a drastic policy change can set expectations and the system on a new sustainable path out of trouble. In the last chapter, I focused my narrative analysis and contributions upon the shocks and vulnerabilities behind Argentina's crises. Yet, as identified in the narrations in section 5.4, policies and policy announcements played a pivotal role in the unfolding, amplification and/or resolution of crises. Future work is needed to understand the nature and motivation of these policies, their perception by economic and financial agents, and their effects on the credibility gap. A narrative hindsight proves essential in capturing information on agent's confidence and sentiments. Understanding the motivation behind the actions of important agents is essential to discuss the policies that should be introduced to tackle dangerous transmission mechanisms.

If the Covid 19 pandemic has highlighted one thing, it is the ability of shocks and perturbations to perpetually repeat and renew themselves. Faced with increased uncertainty about future prospects, it is important for national authorities navigating upcoming crises to coordinate agents' expectations. I see this dissertation as a first step in this direction. I have identified the characteristics of the pivotal episodes behind economic volatility to narrow down the initial scope of research. I have laid a conceptual framework to study the role and construction of credibility during crises episodes. To that end, narrative contributions capture the view of a central actor in the international economic and monetary system, the IMF, as a proxy for the general evaluation of ongoing developments and underlying motivations. Future work, I hope, could help shed light on the importance and structure of national authorities' communication. Using textual analysis procedures could help identify the narrative provided to market participants by governing institutions. This next step could help bridge the gap towards a neater evaluation of the credibility gap and its implications on economic and financial developments.



*Il y a donc, dans toute crise, un déblocage des activités intellectuelles, dans la formation d'un diagnostic , dans la correction d'une information insuffisante ou faussées, dans la contestation d'un ordre établi ou sacralisé, dans l'innovation et la création.*

*Sur la crise,* EDGAR MORIN (2020)

## Chapter 1

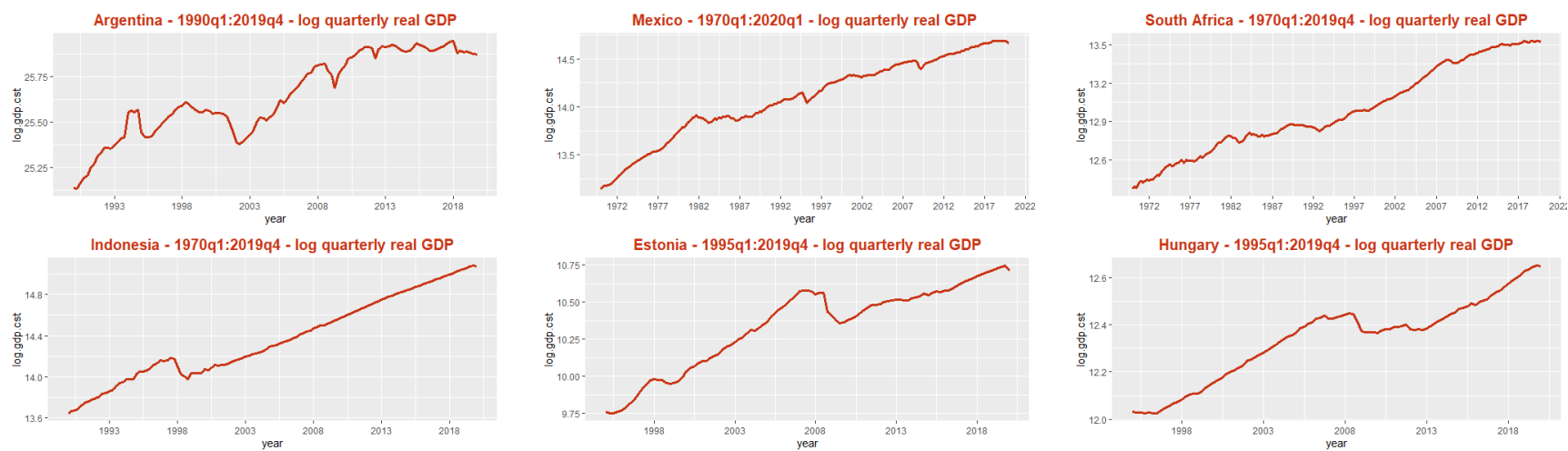
# Growth volatility, business cycles and frictions - crossing literatures

Growth patterns differ greatly across countries. Figures 1.1, 1.2 and 1.3 represent, for a panel of emerging, developing and advanced markets respectively, the quarterly time series for the log of the real Gross Domestic Product (GDP). Few patterns can be naively derived at a glance at the numerous graphs: overall countries grow, they experience regular 'interruptions' of varying frequency and magnitude. Some countries display particularly chaotic or hampered growth history (Argentina and Greece). Some countries enter long lasting periods of stagnation/particularly slower average growth (Argentina, Russia, Portugal and Italy). In emerging and developing markets, fluctuations can be either frequent and *relatively* mild (Mexico, South Africa, Philippines and Turkey) or of great magnitude/length (Indonesia, Estonia, Hungary, Roumania and Russia). Indonesia displays a remarkably straight forward line post 2000. Several countries in advanced markets have steadily increasing growth, though frequently interrupted by mild fluctuations and an overall decrease in slope (USA, UK, Canada, France, South Korea and Singapore). Past economic fluctuations have been costly or damaging for some advanced markets (obviously and sadly Greece but Finland, Switzerland, Portugal and Italy as well).

Interestingly there are different types of downturns. Among others: sudden and steep (e.g. Mexico in 1995, Turkey overall) ; jolting (e.g. Romania in 2010) ; stall and stop (e.g. Estonia on 2007) ; mild trend inversion (e.g. Canada/France in 1990, Philippines post 1985) etc.

These downturns end as differently as they start. A non-negligible fraction entails more or less temporary deviations and a return to the previous trend. Short fluctuations can be observed in Singapore in 2010 or Thailand around 2010. Spain in 1992 illustrates a long deviation from trend that in the end brought back the economy on trend (circa 2000), Finland over 1989-2002 as well. Argentina in 2009 is a good example of a rebound where growth seemed to start back on previous trend but failed to sustain the dynamics.

Figure 1.1: Growth patterns – Emerging markets



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Figure 1.2: Growth patterns – Developing markets

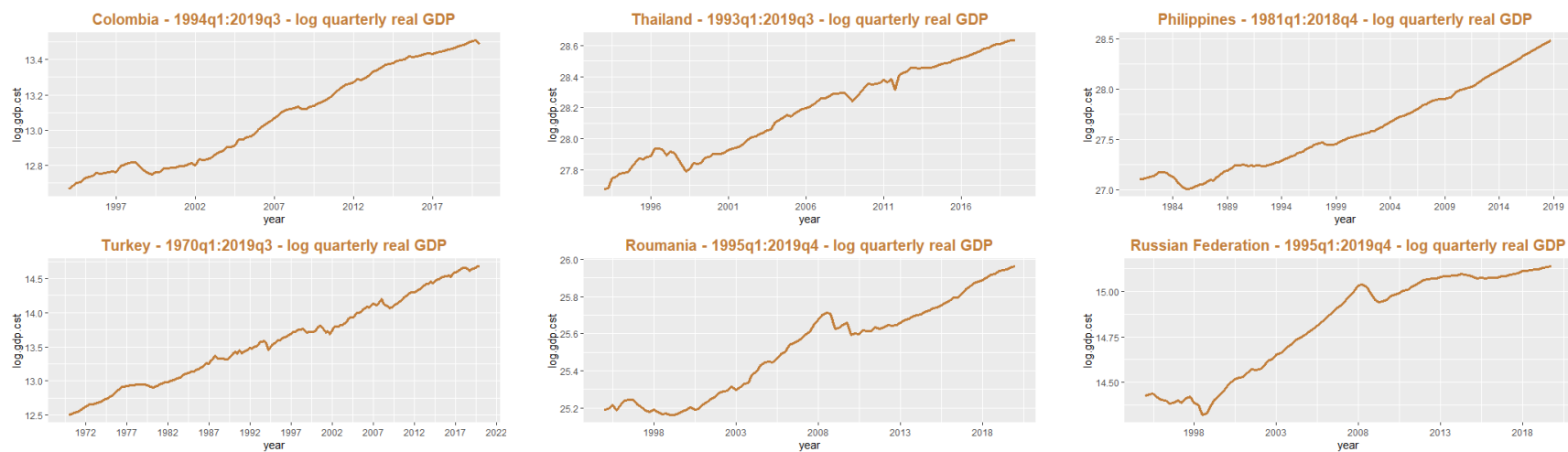


Figure 1.3: Growth patterns – Advanced markets



A second non-negligible fraction of downturns entails permanent losses and a new trend. Indonesia is the best illustration of this frequent type of recession. There are little emerging and developing economies that have not experienced at least one such bad episode. The pattern is not extraneous to advanced markets either, but very often in (much) milder proportions. It can be observed in Switzerland as soon as 1975. The two decades after the GFC illustrate a clear shift in trend for all countries, except possibly Singapore. Southern Europe is particularly plagued by these specific downturns. South Korea offers an interesting illustration as every recession gently dents the trend and slows overall growth.

A final observation can be made by looking at the different sub-panels. Often, fluctuations occur in different countries at the same time. This pattern is observed broadly across country income groups (emerging/developing/advanced) and by region (see Central and Eastern Europe in the first two figures, or the first line of the second panel + France ; Canada appears lagged).

Because economic growth has been considered as one of the main engines in the development of our societies, understanding growth patterns, their determinants and how to tame fluctuations has always been pivotal to the literature. Figures 1.1, 1.2 and 1.3 illustrate key heterogeneity in growth patterns worldwide.

My brief graphical discussion has showcased two levels of analysis for the observed patterns: long-run processes and shorter-term fluctuations. As history suggests, both intertwine in widely varying degrees. The first chapter of this dissertation aims at taking stock of the main lessons the economic and financial literature provides to understand (1) the (structural and conjunctural) determinants of economic growth volatility and (2) the main theoretical determinants of fluctuations at the business cycle frequency (e.g. between 4 and 12 years). I thus address two questions to set the broad scope for this research:

#### Questions to the literature

- What are the main candidates determining differences in country growth volatility?
- What is the role of business cycle fluctuations in driving differences in volatility between emerging, developing and advanced countries?

Across history and countries, heterogeneity of patterns takes root simultaneously at different frequencies and levels (long-/short-run ; permanent/transitory). In this chapter I try to articulate literatures addressing both structural and conjunctural determinants of differences in volatility to identify the main candidates that a more detailed analysis should investigate. I also discuss how the literature has explained some of the observations I derived from the figures.

## 1.1 The determinants of economic growth- and business-cycle-volatility

If my introduction has highlighted fluctuations in real aggregate activity, most key macroeconomic variables – output, current account, consumption etc – exhibit an important variability (Agenor et al. (2000), Loayza et al. (2007)). Sirimaneetham and Temple (2009) construct an index to measure macroeconomic (in)stability and use it to date unstable growth regimes. They show that macroeconomic instability prevents countries from benefitting from convergence and productivity gains. Jones and Olken (2008) discuss in detail the specific cases of growth collapses and take-offs. In particular, growth failures are a characteristic pattern of all but the very rich countries. These episodes are associated with reduced investment and higher price instability.

I detail key contributions of the literature along three lines: internal factors, relating to the structure of the system ; external factors, stemming from international and environmental dimensions ; financial factors, that cover the particular role of financial development and liberalization. In this section, I present the main candidates to volatility along three broad lines. In practice, most of the articles from the literature study volatility through a multilayer framework, using factors from different dimensions.

### 1.1.1 Internal factors – economic structure, institutions and policy framework

A first strand of the literature has tried to identify country-specific fundamental factors discussing (a) the role of the structure of the economy: Structural change (i.e. the reallocation of economic activity across agricultural/industrial/tertiary sectors) has been a key characteristics of recent history. The way this process has effectively taken place can provide insights on the system’s aggregate volatility ; (b) the role of institutional and political factors: Because institutions and policy frameworks define the scope within which the economic and financial system operates, they act as the ideal suspects behind differences in growth patterns and volatility.

- (a) **The lack of economic diversification coupled with the dependence on few volatile sectors** often act as sources of volatility (Imbs (2007), Koren and Teneyro (2007)). If a given sector represents a great share of employment and valued added, should this sector come into trouble, the whole system might be affected. Iceland in the 1970s and 80s offers a good illustration: because the economy relied heavily on the fishing industry, it was subject to the ups and downs of harvest. Impairments in the profitability of the fish processing plants acted as a stark pressure point on inflation, exchange rate policy, wages<sup>1</sup>...

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<sup>1</sup>Interestingly, narrative evidence detailed in chapter 3, links this structural fundamental to several currency crises.



- (b) Governments with **less developed/robust tax bases** often struggle to collect enough revenue to provide funding both for structural reforms and macro-stabilization purposes. The volatility of tax revenues often proves a source of growth fragilities (Fricke and Sussmuth, 2014).
- (c) **Weak institutions and poor economic policy frameworks:** Alesina et al. (1996) find that at times when the probability of a government collapse is high, growth is significantly lowered for some countries. Cuberes and Jerzmanowski (2009) illustrate that trend-growth reversals are both sharper and more frequent in non-democracies. Because, democracies entail lower barriers to entry for new firms (lower corruption, higher property rights, etc), their industries diversify more which entails greater stabilization of shocks. Kerekes (2012) uses Markov Switching Models to identify long run growth patterns. She shows that countries with better policies and institutions are more likely to experience lengthy episodes of sustained economic growth and less volatility. Lane (2003) argues that higher volatility in emerging markets stems from inappropriate pro-cyclical macroeconomic policies. In Phillip Lane's view, structural reforms should allow for stabilizing effects. Fatas and Mihov (2013) illustrate that if policy levels can have little explanatory power for economic growth successes, policy volatility signals as a key determinant of macroeconomic performance. Political institutions shape growth through the constraints they impose on policy-making. In a theoretical framework, Aguiar and Gopinath (2007) identify shocks to trend growth as the main driver of GDP volatility in emerging markets. They argue that these shocks stem from more frequent switches in monetary, fiscal or exchange rate policy regimes.

**Commodity dependence** deserves its own description as it relates to the particular structure of an economy whose production is specialized in few commodities (cf a). The prices of these goods are set on world markets and subject to vivid fluctuations. In practice, fluctuations in world prices of traded goods and service (terms-of-trade) are a key external factor among those identified in the next subsection. The aggregate effect of these shocks depends on the trade balance diversification and the place occupied by commodities. Overall, small emerging markets that are commodity dependent, suffer consequently from more volatile growth patterns (Fernandez et al., 2018).

### 1.1.2 The external dimension – shocks from abroad and the environment

A second line of research has considered external factors as responsible for a less secure environment and greater volatility in emerging and developing markets. In particular, the literature has discussed the origin of the main exogeneous shocks that have driven higher fluctuations among emerging and developing economies: (a) terms-of-trade shocks that capture important fluctuations in goods and services' world prices ; (b) foreign interest rate shocks that represent, for small open economies, fluctuations in the cost of external borrowing ; (c) natural disasters that entail major environmental catastrophes such as earthquakes, floods...

- (a) **Terms-of-trade shocks** have been the source of important fluctuations in countries' external demand and are widely recognised as a source of fluctuations in emerging and developing economies (Broda (2004), Andrews and Rees (2009)). Schmitt-Grohe and Uribe (2018) identify that terms-of-trade shocks represent around 10% of aggregate volatility. When augmenting the portfolio of commodities over 138 countries, the contribution to the volatility of individual countries reaches 33% (twice as much after 2000), Fernandez et al. (2017). Drechsel and Tenreyro (2018) discuss how emerging markets broadly suffer from a heightened volatility of the terms of trade and experience subsequently "highly disruptive economic cycles".
- (b) **Foreign interest rate shocks** can represent an important source of fluctuations in small open economies dependent on external source of financing. Often these shocks combine with financial frictions and heightened risk aversion to amplify aggregate fluctuations (Neumeyer and Perri (2005), Uribe and Yue (2006)). Chang and Fernandez (2013) estimate that foreign interest shocks possess a strong explanatory power<sup>2</sup>
- (c) **Natural disasters** have been found to have differing effects on growth depending on type and sector affected (Noy (2009), Loayza et al. (2012)). The effects are always stronger in developing economies, (Fomby et al., 2013). Better institutional quality and international openness tend to mitigate associated negative fluctuations (Felbermayr and Groschl, 2014).

The fourth element discussed in this sub-section relates to the studies that have examined the relative contributions to volatility of global-, regional- and country-specific factors. This literature helps capturing both the effect of globalization and potential business cycles' synchronization. Part of the literature has tried to estimate the relative importance of **regional and global shocks** against country-specific factors. This literature often uses dynamic factors model to compare the contribution of different shocks to aggregate volatility (country/regional/world specific shocks). In practice, these studies help illustrate the role of globalization and (de)synchronization processes across business cycles. Bordo and Helbling (2003) identify a world business cycle using increasing markets integration (trade and financial liberalization) and a change from country- to world-specific shocks (see also Kose et al. (2008) for an historical perspective). If these studies focus only on G7 countries, Kose et al. (2003), over 60 countries, assess the importance of global over regional factors. Advanced economies prove to be more exposed to the world cycle and less developed ones more distant from it. Monnet and Puy (2019) estimate quarterly world real and financial cycles and show that, for most countries, output comovements with the rest of the world did not change much over the last 70 years. If their results do not advocate for a stronger synchronization of cycles worldwide through time, since the mid 80's countries have been strongly interrelated.

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<sup>2</sup>Key elements of this literature are discussed in the next subsection so as to help motivate my introduction of Markov Switching Models and how this help me contribute to said literature.

### 1.1.3 The financial dimension

Another important determinant studied in the literature relates to how financial development and liberalization shape growth and volatility (Buera et al. (2011), Reinhart and Reinhart (2015)).

- **Financial globalization:** A country with a poor financial system, if opening to world markets, would probably experience costly financial crashes (Martin and Rey, 2006). This could in turn potentially outweigh benefits from financial liberalization, (Ranciere et al. (2008), Loayza et al. (2018)). Financial liberalization should theoretically benefit countries in allowing for a better allocation of resources as well as absorb financial crises/shocks with more efficient stabilizers and policy transmission (Bekaert and Harvey, 2003). In emerging markets, equity market liberalizations have been found to be a source of real growth Bekaert et al. (2003) and associated to a fall in the cost of capital through an increasing participation of foreign investors (Bekaert and Harvey, 2000). Interestingly, Bekaert et al. (2006) find that both equity market liberalization and capital account openness increase real consumption growth volatility but have no significant effect on real growth. As the relative volatility of consumption to output growth falls after financial liberalization they identify improved risk sharing mechanisms. Conversely, a country exposed to uncertainty through an unregulated financial system, even if with high financial development standards, could be exposed to a high frequency of crises. These crises emanate potentially from market innovations and risks overweighting benefits (GFC, Euro Zone, Greece). Broner and Ventura (2016) in particular show that the effects of financial globalization depends "on the level of development, productivity, domestic savings, and the quality of institutions."
- **Financial cycle:** Claessens et al. (2011) describe key historical episodes by type of financial market (housing bubbles, credit booms, equity/asset bursts) that together make the financial cycle (for a panel of advanced economies). Claessens et al. (2012) show that fluctuations in these key indicators relate strongly to business cycle phases. They find that recessions associated with financial disruptions tend to be longer and deeper than other recessions. They conclude by observing that financial market developments matter greatly for the real economy. Borio (2014) offers a good summary and perspective on the literature before 2014. Rey (2018) identifies how the global financial cycle constrains monetary policy worldwide and whatever the exchange rate regime. This proves key as major stabilizing policies prove dependent from capital account developments (and management). Cerutti et al. (2019) discuss the financial cycle for 85 countries under the lens of capital flows. Interestingly, they do not observe a global financial cycle for capital flows. Most variation in capital flows across countries stem from country-specific factors. Ha et al. (2020) study how a global macro-factor fares relative to country-specific macroeconomic and financial factors in explaining macroeconomic fluctuations. For G7 countries,

they identify a dominant lead of the global factor and spillovers from the financial factors (equity/housing prices) to the real side. They do not find evidence of reverse feedbacks.

- ***A view from the finance literature:*** Geert Bekaert and Campbell Harvey have widely contributed to the literature by identifying broadly key differing characteristics of emerging financial markets, which provide a different perspective to the source of financial volatility. In particular, they address key characteristics of financial markets between advanced and emerging markets: (i) *regional integration:* Bordo and Helbling (2003) focus on key emerging market crises episodes (Asian crises and Mexican 1990 associated crises in Latin and South America) and show that regional integration of emerging financial markets acted as a source of crises, especially in the Asian case. (ii) *liquidity and expected returns:* For emerging markets, local market liquidity is an important driver of expected returns Bekaert et al. (2007), which suggests that financial liberalization has not completely alleviated domestic constraints.

Overall, this literature underlines the importance of **financial crises** as the manifestation of underlying determinants that drive economic fluctuations. Chapter 3 details more specifically the set of characteristics behind financial crises ; key candidates include poor economic fundamentals and policy coherence, external shocks and contagion processes. Financial crises are associated with severe persistent economic losses regardless of the income group of the country considered. Nevertheless, EMDE have been shown to recover and rebound from such traumatic events more rapidly than AE (Howard et al. (2011), Wan and Jin (2014)). Bordo and Haubrich (2017) lead an historical event study on recoveries in the United States. They find that recoveries following financial crises are indeed faster. However, they warn against any comparability with other countries given the important differences in output stochastic structures. This concern on the comparability of output growth processes across countries is a key motivation to my approach. In this dissertation, I use Markov Switching Models (MSM) to infer the true data generating process of a given time series, which eludes an ad-hoc specification of what expansions, recessions and recoveries are. The literature using these models to study growth volatility have concentrated on the role of long term structural determinants (Jerzmanowski (2006), Kerekes (2012)). In the rest of this dissertation, I concentrate on volatility at the business cycle frequency. This illustrates the non-linearity growth patterns and part of the theoretical literature I develop next. This also allows me to study how financial crises explain worldwide business cycle volatility differentials, as eluded by the literature (Cerra and Saxena, 2008).

**In a nutshell:** A transversal review of the literature on differences in economic volatility across emerging, developing and advanced markets helps identify a wide set of vulnerabilities and shocks that drive up volatility. In the next section I discuss in more detail the key characteristics of small open economies' business cycles. I discuss key theoretical fundamentals that have been proposed to understand differences in business cycle volatility.

## 1.2 Theoretical explanations of EMDE higher BC volatility

Business cycles in emerging markets and economies differ from those of advanced economies on a number of specific aspects:

- Output is twice as volatile in EMDE relative to AE.
- Consumption and investment are more volatile than output in EMDEs, whereas consumption is relatively less volatile than output in AE.
- In EMDE, the real interest rate is strongly countercyclical and volatile, leading the cycle. In contrast, it is mildly procyclical and less volatile in AE.
- EMDE have large, volatile and important current account reversals and a strong countercyclical trade balance when compared to AE.

Small Open Economy (SOE) - Real Business Cycles (RBC) models, as developed by Mendoza (1991) and expanded by Schmitt Grohe and Uribe (2003), failed to capture these differences. Over the past 15 years, researchers have debated, trying to identify the sources of the higher volatility in EMDE and discussing the necessary extensions to SOE-RBC to capture these<sup>3</sup>. They have put forward different shocks and transmission mechanisms and this review aims at presenting the advances made in the literature<sup>4</sup>.

### 1.2.1 Two building blocks: Interest rate versus Permanent productivity shocks

Neumeyer and Perri (2005) argue that a standard neoclassical model augmented with financial frictions can replicate the features of EMDE and AE when these economies are faced with exogenous foreign interest rate shocks.

They extend the model by introducing a need for working capital and preferences which generate labor supply independent of consumption. The need for working capital makes labor demand insensitive to the interest rate and firms need to borrow to finance production. As such, an increase in the interest rate increases firms-faced labor costs which reduces labor demand. Households' preferences render labor supply insensitive to the interest rate which, following previous chain of action, decreases the equilibrium level of employment. In their framework, the capital stock being more or less stable, this leads to a fall in output.

An important aspect of their approach is the modeling of interest rate fluctuations. They separate the interest rate between the international risk-free rate and a country spread. The latter is determined by either a stochastic process or future expected productivity. These fundamental shocks to productivity drive both the BC and country risk, which amplifies the shocks through the working capital requirements.

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<sup>3</sup>A second branch of the literature, following Kose (2002) and Mendoza (1995), considers the importance of terms of trade shocks and the real exchange rate in capturing the BC properties of EMDE. A third one, exemplified in Kose et al. (2012), aims at extracting world, regional and country-specific factors of business cycles thus offering another approach on the determinants of EMDE BC fluctuations. I do not review these articles.

<sup>4</sup>Durdu (2013) proposes a literature review which I extend to recent contributions.

Uribe and Yue (2006) support the same line of reasoning and underline the importance of looking at country spreads movements. They advocate for a more realistic approach in which the spread reacts to changes in domestic variables and in world interest rates.

Using a VAR to identify country spread and US interest rate shocks (based on the assumption these shocks have a contemporaneous and a lagged impact respectively), they find that the former explain 12% of BC movements and the latter 20%. They explain that 60% of country spread movements are due to country-spread shocks and that US interest rate shocks mostly affect the economy through their effects on county spreads. As such, their modeling introduces country spreads that depend on the stock of debt of the economy. They also rely on the assumption of firms facing a working capital constraint, which proves determinant in their ability to replicate empirical observations as it introduces a direct supply side effect of changes in the cost of borrowing on international markets.

The second approach, pioneered by Aguiar and Gopinath (2007)<sup>5</sup>, argues that a frictionless RBC can actually replicate descriptive statistics if one allows for differences in the relative importance of trend- versus transitory- productivity shocks. They explain that the frequent regime changes faced by EMDE (reflecting an aggregation of drastic reversals in fiscal, monetary and trade policies) justify the larger relative importance of the random walk component of the Solow residual in EMDE.

The Permanent Income Hypothesis (PIH) is at the center of their theoretical approach. A permanent productivity shock translates in higher output today but even more so in the future. As such, consumption overreacts, savings decrease and a trade deficit appears. When agents observe a transitory shock, savings increase and consumption increases by less than in the previous case. A smaller trade balance deficit thus occurs. They find that, by comparing Mexico's and Canada's BC, the relative variance of the permanent component to total productivity gives a ratio of 0.96 in the emerging economy and one of 0.37 for its advanced counterpart. They simulate their model on data-extracted trend and transitory productivity shocks and show it is successful in replicating the 1994-95 Mexican sudden stop.

Naoussi and Tripier (2013) extend their approach to a wider set of countries by focusing especially on Sub-Saharan Africa (SSA) - at the cost of losing quarterly for annual data. They find that there is a strong relationship between economic development and the weight of trend shocks in the fluctuation of productivity. They then compare cross-country variations in the size of the random walk component of Solow residuals with various identified determinants of volatility in SSA. They find that it decreases with the level of income, institutions and the size of the credit market. Moreover, the impact of government consumption is ambiguous and they do not observe any correlation with the inflation rate, trade openness and aid volatility.

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<sup>5</sup>See Aguiar et al. (2017) for a recent application of their approach.

### 1.2.2 Comparing the approaches: And the winners are financial frictions?

Given these two exclusive approaches, researchers have naturally tried to understand which source of volatility dominates the data.

Garcia-Cicco et al. (2010) consider the two shocks over long samples for Mexico and Argentina (1900-2005). Using longer samples makes observing BC characteristics more robust and allows for a better extraction of the stochastic process of non-stationary productivity shocks. They find that a frictionless RBC model driven solely by permanent and transitory productivity shocks performs poorly. In this specification, the trade-to-output ratio follows a near random walk with flat autocorrelation; excess consumption volatility cannot be captured (in Mexico, consumption is even less volatile than output) and the trade balance is found to be more volatile than in the data. All these predictions are at odds with the data. As such, they augment their model with a set of shocks and frictions. They introduce preference and domestic spending shocks. More importantly, they echo the first building block of this literature by introducing country-premium shocks combined with a realistic debt elasticity of the country premium, meant to capture an economy facing financing frictions. This augmented model mimics very well the observed BC. It assigns a negligible role to permanent productivity shocks thus deterring Aguiar and Gopinath (2007)'s view<sup>6</sup>.

Chang and Fernandez (2013) use Bayesian estimation to capture the relative importance of both shocks in the same Mexican sample as used by Aguiar & Gopinath and Uribe & Yue. They find that posterior distributions suggest volatile shocks to the process of interest rates and transient technology but only small trend shocks. In their estimation, temporary productivity shocks (magnified through financial frictions) explain the bulk of aggregate fluctuations ; interest rate shocks are of sizable importance as well but permanent productivity shocks explain less than 3% of variances. As such, they confirm Garcia-Cicco et al's claim that it is all about financial frictions and exogenous interest rate shocks.

More recently, Miyamoto and Nguyen (2017) have renewed the exercise but by considering 17 countries over long time-series (1900-2013). They model financial frictions through the use of an endogenous risk premium that responds to the level of the debt-to-output ratio and to expected future productivity. They introduce five shocks (preferences, government spending, country premium, trend productivity and stationary productivity shocks), which they separate into a common-to-all-countries component and a country specific shock, so as to exploit the panel dimension of their dataset. They find that one needs financial frictions to replicate em-

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<sup>6</sup>Some unpublished articles have studied the importance of the two channels to capture specific episodes of distress in SOE. Seoane (2013) and Seoane and Yurdagul (2017) look at sudden stops. They find that permanent productivity shocks, even though not important in replicating overall business cycles properties, prove to be key when it comes to understanding the dynamics around sudden stops.

pirical observations, even if their degree can vary across countries. Contrarily to the previous two articles, they find that trend productivity shocks explain on average one third of output fluctuations in both small open developing *and* developed economies (Argentina, they claim, is a special case which explains Garcia-Cicco et al.'s findings). Nevertheless, the importance of trend shocks is less important than what was identified by Aguiar & Gopinath. They observe that the nature of trend shocks differs between the two groups of countries. Whereas AE face more common shocks, EMDE are subject to more country-specific trend shocks. They justify this result by postulating that AE are closer to the technology frontier and comove more, whereas EMDE are more prone to domestic policy and structural reforms, i.e. country-specific shocks.

A complementary view, developed in Hevia (2014), relies on the ‘Business Cycle Accounting’ methodology<sup>7</sup>. He expands the usual approach to an open economy setting and compares the relative importance of five wedges<sup>8</sup> between Mexico and Canada. He finds that efficiency and labour wedges are important for both countries. Country spread wedges play an important role for Mexico<sup>9</sup> as well and a minor role in explaining investment, the trade balance and consumption in Canada. Government consumption wedges do not play a role in either country. Overall, the main difference between the two groups of countries stems from country spread wedges, supporting the Neumeyer and Perri and Uribe and Yue’s view. He concludes that productivity shocks only cannot identify BC in EMDE, as they do not disturb the consumption-labour margin. He notes moreover that the minor role of investment wedges does not diminish the role of financial frictions as the latter manifest mostly through efficiency, labour and country spread wedges.

Comparative approaches are not the only ones that have tried to understand the importance of the two channels. More precisely, many have questioned Aguiar and Gopinath (2007)’s theoretical formulation and its underlying hypotheses.

Boz et al. (2011) come back on Aguiar and Gopinath (2007)’s theoretical approach by relaxing the strong assumption that agents observe shocks and decipher their transitory or permanent nature directly. They introduce learning behaviors where agents form expectations about the two components of productivity by using a Kalman filter over past and current TFP shocks. This leads them to relaxing the need for as high permanent components in generating close-to-data simulations. In their model, agents receive two signals: total TFP growth and an additional

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<sup>7</sup>This methodology does not aim at identifying primary shocks, but rather at measuring their impact on a set of wedges said to characterize the economy.

<sup>8</sup>Efficiency wedges capturing TFP, labour and investment wedges capturing labor and investment taxation, country spread wedges capturing fluctuations in the real interest rate and government consumption wedges capturing fluctuations in government spending. Investment and country spread wedges are impacted by the move from a closed to an open economy setting.

<sup>9</sup>Investment wedges are also found to play a minor role in Mexico.



noisy signal on the permanent component of TFP. Two mechanisms are at stake: Under imperfect information, following a permanent productivity shock, agents only realize gradually its nature. As such, the fall in labor supply is contained which prevents a drastic fall in output, as would be the case if there were perfect information. Moreover, if agents observe high TFP growth today, they might also attribute this rise to a previously overinterpreted shock last period. Thus, agents optimally review their estimation of previous cyclical shocks. This feedback mechanism contains higher beliefs about contemporaneous shocks and thus reduces the channel through which a shock affects the economy. Overall, they present the differences between EMDE and AE as the result of different levels of uncertainty (i.e. the noise of the imperfect signal). Uncertainty, they claim, is higher in EMDE as a result of questions regarding the sustainability of reforms. Reducing EMDE's uncertainty would bring BC's moments closer to those of AE.

Another important aspect in explaining consumption fluctuations has been to separate consumptions between durable and non-durable goods – the consumption of the former being usually the most volatile and the latter smoother. Alvarez-Parra et al. (2013) offer such a decomposition and extend the usual SOE RBC to two sectors, one producing durable and the other non-durable consumption goods. They observe that this modification greatly diminishes the role of permanent productivity shocks and underlines the need to introduce financial frictions if one wants to replicate BC fluctuations. Nevertheless, their article makes strict assumptions regarding the tradability of the two goods which by claiming that durable goods only are traded overseas. This, in my opinion, might create unwanted effects related to the mechanisms of the shocks they identify<sup>10</sup>.

Another critic addressed at former approaches was made by Chen and Crucini (2016). The authors claim that a partial equilibrium approach fails to capture important aspects of international macroeconomics, notably productivity spillovers. They extend the classical model to a two-country general equilibrium SOE model and observe that, as a result, interest rate shocks lose their explanatory power, whereas trend productivity shocks prove twice as important as in Aguiar & Gopinath, a result of the importance of productivity spillovers. However, their model does not introduce any financial frictions, which might prove detrimental to their results, as they are key in modelling interest rate shocks.

Seoane (2016) claims that a time-varying parameters SOE RBC is preferred by the data over the otherwise usual model. Using Bayesian estimation to identify the parameters, he identifies that the parameters estimated this way comove strongly with the real exchange rate and notably

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<sup>10</sup>Varela (2017) actually develops a two sector model: tradable vs non-tradable. In her work, non-tradable are subject to more stringent financing constraints as they cannot sell their production on world markets which represents more risk for international lenders. This differentiation between tradable and non-tradable goods makes a good way of modelling the data as the latter are, according to her empirics, the drivers of consumption volatility.

during downturns<sup>11</sup>. As such, he models a two sector SOE RBC with a real exchange rate and claims that this helps identify better the fluctuations. As a result, if stationary productivity shocks and interest rate shocks matter more, trend productivity shocks cannot be left aside as they identify around one third of fluctuations<sup>12</sup>.

In unpublished work, Cao et al. (2016) consider the conditions under which Aguiar and Gopinath's results hold, that is the parameters defining the PIH. They show analytically that, only when the sensitivity of the interest rate to movements in the stock of debt is close to zero and with separable preferences, consumption fluctuations are determined by long term productivity shocks. This effect is powerful as long as the interest does not react to the stock of debt, which offers a clearer approach as to why both approaches have mostly been found to be exclusive. They note as well that the specificity of preferences is key to delivering higher consumption and trade balance volatility but that it disrupts the model's empirical performances, thus advocating for the introduction of frictions in usual models.

In a nutshell, the previously mentioned studies point in one important direction: the introduction of frictions is a key determinant in replicating EME's BC. The next section reviews the literature focusing more closely on these aspects.

### 1.2.3 Delving deeper into necessary frictions

#### First and foremost: Financial frictions

There are two frictions at the core of Neumeyer and Perri (2005) and Uribe and Yue (2006): working capital constraint and endogenous country spreads.

The former element has been at the center of several critics. Oviedo and Yue (2009) question the relevance of said working capital constraints and find that they require interest rate shocks defined by high level and volatility that exhibit as well a contemporaneous negative correlation with TFP shocks, which goes against the data. They thus dub these constraints as an ineffective mechanism. In their previously cited empirical approach, Chang and Fernandez (2013) confirm this finding. Their Bayesian estimation shows that, of the two commonly introduced frictions, only endogenous spreads are crucial for a financial friction modeling of the economy. Mendoza and Yue (2012) come back on the empirical importance of working capital loans and find that they are actually quite small in EMDE. Thus, they introduce low working capital requirements in their models. They extend the former approaches by modeling these constraints as related, not to paying wage bills in advance, but to paying a share of imported intermediate inputs

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<sup>11</sup>This relates to previously mentioned articles that consider sudden stops (Seoane (2013) and Seoane and Yurdagul (2017)).

<sup>12</sup>This articles lies the ground for more links with the previously mentioned second branch of the literature on the importance of world prices, commodities, terms of trade and the real exchange rate. This literature has not positioned itself with respect to the debate developed in this chapter so far. As such I do not develop it much further but leave that to a future version of this chapter.

in advance. The constraint is then amplified by the fact that, if firms are not able to pay for these imported inputs, they must substitute with imperfect inputs, imported or not. This reduces the production efficiency of firms and also reallocates labor production towards domestic inputs, thus reducing final production even more. In Mendoza (2010), the low working capital constraint is combined with an endogenous collateral constraint, which, when binding, amplifies the initial mechanism. If these articles were not meant to address the empirical regularities of EMDE's BC <sup>13</sup>, they prove to be useful and interesting by modeling alternatives relaxing the strong assumptions required when using working capital constraints.

Besides the previously mentioned debate on the underlying dynamics of the country spread, their incorporation in SOE-RBC models have been supported widely in the literature. Some articles have tried micro-founding this embedded financial friction or exploring side explanations to this modelling of risk. I now present these contributions.

Arellano (2008) extends the Neumeyer & Perri and Uribe & Yue approach by giving empirical evidence for and modeling endogenous country spreads that respond to the probability of default on international loans in a sovereign default model. Her approach was complemented by Gordon and Guerron-Quintana (2018) who model the endogenous relationship between bond spreads and future productivity. These two articles, by introducing a modelization of default possibilities in an otherwise standard SOE model, have helped microfounding the determinants of country risk premia.

Fernandez and Gulan (2015) propose an extension of the usual SOE model so as to micro-found the countercyclical nature of the interest rate. Agency problems between foreign lenders and domestic borrowers (modeled through Bernanke-Gertler-Gilchrist contracts) create an endogenous interest rate premium reflecting the private sector's risk of default following productivity shocks. As such, a negative productivity shock not only decreases output but also firms' net worth, which results in higher leverage, default risk and as such country risk premium, which amplifies the initial mechanism. This way, the authors assert the importance of frictional entrepreneurial borrowing in modeling realistic interest rates' dynamics.

Akinci (2017) model the apparition of financial frictions using a costly state verification problem à la Bernanke-Gertler-Gilchrist. This helps her model endogeneously the countercyclical nature of country risk premium, which has been a challenge for previous studies. In the proposed model, a firm's borrowing rate adjusts countercyclically as the productivity default threshold depends on the state of the macroeconomy. Using Bayesian estimation, she finds that time varying uncertainty in firm specific productivity explains more than half of the variances in the trade balance and in the country risk premium.

Overall, these approaches have mostly explained financial frictions in EMDE as stemming

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<sup>13</sup>The two articles focus rather on modeling sudden stops (Mendoza (2010)) and sovereign defaults (Mendoza and Yue (2012)).

from the demand side of the credit market and not from its supply side (banks). To my knowledge, and contrarily to some recent observations on AE (see Schularick and Taylor (2012)), less research has tried introducing frictions on the supply side. I now present these articles.

Another line of work has tried focusing on the importance of frictions among banks as an accelerator to shocks to the financial sector, and potentially foreign interest rate shocks.

Hwang (2012) remarks that most of the credit constraints considered in this literature focuses on international borrowing and offers to look at shocks to the domestic banking sector as a measure of frictions in domestic credit markets. To do so, she introduces banks acting as financial intermediaries that transform domestic deposits into loans to firms using a collateralized loan production function. This production requires labor for monitoring and collateral (domestic bonds and capital) and is subject to two types of shock (to the value of collateral and the effectiveness of monitoring) assumed to be capturing financial distress. Her model's estimation concludes that domestic financial frictions do not alter the transmission of usual productivity or foreign interest rate shocks. Nevertheless, she shows that shocks affecting the loan production process can create credit contractions and recessions.

In unpublished work, Grosse Stefen (2015) introduce a capital importing banking sector in a SOE model, which acts as a leveraged intermediary for capital flows. Banks fund themselves both through domestic deposits and international capital markets. Due to agency frictions, they are constrained in their borrowing at equilibrium but more so regarding international funding. In his model, financial sector shocks deepen the asymmetric borrowing constraints and lead banks to rebalance their funding towards domestic sources. This contributes to the procyclicality of capital flows and macroeconomic fluctuations. Foreign interest rate shocks are followed by similar fluctuations in the economy but the author claims that the financial sector shocks he introduces account for a higher degree of total investment and trade-balance-to-output ratio fluctuations.

Chang et al. (2017) add endogenous firms' funding decisions (between bank loans and market bonds) to a DSGE SOE model, so as to account for the recent rise in EMDE's corporate bond issuances in international markets. If their goal is not the same as most of the formerly cited literature, the mechanism they underline is of prime interest. Banks offer monitoring to firms facing a moral hazard problem (following Holmstrom and Tirole's approach), which is not the case for markets. Yet banks have access to limited equity. As such a fall in world interest rate, increases the demand for capital and corporate bonds and bank loans increase as well, the latter being nevertheless constrained by their scarce equity. If their article doesn't try to replicate BC fluctuations, they offer an interesting approach to modeling the equity constraints faced by banks in EMDEs and as such to supply side financial frictions.

On the side-aspect of risk accounting in EMDE, Fernandez-Villaverde et al. (2011) study how changes in the volatility of the world interest rate can have an impact on macroeconomic

fluctuations even if its level does not vary. Their model identifies foreign debt as a mean to hedge against idiosyncratic productivity shocks, in order to smooth consumption. An exogenous rise in world interest rate volatility increases debt riskiness. To reduce debt exposure, agents reduce domestic absorption by reducing consumption and investment <sup>14</sup>, which leads to subsequent falls in output and hours worked. This channel, which does not act as a substitute to existing ones, proves to be quantitatively important in identifying fluctuations. Even though the authors do not introduce any theory as to why world interest rate volatility might vary over time, they claim that it is a realistic hypothesis. Indeed, it could reflect higher risk during uncertain times (financial crises for example) or political instability. Another explanation they give relates to the fact that interest rate volatility reflects the amount of information available or the focus investors give to new information. During turbulent times, any news increases asset trade in EME's thinner markets, thus increasing volatility.

Their approach finds some echo in the works by Fogli and Perri (2015) and Gete and Melkadze (2018), who study time-varying uncertainty as a driver of BC. The former authors consider the role of this uncertainty on external imbalances and show that, through a precautionary saving mechanism, higher uncertainty changes households' savings and consumption decisions leading to current account surpluses. Gete and Melkadze (2018) extend their approach to replicate, using the same source of shocks - that is uncertainty - to replicate other macroeconomic fluctuations. They introduce banks exposed to aggregate and idiosyncratic risks, thus reacting to changes in volatility. This, in turn, affects both households, as their deposits become riskier, and firms who face a contraction in credit supply. This mechanism, which replicates SOE BC, brings an interesting approach as well as it moves the financial constraint from a demand towards a supply perspective. A distinction that Akinci (2013) questions is the fact that country spread dynamics follows from shocks to the world risk-free interest rate. She shows that EMDE's cost of borrowing is more correlated with global financial risks than with a global risk-free interest rate. She therefore tries to relax the assumption, present in the literature, that investors are risk-neutral agents that react to fluctuations in the risk-free interest rate through fluctuations in countries risk premia. To this end, she uses a panel VAR to disentangle the relationship between country spreads, global financial risk and the world risk-free interest rate <sup>15</sup>. The author finds that, whereas the global risk-free interest rate negligibly contributes to EMDE's fluctuations, global financial risk and country spread shocks explain, respectively 20% and 15% of EMDE's real fluctuations. Global financial risk affects the economy mostly through its impact on country spreads. The latter's fluctuations can indeed be explained by global financial risk to 20%, followed by domestic variables fluctuations (15%) and the global risk-free interest rate movements (5%).

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<sup>14</sup>The fall in investment results from the fact that debt, being a worse hedge against productivity shocks, drives the fall in returns to physical capital.

<sup>15</sup>To do so, she assumes : that global financial variables are exogenous to EMDE, that the global risk-free rate impacts global financial risk contemporaneously but that the reverse channel is lagged and that innovations in financial markets affect EMDE's real economy lagged but that the reverse effect is contemporaneous.

## **Second: Labor market frictions**

Boz et al. (2015) focus on labor markets and how they affect BC. They observe that in EMDE, and contrary to AE, real wages are twice as volatile as output whereas employment is half as volatile as output. They thus argue that there are interactions between labor and financial markets that contribute to BC fluctuations. They extend the classical SOE RBC model with Nash-bargaining-determined wages and advance that interactions of labor market frictions and shocks (TFP and interest rate) contribute to macroeconomic fluctuations. A high interest rate combined with a negative TFP shock decreases the discounted future returns on matching, which decreases the employers' effort in filling vacancies thus increasing unemployment. Moreover, a high interest rate decreases consumption to increase savings, this mechanism being amplified through the uncertainty in future employment and through slackened labor market. The fall in consumption makes non-market activity (related to the outside option of workers) less attractive, decreasing real wages and amplifying shocks as a result.

Altug and Kabaca (2016) try to allow changes in the intensive and extensive margins of labor inputs in SOE RBC and try to see if this helps replicating BC. They introduce search and matching frictions, Nash-bargaining processes for wage determination and working capital constraints for firms. They find, however, that labor market frictions alone cannot replicate the data and that there is a need for working capital constraints as only these can help amplify the effects of shocks on both margins of labor.

Following previous work by Restrepo-Echevarria (2014) and Fernandez and Meza (2015), Horvath (2018) recently focuses on the fact that in EMDE, with respect to AE, a relatively higher share of the labor force works in a poorly measured informal sector. He models how this aspect affects foreign interest rate shocks and output. If a large fraction of the informal economy is not measured, then a rise in world interest rates, at which only formal firms can borrow, drives consumption, investment and labor away from this sector. This increases the borrowing cost for the formal sector, which output, in fine, falls. As observed, output consists mostly of the formal production, the volatility we observe is more important if the informal sector is poorly measured. This models well the relatively higher volatility of consumption relative to output in EMDE.

This approach can be brought closer to other work considering other aspects of labor markets in EMDE such as the importance of self-employment in these economies. Finkelstein Shapiro and Gonzalez Gomez (2017) advocate that this important feature of EMDEs labor markets helps replicate BC following aggregate shocks. Finkelstein Shapiro and Mandelman (2016) explore the role of remittances in exacerbating this pattern. They build a model where countercyclical remittances actually exacerbate the cyclical fluctuations following a negative productivity shock by driving labor away from salaried work, which accounts, nevertheless, for a greater share of total output. Without strong financial frictions, this inherent friction to labor markets in EMDEs helps as such explain the greater volatility of macroeconomic variables in EMDEs.

**In a nutshell:**

Overall the debate on the sources of fluctuations of real business cycles in emerging markets and economies hasn't been totally answered and is still ongoing. Nevertheless a major aspect of this literature relates to the fact that financial frictions have proven to be key elements in order to amplify non-linearities and shocks and replicate EMDEs' macroeconomic fluctuations.

### **1.3 Taking stock of the literature: key elements to keep in mind**

Growth patterns differ widely and so does economic volatility across countries.

This chapter has reviewed the economic and financial literature to identify key shocks and vulnerabilities that shed light upon volatility differentials: (1) country specific factors such as diversification, institutions, policy framework ; (2) external factors such as terms-of-trade/foreign interest rate shocks or natural disasters ; (3) financial factors such as liberalization/integration in world markets, financial development. I retain three elements for the rest of the dissertation: commodity dependence, regional affiliation (contagion, synchronization) & financial crises.

In the second part of the chapter I focus on the theoretical determinants of higher business cycle fluctuations in emerging markets. Two main views oppose: (i) foreign interest rate shocks amplified by frictions ; (ii) a higher proportion of permanent vs transitory shocks to productivity. Both stories have been adjusted/precised in great detail but studies that aim at comparing the different contributions to volatility provide conflicting results. The main element that signals as an unconditional of emerging markets higher volatility are frictions, and in particular financial frictions, because they amplify shocks and non-linearities. Discontinuities are the final key element from the literature identified through discussions of shocks, regimes, binding constraints...

As identified in present chapter, Markov switching models have been used in the literature to capture non-linearities in long-term growth patterns and economic volatility. Differences were then studied under the lens of long-run structural determinants. In the empirical literature, Markov switching models have been widely used to study more precisely business cycle fluctuations. They allow the inference, from the data, of growth regimes and dynamics that can be heterogeneous across countries. These regimes act as an interesting counterpart to those modeled in the theoretical literature. A MSM negative growth regime is akin to persistent/a series of negative productivity shocks, as discussed in Aguiar and Gopinath (2007). Given the importance of financial frictions in explaining volatility differentials, I then study, in the rest of the dissertation, the role of financial crises. The next chapter discusses business cycle volatility worldwide from an empirical perspective.





*On the ascending or stationary trend of an economy, apparently regulated, the crisis generates suddenly not only a slowdown of economic activity but also an increase in uncertainties, fears which might overall provoke regressive phenomena.*

*Sur la crise,* EDGAR MORIN (2020)

## Chapter 2

# Business Cycles worldwide - insights from Markov Switching Models

Emerging Markets and Developing Economies display a higher business cycle volatility than Advanced Economies (Aguiar and Gopinath, 2007). As seen in the first chapter, this illustrates, among other, two main things: (i) EMDE are more prone to foreign interest rate shocks and permanent trend growth shocks and (ii) in EMDE, shocks translate into wider real costs due to higher frictions.

This chapter aims at discussing these conclusions from an empirical perspective to answer the following questions.

### **Taking stock of business cycle volatility**

- What are the key characteristics of business cycles worldwide?
- Are negative growth shocks (recessions) key drivers of differences in volatility?

To that end, I relate to the literature on Business Cycle (BC) datation to take stock of differences and similarities in growth dynamics between Advanced, Emerging and Developing Markets (AM-EM-DM). I rely upon Markov Switching Models (MSMs) to date BC expansions and recessions for a panel of 54 countries (24AM, 15EM, 15DM). By assuming a non-linear Markovian Data Generating Process (DGP) for the observed time series, MSMs identify high- and low- growth regimes, akin to expansions and recessions, and document the underlying transitional dynamics. Of particular interest to the previous chapter, the transitions between low- and high-growth regimes can illustrate negative/positive shocks to trend growth, akin to Poisson

shocks. Differences in the probabilities to enter/exit a recession might thus shed light on the realized relative importance of permanent versus transitory shocks in the data. A by-product of MSMs' estimation, the smoothed probabilities to be in a given regime allow for a precise quarterly datation of business cycles' turning points. This allows me to construct a database of recession and expansion episodes worldwide. I can hence showcase the main similarities and differences between BC phases and country groups.

This chapter contributes to the literature by using MSMs to date precisely business cycles for a wide panel of countries at a quarterly frequency. I can thus take stock of 6 main stylized facts on BC worldwide. Most notably, there doesn't seem to be differences in the the dynamics of the cycle, i.e. the frequency of regime switches: shocks to trend growth are not more frequent in EMDE than in AM. The main disparity between groups comes from the magnitude of the switches. More specifically, recessions entail far bigger losses in EMDE. Section 1 presents the literature on BC datation and the methodology while section 2 presents the sample and the data covered in this dissertation. Section 3 discusses the results and stylized facts and section 4 concludes by highlighting this chapter's contributions on volatility differentials worldwide.

## 2.1 Fluctuations in economic activity and business cycles

Through history, cycles have been a frequent conceptualization tool for observed fluctuations. Empirically cycles have been studied at a wide range of frequency<sup>1</sup>. The underlying idea behind this point is the fact that observed time series can be decomposed as the sum of cyclical components of different frequencies and amplitudes. In this dissertation, I focus my work on the business cycle frequency. These fluctuations occur at a frequency between 2 and 12 years on average. They are essential to economics as these frequencies are often the ones targeted by macroeconomic policies. As such they offer an evident approach to any researcher looking to understand what to do about volatility.

### 2.1.1 Defining the cycle

Many definitions of the Business Cycle are to be found in the empirical literature. This concept underpins indeed several features on which economists do not always conciliate. Burns and Mitchell (1946), when shaping the methodology to be used by the National Bureau of Economic Research, defined *cycles* as

*"expansions occurring at about the same time in many economic activities, followed by similarly general recessions, contractions, and revivals which merge into the expansion phase of the next cycle".*

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<sup>1</sup>See Sismondi (1819), Juglar (1860), Kondratiev (1925) and Kuznets (1930).

Two important features are highlighted here: the co-movement of various macroeconomic variables and the alternation of different phases, namely expansions and recessions. In this dissertation, I focus on the latter as I aim at comparing Business Cycles worldwide at a quarterly frequency. Data quality, comparability and availability at a quarterly frequency of many variables might constrain the sample<sup>2</sup>. This is nevertheless a key element to understand and date business cycles and economic crises (a.k.a. recessions). Future research (detailed in chapter 6) will aim to complement databases and models with more disaggregate measures of economic and financial activity<sup>3</sup>. Burns and Mitchell's approach relied on graphical methods to identify specific cycles. Since then, statistical methodologies have been proposed to automatize the process. As discussed extensively in Harding and Pagan (2005), two main approaches are being used to date these cycles empirically.

The first one consists in identifying country output gaps – that is the difference between observed and potential output. The latter is a theoretical concept illustrating what output could be, should all factors of production be used at their best potential in a frictionless world. By definition, the output gap is unobserved and has to be inferred from the data:

- it can be captured as the cyclical component from the Hodrick-Prescott filter, whereas the trend component captures potential output. This methodology though commonly and often used in most of the macroeconomic literature has long been criticized. Most notably because it creates spurious dynamics in the output time series when the cycle switches phases (Cerra and Saxena, 2017). Hamilton (2018) offers a thorough examination of the flaws associated with this filter.
- it can also be estimated using econometric techniques or a functional production function. Following this approach Mendieta-Munoz (2017) offers a BC comparison between OECD and Latin-American countries. Beyond the need for a wide set of data, this method also requires assumptions on the functioning of the economy which lie above the scope of this dissertation.

The second and most commonly employed approach to dating BC follows from the Turning Point Cycles view. Its funding principle is to identify the moments at which an economy moves from an expansion to a recession and reversely. Because it doesn't require as much data and is easily reproducible, I follow this strand of the literature. I now present the two existing strands that have built upon this idea.

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<sup>2</sup>The OECD (Organisation for Economic Coordination and Development) offers an approach which relates to both features of Business Cycles - the Composite Leading Indicators. I briefly present their methodology and its relevance vis a vis this dissertation in Annex B. The main cave-at of their approach is data availability which constrains the scope of their study.

<sup>3</sup>For information, the main macroeconomic/financial variables to be included in the database include: investment, consumption, debt-to-gdp, forex reserves, effective exchange rates, current account, trade balance, private credit-to-gdp, interest rates, etc

### 2.1.2 Identifying phases of the business cycle

The first one, following the work developed at the NBER, consists in a non-parametric approach. It identifies turning points by defining a set of rules to characterize GDP growth rates<sup>4</sup>. The most commonly used procedure is the application of the Bry-Boschan algorithm to quarterly GDP (BBQ), as developed in Harding and Pagan (2002). It combines a rule for identifying local extrema and a selection procedure to constrain cycle length.

The main critics made to this approach relates to the fact that the true nature of the events, i.e. the true data generating process, is unknown and unobserved by the econometrician, who can only form inferences about said events (Hamilton, 2003). A direct consequence is that any attempt at using a common rule for comparing time series for different countries, i.e. different data generating processes, might lead to spurious analysis. That is, we would want to specify a different dating rule for countries experiencing high or low average growth, or even depending on data quality. This method has nevertheless been widely accepted by the literature for its ease-of-use and its success in matching US BC facts.

Calderon and Fuentes (2014) use BBQ to date BC at a quarterly frequency for 77 countries. They find that EMDE experience costlier recessions than AE, though of similar duration, whereas their expansions are stronger but shorter. I start this research by repeating the exercise over an unbalanced panel of 81 countries (24 AE and 57 EMDE, for a total of 4568 and 5236 quarters). A critical aspect when comparing such a wide coverage of countries at a quarterly frequency is tied to data quality. As such, I chose to rely only on data collected by international organisations (IMF, OECD, BIS, WB) to ensure best achievable comparability. Annex C presents the country coverage as well as country groups.

### Inferring the cycle using Markov Switching Models

The second approach to dating BC turning points follows from the seminal work of Hamilton (1989) (1990). He fits a parametric statistical model to the data and then uses it to identify turning points. More specifically, he builds a regime-switching model in which an unobserved state, used to describe the phases of a BC, follows a first-order Markov process - Markov-Switching Models (MSM). As such, the different states of the cycle are inferred from the data without any a priori specification but the number of regimes<sup>5</sup>. Extended afterwards to more complex specifications (such as heteroskedasticity, multi-variate framework or time-varying transition probabilities for the Markov process), Hamilton's approach has concentrated the focus of nu-

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<sup>4</sup>A widespread approach, often used in the media, defines a recession by two consecutive quarters of negative growth. This rule, whose economic fundamentals are not ascertained, fails at replicating some NBER dates for the US and is seen as flawed by most of the literature Harding and Pagan (2001).

<sup>5</sup>Usually, that number is set to 2 so as to identify the high- and low-growth regimes inherent to the business cycle approach.

merous researchers. This accrued interest echoes the importance of non-linearities in economic time series (Hamilton, 2016). When comparing MSM with non-parametric dating algorithms on monthly US variables, Chauvet and Piger (2008) find that, if MSM outperforms BBQ in real time predictions, both methods perform similarly in identifying historical turning points. Nevertheless, Harding and Pagan (2002) (2003) warn that MSM are a less transparent methodology that might be sensitive to the parametrization choice and the sample period studied.

If MSM have been widely used to study national BC or drive comparisons between countries, the bulk of existing studies has focused essentially on AE. Jerzmanowski (2006) and Kerekcs (2012) form notable exceptions. However, their main focus revolves on the identification of growth patterns rather than business cycle dating, that is a longer run view. As such they run 4 states<sup>6</sup> MSM on annual data for around 85 countries. Overall they find that those countries experiencing sketchier growth patterns are characterized by more frequent stagnation and crisis episodes. They are characterized by institutions of poorer quality, lower investment in physical (infrastructures) and human capital and worse macroeconomic stabilization policies. Altug and Bildirici (2012) is the closest to this article as they compare BC datations using BBQ and MSM for 27 developed and developing countries. I extend their approach to a wider set of countries. As noted in Harding and Pagan (2002), MSM estimation procedure is sensitive to sample size. For 27 countries the estimation did not converge. As such, results presented in the remainder of the dissertation focus on those countries for which it did (24 AM, 15 EM and 15 DM). Annex C presents the country-time coverage for the whole dataset and details countries that have BC dates using MSM. I now discuss Markov Switching Models estimation.

### Estimating Markov Switching Models

The Markov-switching autoregressive model proposed by Hamilton's seminal contribution considers the first difference of the observed series as a non-linear process. Nonlinearities stem out from discrete shifts in regimes, characterized by different means. MSM identify stochastic business cycles, with the different regimes identified as the most statistically relevant states given the data. The model is estimated through solving the actual marginal likelihood and maximizing the likelihood function with respect to the population of parameters.

Since its introduction, Hamilton (1989)'s approach has been extended to more complex specifications so as to refine inference on the true DGP.

$$y_t = \nu_{s_t} + \sum_{j=1}^p \alpha^j y_{t-j} + \epsilon_t^{s_t} \quad (2.1)$$

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<sup>6</sup>The four regimes are then classified as crisis (i.e. strongly negative growth episodes), stagnation, stable and miracle growth episodes, following initial classification by Pritchett (2000)

where  $y_t$  represents the quarterly growth rate of GDP;  $s_t \in \{1, 2\}$  the regime;  $\nu_{s_t}$  the regime-specific intercept;  $p$  the number of lags considered;  $a^j$  the autoregressive coefficient of the  $j^{\text{th}}$  lag and  $\epsilon_t$  an i.i.d. process with variance  $\sigma^7$ .

The second core equation of MSM provides information on the regime dynamics. The stochastic process that generates the unobserved regimes is an ergodic Markov Chain defined by following transition probabilities:

$$p_{ij} = Pr(s_{t+1} = j | s_t = i) = Pr(s_{t+1} = j | s_t = i, s_{t-1} = k, \dots), \quad \forall i \quad \sum_{j=1}^2 p_{ij} = 1 \quad (2.2)$$

Annex E presents the estimation procedure used to infer the two regimes and the transition probabilities from the data. For all countries in the initial sample, five specifications are estimated depending on the number of lags included (0 to 4). Specifications are then tested to ensure that no state is absorbing or transitory<sup>8</sup>. The best specification is selected by comparing Information Criteria. I focus on the corrected Akaike IC, but I also consider the Bayesian Information Criterion and the Markov Switching Criterion developed by Smith et al. (2006). In most cases the differences, criterion-wise, between different specifications are tenuous. Hence, country by country, I verify graphically that the selected specification signals the main episodes for which the log real gdp curve displays a switch in trend.

As a by-product of the estimation, I obtain the smoothed probabilities which provide an inference on the unobserved state using all the information available in the sample. These time series can then be used to date the cycle (Hamilton, 1989). We consider date  $t$  to be in the regime  $s$  if the smoothed probability of observing state  $s$  is above 0,5 at date  $t$ . For some countries, given that some recessions are associated to drastic output losses and steep changes in trend growth, others might be considered too mild for the algorithm to signal. The smooth probability of being in the low regime might thus increase but not reach the 0,5 threshold. While I check graphically the meaningfulness of the estimation, I also verify if milder recessions, acknowledged in other typical sources<sup>9</sup>, that fail to pass the threshold can actually be dated by lowering it<sup>10</sup>.

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<sup>7</sup>In this article the set of specifications only includes various number of lags. It also extended estimations to include heteroskedasticity with little success. I could also include regime-dependent autoregressive coefficients. Nevertheless as some countries have few observations, given the computationally burdensome nature of MSM, I choose not to extend these specifications to any country to ensure comparability between estimates.

<sup>8</sup>An absorbing state is one where the probability to remain in this state is equal to one. A transitory state is such that the probability to remain in that state is null.

Having absorbing states would not echo the repeating nature of BC but rather identify the existence of a structural break in the series, which is not the object of this article.

<sup>9</sup>NBER-OECD-ECRI datations

<sup>10</sup>This is the case for Austria, Denmark, Estonia, France, Italy, South Korea, Lithuania, Switzerland and Turkey.

### Further discussion on estimation robustness

As pointed out by Harding and Pagan (2003), MSM are limited by the validity of the statistical model. An important concern is the fact that the Data Generating Process might actually not be governed by Regime Switches but by a linear specification. Testing the existence of Markov Switching proves to be difficult, as under the null of no switches, parameters governing the dynamics of the model are not identified and the Information Matrix is singular. Hansen (1992) provides a computationally burdensome test to address this question. However his methodology only offers a bound for the Likelihood Ratio statistics and no critical value. On the other hand, Garcia (1998)'s proposal ignores the singularity of the Information Matrix under the null. Carrasco et al. (2014) have developed an optimal test for parameter stability. Their test has several advantages, as it solely requires the estimation of the model under the null but also does not require the entire specification of the dynamics of random coefficients. The test has, as a result, power against a wide variety of alternatives. Finally this test proves to be useful even with few observations, which is sometimes the case for me.

## 2.2 Data and coverage

### 2.2.1 Initial Sample

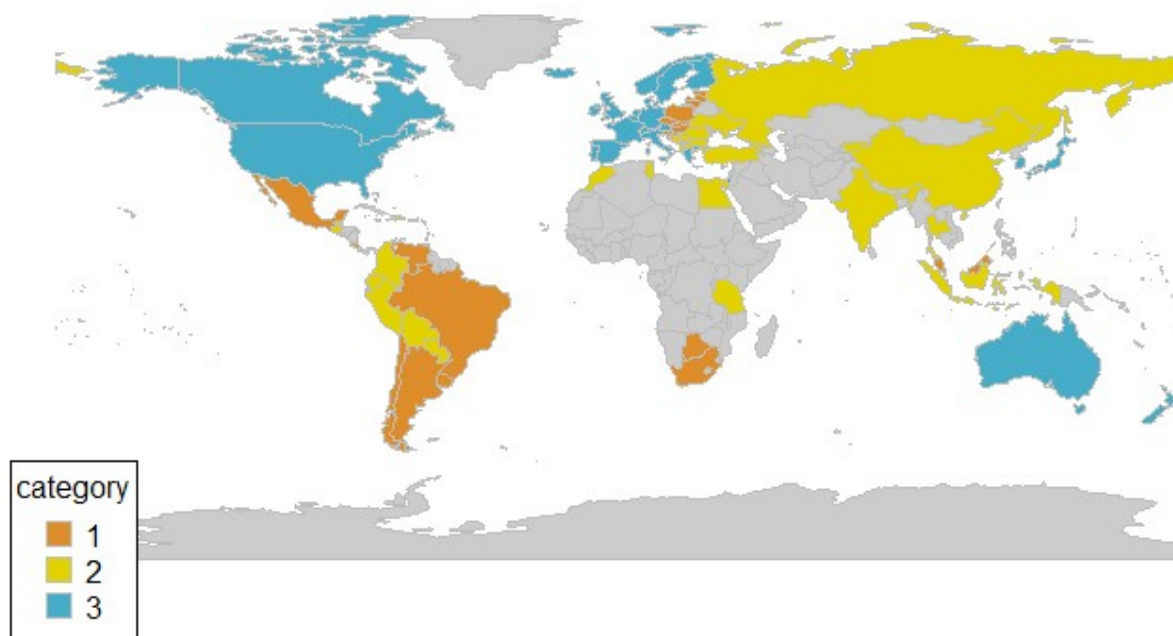
This research focuses on an initial unbalanced panel of 81 countries over 1970q1-2020q1. Countries are selected if there is long enough time series for quarterly real Gross Domestic Product (GDP). I set the threshold to a minimum of 44 observations, which is more or less the length of one business cycle as acknowledged in the literature. Moreover it ensures a minimum of observations below which the econometric datation of turning points might have been spurious.

Time series are collected from the International Monetary Fund – International Financial Statistics database as well as from the Organisation for Economic Cooperation and Development. To ensure that the country-time coverage is the widest possible, alongside available time series for real GDP, I check if nominal GDP and GDP deflator time series allow for the construction of a longer time series. I select for each country the longest available. Time series are seasonally adjusted following the usual X13-ARIMA procedure. Annex C presents for each country the source of the time series and the associated time-span.

Figure 2.1 represents a plot of the countries in the sample. In the rest of the dissertation I split countries into three groups based on their World Bank income classifications in 1995. For some central and eastern European countries, the data is not available at this period and I use their classification based on 2000 data. Advanced economies correspond to the high-income group, emerging economies to the upper-middle income countries and the developing economies label groups the lower-middle and low income countries. I chose 1995 as it is slightly after the



middle of the time sample, ensuring that countries that switched group before/after this date will have spent half of the sample in the same one. Note however that few countries switch group and results are robust to changing the date of the classification.



**Figure 2.1:** Database coverage - by country group

1 = Emerging Markets, 2 = Developing Markets, 3 = Advanced Markets.

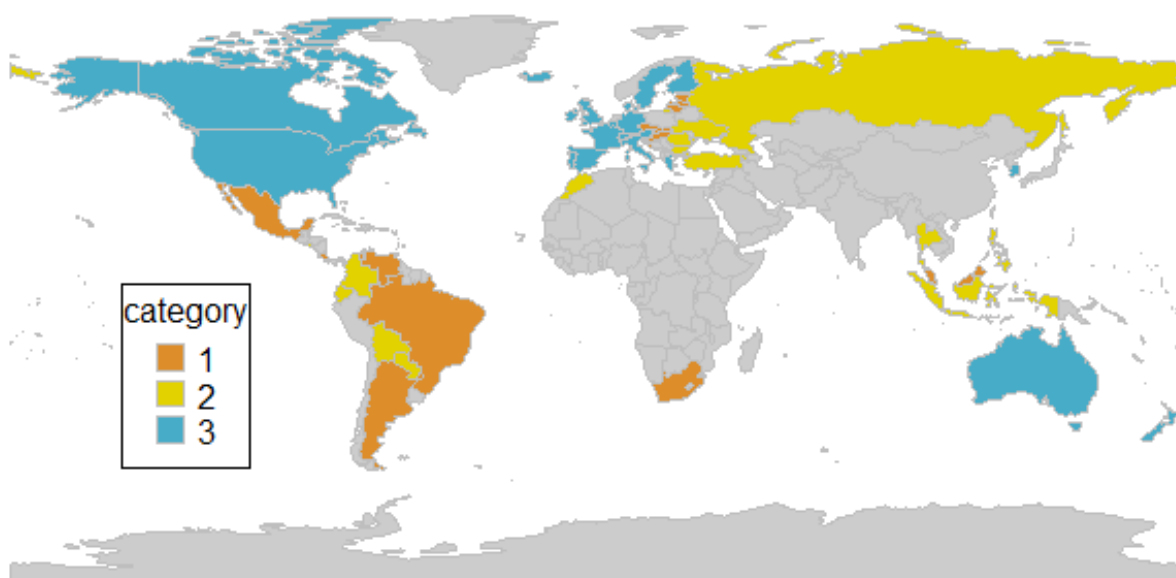
As identified in the literature, the over-dependency of a country upon natural commodities is a significant explanatory characteristics for higher volatility and exposure to foreign shocks. Hence I group countries based on that characteristics. To identify this set of countries, I rely upon three data sources as they cover either a different set of commodities (non- vs renewable ones) or a different panel of countries (including advanced markets or not):

- the IMF World Commodity Exporter Database focuses only on non-renewable commodities. A country is flagged as dependent if oil, gas and metals represent a large share of total exports (above 20% of total exports) or of fiscal revenues. The study covers all types of countries.
- Aslam et al. (2016) focuses on commodities including renewable resources such as food and raw materials (e.g. wood...). A country is flagged if commodities represent more than 35% of its total exports and commodities net exports represent more than 5% of its gross trade. The study focuses on emerging and developing economies
- the United Nations Conference on Trade and Development offers country-level information in its series of *State of Commodity Dependence Reports* starting 2012. All commodities and countries are included. I use this source to check the cases in which the former two might disagree and for potential advanced economies that might be dependent upon renewable commodities (e.g. New Zealand).

### 2.2.2 Final Sample

Over the 81 countries in the sample for which the model is tested, only in 54 occasions does the estimation and selection procedure proves successful. Annex G provides the information on the selected specification for these countries (model specification, parameter estimates, standard errors and statistical significance). They form the sample that will be studied in the rest of this dissertation.

Figure 2.3 maps the countries in the final sample and table 2.1 lists the countries by income group and regional affiliation. Commodity dependent countries are indicated in bold.



**Figure 2.3:** Database coverage post MSM estimation - by country group  
 1 = Emerging Markets, 2 = Developing Markets, 3 = Advanced Markets.

**Table 2.1:** Descriptive Statistics - real GDP and BC volatility

Region	Developing Markets	Emerging Markets	Advanced Markets
AME	Morocco, Turkey	<b>South Africa</b>	
Asia	<b>Indonesia</b> , <b>Philippines</b> , Thailand	Malaysia	Hong-Kong, Korea, Singapore
CEE	Armenia, Bulgaria, <b>Romania</b> , Russian Fed., Ukraine	Croatia, Czech Rep., Estonia, Hungary, Latvia, Lithuania, Slovak Rep., Slovenia	

**Table 2.1:** Descriptive Statistics - real GDP and BC volatility

Region	Developing Markets	Emerging Markets	Advanced Markets
LSA	<b>Bolivia,</b> <b>Colombia,</b> <b>Ecuador,</b> El Salvador, Paraguay	<b>Argentina,</b> <b>Brazil,</b> <b>Costa Rica,</b> Mexico, <b>Venezuela</b>	
WE			Austria, Belgium, Cyprus, Denmark, Fin- land, France, Germany, Greece, <b>Iceland,</b> Ireland, Italy, Luxembourg, Por- tugal, Spain, Sweden, Switzerland, UK
WC			Australia, <b>Canada,</b> New- Zealand, USA

Commodity dependent countries in bold.

Table 2.2 and 2.3 present some descriptive statistics by country groups and by region. Business Cycle volatility is computed as the standard deviation of growth rate time series, it is then averaged by group. To compare group averages, here and in the rest of the dissertation, I first use a Shapiro-Wilk test to check if variables are normally distributed. When this is the case, I use Student's t test to compare group averages; if not I use a Wilcoxon test.

**Table 2.2:** Descriptive Statistics - real GDP and BC volatility

	Nb of Country	Nb of Obs.	Business Cycle Volatility - $\sigma_{\Delta q}^2$						
			mean	std	max	qrt3	median	qrt1	min
by country group									
DM	15	1646	1.88	1.19	5.26	1.96	1.59	1.08	0.69
EM	15	1738	1.34	0.46	2.19	1.56	1.13	1.01	0.90
AM	24	4682	1.09	0.42	2.18	1.35	1.04	0.75	0.50

AM - Advanced Markets, EM - Emerging Markets, DM - Developing Markets

Growth in Advanced Markets is statistically less volatile than in Emerging and in Developing Markets by, respectively, 24 and 73%<sup>11</sup>. If EM are 40% less volatile than DM, the difference is less significant (with a p.value of 0.0803).

Countries located in Africa and the Middle East form the most volatile group, followed by Central and Eastern European countries. As can be expected, Western European countries and

<sup>11</sup>For the three groups, the null hypothesis of a normal distribution is rejected with p-values of 0.0239 (AM), 0.0133 (EM) and 0.00274 (DM). Average volatility in AM is statistically less than in EM with a p-value of 0.03318, and than in DM with a p-value of 0.005629.

	Nb of Country	Nb of Obs.	Business Cycle Volatility – $\sigma_{\Delta g}$						
			mean	std	max	qrt3	median	qrt1	min
by region									
AME	3	501	2.11	1.39	3.63	2.71	1.80	1.35	0.90
Asia	7	1073	1.54	0.26	1.83	1.65	1.59	1.52	1.01
CEE	13	1261	1.77	1.16	5.26	1.74	1.43	1.07	0.92
LSA	10	1118	1.32	0.55	2.19	1.75	1.08	1.01	0.69
WE	17	3311	1.02	0.39	2.18	1.14	1.03	0.76	0.50
WC	4	802	0.95	0.39	1.54	0.98	0.77	0.74	0.73
by commodity dependence									
NoCommod (all)	41	6354	1.41	0.86	5.26	1.61	1.14	0.92	0.50
NoCommod (DM)	9	939	2.38	1.32	5.26	2.63	1.80	1.68	1.00
NoCommod (EM)	10	1134	1.31	0.39	2.19	1.47	1.19	0.92	0.92
NoCommod (AM)	22	4281	1.05	0.36	1.83	1.29	1.04	0.92	0.50
Commod (all)	13	1712	1.28	0.53	2.19	1.59	1.04	0.91	0.69
Commod (DM)	6	707	1.13	0.30	1.59	1.27	1.08	1.02	0.69
Commod (EM)	5	604	1.40	0.62	2.19	1.95	1.04	0.91	0.90
Commod (AM)	2	401	1.46	1.03	2.18	1.82	1.46	1.09	0.73

**Table 2.3:** Descriptive Statistics - real GDP and BC volatility - by region

AME - Africa & Middle East, CEE - Central & Easter Europe, LSA - Latin & South America, WE - Western Europe, WC - Western Countries

the other english-speaking countries display lower volatility than other regions. Surprisingly, Latin and South American countries do not display a high average volatility when compared to other regions that contain mostly emerging and developing markets. This seems to be the result of the low volatility displayed by some smaller countries (Bolivia, Costa Rica and El Salvador). On the other hand, Argentina, often taken in the literature as an example for emerging markets' higher volatility, exhibits the highest volatility of the region and among the highest ones of the sample of countries. Commodity exporting countries do not differ statistically from the group of non-commodity exporters. This is most notably due to the high diversity of countries that make both groups. Developing markets non-dependent on commodities are on average (and in median) very volatile countries. For emerging markets, the 5 countries that rely heavily on commodities behave, on average, similarly to those that do not. One of the two advanced markets being commodity dependent is twice as volatile as the average non-dependent advanced market.

#### Stylized facts 1: Volatility shrinks as markets develop

- (i) **Growth is more volatile in developing than in emerging than in advanced markets.**
- (ii) Developing and emerging markets form a more heterogeneous group than advanced markets.

Figure 2.5: Growth and recessions – Developing markets

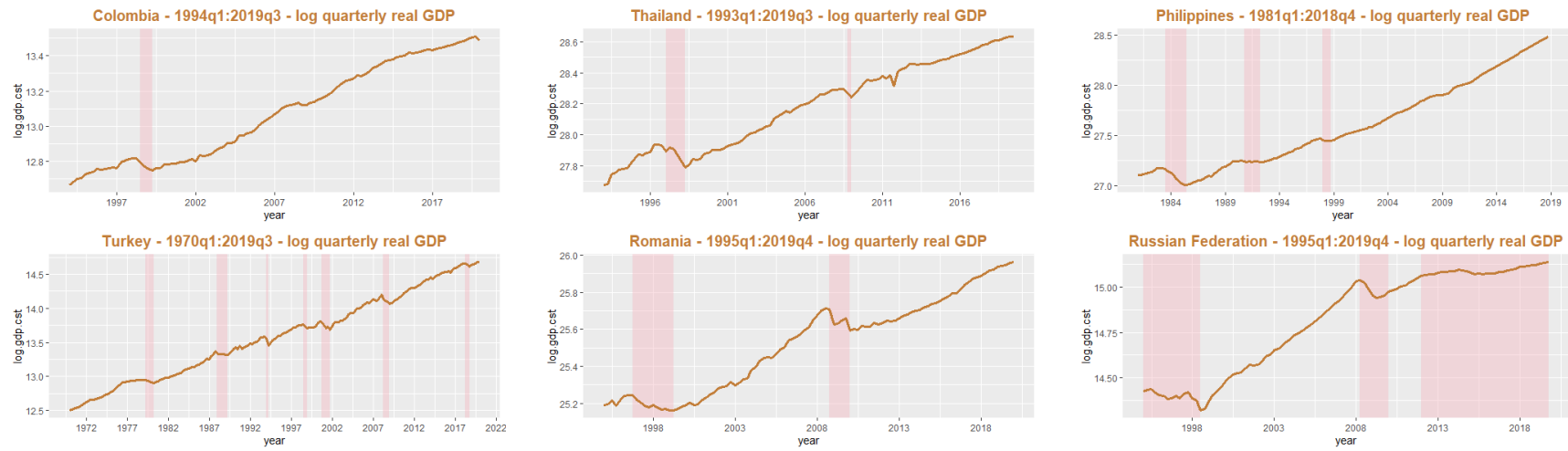


Figure 2.6: Growth and recessions – Emerging markets

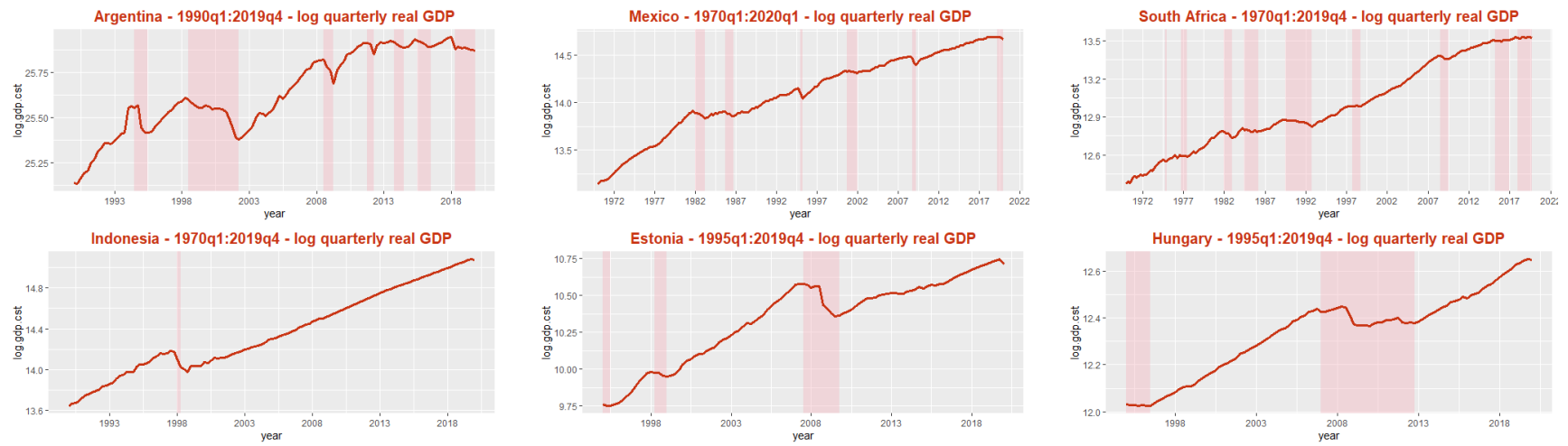
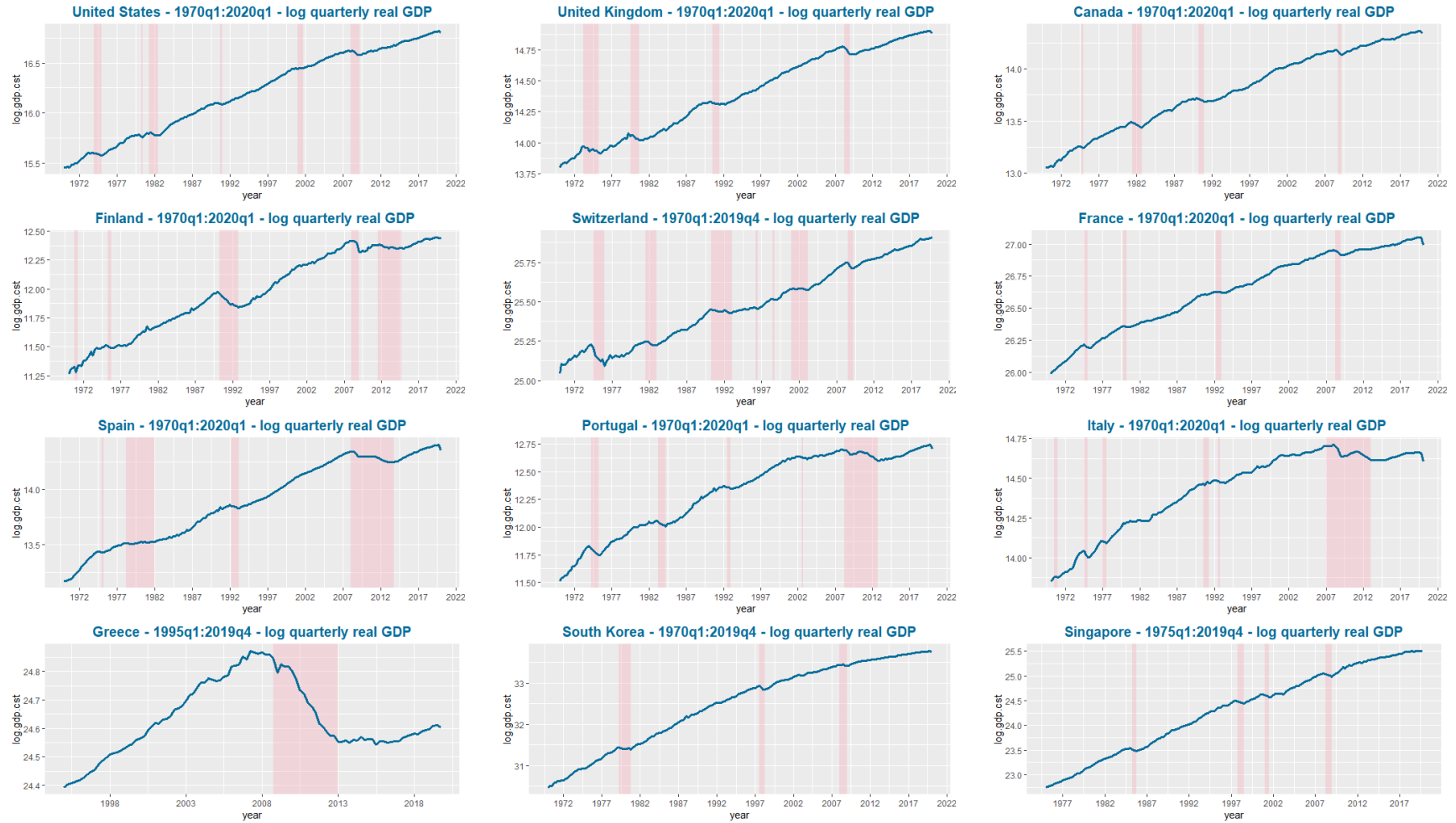


Figure 2.7: Growth and recessions – Advanced markets



Shaded areas indicate recessions as dated using Markov switching models.

### A look at the 'raw' data

Before discussing the stylized facts that can be derived from the estimations, figures 2.6, 2.5 and 2.7 present for a representative panel of developing, emerging and advanced markets the dated recessions (shaded areas). The first observation that can be made is that the Markov Switching Model fits well the visible downturns. There are some missed cases (Colombia 2009, Thailand 2013, Greece 2005). Some MSM-dated recessions appear shorter than the visible downturn, e.g. Indonesia 1998, Portugal 1992. For some countries, recessions include stagnation/low average growth episodes; e.g. Hungary 2010 ; Russia, recent period ; Spain, 1978. Second, there are indeed many types of recessions as illustrated here by the varying lengths of the shadowed areas. In particular, emerging and developing markets seem to be more exposed to longer recessions. This is by far less the case in advanced markets. Southern European countries often display one long recession after the GFC and the European debt crises. Small open advanced markets (Canada, Switzerland) display frequent and at times longer recessions. Third, the frequency of the changes vary greatly within and across groups. Among emerging and developing markets, there are frequent recessioners – Argentina, Mexico, South Africa, Turkey. Note that a graphical comparison between groups needs to consider the longer time series of advanced economies. For the latter, recessions seem to be regular events, the frequency of which varies from around 7 to 13 years. Next section aims at describing in more details these observations.

## 2.3 Business Cycles worldwide – some stylized facts

Two sets of information can be used to compare countries. The first batch relates to the growth regimes that characterize the DGP behind the time series. The second one considers the phases that can be identified in the data using smoothed probabilities.

### 2.3.1 Stylized facts - Learning about growth regimes

Table 2.5 presents, by country group (EM-DM-AM), information on the distribution of the main characteristics of the estimated parameters from the Data Generating Processes:

- the average growth per regime  $g_{Exp}/g_{Rec}$ <sup>12</sup> which highlight the strength of the dynamics, how much can an economy gain/lose as long as she remains in the same state.
- the standard error of the residuals which captures the volatility of the shocks in the gdp time-series that remains unexplained by the model, e.g. perturbations not related to business cycle dynamics.
- the probability to enter/exit a recession, which highlights the inherent dynamics to the non-linear two-regimes growth process.

<sup>12</sup>As different specifications were tested, the average growth per regime was computed country-wise depending on the state-dependent values for the intercepts and, when necessary, the value for the autoregressive parameters:  $\bar{g}_s = \frac{\mu_s}{1 - \sum_{l \in \{0, p\}} \phi_l}$ ,  $\bar{g}_s$  the average growth in state  $s$ ,  $\mu_s$  the estimated intercept in state  $s$ ,  $\phi_l$  the estimated autoregressive coefficient for lag  $l$  and  $p$  the number of lags of the selected specification (between 0 and 4).

(in %)	Mean $g_{Exp}$	Mean $g_{Rec}$	Std.Err.(rsdls)	P(Enter Rec)	P(Exit Rec)
<b>Developing Markets</b>					
avg	1.35	-2.69	1.33	3.99	31.6
std	0.579	2.54	0.881	2.31	15.6
max	3.19	-0.106	3.99	10.0	53.1
qt3	1.39	-0.826	1.43	4.14	45.6
med	1.22	-1.88	1.05	3.60	30.8
qt1	1.09	-3.63	0.879	2.78	19.5
min	0.651	-7.90	0.479	0.848	3.27
nb	15	15	15	15	15
<b>Emerging Markets</b>					
avg	1.20	-2.01	0.989	4.24	27.6
std	0.255	1.87	0.336	3.17	20.1
max	1.66	-0.0884	1.76	10.30	74.4
qt3	1.35	-0.657	1.19	5.94	32.1
med	1.15	-1.59	0.833	3.51	23.1
qt1	0.974	-2.87	0.743	1.70	15.4
min	0.909	-6.68	0.68	1.14	4.17
nb	15	15	15	15	15
<b>Advanced Markets</b>					
avg	0.963	-1.02	0.870	3.89	27.9
std	0.390	0.706	0.379	1.66	13.5
max	1.87	-0.061	1.92	8.45	52.7
qt3	1.18	-0.367	1.03	4.55	34.7
med	0.829	-0.930	0.783	3.65	27.4
qt1	0.681	-1.49	0.583	2.61	16.9
min	0.544	-2.41	0.351	1.75	8.6
nb	24	24	24	24	24

**Table 2.5:** MSM estimations - Regime Analysis

avg - average, std - standard deviation , qt - quartile, med - median

The average growth rates for Advanced Economies are +0.96% and -1.02% per quarter in expansion/recession. Emerging and Developing Markets, on the other hand, gain respectively 1.20 and 1.35% growth per quarter in expansion and lose -2.01% and -2.69% growth per quarter in recession. In other words, if EM (DM) grow 25% (40%) faster in good times, they lose twice (2.5 times) as much as AM in bad times. The differences are statistically significant between AM and EM as well as between AM and DM<sup>13</sup>. Nevertheless, there is no statistical difference between EM and DM.

When considering the dynamics of the underlying Markovian process inferred from the data, we can see that Advanced, Emerging and Developing Markets face similar probabilities to enter a recession (3.9%, 4.2% and 4.0% respectively) and to exit one (27.9%, 27.6% and 31.6% respectively). None of these averages are statistically different at the 5% level, only DM exit probability seems to be higher at the 10% level. Expressed in terms of duration, this means that recessions last around 3 to 4 quarters, whereas expansions can be expected to last around

<sup>13</sup>Annex I provides the results of the Shapiro-Wilk test for normality for all variables. Annex J presents by pair of country groups the results of a test to compare the average by variable.



25 quarters<sup>14</sup>.

Hence I observe that most of the difference in business cycle growth patterns between country groups stems not from differences in terms of the probability to switch regimes but from differences in the way that countries undergo each phase of the cycle.

**Stylized facts 2: BC differences? differing magnitudes but similar dynamics!**

- (i) **Business cycle dynamics is the same on average between country groups.**  
Countries face a probability of 4% to enter a recession and 28.8% to exit one.
- (ii) If expansions are 25% (40%) stronger in emerging (developing) than in AM, **recessions are 2.0 (2.6) times costlier** in the former.

Table 2.7 presents the main information on growth regimes region wise. Expansions and recessions are milder in Western Europe and Western Countries (WEC) than in other regions<sup>15</sup>. This illustrates the fact that this group aggregates mostly AM. The remaining AM can be found in Asia (Japan, Hong-Kong, Singapore and South Korea). Asian and Central and Eastern European countries have lower probabilities to enter recessions than other country groups (2.5 and 2.9% respectively). On the other hand AME and LSA face twice as high entrance probabilities (6.1 and 5.9% respectively). WEC countries display inbetween probabilities to enter a recession (4.1 and 3.6%), nevertheless they exit recessions with a lower probability than other regions (27.0 and 26.4% respectively). CEE countries are an exception as they underperform all other regions (24.7 vs 35.6 in AME, 34.9 in Asia and 32% in LSA).

As observed in the literature (Calderon and Fuentes, 2014), Emerging Markets and Developing Economies form a more heterogeneous group than Advanced Economies. CEE countries' growth can be described as an alternance of strong expansions and rare but prolonged and very costly recessions. Asian countries display even stronger expansions, but their recessions, if as rare and costly as in CEE, are more likely to end faster. As in Asia, AME countries display strong expansions and short and costly recessions but the latter are more frequent. LSA countries display weaker expansions that are more frequently interrupted by recessions, even if milder.

There are no significant differences between commodity and non-commodity countries. This can be explained by the greater heterogeneity of the second group of countries. Overall this

<sup>14</sup>The probability of exiting a given regime and the duration of said event are inversely related. Denoting  $D_s$  the duration of regime  $s$  and  $p$  the probability to remain in said regime, we derive the probability that the duration is equal to  $k$  quarters by :  $P(D_s = k) = p^{k-1} * (1 - p)$ .

Summing over all possible durations we obtain  $\mathbb{E}(D_s)$  the expected duration of regime  $s$ :

$$\mathbb{E}(D_s) = \sum_{k=1}^{\infty} k * P(D_s = k) = \sum_{k=1}^{\infty} k * p^{k-1} * (1 - p) = \frac{1}{1-p}$$

<sup>15</sup>For expansions, the difference is significant at the 5% level between WEC vs AME (p.val = 0.011), and at the 1% level with Asia (p.val = 5.7e-05), CEE (p.val = 1.4e-04) and LSA (p.val = 0.0029). For recessions, the difference is significant at the 1% with Asia (p.val = 2.8e-04), at the 5% level with CEE (p.val = 0.029) and at the 10% level with LSA (p.val = 0.087). The difference is not statistically significant with AME (p.val = 0.12). A one-sided wilcoxon test was used.

**Table 2.7:** MSM estimations: Regime Analysis – by region and commodity group

(in %)	Mean $g_{Exp}$	Mean $g_{Rec}$	Std.Err.(rsdls)	P(Enter Rec)	P(Exit Rec)
Africa and the Middle East (3 c.)					
avg	1.32	-2.36	1.46	6.09	35.6
std	0.343	2.10	0.891	3.65	15.7
Asia (7 c.)					
avg	1.51	-3.01	1.14	2.51	34.9
std	0.294	2.34	0.288	1.17	10.9
Central and Eastern Europe (13 c.)					
avg	1.34	-2.79	1.29	2.91	24.7
std	0.604	2.59	0.879	1.04	22.3
Latin and South America (10 c.)					
avg	1.16	-1.16	0.980	5.94	32.0
std	0.301	0.536	0.388	3.20	12.9
Western Europe (17 c.)					
avg	0.851	-0.974	0.804	4.09	27.0
std	0.287	0.713	0.357	1.76	15.3
Western Countries (4 c.)					
avg	0.855	-0.609	0.774	3.61	26.4
std	0.0886	0.273	0.339	1.63	7.70
Commodity dependent (13 c.)					
avg	1.18	-1.60	0.951	4.63	28.1
std	0.243	1.98	0.412	3.35	14.9
Non Commodity dependent (41 c.)					
avg	1.12	-1.81	1.06	3.82	29.0
std	0.497	1.81	0.624	1.86	16.4

Complete information on the distribution by region and by commodity group can be found in Annex H

translates the fact that being a commodity exporter is not a sufficient determinant to illustrate different business cycle patterns.

### Stylized Facts 3 – Heterogeneity and regional disparities (1/2)

- (i) Regional affiliation illustrates part of the higher heterogeneity of volatility patterns among emerging and developing markets. Commodity dependence does not.
- (ii) AME and LSA display higher frequency to enter a recession (6% on average), whereas Asian and CEE countries are less exposed (2.7% on average). Yet, recessions are steeper in Asia and CEE. For the latter group, recessions are less likely to end when compared with other DM/EM regions (25 vs 33%). WEC capture the average dynamics (3.8 and 27%).

### 2.3.2 Stylized facts - Learning about cycle phases

The previous subsection showcased what similarities and differences underline estimated data generating processes. In this subsection, I use the MSM smooth probabilities to date turn-

ing points and business cycle phases. This allows constructing a database where each episode highlights a cycle phase (expansion – recession).

Table 2.8 recovers, for country groups, the main information regarding each BC phases. The table also provides information on the share of observations/quarters each regime represents. To describe episodes and identify (dis)likeness across group, I define four main layers for the economic taxonomy of episodes: **duration**, **amplitude/severity**, **steepness**, **rebound**:

- **Duration** relates to the length of an expansion/recession. It is measured as the number of quarters in the episode.
- **Amplitude/Severity** relates to the total amplitude of the episode (difference between the first and the last quarter of log real gdp – Peak-to-Through or Through-to-Peak). It captures the cumulated gains/losses covered over the episode (in % of GDP).
- **Steepness** measures the speed at which countries gain/lose real gdp per quarter in recession, i.e. the slope of the episode. It is defined, by episode, as the amplitude divided by duration and measures average growth by quarter.
- **Rebound** measures how quickly countries grow in the year after a recession ends, relative to the average growth in expansion. Comparing the strength of the rebound, rather than the cumulated losses over the year that succeeds a recession allows for controlling for the higher growth of emerging and developing economies relative to advanced markets. It is computed as the cumulated losses after the recession divided by the annualized average growth rate over expansions.<sup>16</sup>

On average, EM and DM time series display 4 expansions and 3 recessions by country. AM have more observations and hence display higher figures (6 expansions and 5 recessions).

**Expansions:** [*duration*] Overall, expansions last around 6 years and a half for Emerging and Developing Markets (25.7 and 25.4 quarters respectively). Advanced Markets' expansions last on average one year more (29.2 quarters). Yet the difference is not statistically significant between AM and EM (p.value for a Wilcoxon test: 0.181). It is only so at the 5% level between AM and DM (p.value= 0.051). [*steepness*] During these periods, EM and DM grow faster than AM, respectively 23 and 52% faster(+1.23, +1.52, +1.00% growth per quarter). The difference is statistically significant at the 1% level (p.values for a Wilcoxon test testing a lower slope in AM than in the other group: 0.000869 vs EM and 1.61e-06 vs DM). DM outperform EM by 23% (p.value = 0.0559). [*amplitude*] For all groups, this amounts to median cumulated gains of roughly 30% (difference not significative with p.values of 0.114 and 0.144 ; AM vs EM and vs DM respectively).

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<sup>16</sup>In practice, there are different definitions for *recoveries*. The most notable one is the period between the through of a recession and the date at which output recovers previous peak-level. Here I choose a different approach. I am interested in the strength of the dynamics in the year following the recession ends. This is closer in line with discussions on the "types" of recessions – L-U-V shaped.

**Table 2.8:** Business Cycle characteristics by phase - MSM estimations - Results

	Expansions				Recessions				
	Time (% of Obs)	Duration (quarters)	Amplitude (%)	Slope (%/qrtr)	Time (% of Obs)	Duration (quarters)	Severity (%)	Slope (%/qrtr)	Rebound Strength
<b>All Countries (54c.)</b>									
avg	84.44	27.92	30.34	1.17	15.56	6.16	-5.41	-1.23	1.04
std	10.96	19.62	25.54	0.74	10.96	5.57	6.27	1.56	0.66
nb	54	243	243	243	54	204	204	204	193
<b>Developing Markets (15c.)</b>									
avg	85.58	25.80	34.04	1.50	14.42	5.73	-8.33	-2.32	1.12
std	13.17	20.92	28.21	1.00	13.17	5.83	7.58	2.54	0.76
max	98.35	87.00	121.91	5.50	55.00	32.00	8.92	0.28	3.48
qt3	92.24	36.00	50.94	1.67	15.38	6.00	-2.47	-0.71	1.49
med	89.04	22.00	25.11	1.26	10.96	4.00	-6.70	-1.51	1.03
qt1	84.62	9.25	13.91	0.95	7.76	3.00	-13.38	-2.82	0.73
min	45.00	2.00	0.87	0.29	1.65	2.00	-29.02	-10.61	-0.83
nb	15	54	54	54	15	41	41	41	39
<b>Emerging Markets (15c.)</b>									
avg	81.54	25.69	31.00	1.23	18.46	6.72	-7.24	-1.42	1.02
std	13.15	17.26	23.55	0.56	13.15	5.40	7.56	1.41	0.69
max	98.11	82.00	88.14	2.97	38.89	25.00	0.59	0.15	3.82
qt3	95.01	39.50	42.18	1.53	30.10	8.00	-2.10	-0.39	1.19
med	83.00	22.00	23.12	1.04	17.00	5.00	-5.11	-0.82	0.97
qt1	69.90	10.50	13.33	0.86	4.99	3.50	-9.41	-2.20	0.58
min	61.11	3.00	2.27	0.42	1.89	2.00	-35.87	-5.47	-0.36
nb	15	55	55	55	15	47	47	47	43
<b>Advanced Markets (24c.)</b>									
avg	85.53	29.75	28.53	1.01	14.47	6.07	-3.56	-0.75	1.02
std	7.65	19.96	25.21	0.63	7.65	5.57	4.24	0.70	0.60
max	96.00	114.00	151.83	5.93	28.36	30.00	2.43	0.72	2.75
qt3	92.47	42.75	36.19	1.13	20.58	6.00	-0.91	-0.22	1.35
med	86.75	26.00	21.38	0.90	13.25	4.00	-2.43	-0.58	0.93
qt1	79.42	16.00	11.38	0.66	7.53	3.00	-5.06	-1.21	0.61
min	71.64	2.00	1.41	0.16	4.00	2.00	-30.71	-2.64	-0.42
nb	24	130	130	130	24	112	112	112	111

The table presents, for **emerging**, **developing** and **advanced** markets, information on the distributions – *average*, *standard deviation*, *maximum*, *3rd quartile*, *median*, *1st quartile*, *minimum* and the number of episodes *nb* – of four characteristics from the economic taxonomy.

**Duration** measures the number of quarters in an episode, **severity** the real gdp cumulated losses over the expansion, **steepness** the loss per quarter and **rebound** the strength of growth in the year after the recession when compared to average growth in expansion.

**Recessions:** [*duration*] For all groups, recessions last on average a year and a half. EM tend to spend one more quarter in recession than AM and DM (6.7 quarters on average for EM, 5.6 for DM and 5.8 for AM. Stat.sig = 5%, p.value = 0.0514 vs AM and = 0.0503 vs DM). [*steepness*] Yet per quarter, a recession is around 80% costlier in EM than in AM and 60% costlier in DM than in EM (respective averages, -0.79 (AM), -1.41 (EM) and -2.29% (DM)). It is thus on average 2.8 times costlier in DM than in AM. The difference is statistically significant at the 5% level between AM and EM (p.value = 0.0111) and at the 1% level with DM (p.value = 3.51e-05). [*severity*] Cumulated losses in a recession are 2 times bigger in EM than in AM (-7.24 vs -3.54% over the episode) and 2.3 times bigger in DM than in AM (-8.26% in DM). These differences are significant at the 1% level between AM and EM/DM (p.value = 8.97e-04 AM-EM and 9.48e-06 AM-DM) but not between EM and DM (p.value = 0.133). [*rebound*] Finally, in the year following the end of the recession, AM recover less than EM and DM (+3.88% on average against +5.40 and +6.28% for EM and DM). The difference is statistically significant at the 1% level (p.value = 4.8e-03 and 7.4E-04). The average recoveries are similar between EM and DM (p.value = 0.17). For all country groups the average growth per quarter during recoveries is not statistically different from the average growth per quarter in expansion (0.96 vs 1.00% for AM; 1.35 vs 1.23 in EM and 1.57 vs 1.52 in DM).

**In a nutshell:** As can be expected with similar transition probabilities, expansions and recessions do not differ much in length. Confirming the information on regimes average growth rates, emerging and developing markets outpace advanced markets in both phases.

#### Stylized facts 4: Recessions' steepness and severity differentiate BCs

- (i) On average, expansions last 7 years (28 quarters) and recessions 1 year and a half (6 quarters). All country groups behave similarly.
- (ii) Expansions are faster in developing and emerging markets (1.5/1.2 times) but cumulate similar total gains for all country groups (+30%).
- (iii) **Recessions are twice as severe in developing and emerging markets. They are 2.8 (1.8) times steeper in developing (emerging) markets relative to advanced ones.**
- (iv) Emerging and developing recover faster than advanced markets in the year after the end of recession. Yet countries do not grow statistically faster than during expansions.

Region-wise, we observe that **AME and LSA countries** experience on average short expansions (20 quarters) that translate into low cumulated gains (+25%). There is a particularly high number of such episodes on average by country (7 in AME, 4 in LSA). As LSA countries tend to have shorter time series (40% less observations), the figures are in practice very similar.

For recessions, these figures are again very high with around 6 recessions per country in AME and 4 in LSA. In these countries, recessions are often short (5 quarters) but associated to significant cumulated losses (-5.9 and -6.5% respectively in AME and LSA). On average, recessions in Latin and South American countries are not too steep (-1.35% per quarter) when compared to other emerging and developing regions. In South Africa they follow more broadly emerging and developing patterns. Following a recession LSA (AME) countries tend to grow 20% (16%) faster than during expansions.

**Asian countries** display both fruitful (+59% cumulated gains) and very long (38 quarters) expansions. Quite mechanically, expansions in Asian countries are strong (+1.5% per quarter). On average Asian countries experience 3 to 4 expansions and around 2 recessions. Recessions are the shortest among all regions (1 year), but they are associated to very severe economic crises. Cumulated losses average at -7.4% over a recession, underlying a steep slope (-2.2% per quarter, the highest average). Nevertheless recessions are followed by strong rebound, 36% faster than otherwise in expansion.

In **Central and Eastern European countries**, expansions last on average 31 quarters and are associated to significant gains (+40% over an expansion). These countries belong to the fastest growing regions, with an average slope of +1.55% per quarter. On average, countries experience roughly 3 expansions and 2 recessions. As for **Latin and South American countries**, time series are shorter for this region as they start around 1995 (50% less observation than the maximum). When this factor is considered, the figures are much more in line with other emerging and developing regions. Recessions are, on average, very long (2 years and a half) and very costly (-10.5% cumulated losses), displaying similar steepness as AME and Asia. Quite distinctively, recessions are followed by slower growth than average after recessions. CEE countries fail to rebound.

In **WEC**, expansions are on average 2 to 3 years long (30 quarters) and associated to modest gains (+24% for WE and +26% for WC). In **Western Europe**, the average slope in expansion is the lowest of all regions (0.87% per quarter). On average, expansions in WC – which includes the USA, Australia, Canada and New-Zealand – are as steep as in LSA. There is an average of 5 to 6 expansions and 5 recessions per country. On average, recessions in WEC countries are 2 to 3 times less severe and less steep than elsewhere (-3.4 and -3.1% cumulated losses respectively and -0.62% and -0.77% per quarter) and last around one year and a half (6.5, 5.5 quarters respectively). On average, in the year following a recession's end, WE countries fail to grow as fast as during expansions (8% slower) whereas WC experience 18% faster growth after recessions and do tend to bounce back quicker. The particularities of WC as a group stems more certainly from the fact that most of these countries are small open economies who have struggled in the past with currency and external issues and volatility.

As could be expected from previous subsection, there are no significant differences between commodity and non-commodity dependent countries whatever the characteristics considered.

**Table 2.9:** Business Cycle characteristics by phase - MSM estimations - Results by country characteristics

	Expansions				Recessions				
	Time (% of Obs)	Duration (quarters)	Amplitude (%)	Slope (%/qrtr)	Time (% of Obs)	Duration (quarters)	Severity (%)	Slope (%/qrtr)	Rebound Strength
<b>Africa and the Middle East (3c.) – 21 exp. + 19 rec. (18 rbnd only)</b>									
avg	83.46	19.29	25.28	1.42	16.54	4.89	-5.88	-2.03	1.16
std	11.87	16.18	20.10	0.75	11.87	3.02	5.09	2.45	0.81
<b>Asia (7c.) – 26 exp. + 19 rec.</b>									
avg	92.97	38.08	58.52	1.52	7.03	4.11	-7.39	-2.21	1.36
std	3.59	19.17	35.15	0.52	3.59	2.00	4.54	1.71	0.66
<b>Central and Eastern Europe (13c.) – 33 exp. + 24 rec. (23 rbnd only)</b>									
avg	81.57	30.79	40.08	1.55	18.43	9.75	-10.54	-2.09	0.80
std	14.66	16.60	26.07	1.16	14.66	8.23	9.54	2.48	0.70
<b>Latin and South America (10c.) – 43 exp. + 37 rec. (33 rbnd only)</b>									
avg	82.25	21.35	24.67	1.21	17.75	5.11	-6.53	-1.35	1.20
std	13.27	18.54	22.33	0.58	13.27	3.89	7.06	1.27	0.69
<b>West Europe (17c.) – 93 exp. + 82 rec. (81 rbnd only)</b>									
avg	83.99	28.54	23.81	0.87	16.01	6.50	-3.36	-0.62	0.92
std	7.58	19.15	19.70	0.38	7.58	5.98	4.75	0.64	0.56
<b>Western Countries (4c.) – 23 exp. + 19 rec.</b>									
avg	86.91	30.04	26.17	1.16	13.09	5.47	-3.09	-0.77	1.18
std	8.84	24.95	18.87	1.08	8.84	4.99	1.72	0.50	0.61
<b>Commodity Exporters (13c.) – 55 exp. + 46 rec. (43 rbnd only)</b>									
avg	83.13	25.71	29.45	1.15	16.87	6.28	-6.13	-1.18	1.04
std	12.79	21.59	26.34	0.49	12.79	5.09	7.08	1.44	0.66
<b>Non commodity exporters (41c.) – 184 exp. + 154 rec. (150 rbnd only)</b>									
avg	84.85	28.59	30.61	1.18	15.15	6.12	-5.19	-1.25	1.04
std	10.46	19.00	25.37	0.81	10.46	5.72	6.01	1.59	0.66

The table presents, for different regions – AME - Africa & Middle East, CEE - Central & Easter Europe, LSA - Latin & South America, WE - Western Europe, WC - Western Countries – information on the distributions – *average*, *standard deviation*, *maximum*, 3rd quartile, *median*, 1st quartile, *minimum* and the number of episodes *nb* – of four characteristics from the economic taxonomy.

**Duration** measures the number of quarters in an episode, **severity** the real gdp cumulated losses over the expansion, **steepness** the loss per quarter and **rebound** the strength of growth in the year after the recession when compared to average growth in expansion.

**Stylized facts 3: (Recession) heterogeneity and regional disparities (2/2)**

- (iii) Africa, the Middle East and Latin and South America display short and relatively slower expansions and costly and relatively short but frequent recessions.
- (iv) Asian countries experience long and fruitful expansions but short and very costly recessions often followed by strong rebounds.
- (v) Central and Eastern Europe display long and strong expansions but their recessions are very long and costly. They are associated to growth slowdowns.
- (vi) Western Europe and Countries experience relatively long and mild expansions. Recessions are yet 2 to 3 times less severe and less steep than elsewhere.

If expansions do not seem to imply major difference between groups in terms of cumulated gains, cumulated losses experienced during recessions impose a heavier cost on the EM's and DM's growth path. Recessions are as such the first candidate in mind when exploring empirically differences in volatility.

**2.3.3 A focus on recession episodes**

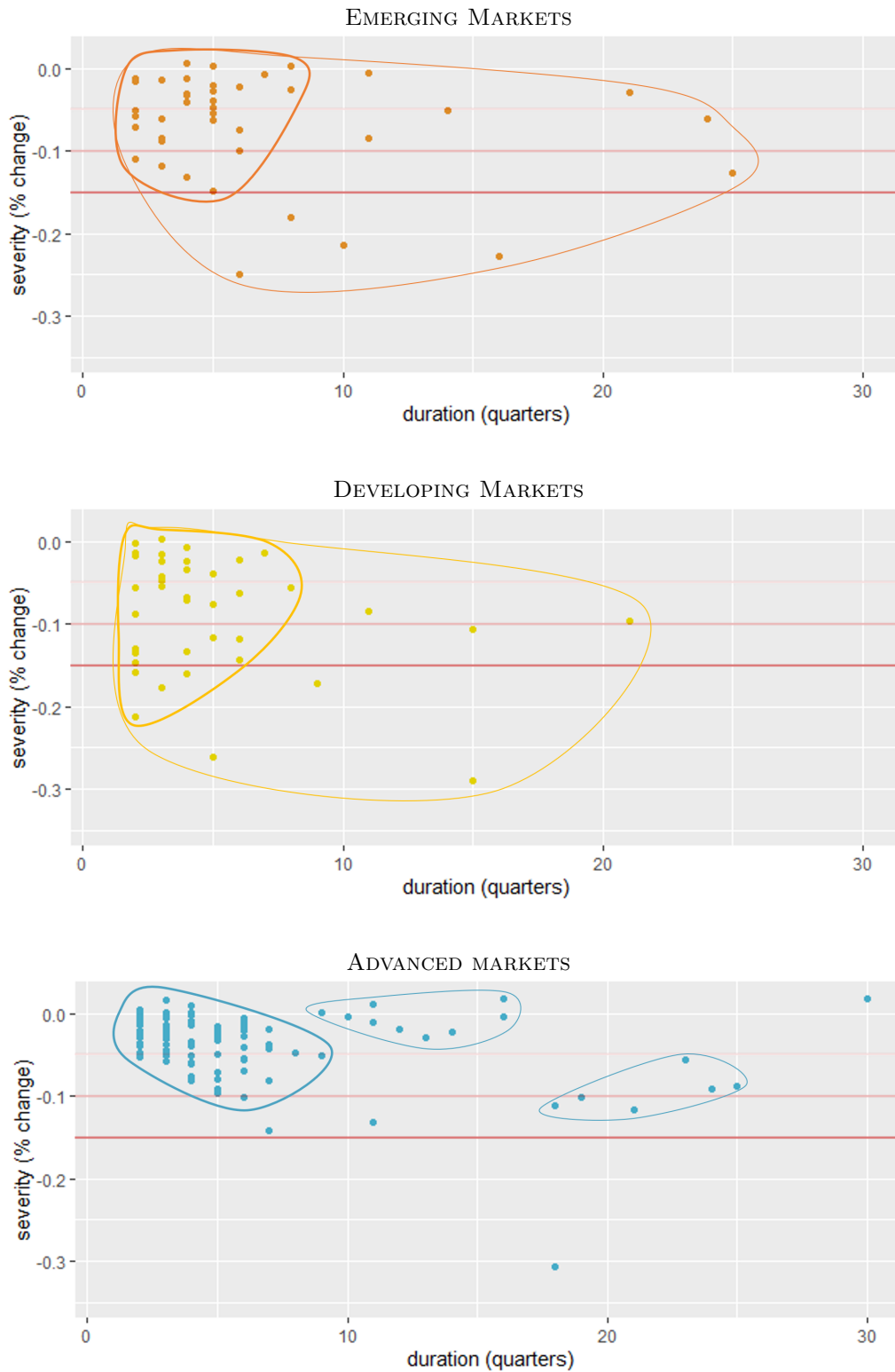
Figure 2.8 scatterplots the distribution of recession episodes by country group. Each episode is represented along two lines of the taxonomy: duration and severity. I draw manually shapes around the areas that concentrate the most recessions. As a naive prior, I would assume that duration and amplitude to be positively related, id est shorter recessions associated with lower losses and longer recessions with higher losses. Hence recessions should be distributed along the diagonal from the top-left to the bottom-right.

At a first glance, no clear pattern strikes the eye: for all country groups there is indeed a majority of episodes in the top left panel (up to a year, above -5% losses) ; and crises are distributed broadly over the plot. Yet, developing (and emerging) markets tend to experience far more crises below the -10% severity threshold than advanced economies do. This is even more salient when considering short recessions. This can be seen by looking at the stronger shape on each graph. As markets develop the shape is less and less distorted towards the bottom left. Emerging and developing show a non negligible number of high severity and/or high duration recessions. For advanced economies, there is indeed a group of recessions associated with durations around or above 20 quarters and significant losses (from an advanced market perspective).

A final set of recessions deserves a particular mention. In advanced markets especially, several episodes are located around (or above) the x-axis and are thus associated to small losses or even small gains. These episodes are akin to stagnation episodes (in the sense that they have low to negligible growth rates). Advanced markets display both very short such recessions or a group of stagnation episodes that last between 2 and 4 years (light shape at the top of the plot).



**Figure 2.8:** Recession episodes by duration and severity, groupwise



Each dot represents a recession: x axis gives the number of quarter and y axis the cumulated losses. Hand-drawn shapes identify the visible location of most crises. Red horizontal lines indicate -5%, -10% and -15% thresholds for cumulated losses.

Annex F details the distribution, by country groups, of recessions by duration (short to protracted) and by severity (mild to severe/drastring). The conclusions are similar and illustrate previous observations.

**Stylized facts 5: Acute recessions: a key developing & emerging markets' feature**

- ▷ **Developing & emerging markets are 8 & 5 times more likely to experience recessions associated with drastic cumulated output losses (larger than 10% of GDP).**
- ▷ Advanced markets are more prone to experiencing shorter and milder recessions. Stagnations are a recurrent feature, even if present in other regions.

Developing and emerging markets have been much more exposed to (complex) financial crises, associated with severe permanent output losses (Cerra and Saxena, 2008). They make for a compelling culprit in explaining volatility differentials.

## 2.4 Volatility decomposition and intermediary contributions

Another interesting feature from the MSM inferences on the data generating process is the fact that they allow for an exact decomposition of business cycle volatility (the standard deviation of growth rates). Timmermann (2000) provides the expression for the exact decomposition of the variance of a MSM generated time serie  $\sigma^2$  based on the frequency (ie.e ergodic probabilities associated to each regime  $\pi_i$ <sup>17</sup>) and the intensity of each phase (i.e. differences between each regime's average growth rate  $\mu_i$  and the average growth rate of the country  $\mu$ ), and on unexplained variance  $\sigma_\epsilon^2$ :

$$\sigma^2 = \sigma_E^2 + \sigma_R^2 + \sigma_\epsilon^2 \tag{2.3}$$

with

$$\sigma_r^2 = \pi_r * (\mu_r - \mu)^2, r \in (R, E) \tag{2.4}$$

Equation 2.3 states that the variance of the time series is explained by three elements:

- the variance due to being in the good regime and deviating positively from average,  $\sigma_E^2$ ,
- the variance due to being in the bad regime and deviating negatively from average,  $\sigma_R^2$ ,
- the variance which is unexplained by the model, i.e. the variance of residuals,  $\sigma_\epsilon^2$ .

As equation 2.4 illustrates, the variance associated with a given business cycle phase corresponds to that of, conditional on being regime  $r$  ( $\pi_r$ ), growing more/less than average growth  $((\mu_r - \mu)^2)$ . Overall, volatility is explained by positive/negative growth shocks, comparable to a Poisson process, and shocks normally distributed, comparable to a Brownian process.

<sup>17</sup>Denote p the probability to enter a recession and q the probability to exit one. Then the ergodic probability to be in a recession  $\pi_R$  is  $p/(p+q)$  and  $\pi_E = 1 - \pi_R$ . This derives from observing that  $P(\text{in expansion}) = P(\text{being in a recession}) * P(\text{enter a expansion}) + P(\text{being in an expansion}) * P(\text{staying in expansion})$  ie  $\pi_E = \pi_R * q + \pi_E * (1 - p)$ .

Table 2.10 presents the variance decomposition for the three country groups based on values from table 2.5. EM and DM are 36/70% more volatile than AM. In EM, growth shocks explains a higher share of total variance than exogenous white noise shocks do (54.9%). In DM, the difference is less tenuous as growth shocks explain only 48% of the variance. For AM, the picture is much different as growth shocks only explain one third of the variance (35.9%).

Group	vlt.gwth	$\sigma_g^2$	Of which in $\sigma_g^2$ :						
			$\sigma_E^2$	frq <sub>E</sub>	int <sub>E</sub>	$\sigma_R^2$	frq <sub>R</sub>	int <sub>R</sub>	$\sigma_{rsdl}^2$
EM	1.47	2.17	0.16	0.87	0.18	1.03	0.13	7.75	0.98
in%		100	7.3			47.6			45.1
DM	1.84	3.39	0.18	0.89	0.21	1.45	0.11	12.89	1.76
in%		100	5.4			42.6			52.0
AM	1.09	1.18	0.05	0.88	0.06	0.37	0.12	3.03	0.76
in%		100	4.4			31.5			64.1
Relative to advanced markets:									
EM/AM	1.36	1.84	3.07	0.99	3.11	2.78	1.09	2.56	1.29
DM/AM	1.70	2.88	3.54	1.01	3.50	3.90	0.92	4.25	2.33

**Table 2.10:** Variance Decomposition of output growth for AE and EMDE

Decomposition is based on Timmermann (2000). vlt.gwth denotes growth volatility measured as the standard deviation of growth rates.  $\sigma_g^2$  denotes the second moment/variance of the growth rates time series.  $\sigma_X^2$  denotes the variance due to deviations from average growth in regime X. It is computed as the product of a measure of the frequency of the deviations (frq<sub>X</sub> the ergodic probability of regime X) and the intensity of the deviations (int<sub>X</sub> is the square of the difference between growth in regime X and average growth).  $\sigma_{rsdl}^2$  denotes the variance unexplained by the Markovian process.

For all countries, the variance associated to expansions represents the smallest source of volatility (7.3, 5.4 and 4.4% for EM, DM and AM respectively). The fact that this variance explains slightly more total variance in EM and DM stems from these shocks being 3.1/3.5 times more intense on average. There is very little difference in the frequency of the positive perturbations. The variance associated to recessions is 7 to 8 times more important than that of expansions (47.6, 42.6 and 31.5% for EM, DM and AM respectively). Once again the reason behind this observation can be found originating in negative growth shocks being 2.6/4.3 times stronger in AM than in EM/DM.

**Contributions 1: It's all about recessions' severity!**

- **The bulk of volatility differentials stems from volatility within recession phases, not from expansions and only moderately from the residual random walk component.**
- *In the words of Aguiar and Gopinath (2007), persistent growth shocks explain more total volatility in emerging and developing than in advanced markets when compared to unexplained transitory shocks (1.5 and 1.3 times more respectively).*

## 2.5 Business cycles: some facts and results to take away

Looking at growth patterns worldwide, business cycles appear as a major feature illustrating differences in volatility. To date business cycles turning points, two main empirical approaches oppose. The first sets an exogenous detection rule to best match observations, whereas the second infers, from the observed time series, a non-linear data generating process. The latter offer a more detailed overview of the underlying heterogeneous dynamics. Using Markov Switching Models, I thus date business cycles for an unbalanced panel of 54 countries<sup>18</sup>. I use these estimates to study volatility differentials and explore the sources of heterogeneity.

Overall, I confirm and illustrate four sets of stylized facts:

1. Business cycle volatility is higher in developing than in emerging than in advanced markets.
2. BC differences stem from wider magnitudes of regime changes, not from the dynamics.
3. Emerging and developing markets form more heterogeneous groups.  
Regional disparities capture key characteristics, e.g. various types of recession.
4. Recessions' steepness and severity make for differences in BC.

These facts highlight interesting (dis)likeness between business cycles worldwide. I use MSM to decompose output growth volatility along these lines.

- Differences in business cycle volatility do not stem from more frequent regime switches. The magnitude of the negative growth shocks experienced by less advanced markets is a key factor behind differences in volatility.
- Developing (emerging) markets are 8 (5) times more likely to experience a recession with cumulated output losses above 10% of GDP.
- Business cycle volatility is responsible for roughly a half of aggregate volatility in emerging and developing markets (against unexplained White Noise shocks). In advanced markets, macroeconomic volatility explains only 36% of the total.
- Recession-associated volatility marks the key differing characteristics between emerging and developing versus advanced markets.

Of particular interest, the higher contribution of business cycle fluctuations (persistent growth shocks) to aggregate volatility in emerging and developing markets tends to support the view of Aguiar and Gopinath (2007). Nevertheless, business cycle fluctuations do not matter because they are associated with more frequent regime switches but because each switch entails wider fluctuations. Overall, this chapter identifies the pivotal role of severe recessions behind volatility differentials. A potential explanation behind these particular downturns reflects the frequent occurrence of costly financial crises in emerging and developing markets. The latter are indeed often associated to high output losses, see in particular Claessens et al. (2009)

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<sup>18</sup>For 27 of the 81 countries in the initial sample, MSM estimations did not converge, a clear and acknowledged cave-at of these procedures.

on 21 OECD countries or Cerra and Saxena (2008) for a broader panel of countries. This also echoes chapter 1's conclusions on the role of financial crises (and factors). Next chapter presents in more detail the key candidate financial crises considered in the literature and this dissertation – sovereign, currency and banking crises – and details the construction dating the start of these episodes.



*À l'origine, Krisis signifie "décision": c'est le moment décisif, dans l'évolution d'un processus incertain, qui permet le diagnostic. Aujourd'hui, crise signifie "indécision". C'est le moment où, en même temps qu'une perturbation, surgissent les incertitudes.*

[...]

*Tout système vivant (...) comporte du désordre en son sein, et il fonctionne malgré le désordre, à cause du désordre (...). Or la crise est toujours une régression des déterminismes, des stabilités, et des contraintes internes au sein d'un système, toujours une progression des désordres, des instabilités et des aléas.*

[...]

*Le déferlement des désordres est associé à la paralysie et la rigidification de ce qui constituait la souplesse organisationnelle du système, ses dispositifs de réponse, de stratégie, de régulation.*

[...]

*La crise est à la fois un révélateur et un effecteur. On voit mieux en effet comment la crise révèle ce qui était caché, latent, virtuel au sein de la société (ou de l'individu): les antagonismes fondamentaux, les ruptures sismiques souterraines, le cheminement occulte de nouvelles réalités ; et en même temps la crise nous éclaire théoriquement sur la part immergée de l'organisation sociale, sur ses capacités de survie et de transformation.*

*Sur la crise, EDGAR MORIN (2020)*

## Chapter 3

# A new database of financial crises: from theory and empirics to narrations

Last chapter focused on the economic sphere, looking at an aggregate measure of economic activity, real GDP, to date, inter alia, recessions. From a Markovian point of view, these recessions manifest as a series of negative growth shocks of diverse magnitude and duration by country group. They form what I deem *economic crises*. Of particular interest, EMDE display a higher exposure to acute recessions. Another widely documented fact, financial crises have been a key characteristics of our globalizing economies over the last decades: particularly in emerging markets and developing economies. In the upcoming chapter, I analyze further these facts by expanding the database of economic crises with a (in parts brand new) **quarterly database of starting dates for three financial crises (currency, banking and sovereign crises)**. The database includes the 81 countries from the initial sample over an unbalanced sample covering the quarters inbetween 1970q1 and 2019q4<sup>1</sup>.

Doing so, I keep in mind how chapter 1 identified financial frictions, external shocks, financial development and liberalization as key determinants of business cycle volatility and important pieces of evidence. Together with the next one, this chapter aims at showcasing key observations and highlight stylized facts to answer the following question: How do differences in exposure to crises define and characterize differences in volatility?

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<sup>1</sup>There is one key difference inbetween raw databases of economic vs financial crises that needs to be mentioned. Economic crises on one hand are identified as a sequence of quarters (a time-window). Financial crises are identified so far as dummy variables, i.e. quarters when the crisis starts. Future research will aim to aggregate quarterly end dates for financial crises episodes. Laeven and Valencia (2020) discuss the end date for some banking crises. Reinhart and Rogoff (2009) database provides quantitative and narrative elements in that direction. IMF article IV archives address the recoveries and upcoming vulnerabilities/strength from a narrative perspective and will help draw a neater line. This question, left to upcoming research, is briefly discussed in chapter 6.



In section 3.1, I take stock of existing definitions and theories on currency, banking and sovereign crises in the literature. I discuss empirical datations at a quarterly frequency in section 3.2. The case of currency crises is of particular importance. History displays a high variety of currency crises (Kaminsky, 2006) and dating methodologies are numerous. I contribute to the literature by building a **narrative database of currency crises**, englobing existing datations, based on IMF archives. Section 3.3 addresses the methodology and the source for this database. Chapter 4 discusses the descriptive statistics and historical hindsight associated with the database.

### 3.1 The case for financial crises

As chapter 1 alluded to, there are many "crises" on the list of suspects for crimes of volatility and losses (e.g. stock market bubbles/crashes, housing bubbles, political crises, wars, social crises etc)<sup>2</sup>. In this dissertation I choose to focus on the three main financial crises in the literature<sup>3</sup>: currency crises, banking crises, and sovereign crises (Gourinchas and Obstfeld, 2012).

These episodes often represent permanent staggering toll on one's economy (Cerra and Saxena (2008)), e.g. costlier recessions and/or regime switches<sup>4</sup>. Moreover, financial crises (FC) have been hitting our economies more frequently as we integrated internationally through financial and commercial globalization. A fact recognized for all countries, and illustrated in Reinhart and Rogoff (2009). These events have been much discussed in the academic literature, empirically and theoretically, as key stigmata of our contemporary economies.

Figures 3.1, 3.2 and 3.3 present for the panel of countries followed so far the location of financial crises on the growth path. Red bars indicate currency crises, dotted dark blue bars represent banking crises and dotted grey bars date sovereign crises. A few observations can be derived at a first glance :

- (i) financial crises are frequent, especially currency crises ;
- (ii) financial crises are very often associated with economic downturns ;
- (iii) different types of financial crises tend to trigger concomitantly ;
- (iv) few countries experience few crises.

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<sup>2</sup>Obviously, these other events matter and should be considered. When drawing the methodology to conduct the historical sequencing of crises episodes, I pay particular interest to these developments (social and political crises are frequent in EMDE). Future work on the database could explore measures of political risk spreads from Bekaert et al. (2014) and Bekaert et al. (2016) to date signals of political crises

<sup>3</sup>Future research will aim to review/append this literature review with discussions on triggers, shocks, mechanisms, frictions, transmission mechanisms, using the taxonomy of chapter 5 (see chapter 6)

<sup>4</sup>What I refer to conceptually when speaking of regime switches are the discontinuities in the growth process that have been identified in the literature.

Figure 3.1: Growth and recessions – Emerging markets

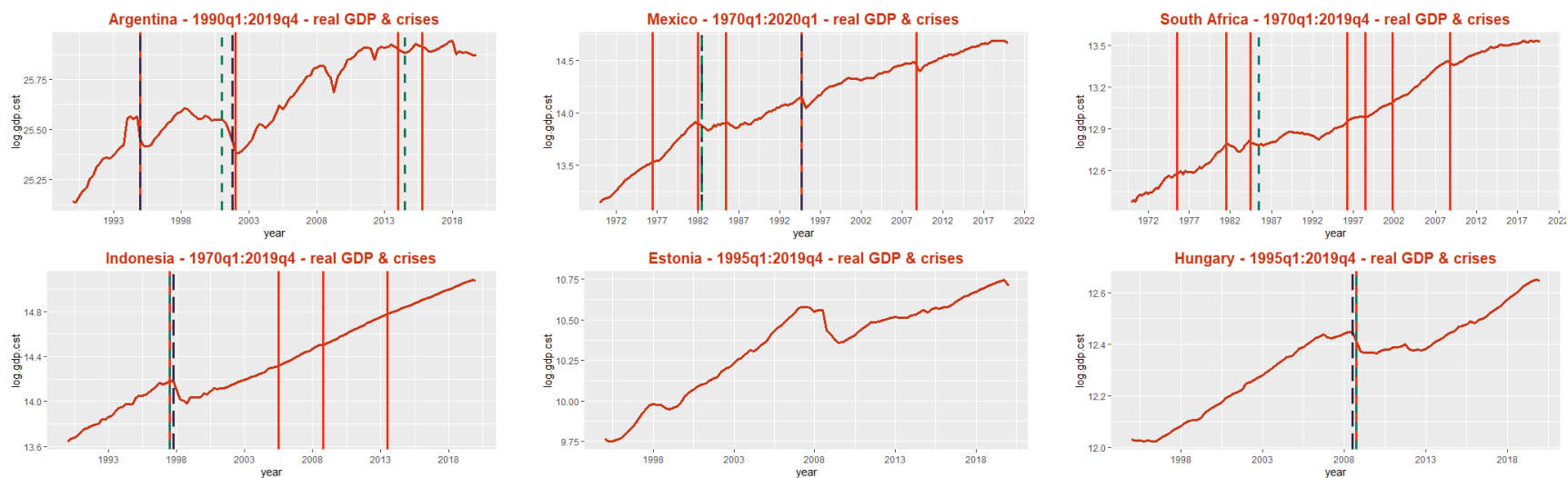


Figure 3.2: Growth and recessions – Developing markets

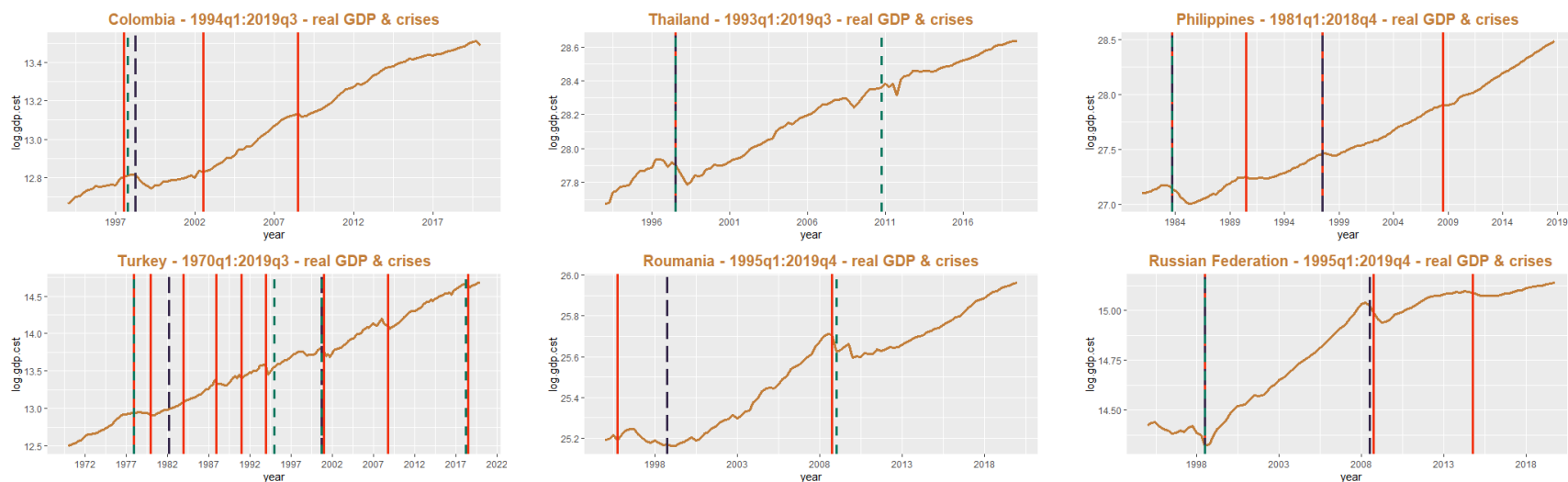
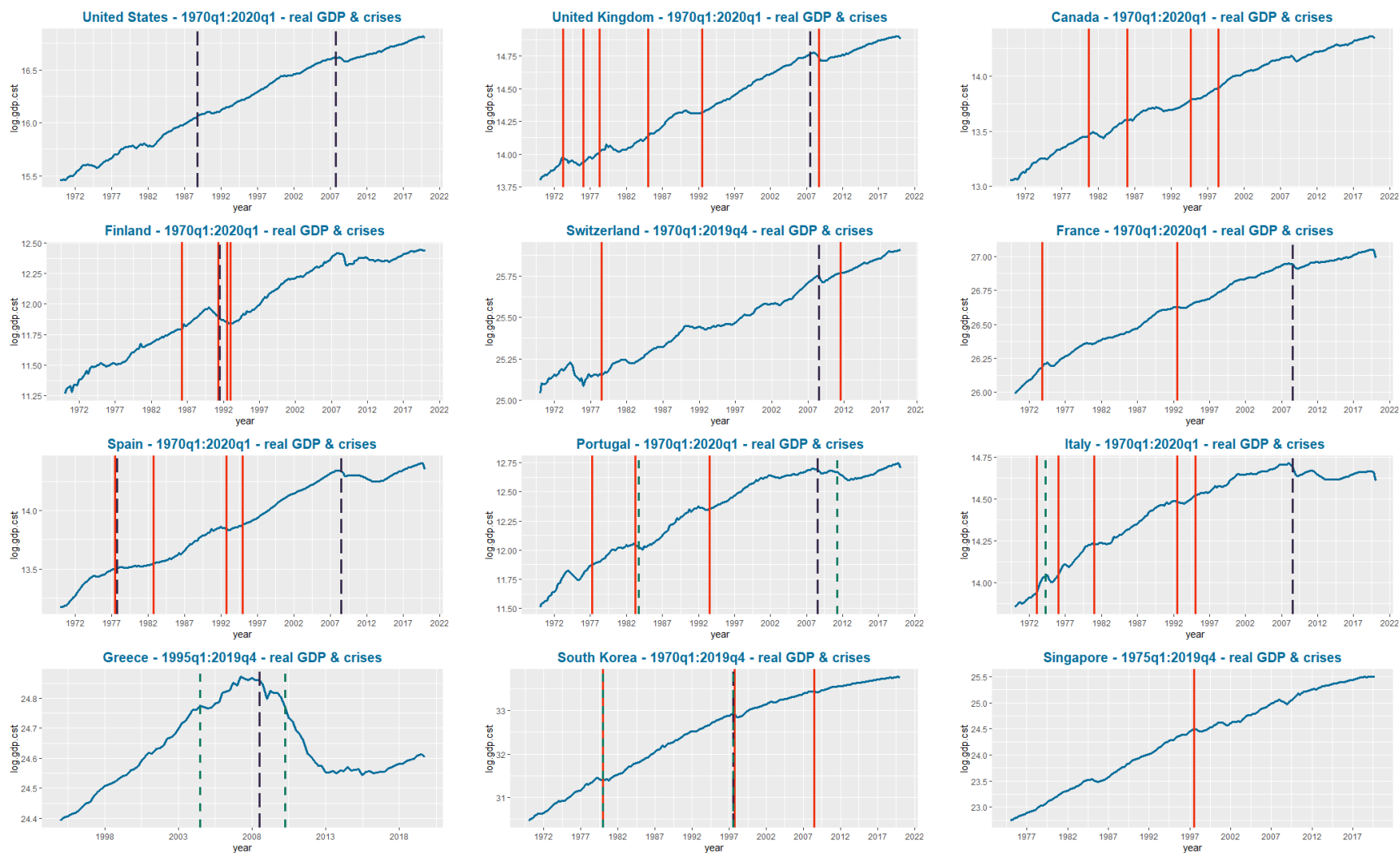


Figure 3.3: Growth and recessions – Advanced markets



Shaded areas indicate recessions as dated using Markov switching models.

### 3.1.1 The many types of financial crises

I now use the literature<sup>5</sup> to define the three<sup>6</sup> types of financial crisis I consider in this dissertation: currency, banking and sovereign<sup>7</sup>. These definitions open the discussion by highlighting key elements: the signal for the crisis to start, the agents/sphere involved and the constraints on policy space<sup>8</sup>.

**Currency crises**<sup>9</sup> start when a country's external anchor – the exchange rate – loses suddenly a great share of its value (Frankel and Rose, 1996). Currency crises also include abnormal periods of mounting pressures on foreign-exchange markets (including speculative attacks and self-fulfilling mechanisms) (Eichengreen et al., 1996), (Patnaik et al., 2017). Due to the central role of nominal anchors in the economy, troubles on the external monetary sphere can quickly pressurize the real and financial sphere as well as the whole system<sup>10</sup> (Kaminsky et al., 1998). Hence currency crises are associated with policy intervention and often notable changes in the central bank's (CB) policy course<sup>11</sup>. Notable measures include: interest rate policies, devaluations, foreign exchange interventions, capital flow measures, notable regime change (Kaminsky, 2006), (Kaminsky, 2016). Among EMDE, they are often associated with sudden stops and/or speculative attacks on exchange rate markets (Calvo, 1998).

**Banking crises** are signalled by periods during which financial distress in the banking system starts to pose systemic risks. This can be illustrated in situations during which confidence deteriorates greatly and some institutions face bank runs or endure great losses. Financial institutions can also fail to meet balance sheet requirements and be forced to undergo restructuring/renationalization/file for bankruptcy. Banking crises are triggered when increases in systemic risk or cumulated losses provoke significant banking policy intervention measures. (Laeven and Valencia, 2020). Beyond the banks and the other financial institutions, the central bank or a related institution, often depositary of a financial stability mandate, are involved in the crisis. Banking crises are often addressed by macro-prudential policies. In case of heightened investors risk aversion and ensuing market dysfunctions deterring the transmission channels of monetary policy, central banks might intervene and alleviate liquidity-related pressures

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<sup>5</sup>This section details the definitions and characteristics of each event per se. The literature has heavily discussed the intricate links between crises: see Kaminsky and Reinhart (1999) on twin banking and currency crises, Reinhart (2002) and Na et al. (2018) on twin currency and sovereign crises, Reinhart and Rogoff (2011) on twin banking and sovereign crises and ? on the interaction and the sequencing of crises episodes. Sub-section 3.1.2 discusses the mechanisms they show case. Sub-section 3.2 discusses more in depth their contribution on empirical datation of financial crises

<sup>6</sup>As discussed in chapter 6, sub-section 6.1.3, future research will aim at a comprehensive approach of crises (stock market crash, political, social, etc)

<sup>7</sup>As a reminder, economic crises are dated using Markov switching as a sequence of negative growth shocks.

<sup>8</sup>Sub-section 3.2 discusses in more detail questions on empirical datation for each financial crisis.

<sup>9</sup>As a key contribution of this dissertation entails work on currency crises, I detail the definition in sub-section 3.3.2

<sup>10</sup>The main determinants include trade/financial liberalization/openness, trade diversification, exchange rate regime, currency mismatch on agents budget constraints, etc

<sup>11</sup>Often, central banks' reactions to troubles on the FX markets. I detail later the specificities of the trigger

faced by banks (lending facility supports/credit policies, negative interest rate policies, forward guidance<sup>12</sup>).

**Sovereign crises**<sup>13</sup> entail **sovereign defaults** that follow any breach of contract a country might decide/have to make regarding the repayment (principal, interest) and associated schedule of formerly emitted debt obligations – *signal* – (Reinhart and Rogoff, 2009). Most defaults are associated with haircuts on the schedule or part of the amount. Very few defaults in the recent period correspond to full repudiation. Moreover, a country is often considered in default if it has to subscribe new debt (often concessionnal at the IMF) to support the economy in the process of negotiation (Kraay and Nehru, 2006), (Cohen and Valadier, 2011). Sovereign crises affect the national government (sovereign sphere) in its ability to meet a budget constraint. Given independence and context, central banks can intervene to monetize part of the debt or alleviate it by inflating the nominal domestic/foreign anchor – inflation/exchange rate (Reinhart, 2019). As international episodes, these crises often involve market participants (domestic and/or foreign) on USD- or Local Currency bond markets. International institutions (e.g. the IMF) are often involved in their unfolding. Sovereign crises illustrate the dry-out of fiscal policy space and times of heightened dependency on external funding/world financial markets. The latter have been recently studied in a broader sense as **fiscal crises** (Medas et al., 2018).

To devise more appropriate policies in the face of a crisis, the academic literature has questioned potential links between crises and activity. More specifically, the literature has debated whether financial crises prove to be the cause, the consequence of worsening economic conditions or some self-fulfilling side-event. I now discuss the main determinants of financial crises.

### 3.1.2 Some theoretical foundations on what lies behind financial crises

In an unstable environment, displaying fluctuations in activity, inflation, unemployment, foreign exchange and financial disturbances, it is important to take stock of the channels of transmission that give rise to financial crises. In other words, it is important to understand which shocks and fluctuations have triggered which sequencing/chains of events (a.k.a. transmission mechanisms) for a given crisis to manifest. Identifying how financial crises take root in a given context<sup>14</sup>

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<sup>12</sup>The last key unconventional monetary policy consists in asset purchase programs. They consist in the central bank intervening on primary/secondary markets for (often) government securities, (less frequently bank bonds). Hence their target might not necessarily be the same.

<sup>13</sup>The IMF organized in 2018 a international conference on sovereign crises including academic and policy participants (IMF, 2018). The entire document is a real mine of information on several aspects of sovereign crises. Of particular interest here, Eichengreen et al. (2018) presents the evolution of public debt through the ages. The presentation clearly discusses these drastic episodes and how they interacted with other financial crises.

<sup>14</sup>Models are, by essence, the very expression of the combined set of assumptions at their base. The mechanism they identify allows us to understand what may have given rise to an event that falls under a particular category of financial (sovereign/banking/currency) crises. The "reality" of the mechanism is, per se, subject to our ability to identify in real life situations these assumptions as shedding light upon existing specific frictions and decision processes. As the three generations of currency crises attest, a model might be adequate for a subset of the overall sample only.

helps highlight the key inconsistencies/fragilities/frictions that should be the next target of policy making. Irrespective of the type of crisis <sup>15</sup>, two main lines of ideas commonly oppose<sup>16</sup>.

### The "fundamentals" story

The economic and financial system is characterized by structural fragilities, deficiencies and/or inconsistencies. Inherent frictions on diverse transmission mechanisms can amplify external shocks and fluctuations. This pressurizes existing vulnerabilities and threatens the whole system (negative feedbacks). Frictions and/or policy frameworks can also (or not) dampen part of the shocks/fluctuations (positive feedbacks). A crisis will then occur on different grounds. (i) Because shocks/ fluctuations are too large for the whole system to adapt. The (policy-) stance on a particular sphere of the economy has to change to evacuate some of the systemic pressure<sup>17</sup>, (ii) because the initial, even if small, shock gets amplified through different transmission channels. More and more agents in the system get affected as frictions generate bottlenecks where pressures concentrate and vulnerabilities reveal. The limitations of existing frameworks are thus questioned and loopholes behind fundamental deficiencies reveal.

- **Currency crises:** They can occur on foreign exchange markets because there are inconsistencies in the underlying fundamentals, such as the exchange rate regime or the monetary policy rule and use of foreign reserves. In Krugman (1979), the central bank monetizes government deficits to prevent inflationary pressures and thus draws on limited reserves to maintain the peg. From the point of view of a fixed exchange rate regimes, in situations of fiscal dominancy, excessive government spending objectives may come to appear inconsistent. Currency crises occur when this inconsistency becomes too evident, a.k.a. the stock of foreign reserves reaches unsustainably low levels, and the country is subject to speculative attacks because the current course of action contradicts what fundamentals practically allow for future developments. The fixed exchange rate regime prevents to completely evacuate inflationary pressures over time.
- **Banking crises:** Because private agents do not dispose of the same status as a sovereign government, they have access to assets of different nature. Thus, crises manifest differently in the financial sphere. Here I focus on those related to credit and banks/financial institutions. Kiyotaki and Moore (1997) constrain private agents borrowing to be backed by some collateral (seizable in case of default). If the private borrower's net worth falls due to a small negative productivity shock, collateral constraints might prevent them from

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<sup>15</sup>See Lorenzoni (2014) for a detailed theoretical literature review of international financial crises.

<sup>16</sup>I feel that the approach I develop in this dissertation calls for a more thorough discussion of Minsky (1978) and Minsky (1992). I leave that for future updates.

<sup>17</sup>By sphere, I relate to the main elements from the narrative taxonomy of crises in chapter 5: the monetary, sovereign, financial, real and social spheres of the system. For example, a currency crisis will imply pressure through the external nominal anchor (monetary sphere), which inflates the other spheres of the economy. In troubled times, if another part of the system presents alarming signals, a change of policy might be needed by the central bank.

further borrowing and entail cuts on investment expenditures/claims on future revenues. When the shock amplifies sufficiently, the losses and risks might have systemic levels and threatened lenders' balance sheet requirements. Mishkin (1992), Mishkin (1996) address how asymmetric information generates frictions in financial markets. If fundamentals deteriorate too much, issues of moral hazard and adverse selection (negative feedbacks) might lead to severe market dysfunctions and as losses occur, end in banking crises. Here the structural deficiencies relating to access to information generate episodes in which riskier borrowers access the pool of participants, increasing the probability of a systemic banking crisis.

- **Sovereign crises:** When poor countries access world financial markets (e.g international private capital markets), governments may launch large-scale borrowing programs. These programs involve government public debt assets traded usually on primary markets<sup>18</sup>. Structurally, debt contracts exist under the threat of a one-sided decision by the sovereign authority to repudiate part/all of existing obligations, something more probable if economic fundamentals deteriorate widely and the situation calls for a drastic policy change (negative feedback). Hence to ensure the participation of foreign investors on financial markets (and the existence of an arbitrary condition), there must be a counter-effect ensuring governments will not default (positive feedback). Investors ration credit and ensure they get rewarded for the risk of default. If countries default, they suffer a persistent or temporary loss of resources and access to financial markets, (Eaton and Gersovitz, 1981). Of particular interest, Cohen and Sachs (1986) show that country's policy space is non-linear. In one regime, it is unconstrained and the debt-to-gdp ratio increases as growth slows down. In the other regime, where growth is low, borrowing is rationed and the debt stock is contained. In the second regime, weaker growth fundamentals coerce the country after some time to default on part of her debt, namely on all interest payments that exceed the real growth rate. Recently Aguiar et al. (2019) develop a model detailing the maturity dilemma faced by governments on the management of their debt profile: bond prices usually move against government's intentions in intervening on long-term bond markets and thus entail losses. As such they are subject to relying only upon short-term debt (i.e. to roll over existing stocks<sup>19</sup>). Any deviation from this policy stance might imply losses and be the source of a default as a constrained policy space (maturity mismatch) prevents the government's ideal/wanted policy course.

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<sup>18</sup>Developments on the secondary market largely include other institutions such as banks and private financial institutions.

<sup>19</sup>This is a key element behind self-fulfilling debt crises. I develop the theoretical framework later in this sub section and give empirical illustrations in the next sub section.

### The "self-fulfilling" story

Usually, in an economic<sup>20</sup>/financial theory, what allows the system to operate is, notably, its reliance upon functional markets. Markets (of all types) are the places where different agents<sup>21</sup> meet to exchange assets/claims<sup>22</sup>. Each agent confronts the market with a set of policy rules in mind, determining her actions – the choices she makes regarding current decisions and those that might have an impact on the future states of the world, often forward-looking considerations. They formulate these decisions against the set of information at their disposal in the current state of the world and given their knowledge of the structure of the economic and financial system (rational **expectations**). It is possible that, due to different structural characteristics or frictions, some agents, let's take investors for the sake of the example, come to expect somber futures more easily (heightened **risk aversion**). If agents' implication in the market is large enough (a large pool of investors, or systemic participants<sup>23</sup>) or given particular market settings, their expectations matter/express at an *aggregate level*. These expectations can transform into effective policy changes<sup>24</sup>. At that point, other agents might understand and react to this new information (*heterogeneity* is a source of information). Depending on the context, other agents might use this negative signal to update their own expectations downwards with respect to what fundamentals signal. They adapt other policies accordingly and the phenomenon can spread and take real roots<sup>25</sup>. Whatever the market, if fears are too strong, there is a chance for it to destabilize the whole system. Note that this particular mechanism works not because there has been an anterior (sequence of) negative productivity/growth shock(s). **Self-fulfilling crises**<sup>26</sup> fatally blow the economic and financial system because they create lethal interruptions/fluctuations in

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<sup>20</sup>I have not evoked the literature on self fulfilling economic crises in the last chapter. The interested reader might refer to Woodford (1990).

<sup>21</sup>From governments and central banks to banks, financial institutions, non-financial corporations, households and international institutions

<sup>22</sup>From physical assets, investments, goods and services, financial assets – foreign exchange and foreign exchange securities, private securities – to labor as a claim on someone's time or even knowledge and patents (the COVID 19 vaccine for example is an issue of current political debates.)

<sup>23</sup>For work on **granularity** see the seminal and enthralling work of Gabaix (2011), Gabaix (2016). At this stage in my research, the option at my disposal to "easily" mimic the concept of granularity is to build my analysis around my taxonomy's key characteristics: (i) with *multiplicity*, a higher number of red flags in the episode acts as a proxy for the importance of given episode and, (ii) *severity*, *duration* or *cumulated losses* which can be used as in-sample measures of the economic magnitude of these events. Section 4.3.2 will address these questions. The starting assumption I will try to take to the data is the following: "The more crises, the smaller their share in the total distribution of episodes and the bigger the economic effect they are associated with". I expect the distribution (along the spectrum of multiplicity) to be tilted towards very costly economic crises, whatever the definition.

<sup>24</sup>Keep in mind that I coin policy in a theoretical sense. From any agent's point of view, it is the set of decisions/actions taken in a given period, conditional on available information at the time. For example, household's policy rules will commonly focus on consumption, savings, labor decisions etc

<sup>25</sup>Many literatures, outside my area of expertise deserve a mention: herding behaviour in macroeconomics, market behaviour, comportemental economics, cognitive works and networks (check the work of former student Aymeric Vié.)

<sup>26</sup>Bubbles as well, as a matter of fact



the liquidity<sup>27</sup> on particular financial asset markets<sup>28</sup>. These realizations are sudden and might surprise other agents<sup>29</sup>. The new reality – i.e. the information set adjusted to capture negative effects of self-fulfilling mechanisms – might be one in which another agent has a very constrained policy space. For these particular policy reactions, there is a possibility, given fundamentals and the structure of the system, that the optimal choice is not unique. Multiple equilibria are often a source of indeterminacy. Self-fulfilling crises are thus episodes we can consider as a toss-of-coin away from having been avoided.

- **Currency crises:** The *second generation model* of currency crises, that refers to self-fulfilling episodes, is developed in seminal contributions by Maurice Obstfeld (1991), (1994), (1996)<sup>30</sup>. If committed to a peg, a government with good fundamentals might still be subject to speculative attacks, sometimes self-fulfilling. Subject to negative economic developments, a government might always be tempted to depreciate her currency so as to dampen economic fluctuations. Doing so, she might even aim to reach for higher production than the natural rate dictates<sup>31</sup>. Because of this stance's inconsistency with a fixed peg, to display commitment, the government might even constrain herself with enduring, e.g. political, losses should she intervene on the forex market. Despite all these reasons, this inconsistency has laid the ground for speculative attacks to materialize self-fulfilling currency crises. Should investors and the government have different access to information on the shock affecting the economy<sup>32</sup>, if enough investors come to believe that the government is abusing of the situation (reaching higher production than what, based on their information, should be), they might expect the government to depreciate the currency. Depreciationary pressures turn into inflationary and the government will always find it preferable to depreciate to solve the accumulation of dysfunctionalities. As soon as investors coalesce around the same negative idea that a depreciation should occur, it is bound to happen and the crisis triggers<sup>33</sup>.

- **Banking crises:** Bank runs are well known banking crises. History textbooks often

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<sup>27</sup>This could manifest through sharp increases in liquidity premia. In different contexts, notions of currency premia, term-premia, default-premia etc might also prove useful.

<sup>28</sup>Think broadly of markets (primary and secondary) as potentially including government securities or bank bonds.. private debt/equity.. money market.. forex.. forex securities.. etc

<sup>29</sup>They differ from what could be expected from the fundamentals' signal

<sup>30</sup>Aghion et al. (2001) provide another interesting mechanism for currency crises, which extends to both fixed and peg regimes. Nominal frictions and credit constraints of private domestic firms combine to create multiple equilibria. Including one in which any depreciation forcefully constrains exporters' balance sheets (currency mismatch). This creates a fall in investment and production. A depreciation ensues as there is lower demand for domestic exports. The possibility for such an equilibria to exist, makes self-fulfilling crises possible. If fears of depreciation overtake exporting firms, they might create the fall in investment and production behind the now-realized depreciation.

<sup>31</sup>The fundamental idea behind this assumption is the fact that production at equilibrium might be lower than the socially efficient one due to higher, e.g. labor-market, frictions.

<sup>32</sup>E.g. based on a sunspot variable, it is possible to extend the framework

<sup>33</sup>See Morris and Shin (1998) for a more realistic description of investors signal extraction when faced with a noisy information on the shocks.

illustrate the 1929 depression with pictures of long lines of people in front of banks. More recently, in 2007, the UK institution *Northern Rock* witnessed, nationwide, thousands of customers rushing to the bank's offices. Bank runs are 'simply' that: faced with unexpected news (signal/information), private agents holding claims against a bank coordinate their expectations downward. Out of fear for their own liquidities, these agents claim suddenly and commonly their due at the bank. Her balance sheet<sup>34</sup> is constrained by an increased demand of short-term liquidities (the bank's liabilities face downward pressures). She is forced to sell assets to meet the demand. For those fast enough to reach the door, the bank services using its own reserves and liquid assets. Soon the bank is left with illiquid assets that have not yet matured<sup>35</sup>. Selling them entails a loss – the interests that had yet to be claimed. When faced with too much losses, the balance sheet liquidity mismatch proves lethal to the bank and the fears realize. Because assets and liabilities in the portfolio of the bank have differing maturities, in face of uncertainty, agents' expectations might come to be self-fulfilling (Diamond and Dybvig, 1983).

- **Sovereign crises:** It is common practice for governments to never repay existing debt but to roll it over, defaults occur when this becomes impossible. This particular nature of sovereign debt entails the roots of self-fulfilling mechanisms. In Cole and Kehoe (2000), each period begins with the realization of an exogenous sunspot variable<sup>36</sup> that settles, along with inherited fundamentals (state variables), the aggregate state of the world. Before repaying the debt she inherits from the past, the government first decides to emit new debt obligations on the market. International bankers evaluate the information at their disposal<sup>37</sup> and then decide what quantity of bonds to buy. In other words, they decide at what price they agree to buy bonds. Because the government still has the possibility to default on the existing stock of debt, bankers' earnings are yet undecided<sup>38</sup>. If the stock of debt is, given fundamentals, low enough there is no chance, whatever the state of the world, that this happens, and the day goes on. If the stock of debt is high enough the reverse might happen. In between, there is indeterminacy, i.e. there is a given

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<sup>34</sup>What the bank owes versus what the bank owns.

<sup>35</sup>In other words, the assets that have not matured yet are those for which the interests have not paid back yet. Or in other illustrated simpler ones: Imagine, for yourself, the other main activity, beyond deposits, that may bring you to your bank's doorstep. Should you want to invest in a new project (a new flat, a new business perhaps) or to reduce the constraints your current consumption's policy rule endures (anticipating a future promotion, who knows), you first think of going to your bank. Because she lends you a lot right away, you owe her a little bit for a long period, and you're safe to go on with your idea. If she were to come at your doorstep, soon after lending you, you'd be perhaps a bit constrained too. Well at that moment, you're the bank I'm talking about, you sell whatever you can. If you own some stocks on a company that haven't paid anything yet, you might sell them, even if it's not the value you had in mind when buying them, or even if it's a lower value. They didn't mature as you planned.

<sup>36</sup>Imagine tossing a special coin each day that gives you a value, taken randomly from  $[0,1]$ . If you were the government, this value would act as a proxy for how many people, this day, would trust you.

<sup>37</sup>The aggregate state of the world, the new liquidity on the markets (the government's "offerings"), and what they can expect to earn back on their past obligations holdings

<sup>38</sup>Because of this difference in information set, and the importance of the sunspot variable, there is a risk of coordination issues.

level of debt above which, if the sunspot realization is bad, agents fear default too much, and reality mimics expectations. In practice, they refuse to buy new bonds and a crisis happens as the government cannot roll over the debt, irrespective of the fundamentals. Nevertheless if the realization is good the day goes on<sup>39</sup>. Cole and Kehoe (2000) have in mind the Mexican default of 1994-95 in their analysis. Aguiar et al. (2017) refine their approach by adapting the market's auction process. This enables self-fulfilling defaults even when prices do not reach 0 (i.e. the bankers refuse to roll over in previous model). A case more in line with emerging markets and developing economies' recent history and the self fulfilling narrative behind them.

In practice, some crises do not fall under one of these two views and are the result of pure political interplay for example (Herrera et al., 2020). Ecuador's default on \$3 billion worth of bonds in 2008 is a good illustration of these special cases<sup>40</sup>.

### 3.1.3 Multiplicity under the spotlights

Given the scope of my contribution, another key area of the literature deserves particular interest. Financial crises are multiple events in the sense that different types of crisis often intertwine. From my perspective, this layer of the taxonomy of crises – *multiplicity* – is pivotal: from a theoretical perspective, hereby discussed, and from an empirical perspective, later addressed. What I define as multiplicity is the fact that each episode of crisis can involve a different sequence of related crises:

- (0) absence of shocks (pure expansions) – exp.eco – acts as an initial reference point ;
- (1) economic crises, i.e. recessions, unrelated to other financial crises – smpl.eco ;
- (2) financial crises occurring in good times and unrelated to negative shocks – sgl.fin – They entail the crises that occur out of self-fulfilling mechanisms, crises that trigger in return more positive feedback effects than the initial negative ones ;
- (3) economic crisis associated with one type of financial crises: (a) sovereign crises – sgl.sov – (b) banking crises – sgl.bkg (c) currency crises – sgl.cur ;
- (4) economic crisis associated with two types of financial crises: (i) sovereign + currency – dbl.sv.cr – (ii) banking + currency – dbl.bk.cur – (iii) sovereign + banking – dbl.sv.bk – and
- (5) economic crisis with all three types of crises – tpl.crs.

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<sup>39</sup>Using another sun-spot variable, it is possible to replicate the same type of self-fulfilling crisis from the point of view of the government. If the government feels bankers might be wary, she might decide to decrease exposure, a.k.a. her stock of debt to exit the crisis zone. Doing so, she might have avoided a crisis temporarily, but she will have constrained capital investors' policy space and potentially affected the capital stock. If capital investors become wary of the possibility for the government to default (i.e. for them to endure productivity losses), they might constrain their investments. Fundamentals might deteriorate such that otherwise solvable debt self-fulfillingly becomes unsolvable.

<sup>40</sup>The economy was expanding, the Central Bank had \$5,6 billion worth of foreign reserves. There were no pressure by international markets on the domestic economy. Yet, following sheer political motives, president Rafael Correa declared part of the national debt "illegitimate" and refused to pay interest to foreign lenders.

In this dissertation, I commonly use the wording of **multiple crises** to refer to episodes that involve at least two types of **financial** crises. As will be illustrated later with the database, this condition is sufficient to exclude crises occurring in expansion. Henceforth, I will navigate this concept of multiple crises with the idea that they are necessarily associated with economic losses and recessions. I now present seminal contributions from the literature<sup>41</sup> questioning the intricate links between financial and economic crises.

- **twin banking + currency crises** Kaminsky and Reinhart (1999). Note as well the third generation type of currency crises (illustrated in Chang and Velasco (1998) (2001)). Kalemli-Ozcan et al. (2016a) offer a recent empirical application on bank level data.
- **twin sovereign + currency crises** Reinhart (2002) and Na et al. (2018)
- **twin sovereign + banking crises** Reinhart and Rogoff (2011) and Kalemli-Ozcan et al. (2016b) (and associated articles in the volume are relevant and deserve mention). Bordo and Meissner (2016) provide a thorough discussion of the topics.
- **triple: complete crisis episode** Reinhart (2012) on the interaction and the sequencing of crises episodes. Reinhart 2018's Nobel symposium Reinhart (2018), Kaminsky et al. (2003) on the 'unholy trinity of financial contagion'.

### 3.1.4 Nota Bene on Markovian non-linearity and crises: bridging theory to empirics

My dissertation relies heavily upon notions of discontinuities and non-linearity. So far, my empirical strategy aimed at identifying different regimes of positive/negative growth. From an empirical point of view, growth in a particular quarter will deviate from average for two reasons: (i) it is subject to regime change and endures a persistent series of positive/negative sizable shocks, and (ii) it is subject to shocks, normally distributed around 0 (exogeneous to the data generating process of growth). It is interesting to find the theoretical counterpart to these shocks. Jumps between regimes can be thought of as sudden changes in the fundamentals or as the manifestation of a negative sunspot realization. The white noise, on the other hand, can be considered as unaccounted random shocks and sources of volatility. In this dissertation, I do not develop a proper theoretical model introducing Markovian processes, but the literature has been keen on such using Markovian processes to model sunspot variables or fundamentals (Jeanne and Masson (2000) on currency crises, Davig et al. (2011), Bi (2012) and Greenlaw et al. (2013) on sovereign defaults and fiscal crises).

A key illustration of this rationale applied to sovereign crises can be found in Carre et al. (2019)<sup>42</sup>. They argue that to appropriately replicate probabilities of default, output should be

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<sup>41</sup>This section is very much work in progress. The idea is to present in a synthetic manner the main transmission mechanisms between crises.

<sup>42</sup>Their model is in continuous time. Nevertheless, Markov processes offer a good projection of Poisson processes from continuous to discrete time. The Normally distributed White noise act as a projection of the Wiener process in discrete time.

modelled as a Lévy process, that is a Wiener process – or Brownian motion process – (i.e. small shocks occurring at a high frequency) and a Poisson Process (i.e. large shocks occurring at a low frequency). Annex K presents in more detail the theoretical considerations justifying their approach. In a nutshell, if negative shocks happen often but have a small impact on growth, they will not yield any default risk. It is always indeed preferable to repay so as to avoid any economic costs inherent to the financial crisis. On the other hand, a large and yet less risky shock has much more impact on how much a country can borrow and reimburse. Indeed when the shock impacts the country, the alternative of defaulting might become preferable than that of bearing both the output shock and debt reimbursement. Using Markovian processes as a transition to the empirical literature, it is worth saying they are not common practice. MSM have already been used to study financial crises (Hamilton, 2016), but in comparison to other methodologies, they haven't taken much sun over recent history. In this dissertation, I do not use MSM to date financial crises, only economic crises. Future work will expand my current use of MSM to endogenize the relation between economic and financial crises. Empirically Hamilton (2005) studies banking crises and Hubrich and Tetlow (2015) use MSM to study episodes of heightened financial stress in the US. Considering currency crises Cerra and Saxena (2005) and Martinez-Peria (2002) offer an empirical investigation of currency crises in Asia during the end of the 90s and in Europe during the EWS. Jeanne and Masson (2000) show that for the case of the French Franc in 1987–1993, the window for which Obstfeld (1994) studies escape clause models, using a MSM dated sunspot to influence devaluation expectations significantly improve the fit of the model.

## 3.2 Financial Crises - Identification and dating

This section has two goals. First I present the database of financial crises that makes the core of this dissertation. Second I review the broad empirical literature on the datation and identification of currency crises.

### 3.2.1 Some background elements on the dating of financial crises

As previous sections have shown, between and within type, financial crises differ in the way they manifest and transmit themselves. Yet, it is important to note that the literature overall always identifies 3 key common elements behind a financial crisis. They should, therefore, find an echo in the diverse datation approaches:

- Financial crises are associated with particularly important shocks or magnified fluctuations
- Financial crises are associated with (systemic) agents' policy space being suddenly and drastically constrained
- Financial crises are associated with important interventions and often entail a permanent change in the authorities' policy course.

In practice the empirical datation of episodes can be thought of binarily:

(1) there are fluctuations in some aggregate variables. These fluctuations must be of significant magnitude to signal (i) an external shock, (ii) some agents/market being severely constrained, (iii) the cristallization of existing rigidities, impairing usual transmission mechanisms and positive feedbacks in the economy.

(2) the crisis entails actions and change. Authorities might change the current conventional policy course to allow more flexibility and stabilization on a specific market<sup>43</sup>. Authorities can also be, de facto, forced to kickstart a process that will fundamentally/structurally change the current system of policy-making<sup>44</sup>.

Echoing these two elements, the biggest trunk of the literature focuses on identifying abnormal movements for a set of variables related to specific mechanisms of a crisis and events that mark an important policy intervention. The conditions and sets of boolean (identifying the determinant events) form an algorithm which signals a crisis out of the core set of time series, the empirical approach to datation. The second trunk<sup>45</sup> has always accompanied the first. Economic historians and economists have long narrated crises episodes to better describe their functioning. Several approaches from the first branch often back their empirical datations by narrative elements. This is particularly true for banking and sovereign crises, and more dispersed in the case of currency crises. In this sub-section, I discuss the main approaches of the *empirical* approach for the three main types of crises: sovereign, banking and currency. I also highlight key *narrative* contributions. As the presentation ensues, I present the data I use in the database. The sources are detailed in annex M, most come from the International Monetary Fund – International Financial Statistics. Sub-section (3.3) discusses the narrative line in more detail.

### 3.2.2 Currency crises

Currency crises form a frequent historical pattern described by many cohabiting theories. Dating currency crises has thus been the subject of *many* articles in the literature<sup>46</sup>. The empirical literature has focused on diverse macroeconomic indicators to capture (i) the manifestation of the crisis (exchange rate fluctuations), (ii) conventional policy reactions aimed at dampening the shock (international reserves, policy rates) (iii) significative policy changes (devaluations, change in the exchange rate regime).

A first part of the literature has used large fluctuations of the nominal exchange rate (either effective or bilateral vis-à-vis USD) to date currency crises. In Frankel and Rose (1996), a crisis

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<sup>43</sup>A devaluation, a bank nationalization, accessing emergency external financing etc

<sup>44</sup>Exiting a peg or adopting a currency board, defaulting and loosing market access, recent quantitative easing experiences in EMDEs (a current area of research of mine at the IMF I discuss in more detail in chapter 6, section 6.2) etc

<sup>45</sup>That my bush has only two main trunks is an evident approximation future literature review shall address.

<sup>46</sup>See upcoming description of Boonman (2019) for a literature review on the matter (with a focus on publications before 2012, online appendix).

is identified if, during a year, (i) the domestic currency faces a year-over-year depreciation of at least 25% and (ii) the depreciation exceeds previous y-o-y change in the exchange rate by at least 10%. Signals are then filtered over 3-year windows: after a crisis is signalled, in the three following years all positive signals are muted. Recently, to adapt the filter to quarterly data, Laeven and Valencia (2020) have extended the window of observation to 5 years and the threshold for a significant depreciation to a change of minimum 30%.

I first apply the initial filter to my sample of countries<sup>47</sup> for which MSM converged and data is available  $i, t$ . To date crises  $is.cur.crs == 1$ , I use the year-over-year growth rate of the nominal bilateral exchange rate between the local currency and the USD (LCU per 1 USD)  $g^{e,yoy}$ .

$$\begin{aligned}
 is.cur.crs_{i,t} = 1 \text{ if } \{ & g_{i,t}^{e,yoy} < \lambda; \\
 & \& \ g_{i,t}^{e,yoy} > g_{i,t}^{e,yoy} + 0.10; \\
 & \& \ \forall s \in \{t - \omega, t - 1\}, is.cur.crs_{i,s} = 0; \\
 (\lambda, \omega) \in \{ & (-0.25, 12), (-0.30, 20)\} \}
 \end{aligned} \tag{3.1}$$

**FR-3/5y:** Using a 3-year window I find 79 currency crises. The database in Laeven and Valencia (2020) covers an unbalanced panel of 136 countries identifying 236 currency crises over 1970–2017. The intersection of their database with mine<sup>48</sup> signals 67 currency crises.

The second part of the empirical literature has adopted a broader approach to signalling currency crises. Historically and theoretically, speculative attacks are a key source of currency crises. Hence they might have also be the source of policy actions aimed at preventing expectations to coalesce and realize. Central banks need not "really" set the exchange rate to a new level as in models of fixed exchange rate regimes (devaluations). They can counter downward pressures either by selling international reserves<sup>49</sup> or by adjusting key policy rates<sup>50</sup> Eichengreen et al. (1994), (1995), (1996). This part of the literature identifies crises by using significant variations in an Exchange Market Pressure Index (EMPI) to date episodes of heightened stress on forex markets. Sachs et al. (1996) and Kaminsky and Reinhart (1999)<sup>51</sup> construct the index as the

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<sup>47</sup>Out of the initial sample of 81 countries, I first focus on countries for which there is growth data and the MSM estimation converged (54 countries).

<sup>48</sup>I.e. over the 51 countries and the time periods for which I have available growth rates data.

<sup>49</sup>This is key in Krugman (1979). By selling international reserves (i.e. denominated in foreign currency), the central banks affects directly the demand for the domestic currency. Increasing the demand for an asset (here the foreign exchange) is bound to increase its value, here the exchange rate. This effect might be enough to reverse downward pressures. The monetary model of exchange rate determination and Dornbush's contribution on the role of expectations in driving excessive fluctuations are worth noting.

<sup>50</sup>By increasing the rate at which assets in domestic currency are rewarded, the central bank motivates international investors towards buying them. She can prevent capital outflows if confidence is high enough. See Covered and Uncovered Interest Rate Parities for further information on the mechanism.

<sup>51</sup>During episodes of hyperinflation, large depreciations might have a very different economic impact/under-

weighted average of the quarterly growth rate of nominal exchange rates and the change in the stock of reserves foreign reserves<sup>52</sup>. Eichengreen et al. (1996), Bordo et al. (2001), Gourinchas and Obstfeld (2012) adopt a broader approach by including the change in interest rates in the index<sup>53</sup>. For each country, the obtained EMPI time series is then filtered. A rule ensures the algorithm retains only quarters in which the EMPI deviates from the average by more than 2-to-3 standard deviations. The higher threshold the more cases considered can be coined tail-events (wide magnitude, small frequency). Note that the index dates periods (i.e. including sequences of observations) of distress on forex markets, not just the starting points of currency crises. The main constraint when applying these methods for a wide panel of countries is quarterly data availability. Bussiere and Fratzscher (2006) construct a similar EMPI using real exchange and interest rates.

For all countries/quarters  $i, t$  of available data I construct 3 EMPI time series: one following the first part of the literature and two including interest rates as well<sup>54</sup>. For the first  $EMPI^1$ , the index aggregates two variables: (i) quarter-over-quarter growth rate of the nominal exchange rate (local currency unit per US Dollar)  $g^e$  - (ii) weighted change in foreign reserves (excluding gold)  $\Delta r$ . A currency crisis is signalled when the index deviates from average by 2 or 3 standard deviations.

$$\begin{aligned}
 emp_{i,t}^1 &= g_{i,t}^e - \frac{\sigma_{g_i^e}}{\sigma_{\Delta r_i}} \Delta r_{i,t}; \\
 is.cur.crs_{i,t} &= 1 \quad \text{if } \{(emp_{i,t}^1 - \overline{emp_i^1}) > \kappa * \sigma_{emp_i^1}, \kappa \in \{2, 3\}\}
 \end{aligned} \tag{3.2}$$

**EMPI1:** I find, over the unbalanced panel of 51 countries cumulating 6209 quarters, 132/31 crises with a 2/3\*standard deviations threshold.

Due to data availability, the literature has considered two types of rates when introducing interest rates  $ir$  in EMPI: (i) the monetary policy-related interest rate  $mon.pol.rt$  or (ii) the money market rate  $mny.mkt.rt$  (a very liquid market that acts as proxy for the policy rate). I construct time series for these two version:  $EMPI^2$  and  $EMPI^3$ :

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standing than otherwise. As such the index is then studied separately accordingly Kaminsky and Reinhart (1999). An alternative to previous approach considers taking fluctuations in real exchange rate so as to cope for price disruptions Wan and Jin (2014).

<sup>52</sup>The weights are given by the variance of exchange rate fluctuations divided by the variance of the variable considered (exchange rates, and reserves). Change in reserves enter the index negatively to captures the fact that the central bank might fight off depreciations by selling reserves.

<sup>53</sup>Often weighted by the variance of exchange rate fluctuations divided by the variance of interest rate changes.

<sup>54</sup>I do not construct measures using real variables or interest rate differentials. This is mainly because, as explained in next sub-section, I then review all potential episodes using narrative elements to date the crisis starting quarter. These three indicators already provide a handful of episodes to consider (251). I will use these in indicators as future robustness tests.



$$\begin{aligned}
 \text{empi}_{i,t}^j &= g_{i,t}^e - \frac{\sigma_{g_i^e}}{\sigma_{\Delta r_i}} \Delta r_{i,t} + \frac{\sigma_{g_i^e}}{\sigma_{\Delta ir_i}} \Delta ir_{i,t}^i; \\
 \text{is.cur.crs}_{i,t} &= 1 \quad \text{if } \{(\text{empi}_{i,t}^j - \overline{\text{empi}_i^j}) > \kappa * \sigma_{\text{empi}_i^j}, \kappa \in \{2, 3\}\}; \\
 (j, ir) &\in \{(2, \text{mon.pol.rt}), (3, \text{mny.mkt.rt})\}.
 \end{aligned} \tag{3.3}$$

**EMPI2:** Using data available for monetary policy-related interest rates, over 2590 observations, I find 58/15 quarters of crises depending on the threshold.

**EMPI3:** Using money market interest rates, it is possible to construct an EMPI for 4408 quarters. Conditional on the threshold, 102 or 35 quarters in crisis are dated.

For banking and sovereign crises, it is often the case that dating algorithm results are completed with short narrative elements. Currency crises do not escape these complementary historical elements as well. Eichengreen et al. (1994) provide few lines descriptions behind currency crises in Europe during the 90's, Bordo et al. (2001) use for some countries in their sample<sup>55</sup> narrative elements to select crises among a subset of EMPI dated years. Kaminsky (2006) identify, in few lines, when countries devalued their currency, when their exchange rate underwent large depreciations, when the forex market was frozen or when there was a major change in exchange rate regime. Overall these narrations build upon the dating algorithm used in each article. Hence they do not provide a comprehensive approach of the literature using narrations. Regarding the latter point, Boonman (2019) recently helped fill this gap. The article uses a set of 6 dating rules<sup>56</sup> on monthly data to date possible cases. Boonman (2019) filters among all observations those for which at least two indicators<sup>57</sup> signal or which are in a reference panel of the literature<sup>58</sup>. For this set of candidate crises, he then reviews these cases to build narrative paragraphs using research articles and news. He considers 35 emerging markets and developing economies over 1990-2016. To my knowledge, his approach is the first significant contribution towards building a comprehensive database of narrative elements for dating currency crises that takes stock of the main different trends in the literature. I fell upon this article while having already started my own database on (currency) crises. Next sub-section, which addresses my methodology for constructing a comprehensive database of currency crises will address the differences between our approaches.

Because I felt limiting my database to the convergence of my estimations would represent a shortage, I expand the sample to include 69 countries. In some cases (e.g. Greece), I also

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<sup>55</sup>The link to their online appendix didn't work and I fail to access the raw source for their article.

<sup>56</sup>His survey includes 6 criteria (against 5 for me): large nominal depreciations (similar as Frankel and Rose (1996)), large real depreciations (Apoteker and Barthelemy, 2005), EMPI using exchange rates and reserves with a 2 or 3 threshold, EMPI including interest rate differentials as well with a 2 or 3 threshold.

<sup>57</sup>After 2010, one signal suffices.

<sup>58</sup>Reinhart and Rogoff (2009), Laeven and Valencia (2012), Kaminsky (2006), Babecki et al. (2012)

explore historical events even if data is unavailable or too bad to be used in estimation<sup>59</sup>. I expand the list of countries to include countries with longer time series of observation and no MSM estimation<sup>60</sup>. Before moving on with the construction of my database of currency crises, I discuss empirical datations of banking and sovereign crisis and the empirical literature addressing the datation and/or identification of self-fulfilling crises. They form a keystone of the theoretical literature on financial crises and the empirical literature is not to be overlooked.

### 3.2.3 Banking crises

In the empirical literature on dating crises, the dual aspect behind the datation is perhaps the most salient for banking crises. In 2008, as the Global Financial Crisis unfolded, Luc Laeven and Fabian Valencia published a wide cover database on banking crises dates at a quarterly frequency (Laeven and Valencia, 2008). The database has since then been subject to frequent extensions and updates, Laeven and Valencia (2010), (2012), (2018). In the most recent update Laeven and Valencia (2020) identify banking crises based upon two subsets of signals/information:

- There are signs of financial distress in the banking system. Such a situation is defined by Laeven and Valencia if the share of nonperforming loans is above 20% of total loans, if the share of bank closures is at least 20% of banking system assets or if the fiscal restructuring costs of the banking sector exceed 5% of GDP. This condition can be the sole trigger of a crisis.
- There have been significant banking policy intervention measures to cope for losses in the banking system. Six policy interventions are considered: deposit freeze and/or bank holidays ; significant bank nationalizations ; high bank restructuring fiscal costs ; extensive liquidity support ; significant guarantees put in place ; significant asset purchases

The quarterly dates are taken from the initial dataset of Laeven and Valencia (2020), which provides additional narrations for a sub sample of cases. Overall, from the point of view of Laeven and Valencia (2020), a sudden and significant policy announcement/intervention<sup>61</sup> is what signals ongoing systemic financial distress. I also compare their database to Romer and Romer (2017)(2018)(2019) narrative measures of financial distress (discussed in the next sub section). As a reference point, over their initial sample of 151 crises (136 countries, unbalanced panel over 1970–2017), Laeven and Valencia (2020) find that countries face on average at least one banking crisis. Few countries actually cumulate banking crises over 3 episodes (e.g. Argentina, Ukraine

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<sup>59</sup>There is a time serie for Greek real GDP dating back to 1970 (OECD). Even after aplying filters, its seasonality blurs any information that could be taken from it graphically and econometrically.

<sup>60</sup>Note that there are also quarterly dates for sovereign and banking crises outside the sample of countries after MSM estimation. I do not mention them in order to maintain a unique reference sample for the reader. These crises are of the utmost importance as I believe future estimation refinements (see chapter 6) will allow for a greater coverage of countries.

<sup>61</sup>Note that there is a long standing debate on the nature of conventional–unconventional ; macro-stabilizing–macro-prudential ; external–credit policies.

in my sample). This hints towards banking crises being associated with in-depth and structural changes aiming for persistent effects (i.e. targeting, a priori, sources of vulnerabilities/frictions on the fundamentals). Overall, my database includes **52 banking crises**, which gives an average of one per country. In practice, 10 countries experience 2 banking crises (including Argentina and Ukraine).

### 3.2.4 Sovereign crises

In the case of sovereign crises, the empirical literature naturally concentrates on debt and government fiscal policy space. Default, per se, is a political choice made by the sovereign authority that entails a change of policy course. Either the sovereign subjugates part of her policy decisions to external conditions and monitoring, or she condemns herself to lose access to markets and subsequently to future growth potential. Sovereign debt crises are identified if at least one of three main propositions is verified (Kraay and Nehru (2006), Cohen and Villemot (2015)):

- A country is unable or unwilling to repay its debt. This is measured by looking at the arrears accumulating on a country's note. If they represent more than 5% of total debt, a country is in a crisis. Data on debt arrears are taken from the International Monetary Fund - International Financial Statistics.
- A country enters a debt restructuring plan. This is identified empirically as countries benefit from a debt relief from the Paris Club (rescheduling and/or debt reduction). HIPC initiatives are excluded from the sample as they often take place when the country has already built back some fundamentals.
- A country receives significant non-concessional financial assistance from the IMF. This can take the form of StandBy Agreements, Extended Fund Facilities or access to specific Credit and Liquidity lines, allowing up to more than 300% of quota cumulatively. To act as a trigger, the program must represent at least 50% of the country's quota at the Fund. It is worth noting that the increase in the size of programs over time increases the pass-through of this criterium<sup>62</sup>. To trigger the crisis, the program must be disbursed by the country in quantities that overpass this same threshold. This ensures selecting cases of external financing *uses* and further eliminates cases in which only small disbursement are needed to calm the situation<sup>63</sup>.

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<sup>62</sup>This dynamic has been a real source of discussions and debates. Academic on one hand: adapting to evermore complexifying crises, the IMF constantly had to reinvent its approach and its policy views (Reinhart and Trebesch, 2016). Note that, from a practical point of view, this translated into structural transformations for the IMF, e.g. the rise of the Independent Evaluation Office at the IMF; the increasing role of the Strategy, Policy and Review department that adapts the Fund's 'policy voice' to new research and new situations (e.g. the Covid-19 shock). Political on the other hand, as an increasing size of lending programs (liabilities) calls for an even greater contribution by member economies, thus affecting the decision process on quotas. Quotas reflect the share of votes a member disposes of at the board and acts as a good proxy for contribution. When the bill arrives at the table late at night, scenarios and debates on who should pay are fundamentally political, because they decide what the consensual scenario should be.

<sup>63</sup>Note that the increasing size of programs increases again the probability of detection of crises. In that case,

This database of Sovereign Defaults was then compared to Reinhart and Rogoff (2009) and Laeven and Valencia (2020) datations, which provide additional narrative evidence. For crises without quarterly datation, I relied upon IMF article IV to identify the starting quarter<sup>64</sup>.

Medas et al. (2018) make for a recent empirical database contributing to the broad discussions around crises dates involving a government in financing needs. Their definition of **fiscal crises** covers wider ground than mine. A fiscal crisis will detect if (i) the country is subject to a credit event as the government reduces the present value of the debt owed to creditors, (ii) the country has access to IMF financing in a program of size superior to 100% of quota and containing fiscal adjustment objectives<sup>65</sup>, (iii) when the country im-/ex-plicitly defaults on debt due to very high inflation and/or domestic arrears, (iv) the country suffers from loss of confidence by markets, e.g. loss of market access and spikes in financing costs on markets (spreads). By broadening the set of triggers, and in the case of IMF programs lowering it<sup>66</sup>, the notion of crisis expands to that of a government facing heightened constrained policy space to act. The notion of sovereign crisis I follow related to sovereigns in dire external financing needs, and thus cover a sub-sample of the **fiscal crises**<sup>67</sup>. Hence, as robustness, I compare the two databases, over the sample of interest<sup>68</sup>. Our databases differ in 26 cases, when either I miss a signal (25) or the starting quarter differs (1). I delve deeper into each case by consulting IMF archives to identify if there are mentions of crises, strongly related policy change, or troubles in the fiscal/sovereign sphere. In the end, out of the 26 initial fiscal crises, (i) 10 are coined as sovereign crises and remain in the database, (ii) 1 is redated and (iii) 15 are excluded. Out of the 15 cases excluded: (a) 4 were linked to HIPC initiatives and indeed associated with a favourable economic environment and policy space ; (b) 2 had contracted SBA but used less than 50% of the quota. In one case there are clear mentions of remaining policy room and access to external financing, in the other, the shock is common (terms-of-trade) and little disbursements act as transitional adjustments ; (c) 9 had no mention of the sovereign being in trouble or of a drastic policy change. Overall, my database includes **36 sovereign debt crises episodes**<sup>69</sup>.

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as we control for the funding to be used, this becomes less of an issue in terms of detecting dire external financing needs. (Quotas are changed at a low frequency and might thus not reflect adequately the size of the country's issues at hand Reinhart and Trebesch (2016))

<sup>64</sup>All such events are recorded in the database presented in the following sub-section of the dissertation.

<sup>65</sup>Precautionary programs are excluded

<sup>66</sup>The threshold of 100% is indeed higher, but there is no constraint on using at least 50% to trigger a crisis.

<sup>67</sup>Note recent interesting work on fiscal crises by Romer and Romer (2019). I discuss it in more detail in upcoming section.

<sup>68</sup>The time coverage I chose is the one from the unbalanced panel of 51 countries. For the remaining 30 countries, should improvements on the economic crises dating allow expanding country coverage, I will continue the comparison.

<sup>69</sup>As a reference point the most recent and wide database, Laeven and Valencia (2020), date 79 sovereign crises for 136 countries.

### 3.2.5 Nota Bene on dating self-fulfilling events

From an econometric perspective, dating self-fulfilling equilibria entails capturing the sunspot variable that makes for the existence of multiple equilibria: a difficult task as this variable is, by essence, the proxy for the manifestation (into actual/observed decisions) of subjective considerations. Yet it is a rare fact for numbers (only) to capture this idea directly. Usually, either (i) more complex econometric models are required or (ii) historical context and narrative elements help shed light on/narrate what ‘really’ happened.

For currency crises, Jeanne and Masson (2000) offer an excellent illustration of the first approach using Markov switching models on devaluation expectations. Eichengreen et al. (1994) and Bordo et al. (2001) offer a good alternative for the second. Considering the case of self-fulfilling banking crises, recent literature (Laeven and Valencia, 2020) define *bank runs* as a key target of their empirical strategy and often complements the datation with historical narratives, thus offering comprehensive elements on these self-fulfilling events.

For self-fulfilling debt crises, a fruitful branch of the theoretical literature, there have been several recent empirical developments worth noting. De Grauwe and Ji (2013) focus on the peripheral countries of the Eurozone during 2010:11. Cohen and Villemot (2015) aim at identifying the probability for a debt crisis to be self fulfilling. To that end, they develop a circular econometric test linking debt-to-GDP to growth to the occurrence of a sovereign crisis (back to the debt-to-gdp ratio). The circular dependency comes from the fact that growth can either be impacted by an external shock or by the occurrence of a sovereign crisis. Mechanically growth has an effect on the debt-to-GDP ratio which increases as output, the denominator, falls. Debt can also be negatively affected by unexpected shocks/developments<sup>70</sup>. Finally, the debt-to-gdp ratio is a key explanatory factor of sovereign crises occurrence alongside other determinants and a shock. The latter captures exogenous variations in the threshold upon which the government is expected to default. Based on crisis occurrences and the estimation of the different shocks, it is possible to capture the multiplicity of episodes – "equilibria"<sup>71</sup> – a key step in identifying self-fulfilling episodes. If both a negative growth shock and a worsening financial conditions shock hit the country at the same time as a crisis, it is possible for the event to be self-fulfilling with either one or the other shock triggering it<sup>72</sup>. Overall they find that, on average, between 6 and 12% of crises are probably of self-fulfilling nature. In annex L, I address in more detail their methodology and apply their test on a sub-sample of my dataset<sup>73</sup>. The notion of growth shocks in Cohen and Villemot (2015) follows the previously presented approach in Carre et al. (2019). Defaults occur because, inter alia, there are big negative (Poisson) shocks to growth

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<sup>70</sup>e.g. valuation effects or unforeseen contingencies.

<sup>71</sup>Crisis or not ; negative growth shocks or not, exogenous worsening of financial conditions or not

<sup>72</sup>Their empirical estimates include a sunspot variable that allows for this particular identification.

<sup>73</sup>Part of my choice is based on the frequency and data needs of their approach which matches mine better than others

which drives spikes in default risks (and might create self-fulfilling mechanisms). These Poisson shocks are a good approximation of Markov regime switches.

Aguiar et al. (2017)'s quantitative analysis calibrates the model they bring to the data using the moments of key Mexican time series over 1980q1:2015q1. In particular, they try to match movements of the spread of Mexican debt over US bonds, a common measure of default risk. They find that roll-over (self-fulfilling) crises are rare events over Mexican history, a signal, in their view, of a government carefully avoiding to enter the crisis zone. Note that their theoretical model entails non-linearity in default costs. This underlines, again, the importance of multiple equilibria for the empirical study of self-fulfilling events. In their case, for a default to occur, debt must be high and growth low. They aim to illustrate the fact that crises are often associated with debt issuances or repurchases at abnormally high spreads. These signal *desperate 'buy-back' deals* by governments, as they attempt to tame market expectations away from self-fulfilling equilibria.

Bocola and DAVIS (2019) focus their initial quantitative approach of self-fulfilling debt crises in Italy over 2008:12. They identify, in interest rate spreads' fluctuations, the role of fundamental and non-fundamental risk<sup>74</sup>. Non-fundamental risk is captured by the roll-over risk premia, defined as the *realized* returns from rolling over debt – at maturity  $n$  – between two consecutive periods relative to what a one-period bond would have yielded. Using the distribution of this premia through the maturity spectre, they can identify the role of rollover risk. The latter is limited, explaining an average of 13 % of the model-implied interest rate spreads. To test the external validity of their approach, they consider a panel of 11 emerging markets over 1995–2009 (using data from Broner et al. (2013)). They find that, on average, debt issuances have a 3.6 year lower maturity in crisis time versus normal times. This characteristic is particularly salient for Latin and South American countries (Argentina, Brazil, Colombia, Mexico and Uruguay). Nevertheless there is cross country heterogeneity as in few cases (Russia, Venezuela and Hungary), sales of long-term debts did predate the crises. They conclude by suggesting that this dispersion in debt issuances' maturity profiles biases downward the role for roll-over risk – and self-fulfilling episodes – we might infer from looking at the average behaviour of emerging markets and developing economies.

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<sup>74</sup>In their theoretical foundations the authors partition, a common habit in the literature, the possible states of the world into different equilibria, including a self fulfilling one. Frontiers between these realms are captured by the fundamentals and help define the space where investors coordinate to enforce their expected reality forward. This multiplicity of equilibria is by essence Markovian.

### 3.3 The case of currency crises: methodology for a new narrative database

This sub-section addresses in detail the construction, methodology and sources behind my database of narrative quotes on currency crises. Narratives<sup>75</sup> are old practices currently re-viving as a practical tool to research. Before delving into my own database, I use the literature to identify the key elements I am bound to answer.

#### 3.3.1 Insights from the literature

Narrations have always existed, in the literature on crises but more generally in economics, as a fundamental part of the research process. Yet, as quantitative tools and access to data developed, a "*hardness bias*"<sup>76</sup> developed (Akerlof, 2020) and narrative contributions saw their place in the literature shrink. Narrations were mostly left to introductions and motivations as a practical illustration. Outside economic history (a major exception), they rarely made for a noble chair at the table. Yet, over the last two decades, they started gaining in momentum Shiller (2019). From the point of view of the international macroeconomic and financial literature' point of view, small narrative elements (often 5 lines or less)<sup>77</sup> have guided the study and identification of economic and financial crises over the last 50 years. Recently, Christina and David Romer (RR) launched a vast methodological work building upon narrative elements. Said research has yielded important results across fields Romer and Romer (2004), (2010), (2017), (2018), (2019). To structure my database, I follow their hindsight.

To me the first object that deserves our attention is the source of the data in the RR series. They are diverse but a clear pattern arises. The source is often official and intended for broad diffusion (FOMC minutes and the Federal Reserves *internal reports* in RR04, US *Economic Reports*, presidential speeches and statements in RR10, *OECD Economic Outlook* in RR17/18/19) or written by analysts and specialists and intended at key economic and financial agents of the system (Economic Intelligence Unit *Country Reports* in RR19). The concept.s of interest<sup>78</sup> does

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<sup>75</sup>There are many types of "narrations": from long detailed descriptions of historical developments, to shorter and more conceptual descriptions (highlighting a mechanism for example) and even shorter to a line describing an event (e.g. "currency was devalued by 15%"). They also differ content-wise: factual, story-telling, quotes, descriptive, methodological analysis. Finally they differ purpose-wise: some act as the object of discussion, others as a source of information/shocks, others as robustness checks, others as material for the analysis. Before moving on with my database, I remain comprehensive when coining "narrations".

<sup>76</sup>That is towards more mathematical approaches

<sup>77</sup>There is of course a large variance in the size of narrative elements. From my own experience manipulating existing datasets, I feel the distribution to be skewed to the left. For example Eichengreen et al. (1994) and Reinhart and Rogoff (2009) have around 4-5 lines descriptions, Kaminsky (2006) has 1(2) lines descriptions. Laeven and Valencia (2020) uses 5 to 10 lines narrations. The reason the length of the narration matters is that it directly impacts the volume of information conveyed. Naturally too much of it disserves the exercise. As a reference point closer to my approach, recent work by Romer and Romer (2019) display narrative elements inbetween 5 and 25 lines.

<sup>78</sup>They apply their methodology to monetary policy shocks, tax changes/fiscal shocks and to financial distress/-financial crises.

not need to be at the center of the documents. Nevertheless, they need to discuss it frequently and help identify sequencing of events or conditions that might reveal essential. Because of the source of the document (e.g. policy-makers) the document can help shed light on key motivations behind developments key to the concept being studied. Often the source includes an analytical presentation of the developments shedding light on possible causal links.

The second element that comes in any of the RR articles is actually an essential element to every research: a clear definition of the concepts and events studied backed by clear research question(s). In the case of narrative contributions, this deserves particular attention because the research is bound to *match* "different languages"<sup>79</sup>. Because the focus of the article is often taken from the point of view of the contribution to the literature, it might be described in a more conceptual – theoretical – way than in more descriptive writings. The RR series focuses on two notions: policy shocks and financial distress. All narrative contributions include a clearly stated definition, backed by the literature, of the concept at hand. This definition acts as a reference for the 'more practical' terms of the source. To first bridge the two 'languages', the narrative approach defines a sample of episodes, often based on quantitative indices<sup>80</sup>, that can set the initial scope for the study or act as a benchmark for comparison. Finally, the RR series also define a set of questions to ask when reading the article. These questions further illustrate how the research concept will take ground in the documents.

The third and final element in all RR contributions is the identified methodology they adopt when reading the documents. This usually consists in defining a broad (open) set of economic and financial developments<sup>81</sup>. The latter relate directly (or indirectly) to key factors behind the topic of interest by shedding light upon key factors. These factors often group into two main aspects: those relating directly to the manifestation of the event studied and those relating indirectly to it via developments of more fundamental/structural determinants that guide the behavior of agents involved in said event<sup>82</sup>. Two last elements are needed to complete the methodology. They both depend on the research questions being asked. First, the methodology should present the *format* of the narrative contributions (i.e. what is taken from the data and how is it presented). Second, most narrative approaches include a *box-ticking* step. A direct/-side purpose of a narrative approach often entails some elements for a taxonomy of episodes<sup>83</sup> or a clear decision on the nature of an event<sup>84</sup>. In practice, this consists of ticking the boxes

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<sup>79</sup>What I mean is that approaches to the same concept might differ between the academic literature and, for example, policy-oriented reports.

<sup>80</sup>RR10 focus on "significant legislative changes" based on the number of "incidental mention". RR17/18/19 take a range of existing datations of financial crises as a benchmark against which to confront their measure and start their analysis by filtering episodes based on hitcounts for a set of key words. A key aspect of RR approach is that the initial filtering of episodes is based on quantitative text analysis.

<sup>81</sup>For example, RR10 uses discussions on macroeconomic developments that might justify an endogenous adaptation of tax rates.

<sup>82</sup>In RR17/18/19 financial distress is identified if there are discussions on clear markers of increased cost of intermediation – the concept taken from the literature (Bernanke, 1983) – or references to developments that might impair financial institutions (the agents involved in the event) thus affecting indirectly the cost of intermediation.

<sup>83</sup>See for example the intensity of credit disruptions/crises in RR17/18/19.

<sup>84</sup>See for example the opposition endogenous/exogenous tax changes in RR10.



associated with those factors that actually mattered, given the narration.

Given the renewed dynamics of the literature in terms of narrative elements, I felt my literature review could offer a practical side-contribution. The following box offers my 'summary' view on a check-list of key elements narrative methodological approaches should incorporate.

**A go-to-guide/check-list for an economist in for some narrative elements**

a **The source:** The source of the documents that will be read is the first element to discuss. It is the raw data behind any narrative contribution. Source documents are written by agents from a different time/perspective, with a different approach than the one driving the research. Hence it is important to identify the signals this information carries.

- (i) The source must discuss frequently the topic of interest. The source should offer a descriptive, analytical &/or policy view of what unfolded. She addresses the effects of relevant policies/actions and other notable changes that may have contributed to related developments. The source discusses the topic of interest's main determinants and help shed light on the conditions that gave rise to the situation considered.
- (ii) The source covers, at a regular frequency, a long list of countries/cases on a broad historical window. She addresses the topic at hand in a universal and comprehensive manner, i.e. offering a comparable approach of key concepts across countries and through time.
- (iii) The source clearly identifies *who speaks* in the documents. Authors are often analysts, economists or policy-makers discussing developments that happened – from their view – not long ago. They might be involved in the decision process to some actions that affected the course of events. They provide an insider's view<sup>a</sup> on the motivations behind (part of) the topic considered.
- (iv) The source often targets/is available to a broad set of agents (not necessarily of direct systemic importance). This element should be clearly identifiable as it helps discuss potential biases inherently carried in the raw material<sup>b</sup>. Her sources must be clearly stated. She must display tokens of quality/seriousness and/or be recognised.

b **The angle of attack:** The documents considered are often long and might address a broad range of topics. As I previously mentioned, each source also carries her own approach to the topic studied. Hence it is important to define, in the "words" of the research, what will drive the approach to the data. A narrative contribution should

define the key concepts that will drive the analysis, identify an initial set of cases to consider, and present the question that guides the approach.

- (i) Defining the concept(s) studied in the research project entails references to the literature to identify its(their) key characteristics and manifestations. The definition should offer an encompassing approach of the topic to act as a benchmark during the treatment process, also known as reading. It is often backed by theoretical elements.
- (ii) Because a narrative approach entails treating a lot of data, it is important to first narrow down the study to a (reasonable<sup>c</sup>) set of cases. This decision often involves quantitative rule(s) that identify within the sources those that mention the topic relatively more<sup>d</sup>. Of particular interest, a benchmark set of episodes can be taken from key references in the literature to act as to shed light on the novelty/differences of the approach. It is possible<sup>e</sup> to then read documents relating to untreated cases to complete the picture and check for the existence of missed signals.
- (iii) The research question that drives the project is often too broad to help guide efficiently reading the documents. This can be due to the source covering a broad range of topics. This can also occur because the topic in question can be discussed along several different characteristics and characterizations<sup>f</sup>. Hence a narrative approach includes a set of specific questions that help relate aspects of the research topic to more precise elements the narration should shed light upon. They act as an introduction to a more detailed description of the methodology because they organize the main grid a reader should have in mind.

c **A methodology:** Given the source and the initial scope of the study, the narrative approach should finally describe the methodology applied when reading the documents. The methodology has to clearly state the elements the researcher should be looking for when reading. The methodology acts as the bridge between the research scope and the raw data: identifying, given the literature and the questions, what are the main objects of interest and how they should be treated.

- (i) To answer a constant question I get when mentioning narrative contributions and methodology: **you read**<sup>g</sup>. The essence of a narrative approach is to understand key transmissions mechanisms based on the described sequencing of events. (Active) reading of the document ensures a better evaluation of key details/references and their weights/place in the developments that are being described.
- (ii) The methodology identifies the different set of developments that the reader

should be looking for when reading. These developments act as proxies for factors related to the event studied. They can be the direct manifestation of an object of interest. They can also relate to more fundamental/structural determinants that affect the event and the mechanisms studied. These developments can be related to specific agents of the economic and financial system. They can also relate to specific transmission mechanisms and their effect on given macroeconomic/financial concepts. The methodology should also evoke potential decisions, news, shocks that could be related. A particular focus should always be given to looking for statements on causal inferences. Because these developments might have different weights/roles in the event studied, the methodology should explain how/when to identify relevant matters.

- (iii) So far, recent narrative contributions have aimed at offering for the events they consider either ( $\alpha$ ) a precise datation or ( $\beta$ ) quantitative/qualitative taxonomical elements or ( $\gamma$ ) time series illustrating a core concept. This last step of the methodology is conditional on the broad objective of the study. The methodology defines how the raw data, i.e. the writings, are recorded as the final output of the process. This includes, on one hand, the narrative contribution that details the factors identified in the previous point. This should be organized around quotes or page references from the source documents. On the other hand, for the events or documents treated, the methodology often entails a *box-ticking* stage during which key characteristics are recorded. These can include dates on a calendar, a ranking based on magnitude/intensity, boolean variables on the role of specific factors in a particular event etc. Overall these outputs should be easily treatable and aimed for diffusion.

<sup>a</sup>Or they discuss the motivations of what happened

<sup>b</sup>A document written for market participant might not have the same tone (bias) as one written by an international institution for a broad audience. There are biases in all cases, what I am saying is that they should be identified.

<sup>c</sup>There is an arbitrage condition between (+) the benefits of having access to enough information and heterogeneity to draw valid conclusions and (-) the inevitable/irreducible cost of treatment (active reading) for each document.

<sup>d</sup>They relate to numeric measures/ hitcounts on selected words mentioned in text.

<sup>e</sup>Not all approaches do this last step, given the gigantic volume of information to process.

<sup>f</sup>This is the most important reason.

<sup>g</sup>A recent approach of the literature uses key words and large text scrapping codes to gauge long or numerous textual sources. These studies have a different purpose as they usually either try to extract stylized elements or evaluate the general tone of the document. From a conceptual perspective, projects using text scrapping are inherently aimed at a more specific question and literature. This is due to the fact that, by focusing only on a finite set of keywords, this approach prevents addressing broader/more theoretical linkages. It also overlooks all the *insider's hindsight* additional information provided when reading. A great review of these methodologies can be found in Fayad et al. (2020), which uses text analysis to develop a sentiment index measuring country's responses to IMF Article IV advices.

I now apply this methodology to my study of currency crises. I first define currency crises

given the previous literature review. Then I present (a) the source of my narrative study. The last sub-section reviews (b) the sample of cases considered, the questions of interest (given my definition) and (c) my identification methodology.

### 3.3.2 Defining currency crises

A currency crisis<sup>85</sup> is a particular type of financial crisis. She is a financial crisis because she entails heightened disruptions on the foreign exchange markets. Forex markets include transactions related to the exchange rate(s)<sup>86</sup> and the products derived from it<sup>87</sup>. A currency crisis is particular because of the nature of the asset traded (in-)directly on these markets: domestic currencies<sup>88</sup>. As the external nominal anchor, the exchange rate<sup>89</sup> measures the relative value of a currency against another. As such the exchange rate acts as a proxy for the relative trust/faith in a given currency. This is particularly important because the exchange rate is associated with all current and future decisions by economic and financial domestic agents when interacting with foreigners.

A currency crisis occurs when substantial pressures accumulate on forex markets due to agents sharing conflicting views as to what the actual value of a currency should be. The pressures unveil the inherent vulnerability/inconsistency/indeterminacy of the present situation. This, in turn, forces a marked change in the policy course of an agent(s) or a substantial adjustment in prices – re-valorization. This action can solve the issue and align agents' considerations on a new path for the currency. It can also prove insufficient to tame divergences and lead to a resurgence of troubles. To illustrate in more detail the key factors and developments behind currency crises in the literature<sup>90</sup>, this definition uses three lines of reasoning: given that all transactions including domestic and foreign agents find a counterpart in forex markets, I detail

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<sup>85</sup>I retain a non negligible part of the following references from having taught (TA) several years International Monetary Relations for Agnès Benassy-Quéré at Université Paris 1 - Panthéon Sorbonne. Her manual was detrimental in my approach of international macroeconomics and finance, Benassy-Quere (2015).

<sup>86</sup>E.g. bilateral between a country and partners.

<sup>87</sup>Markets for spot/forwards, options, swaps, derivatives

<sup>88</sup>That the currency is, in essence, particular has been a key item of discussion in the history of economic thought. For starters, the interested reader can refer to Keynes' theory of money, the quantity theory and the neutrality of money (Friedman and the monetarists).

<sup>89</sup>The particular role of the exchange rate has also been a frequent topic of discussion in the history of economic thought. The reader can refer to Hume's price-specie flow mechanism (his reasoning relies on the value of flows, which in practice is illustrated in the exchange rate) to discussions on the case for flexible exchange rates (Milton Friedman in 1950, Harry Johnson in 1953 or Maurice Obstfeld in 2020). Of particular interest for emerging markets and developing economies, the reader can also relate to discussions on the fear of floating by Guillermo Calvo and Carmen Reinhart (2000) (2002).

<sup>90</sup>There are numerous empirical research that has studied the determinants of currency crises. These studies usually combine a datation of currency crises following one of aforementioned algorithm. They then complement the database with time series for the main macroeconomic and financial indicators. Some filtering/econometric techniques are then usually employed to understand which variables, displaying insightful variations before the crisis, help predict it (see the large literature on Early Warning System Bussiere and Fratzscher (2006), Bussiere (2013)) or help characterize particular types of currency crises (see Kaminsky (2006)'s use of regression tree analysis)).

how different agents are exposed/related to it ; given that the value of the currency, at stake in these crises, is determined on markets, I review key factors and determinants that might affect price determination ; given that all crises entail nonlinearity in an agent's policies, I discuss the key markers of such actions. Annex N provides detailed information by category.

**Agents and transactions:** The exchange rate matters for all transactions<sup>91</sup> involving agents valorising the utility of said transaction in different currencies. That makes for a lot of transactions and as many different types of agents as possible. Here, I describe the main possibilities for key agents to be affected by the external nominal anchor.

**The factors behind forex markets:** To properly define currency crises, it is important to pay attention to fundamental/structural determinants of forex markets: exchange rate regime, trade and financial liberalization, global imbalances, trade specialization, financial markets development, balance sheet currency mismatches, long-run real appreciationary pressures.

**Changes in policy:** Because a crisis entails the evacuation of accumulated pressures, she is characterized by the revision by one or more agents of their optimal policy functions. I now describe the main policy adjustments that matter for the forex markets: expectations realignments, devaluation, forex intervention, policy rate changes, capital flow measures, changes in exchange rate regimes, and finally asset purchases programs.

Having defined extensively a currency crisis and its determining factors, I present the source I use for my narrative contributions.

### 3.3.3 A dive into IMF archives

In this dissertation, I focus on the International Monetary Fund (IMF) as the principal source for narrative elements. I have been highly exposed to working with these publications while previously employed at the Banque de France<sup>92</sup>. I now describe the institution and present the context in which the staff prepares the documents I read. A description of said documents follow. The presentation of the source concludes with a summary of the information along the methodology from box page ??.

The IMF is an international organization conceived in July 1944 at the Bretton Woods conference. Her primary mandate is to preserve the stability of the international monetary system – i.e. the system of exchange rates and international payments. She is a major actor in support of international economic and financial cooperation – see Fioretos (2019) for a discussion of the IMF's place in a globalizing world, in which new forums of discussion/action/cooperation

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<sup>91</sup>A reader interested in a **more** detailed approach can search the latest IMF's Balance of Payments manual. As of the date of writing this: IMF (2009).

<sup>92</sup>As an intern in 2012-13, I monitored daily the evolution of the Greek crisis and associated institutional policy management (notably by the IMF). As an intern and later as an economist, I also contributed to the reactions of the French Central Bank to certain IMF publications. These reactions were aimed at the French representative at the Executive Board for discussion on said publications.

develop. IEO (2019) reviews the institution's efforts to promote and sustain cooperation since the GFC. The IMF is a Fund that builds upon member's economies<sup>93</sup> quotas/financial contributions<sup>94</sup> to provide external financing to other member economies in needs of assistance. The IMF is governed by a board of directors that represent each member economy. The Fund is managed by a representative executive board – 24 chairs – chaired by the managing director<sup>95</sup>, assisted by four deputies. Overall, the Fund's position as an international institution responsible for a supranational mandate – the functioning of the international monetary system – makes her a key participant worldwide, with a distinct own voice.

The IMF's mandate<sup>96</sup> is broader than just financial assistance. The Fund's staff can provide technical assistance, build capacity locally, overview appliance to statistical standards... Of particular importance to me, the IMF's particular position endows her with a specific mandate of surveillance. This sometimes got the institution the title of "*gendarm* of world markets". Surveillance is done at different levels: (i) from a global and wide perspective in publications such as the *World Economic Outlook*, (ii) on more specific topics/regions in recurrent periodics *Global Financial Stability Report*, *Fiscal Monitor*, *External Sector Report*, *Regional Economic Outlook* or (iii) at a country level in **Article IV** and other country reports – the *Recent Economic Developments* series. Surveillance is often a key condition associated with the IMF's financing programs. Hence program-related documents such as requests for assistance or program review also entail 'surveillance' elements. In this dissertation, I focus on the lower level of surveillance: at the country level. Worth noting, there has been only few research using article IV publications and related background papers from a narrative perspective. Romer and Romer (2017) and Hernandez (2019) form recent notable exceptions.

Article IV publications are the practical application of the fourth article in the IMF mandate<sup>97</sup>. Indeed at the bilateral level, the IMF monitors and evaluates the situation of the economic and financial systems in order to identify potential sources of risk. To that end, she relies upon a conceptual framework for assessing country risks applied to all members (Ahuja et al., 2017)<sup>98</sup>. What draws me towards these particular publications is the fact that I coordi-

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<sup>93</sup>The number of member economies rose from 44 in 1944 to 189 as of mid July 2020.

<sup>94</sup>At the end of my grant at the Banque de France, I got the occasion to work on the discussions regarding future IMF quotas/resources. The policy note aimed at discussing, conditional on different scenarii, expected costs associated with future crises management.

<sup>95</sup>Currently Kristalina Georgieva.

<sup>96</sup>The interested reader can refer to Liu (2018) for legal considerations on the IMF's mandate and the Fund's inherent rule of law.

<sup>97</sup>Participants in the Fund's activities bound themselves more or less concretely to a set of agreements. Inter alia here on surveillance but also on the furnishing of information (art. VIII) and restrain from imposing unauthorized restrictions on international payments and transfers (art VIII).

<sup>98</sup>Note that, while at the Banque de France, I animated a seminar on behalf of the CB and the IMF's Institute for Capacity Development on country risk assessment – focus on the external sector – with African economists. I mention that as another signal for my acquaintance with the Fund's documents and methodology.

nated the conduct of the article IV France for the Banque de France two consecutive years<sup>99</sup>. Being confronted to the production process from the inside provides me, ex-post, with (1) a great familiarity with the content of the documents and the different topics covered ; (2) a better understanding of the entire process engulfed in the article IV annual consultations ; (3) a direct experience<sup>100</sup> of the interactions between the IMF and national representatives and how the latter's views were discussed and taken into consideration. I have also been part of the IMF SPR department in the Macro Policy division. This new insider's view and discussions with colleagues provide me subsequently with (4) a better understanding of the internal 'article IV consultation' process and the making of the Fund's views. Having this insider's view on the insiders' writing the documents is, I believe, a good way for me to catch the underlying motivations in the information entailed in descriptions, analysis and policy views.

The article IV publications is only the final step in the process defined as the *article IV consultations*. These consultations entail exchanges of information/statistics, views on specific questions and topics, meetings between the IMF staff mission<sup>101</sup> during a few weeks visit in the country, etc. All participants in the process, evidently, anticipate the whole procedure and prepare in advance their analysis and their *a priori* views on certain specific topics of interest. As such, for the BdF/IMF, there are background papers that are prepared for internal diffusion. They are used to define the institutions' positions and scope for discussion. Note that, for the IMF, the *Recent Economic Development* series of country reports offers a good grasp of these background documents. During the visit, national representatives/authorities and IMF mission meet and discuss topics of interests. In practice, the consultations conclude with the publication of the Article IV report, validated by the executive board of the IMF. The conclusions are often made public and associated with a press release. Nevertheless some countries refuse the release, and even sometimes the conduct of the mission – it is their own right. The *de jure* rule regarding the conduct of the consultations should lead to annual publications. In practice, and especially in the archives, publications are available at a lower frequency (biennial). Moreover, as countries can refuse the publication of an article IV's conclusion, there might be gaps. Yet, searching archives allows for the recovery of other notable publications that make up for the loss<sup>102</sup>.

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<sup>99</sup>From the start of my PhD, my research has been confronted with current topical issues and a policy-view. I grew to learn about the making of economic decisions but also the institutional fundamentals underlying these processes. Looking back at my experiences at the Banque de France and as an intern at the IMF, I sort-of feel like a field-researcher involuntarily studying the making/fundamentals of the communication of international institutions and policy makers. This claim is not meant as a statement of authority but rather as the observation of a researcher discovering new approaches and questions.

<sup>100</sup>I notably coordinated the contribution of the BdF to the French answer to the Fund. I coordinated the briefing file for the BdF Governor's meeting with the Fund. I also assisted to meetings between the IMF staff mission and BdF/ACPR representatives.

<sup>101</sup>What I denote the IMF staff mission includes all economists and staff from a regional department or, in rarer cases, from transversal departments at the Fund, who take part in the visit.

<sup>102</sup>The most salient example are the Recent Economic Development Argentinean country reports published in 2016 and covering in detail the years 2012/13, 13/14 and 14/15. The first two reports also discuss economic and

IMF archives are widely accessible. The e-library <sup>103</sup> offers a wide cover of countries economic and financial history. The library gives access to several types of publications: official or academic publications, reports (program-related or not), books... Accessing a country's page at the Fund also gives access to official country-related communications, news brief, speeches, transcripts etc... The many types of content provide many potential sources of information related to elements that mattered for each crisis. I concentrate my readings: (1) on article IV publications when available ; (2) on Recent Economic Development country reports (often more detailed than article IV publications, especially before the 1990's, when the formatting of the article IV muted a bit) ; (3) program-related request for financial assistance, which entail the staff's view on the economic and financial system and a recommendation for the executive's board decision, or the regular planned reviews of program's advancement and respect of conditionality ; (4) Independent Evaluation Office reports which relate to specific crises (notably Argentina 1991-2001 (2004), Korea, Indonesia and Brazil end 90's (2003), Greece, Portugal and Ireland in 2010's (2016b)) or that address key elements that could have affected the Fund's view or the events: data issues (2016a), the IMF's role as a trusted advisor (2013) or the IMF's policy advice on exchange rates (2007). The consistency of the Fund's view – and consequently of the documents I treat – is ensured internally as the *Strategy and Policy Review* (SPR) department reviews all publications. Working with management and other departments, SPR ensures the unicity of the Fund's voice. She builds upon analytical tools and research to evaluate the policy implications of recommendations and opinions. SPR also work internally on the adequacy of the conceptual framework and follows/conducts recent research and unfoldings to adapt the view to the changing world<sup>104</sup>.

The adequacy of the IMF's approach is of primary interest for my initiative. Indeed the framework behind the publications has multiple advantages: (i) currency crises as disruptions on the international monetary system are of key importance for the IMF, (ii) it is backed by a serious methodology, that borrows from academic literature and years of experience ; (iii) it allows for comprehensive coverage and analysis of episodes ; (iv) the reports are written by economists, well sourced and recognized for their seriousness (v) the documents are considered as a reference view worldwide and media-wide (from press articles to academic research). It is also important to note that the IMF's framework has evolved over time. Reinhart and Trebesch (2016) discuss how the IMF adapted the conduct and scope of her activities to the different waves of financial crises and changes in the international monetary system. Yet this doesn't mean that the Fund's approach is unbiased and uncriticized. The most discussed illustration of this statement is the huge wave of critics and mistrust that rose in the 2000's in Latin and South American Countries. Hernandez (2019) leads a discursive analysis of the policy biases in

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financial developments since 2006 when the authorities decided to cut ties with the IMF.

<sup>103</sup><https://www.elibrary.imf.org> or <https://archivescatalog.imf.org>

<sup>104</sup>A key illustration of this fact would be my research as a summer intern with co-authors from the SPR department on the effectiveness of unconventional monetary policies in open economies.



the treatment of Argentina over 1989-2006:2016-17. He uses article IV publications to estimate the bias in policy recommendations. Having read these documents with particular attention, I can only agree with his conclusions. When exploring the archives to define my methodology, I read, for Argentina, all of the IMF's press releases, information notices and the, key, speeches by the managing director. The speech by Michel Camdessus on May 27th, 1996 at the Academy of Economic Science in Buenos Aires, Argentina is a **must read** to understand in practice what is at stake here. Since the 1980's, the Fund had been following, what was later coined in 1989, the *Washington Consensus*.

This was an economic dogma that revolved around a set of policy recommendations that covered fiscal and monetary discipline, tax reforms, flexible exchange rates, privatization of key activities, a wide process of liberalization (notably to inward capital flows, e.g. direct investment), market deregulation and an amelioration of institutions. Whether or not this is a good policy agenda is not for me to tell but for history. The drastic developments that engulfed emerging markets at the end of the 90's affected most consequently Latin and South American countries – Argentina widely exposed on the front lines (IEO, 2004). The country experienced one of the worst recessions in her history. In 2006 the country cut ties with the IMF to only enter in official 'normal' relations 10 years later. The IMF adapted her views on the Washington ex post and worked towards renewed cooperations. The methodology and views of the Fund are changing but still remain a topic of discussion as illustrated in the following quote from IEO (2019).

*“IMF staff developed the IV to provide a coherent framework for policy advice on dealing with volatile capital flows based on both detailed review of country experience and conceptual work. The IV has garnered praise but also generated some frustration. Some countries have wanted the IV to endorse the use of capital flow management (CFM) measures as part of a broader toolkit that could be used pre-emptively rather than as last in the hierarchy of policies. In addition, some advanced economy (AE) and EM officials feel the IV has been applied too rigidly, for example, in labeling as capital flow management measures some steps that countries view as having been taken for financial stability or social reasons.”*

The quote illustrates very much a fundamental that, I, as a reader try to see in the documents: What is the IMF's view? And why? Because the IMF has a set of principles, her approach is fundamentally biased. When reading, I try to pay attention to cases where this could have mattered.

Finally, due to her unique place in the International Monetary System, the IMF has indeed a voice of her own but she also has responsibilities and a restricted space for talking. Restricted *de jure* by her mandate that prevents from making any political judgments irrelevant to primary

concerns. A key example to that is Peru in 1992<sup>105</sup>. In April, the president Alberto Fujimori dissolved the Congress and assumed full powers using military support. Whereas this event acted as a deep constitutional crisis and affected the position of international actors against Peru (and hence the relative value of the currency), the IMF rarely mentions it in its article IV publications for 1992 and for 1993: "Capital inflows resumed since 1990, in response to the Government's policy of normalizing relations with foreign creditors and the liberalization of the exchange system" [...] "Inflows slowed down with the uncertainties surrounding the political environment in early 1992, but continued being positive through September 1992". Restricted *de facto*, because her voice is a key signal on markets worldwide. Leaks, uncertain claims, bad projections can be the source of heightened market risks<sup>106</sup>. Hence her communication has to be tailored.

I now refer the source to the main features from the go-to-guide. I also detail remaining elements from the guide on the angle of attack and the methodology.

### 3.3.4 Ticking boxes from the check-list

#### A. SOURCE

The source is the *International Monetary Fund's article IV publications*, I also rely on other publications that entail elements from economists country reports (descriptive and analytical views). These include: (1) *Recent Economic Development country reports*, that act as internal background papers to article IV final reports ; (2) program-related documents including *requests for assistance* and *reviews of program's advancements* ; (3) Independent Evaluation Office reports on the implication of the IMF in selected crises or topical reports, e.g. on the role of statistics and data quality in past experience ; (4) in few occasion I also consult press releases<sup>107</sup>.

- (i) Given the institution primary mandate, currency crises and associated determinants are a key item of discussion in IMF country reports. This primary mandate actually ensures that the IMF discusses/follows issues related to currency crises as they identify as key disruptions in the functioning of the international monetary system. The conceptual framework that the IMF uses in assessing countries risks also ensures a wide covering discussion of potential determinants.
- (ii) Article IV publications are available at a regular but not high frequency. They are often biennial/annual. Expanding the scope to other publications that entail the same descriptive/analytical elements, allows for a more detailed study. These publications cover the panel of member countries, which includes my sample of study. For all countries, IMF publications are directed by one consistent policy-view, which enables consistency of the

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<sup>105</sup>This particular episode is dated as a currency crisis only using the Frankel and Rose 1996 method. My narrative quotes confirm that it is not a currency crisis

<sup>106</sup>The IMF has a very strict security policy to ensure the safety and the awareness on *crown jewels* and procedures.

<sup>107</sup>For Switzerland, I also relate to historical work and OECD archives

approach, and a comprehensive framework, which enables the comparability of economic and financial systems worldwide. Moreover, the IMF's conceptual framework has been known to adapt to changing international conditions and realizations. For crises as diverse as currency (financial, works as well), this is a notable advantage.

- (iii) Article IV publications are written by the IMF's staff (economists). They are the results of consultations with national authorities and representatives. They often incorporate the Fund's descriptions, analysis and policy views on the recent, current and prospective state of the country. The Fund might also form an opinion on policy-relevant issues (advisory or, in a program, a bit more). The view of the national authorities has been introduced in a clearer way in the documents through time, but overall the Fund speaks with her own voice. Documents are written not long after or at the time of the events. They entail detailed descriptions of specific events and manifestations as well as more general analysis of the transmission of macroeconomic and financial perturbations. Given the policy-view, motivations are an essential element considered.
- (iv) IMF publications are widely consulted documents. They are accessible, well sourced and referenced. The publications are often written by economists, who also work on research projects<sup>108</sup>. Her position on the international stage acts both as a source of potential biases and a source of potential auto-censorship. It is possible to evaluate these biases in the documents.

## B. ANGLE OF ATTACK

- (i) **Concept:** A currency crisis is a particular type of financial crisis. It is a financial crisis because she entails heightened disruptions on the foreign exchange markets. Forex markets include transactions related to the exchange rate(s) and the products derived from it. It is particular because of the nature of the asset traded (in-)directly on these markets: domestic currencies. As the external nominal anchor, the exchange rate measures the relative value of a currency against another and acts as a proxy for the relative trust in a given currency. This is particularly important because the exchange rate is associated to all current and future decisions by economic and financial domestic agents when interacting with foreigners.

A **currency crisis** occurs when substantial pressures accumulate on forex markets due to agents sharing conflicting views as to what the actual value of a currency should be. The pressures unveil the inherent vulnerability/inconsistency/indeterminacy of the present situation. This, in turn, forces a marked change in the policy course of an agent(s) or a substantial adjustment in prices – re-valorization. This action can solve the issue and align agents considerations on a new path for the currency. It can also prove insufficient to tame divergences and lead to a resurgence of troubles.

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<sup>108</sup>The research objective is often not the same as academic research, but this ensures that the ideas of the staff remains connected with current research.

- (ii) **Initial sample:** I failed to use textual recognition on the archives to filter the initial sample for the study. This is due to old archives not/hardly being processable. As a result, and given the wide discussions in the literature, I follow the approach by Boonman (2019) as I decide to set my initial sample on methodologies from the literature. Relative to his work, my database covers a wider set of countries (70 against 35). Whereas he relies upon academic research articles and press releases, I attempt at using a consistent source and narrative methodology to dating all crises. I also adopt another form of output for the database by relying upon quotes from IMF publications that allow for direct ex-post external judgments. To date the initial set of quarters in crisis, I rely upon the 8 previously presented methodologies: Frankel&Rose-3years, Frankel&Rose-5years,  $EMPI_2^1$ ,  $EMPI_3^1$ ,  $EMPI_2^2$ ,  $EMPI_3^2$ ,  $EMPI_2^3$ ,  $EMPI_3^3$ . I also consider Boonman (2019) and Laeven and Valencia (2020) as robustness. To set the scope for my database, I intersect the previous different datations and identify 250 episodes for which at least one signal suggest a currency crisis. These episodes can cover signals occurring at different quarters. Given the frequency of the publications, I can verify in past/future publications, the starting point of the crisis.
- (iii) **Research question:** In present section, I use the narrative approach to date the start of currency crises. Hence I focus on following questions: Are there detailed descriptions of heightened fluctuations on forex markets? Are there fundamental vulnerabilities/inconsistencies impairing the functioning of forex markets? Are agents stressing/stressed by developments on forex markets? Are agents expecting/speculating on a depreciation? Are agents constrained in their policy choices? Are national authorities intervening to dampen developments/pressures? Do announcements relate to substantial/novel policy implementation or significant change in the global policy framework?

### C. METHODOLOGY

- (i) **Documents read:** I referred to over 208 article IV publications documents, 59 recent economic developments, 6 IEO reports, 31 program reviews and 9 other sources (IMF press releases mostly. For Switzerland, as the country joined the IMF late, I rely upon OECD publications<sup>109</sup> and Baltensperger and Kluger (2017) for a monetary history of the country). Given that my current focus is on currency crises, I read in detail the most relevant parts of the documents: those that related to the external sector and monetary policy first, sovereign, financial and real factors next. I focused on the latter elements with particular attention whenever I felt the narration missed a link or information was insufficient to conclude.
- (ii) I consider three sets of **factors and developments** of interest when analyzing whether the episode studied entails a currency crisis: (i) key (systemic) domestic agents/sectors involved in cross-border transactions and likely to be constrained or stressed around a currency crisis ; (ii) key fundamentals determining how forex markets function – exchange rate regime, trade and financial liberalization, external/global imbalances, trade diversification,

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<sup>109</sup>See RR17/18/19 for a discussion of the source.

financial development, balance sheet risks and (iii) key policy changes and interventions – exchange rate devaluation, foreign exchange intervention, change in policy rates, capital flow measures, announcements and expectations realignment, open market operations etc. I look for staff statements articulating these different factors with "periods of heightened pressure", "abrupt" or "substantial" changes and policy interventions. In particular, I identify key stated events or causal/qualitative statements providing information on the origin and starting quarter for the crisis.

- (iii) **Output:** For each episode considered, I code whether it identifies as a currency crisis or not. If so, I keep track of the starting quarter. I record the main quotes and descriptions from the textual sources that allow identifying the nature of the episode considered<sup>110</sup>. Quotes and details are available in the associated database.

When I first started my database of currency crises, my goal was to achieve a clean comprehensive datation of currency crises. As I was reading, I realized that there was more value into these narrations (e.g. links to other crises and information on the role of expectations). I concentrated my activity into checking the best start date on the calendar and into recording the quotes that offered the best description of the events. I decided to retain only quotes, because of time constraints. Future work entails detailing and building more comprehensive narrations.

Overall I date **124 currency crises** over my sample.

## Conclusion

Financial crises are frequent events throughout countries' history. They are often associated with (important) growth slowdowns and reversals. In this chapter, I first review theoretical and empirical literatures to define and date currency, banking and sovereign crises. All crises share common features and are associated with: (i) heightened stress on a particular financial market, or for a particularly systemic participant on a market and (ii) drastic policy changes. Financial crises originate either as fundamentals (unexpectedly) deteriorate or as the result of self-fulfilling mechanisms. Often, different types of crises trigger consequently.

Banking and sovereign crises prove relatively easy to date, as the literature converges on few common criteria. Echoing the numerous mechanisms, theories and history of currency crises, several empirical approaches oppose. As they concentrate on different sets of empirical indicators, they yield slightly diverging results. To date currency crises for the countries in my sample, I rely upon recent novel literature using narrative economics. Narrative contributions complement empirical approaches by extracting information, from qualitative and often

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<sup>110</sup>The purpose of applying my narrative methodology was to date crises starts. Using narrations and identified quotes, future research, beyond the scope of this article, will code the key factors and developments that played a role in each currency crisis. A second future contribution of this database entails the classification and analysis of currency crises.

neglected textual sources, on agents' perceptions, sentiments and motivations. Given the current momentum of this literature, I contribute by proposing a go-to-guide for the key elements entailed in such methodologies. These approaches rely on textual sources to shed light on the global narrative of ongoing developments. To provide a meaningful and representative proxy, the sources are often diffused among a wide panel of agents, written by reliable authors and/or by insiders to key decision processes. Narrative approaches rely upon a conceptual framework derived from the theoretical literature to treat this qualitative *forgotten soft data*. Narrative contributions study how agents' perceptions of their environment and underlying motivations drive aggregate developments. I first apply the guide to date the start of currency crises. I read over 315 IMF publications – mainly article IV consultations – and arbitrate and date, with quotes, 250 candidates.

Overall, my database includes 124 currency, 52 banking and 36 sovereign crises. As financial crises often associate with economic crises (recessions), next chapter match the new database with business cycle dates and 239 expansions and 200 recessions. I use these crises episodes to study the heterogeneity of crisis experiences and highlight the key characteristics of the financial crises driving economic volatility.



*À un premier regard, la crise se manifeste non seulement comme fracture dans un continuum, perturbation dans un système jusqu'alors apparemment stable, mais aussi comme un accroissement des aléas donc des incertitudes.*

*Elle se manifeste par la transformation des complémentarités en antagonismes, le développement rapide des déviations en tendances, l'accélération de processus déstructurant/désintégrant (feed-back positifs), la rupture des régulations, le déferlement donc de processus incontrôlés tendant à s'auto-amplifier d'eux mêmes ou à se heurter violemment à d'autres processus antagonistes eux-mêmes incontrôlés.*

*[...]*

*"La crise n'est pas le contraire du développement, mais sa forme même",  
Antonio Negri.*

*Sur la crise, EDGAR MORIN (2020)*





## Chapter 4

# A taxonomy of crises

In chapter 2, I identified that the key source of BC volatility differentials, in between developing, emerging and advanced markets, was the intensity of the recessions. Developing and emerging market are more volatile, not because they enter more frequently into a recession, but because when they do, they lose much more. Developing and emerging markets are 8 and 5 times more likely to experience acute recessions, i.e. with losses above 10% of GDP. As chapters 1 and 3 identified, developing and emerging markets' higher volatility stems both from structural weaknesses as well as from a greater exposure to shocks often amplified by financial frictions. When the perturbations magnify too much or when they disturb agents' information sets too much, they can result into episodes of heightened pressures on financial markets, spikes in uncertainty and drastic policy changes. In previous chapter, I detailed the construction of my database of financial crises which includes for the 54 countries in the sample: 124 currency, 52 banking and 36 sovereign crises. In present chapter, I take stock of key stylized facts and characteristics on crisis episodes, in developing, emerging and advanced markets, over recent history. I study the sequencing of crisis episodes and how they relate to acute recessions. I identify the contributions of financial crises to business cycle volatility differentials.

Section 4.1 discusses the descriptive statistics and historical hindsight offered by the database. I conclude on a set of stylized facts and future elements to discuss: (i) How important is EMDEs' higher exposure to financial crises? (ii) What do regional patterns and waves of crises speak for? (iii) Currency crises are numerous: do they differentiate across countries? (iv) Banking crises, if expressing diverse liquidity shortage issues, are a common plague for all countries: how do they coordinate with other crises? (v) A sovereign crisis is a distinctive sword of Damocles hanging over EMDEs' head: What makes them so significant?

In section 4.2, I intersect the financial crises database with that on business cycle phases. By matching financial crises' starting quarters and business cycle phases, I identify crisis episodes: expansion/recession (not) associated with financial crises. The sequencing of crises provides important information on financial crises: on how they associate and on when they trigger? There is a high variety of crisis episodes when considered as a quadruplet of "time-related" events (economic crisis (i.e. MSM recession) (0/1) – currency crisis (0/1) – sovereign crisis (0/1) – banking crisis (0/1)). I define *multiplicity* as the quality for a crisis episode to entail a sequence of different crises' "shocks", among {economic, currency, banking, sovereign crises}. The more crises involved in the episode, the higher the degree of multiplicity. Given the frequency of currency crises, I also study their relation to economic and other financial crises across countries: a layer of the taxonomy coined *currenccity*. These two characteristics strike as key distinctive markers when opposing EMDE to AM. Overall, the wide majority of financial crises associate with recessions. Currency crises form a notable exception as they tend to be more likely associated with expansions as market develop<sup>1</sup>. Currency crises are also more likely to associate with other financial crises. Full crisis episodes are a key stigmata in less advanced markets' recent history.

Section 4.3 studies how crises fare along the 3 layers of information based upon economic crisis episodes: *severity* (e.g. the cumulated gains/losses<sup>2</sup>), *duration* (e.g. the number of quarters in episode) and *rebound*<sup>3</sup> (e.g. the cumulated gains in the first year after the end of the recession). I first showcase how financial crises affect the business cycle phases they associate with overall, by region, by multiplicity and by currency signal. Multiple crises are always more severe, with or without currency crises. They are rare in advanced markets and more frequent in less developed markets. Simple economic crises are more likely in more advanced markets.

In section 4.4, I showcase a set of variance decompositions along the lines of the taxonomy. I provide estimates of the contribution of diverse crisis episodes to business cycle volatility. Financial crises play a critical role in driving business cycle volatility differentials. Currency crises associate with an important share of BC volatility. In less advanced markets, they are more likely to create panics and associate with other financial markets' troubles. When crises multiply, so do economic losses.

Section 4.4.3 concludes this dive into the data by taking stock of what, so far, this dissertation has identified. I open on questions on causality discussed in chapter 5.

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<sup>1</sup>In AM, these expansionary currency crises are often dated before 1990.

<sup>2</sup>Steepness forms a proportionally good measure as the average slope during an episode.

<sup>3</sup>Note that, my conception of a rebound, i.e. growth in the year after the end of an economic crisis, misses part of the focus of recent literature.

## 4.1 Historical insights and stylized facts: some issues for consideration

### 4.1.1 A recent history of crises

Figure 4.1 presents the distribution of all crises in the sample through time. When considering the distribution of crises through time, several episodes can be highlighted<sup>4</sup>.

(A) **1972–1986: 15 years of currency crises in advanced markets** – 43.4% of currency crises in advanced markets are associated with this period. They reveal several traits.

- (i) Small open advanced economies, often commodity exporters, are exposed to currency attacks and speculation (e.g. Australia, Canada, Iceland, New-Zealand). Over the period, the particularly undiversified nature of their exports and economy made them highly vulnerable to fluctuations in world commodity prices and exposed to speculation. This biased economic structure of earnings reduced drastically the policy space of national authorities, especially when confronted to drastic external conditions/shocks and speculative attacks. All cases in Iceland involved speculative attacks and most involved exposure of the fish industry through trade; New Zealand and Australia also display mostly episodes of speculative attacks and trade induced currency crises. In Canada, commodity is less of an issue, the central bank often intervened to smooth fluctuations/disruptions in the forex market, prevent confusion about monetary policy objectives and avoid spillovers to other markets. The implied frequent changes in the CB stock of foreign reserves often exposed the institution to strong downward pressures that forced a change in policy.
- (ii) **Europe episode 1 *A new time of crises*** Western European countries struggled several years with the construction of a common monetary system. Inbetween 1972 and 1978, the first attempt at creating a unique currency band for countries' exchange rate fluctuations ("the snake") proved highly unstable with several exits and even reentries. The lack of confidence in the consistency of policy and the commitment of the authorities caused several currency crises. The second attempt at a common system was introduced in 1979 as the European Monetary System, in which countries, inter alia, managed the value of their currency against the ECU, a virtual unit of account constructed against a basket of currencies. The first phase under this arrangement (1979-1986) saw a rather flexible use of the system. Nevertheless fragilities on the domestic sides forced several countries towards devaluations (Belgium, Italy, France).
- (iii) ***The crises awaken*** In emerging markets, few events are actually recorded before 1980 due to reduced availability of quarterly real GDP data.

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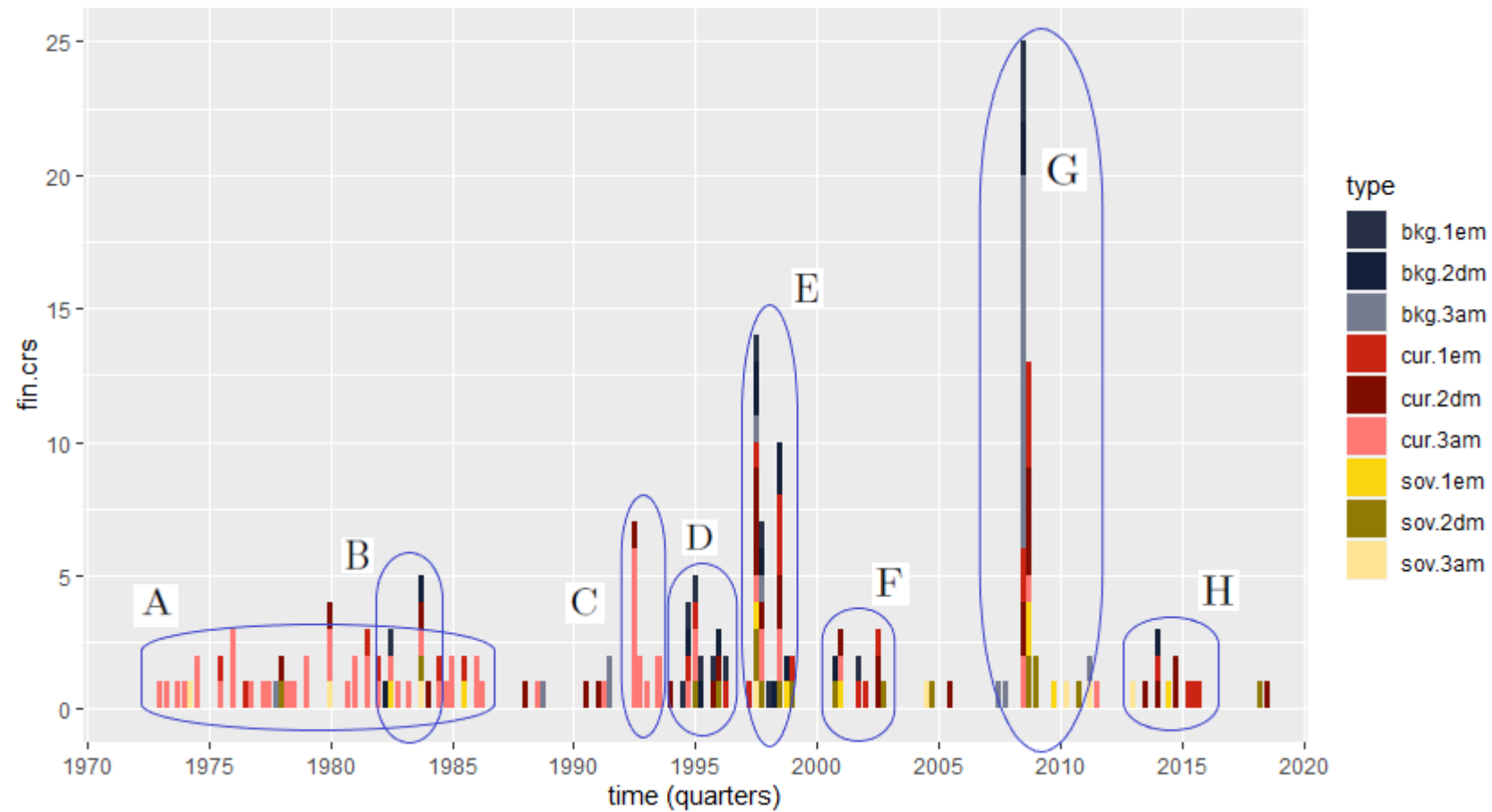
<sup>4</sup>I will not deny applying *Star Wars*-related names to my episodes. Yet, my sequencing of episodes is in no way parallel to the (stated) chronology of the *Skywalker* saga' own episodes.

- (B) **Beginning of the 80's: the first multiple crises in EMDE in the sample "The Crises Menace"** – The first multiple crisis episodes hit emerging and developing markets at the beginning of the 80's. In 1982q1, as Mexico enters a recession, a currency crisis triggers. 2 quarters later, a sovereign and a banking crises hit the country. For Philippines, as the country enters its second quarter of recession in 1983q4, the three financial crises trigger.
- (C) **Beginning of the 90's: Currency debacle in Western Europe: Europe episode 2: "The Currency Strikes Back"** – Beginning of the 1990's, Western Europe once again faced a currency debacle (C). The exchange rate mechanism which bounded domestic currency to one another submitted to market pressures as inconsistencies in domestic policies and unemployment rose.
- (D) **Mid 90's: Emerging Markets tremble but maintain the course "Attack of the Crises"** – Mid 90's, emerging markets suffered a first wave of banking (and currency) crises (D). In most cases, financial markets were poorly developed and the banking system poorly regulated. Banks faced increasing external and domestic funding costs, which forced the closure or privatization of numerous banks in Latin and South America (Bolivia, Brazil). In some cases, the liberalization process had exposed vulnerable financial institutions to external pressures and capital flight (Costa Rica, Paraguay). Following the Mexican *Tequila crisis* of December 1994, Argentina suffered a similar fate but contagion remain contained. In Central and Eastern European countries, several banking crises shook the region at that period. Most of them resulted from poorly regulated financial institutions, often scarred by political interference (Bulgaria, Romania, Latvia, Lithuania etc.).
- (E) **End the 90's: Contagion, disasters and the emerging virus "Revenge of the Crises"** – By the end of the 90's the situation deteriorated quickly for emerging and developing markets worldwide. The global crisis episode started with Thailand in July 1997. As many Asian countries, Thailand benefitted from large capital inflows that fueled speculative investments and further constrained the Central Banks exchange rate objectives. As the economy slowed down (following external perturbations), the situation became unsustainable and heightened risk aversion and panic precipitated a full-on crisis. Soon, the trouble contaminated most Asian countries and the panic reached other emerging and developing markets.
- (F) **Beginning of the 00's: "The (Last) Crises"** – In some countries, the previous period of trouble had long lasting effects and as the 21st century started, several emerging and developing markets suffered from continued external pressures and speculative attacks (F). Argentina triple crises in 2001-02, which followed from the recession initiated in 1998 by world financial troubles, acts as the most famous example in this bucket.
- (G) **2008–2012: the Global Financial Crisis (GFC) and Europe episode 3: Return**

*of the Crises* – After a period of relative tranquility mid 2000’s, financial markets and the world economy completely collapsed during the Global Financial Crisis (G). The crisis originated in the USA and soon spilled over to most advanced markets. Overall, most emerging and developing markets faced troubled forex markets but managed to navigate the period more or less uninjured. The GFC was followed, in Western Europe, by continued difficulties as Southern European countries faced spikes in risk premia.

- (H) **Mid 2010’s: Worsening conditions on the emerging front *The Rise of the Crises(?)***: In this period of worsening external conditions for many emerging markets and developing countries, the spike in financial crises is unexpectedly low. There are some crises in the usual victims of crises (Argentina, Turkey etc). Part of the explanation can be found in Reinhart (2019). Carmen Reinhart argues that, given external conditions, defaults that could have been expected and yet were not signalled, i.e. the *missing defaults*. She argues part of the explanation can be found in China’s worldwide financial activities being grossly undervalued. In her view, China has been finding over recent history a new place as a financial center in the international monetary system, part of which follows a political motive (the *Silk roads*). Hence she has developed heavy lending practices and foreign investments in many countries worldwide. These developments might disguise parts of EMDE’s recent history of debt crises and explain their low occurrences in the last ten years.
- (I) **2020’s onward: A guess outside the box *Towards a new saga?*** The Covid-19 pandemic has hit all countries worldwide as an exogenous supply and demand shock. Often associated with drastic and innovative policy interventions to prevent the build-up of imbalances, the shock is paired with a great uncertainty about future health, economic and financial prospects and developments until the summer 2021 at best. Most policy interventions were able to sooth market expectations but external financial assistance was often needed. During the crisis, the IMF introduced a new tool, the *Rapid Financing Instrument* to provide emergency liquidity. If the situation stabilized partially on financial markets, prolonged economic losses could deteriorate economic fundamentals enough to either (i) directly damage the economic and financial system or (ii) shift agents’ expectations towards this bad equilibrium. As chapter 5 will identify, political uncertainty and the weakening of the social contracts are particularly important in the build up of trust debacles and full-on crises. Given the novelty of the measures associated with the management of the Covid-crisis, social unrest and political dissensions are bound to rise. Most notably because the health crisis has shaken the most vulnerable and pressured the social spheres regardless of the development of the economy.

It is worth noting that there were some periods of relative tranquility before 1990, around 2005 and before 2020. This observation needs to be noted but from the point of view of having currently only 54 countries in the sample.

**Figure 4.1:** Number of crisis per quarter, by type and country group, over the sample

sov... correspond to the number of sovereign debt crises, cur... for currency crises and bkg... for banking crises.  
 ...1em means the crisis occurred in an Emerging Market, ...2dm in a Developing Market and ...3am in an Advanced Market

### 4.1.2 Descriptive statistics

Table 4.1 presents descriptive statistics on the financial crises covered in the sample (MSM).

**Table 4.1:** Descriptive Statistics - Number of financial Crises by type and country-group

(nb of)	country	obs.	cur.crs	bkg.crs	sov.crs
DM	15	1628	34	16	18
EM	15	1729	29	14	10
AM	24	4548	61	22	8
AME	3	498	16	2	6
Asia	7	1068	17	6	7
CEE	13	1250	14	14	6
LSA	10	1107	22	9	11
WE	17	3187	43	19	6
WC	4	795	12	2	0
CMD	13	1703	41	11	13
NO.CMD	41	6202	83	41	23

On average, whatever the income group, over available data, countries face 2 to 3 currency crises and one banking crisis. For sovereign crises, emerging and developing markets are more exposed to this type of event (on average a third of AM might be exposed to sovereign crises, against two thirds for EM and all DM.). For all groups, currency crises are around 2 to 3 times more frequent than other episodes (7.5 times more frequent than sovereign crises in AM). For advanced markets, 50% of currency crises occurred before 1991Q4 and 75% before 1998Q4 (against 17 and 40% on average for emerging and developing markets).

#### Looking at the crises regionally:

**Africa and the Middle East** display a high frequency of currency crisis and default per country (5/1.6 per c.). This particular exposure to currency crises illustrates the cases of South Africa and Turkey (Morocco forms the last member of the trio). South Africa's exposure to currency crises stems mainly from the country's high exposure to the commodity roller coaster through gold prices. The Turkish history has been one of weakened fundamentals, political uncertainty and speculative attacks. Over the first part of the sample, Turkey experiences a currency crisis every 4 years. Beginning 90's, the pace slows to 7 years of break, but a currency crisis is never too far away from Turkey as the last crisis illustrates (2018.q3 10 years after the 2008q4 crisis). **Asian countries**, well within the average, face 1 banking and sovereign crises and 2.4 currency crises per country. **Central and Eastern Europe** displays a low number of sovereign crises (1 per 2 countries), and 1 currency and banking crises per country. Note that this region is the less exposed to currency crises. Currency crises shock the group in



four waves, 2 to 4 countries at a time: the first in 1996, the second with the global emerging market crises end of the 90's, the third with the GFC and the last in 2014. Romania faces 2 currency crises, Russia 3. **Latin and South American countries** fell within average, with one sovereign and banking crises and two currency crises by country. **Western Europe** displays a low occurrence of sovereign default by country (1 in 3). Banking crises are, as elsewhere, evenly distributed. On average western european countries face 2 currency crises. 93% of the currency crises occurred, as could be expected with the introduction of the Euro, before 1998 (before 1995 to be accurate). **Western countries** – Australia, Canada, New Zealand and the United States – do not display any sovereign crises over the sample. 2 banking crises in the USA (1988q4 and 2007q4). Australia, Canada and New-Zealand experienced each 4 currency crises. These crises are key characteristics of small open advanced economies struggling with commodity dependence, challenging reserves management, speculative attacks and expressed doubts about the monetary policy stance. Nevertheless, as AM display longer time series, it is more useful to compare probabilities between groups.

#### 4.1.3 Differences in exposure to crises, stylized facts and some culprits

Table 4.2 presents the annual probabilities to face a given crisis for the different country groups.

**Table 4.2:** Descriptive Statistics - Annual probability of experiencing a financial crisis by type and country group

(in %)	Prob(cur.crs)	Prob(bkg.crs)	Prob(sov.crs)
EM (15c.)	6.71	3.24	2.31
DM (15c.)	8.36	3.93	4.42
AM (24c.)	5.36	1.93	0.70
AME (3c.)	12.9	1.61	4.82
Asia (7c.)	6.37	2.25	2.62
CEE (13c.)	4.48	4.48	1.92
LSA (10c.)	7.95	3.25	3.97
WE (17c.)	5.40	2.38	0.75
WC (4c.)	6.04	1.01	0.00
CMD (13c.)	9.63	2.58	3.05
NO.CMD (41c.)	5.35	2.64	1.48

Emerging markets face an annual probability of experiencing a currency crisis of 6.71%, 3.24% for a banking crisis and 2.31% for a sovereign crisis. Developing markets face higher probabilities for all crises (8.36 for currency crises, 3.93 for banking crises and 4.42 for sovereign crises). Advanced markets face lower probabilities than the two other groups: 5.36, 1.93 and 0.70 for currency, banking and sovereign crises respectively. Overall, emerging/developing markets are 1.2/1.5 times more likely to experience a currency crisis than advanced ones. They

are also 1.5/2 times more likely to experience a banking crisis. For sovereign crises, the picture is even more striking as EM and DM are 3 and 6 times more likely than AM to face such an event. Overall, DM face twice the increase of exposure to crises than EM when compared to AM (+20.9/+51.3% for currency crises, +67.9/+104% for banking crises and +297/+631% for sovereign debt crises). The main source of heterogeneity between country groups stems from sovereign crisis episodes.

Looking at differences and similarities between regions, we can observe that sovereign crises are particularly frequent in AME and LSA (from 1.5 to 5.5 times more likely). WEC are, as can be expected given group composition, less frequently exposed. Currency crises are particularly frequent in AME (12.9%), followed by LSA (7.95%), but less so in CEE (4.48%). They remain frequent enough in Asia, WE and WC. Banking crises are more frequent in CEE and LSA (4.48 and 3.25%) than in other regions, AME and WC are the less exposed regions (1.61 and 1.01%, but with lower country coverage (only 3 and 4 countries per group)). Overall, AME are highly exposed to currency and sovereign crises. LSA cumulate as well a high exposure to banking crises. CEE have been little exposed to currency crises relative to other regions but have suffered in more occasions from banking crises. Asian countries seem to experience the same share of banking and currency crises as WEC but present a 3 times bigger exposure to sovereign crises. WEC experience far less sovereign crises. Currency crises are an important feature for these countries. This can be easily traced back to (i) the many currency crises in European countries during the construction of the Euro, to (ii) the many currency crises that have impacted small open advanced economies, often commodity exporters (e.g. New-Zealand, Australia, Canada, Iceland, Norway) and to (iii) the currency crises that have affected Asian countries that have reached the AM group (South Korea, Hong-Kong, Singapore).

Opposing non- to commodity exporter, it is interesting to note that, if there are no difference in exposure to banking crises, sovereign and currency crises are around twice as frequent. This observation comes along well with two main facts from the literature. First, commodity exporters are more exposed to terms-of-trade shocks and highly volatile world prices, the value of their currency being thus greatly influenced by trade flows, and subject to crises. Second commodity exporters have been described as often suffering from a natural resource curse. From a sovereign perspective, the more the economy is reliant upon one source of revenue the more likely it is to face shortening on its earnings, should said sector be severely affected.

To conclude, so far the database has illustrated the following facts:

**Stylized facts 6: As markets develop, exposure to crises falls... especially for sovereign crises**

- Overall, AM are less likely to encounter any type of crisis than EM and DM (1.2/1.5

less likely for currency, 1.5/2 for banking, 3/6 for sovereign crises.)

- **Currency crises** are frequent crises for all countries (2 to 3 times more than sovereign and banking crises), for different reasons. DM are the more exposed (8.4%), EM follow (6.7%), AM close (5.4%), country groups display different types of currency crises. On average, commodity exporters are 2 times more likely to experience a currency crises than non-commodity exporters.
- There is little heterogeneity in exposure to **banking crises**. Central and Eastern European countries form a notable exception, with twice the exposure as other regions (Latin and South America excluded, 1.5 the others' exposure). Advanced markets displaying often longer time series, they are, over the sample, less likely to encounter one. Nevertheless AM banking crises are mostly recorded around the GFC. Other cases include inter alia the Nordic crises beginning of the 90's.
- Over the recent history, **sovereign crises** mark a pronounced difference between AM and EMDE (3/6 times bigger –  $0.7 < 2.3 < 4.4\%$ ). Defaults have been a key characteristics of the recent history of emerging and developing markets. Serial defaulters (e.g. 3 events for Argentina and Turkey) boost the results in Africa & the Middle East and in Latin and South America, but default is a widespread disease. Defaults in advanced markets include those associated with the 2012 European crisis and past financing issues in the 70/80's.

These figures, if very informative, miss the fact that financial crisis episodes are often a combination of different crises. It is therefore important to associate crises temporally with one another. To that end, I rely upon the MSM business cycle datations derived from the previous chapter.

## 4.2 When business cycles met financial crises: sequencing and multiplicity.

I use an algorithm<sup>5</sup> to first associate financial crises with BC phases (MSM). The algorithm relies upon three rules to associate financial crises and recessions:

- **a simultaneity rule:** If a financial crisis starts **during** a recession, the two are paired.
- **a backward looking rule:** If a financial crisis hits the country in the year **before** the recession starts, they are paired. In practice, among the four quarters before a switch that are in expansion I consider only those in expansion, e.g. if the expansion has a short duration<sup>6</sup>.

<sup>5</sup>This filter allows for no claims on causality.

<sup>6</sup>I discuss the specific case of double dips and transitive expansions and how they relate to crises afterwards.

- **a forward looking rule:** If a financial crisis starts in the year **after** the end of a recession, they are paired. In practice, the backward looking dimension takes precedence. For example, if the ensuing expansion lasts for 6 quarters, there is a two-quarter expansion of the window of study.

A prior to the backward and forward dimensions of this algorithm – centered around recessions – is the duration of the expansions before and after the episode. I first develop a brief taxonomy of expansions depending on their length<sup>7</sup>. If the expansion lasts 4 quarters or less, I coin the episode "*a double dip expansion*". All crises occurring in this expansion are associated with the recession that follows (backward looking rule). There is no use of the forward-looking rule on this expansion. If the expansion lasts 5 to 8 quarters, I coin the episode "*a transitive expansion*". The last four quarters are, by backward looking dominance, associated with the recession that follows. The remaining 1 to 4 quarters are associated with the recession that precedes. If the expansion lasts more than 9 quarters, I separate them in 4 groups: "*short*" (9-16 quarters), "*average*" (17-32q.), "*long*" (33-64q.) and "*protracted*" (above 64q.) . The following and preceding recessions each encroach on the expansion's duration by 4 quarters.

Figures 4.2, 4.3 and 4.4 present for a sub-sample of developing, emerging and advanced markets the varieties of crisis episodes experienced by countries. Each figures plot the log of real GDP, recessions (shaded areas) and financial crises (vertical bars, in red currency crises, in dotted dark blue banking crises and in dotted gray sovereign crises).

The datation and sequencing of events cannot, per se, be the sole judge of causality. If I were to advocate that a financial crisis is caused by a recession if it follows a switch in regimes and a series of negative growth shocks, I would ignore the situations in which the shock that causes the crisis is the same shock that caused the recession, taking different longer channels of transmission. I would thus overestimate the number of cases for which a growth shock is indeed responsible for the crisis and bias my observation. Hence I leave temporality to the side to explore another layer of taxonomy made available by the database: multiplicity.

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<sup>7</sup>When presenting the link between the taxonomy of expansion and the rules of the algorithm, I restrain from specifying how the algorithm takes into account the first and the last episodes of a country's history. Given sample limits, I apply in the same order the backward and forward rules. A caveat of my approach is the fact that all episodes at the beginning/end of the sample are shorter than in reality. A second caveat is the fact that I do not consider information on crises occurring before the real GDP time series starts. Because I understate the number of crises, I believe my results to be potentially underbiased.

Figure 4.2: Crisis episodes – Developing markets

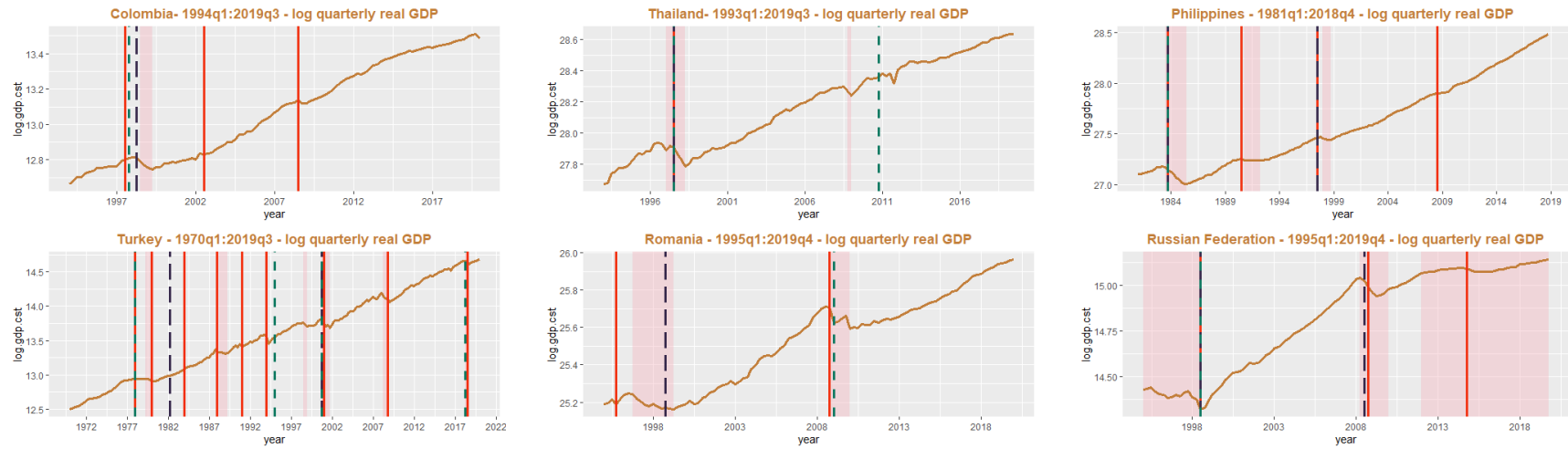


Figure 4.3: Crisis episodes – Emerging markets

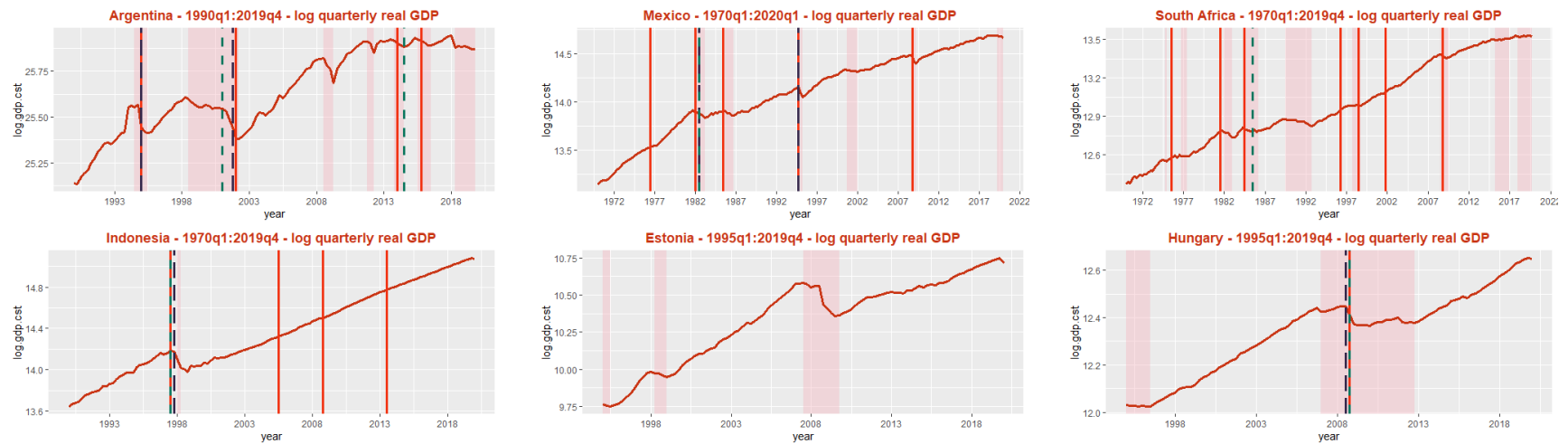
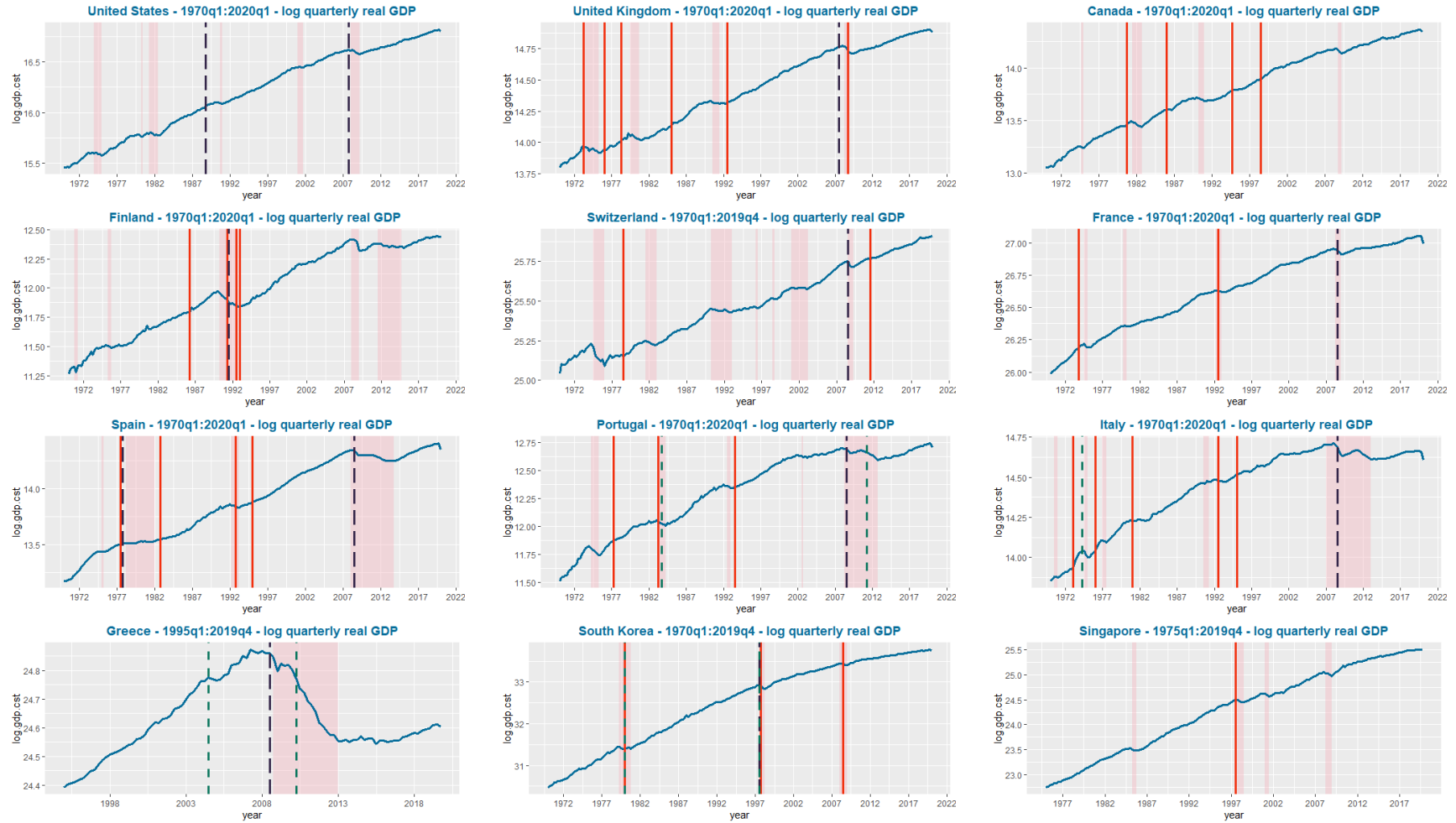


Figure 4.4: Crisis episodes – Advanced markets



Shaded areas indicate recessions as dated using Markov switching models.

### 4.2.1 Sequencing and the multiplicity of crisis episodes:

#### A new layer for the taxonomy: multiplicity

As crises rarely come alone, I now identify if financial crises are involved in single, double or triple crisis episodes. The classification simply follows from the number of financial crises that can be associated with the same economic crisis<sup>8</sup>. **Single crises:** When one currency or banking or sovereign crisis is associated with a recession. **Double crises:** When a recession is associated either to (i) banking & currency, (ii) sovereign & currency or (iii) sovereign & banking crises. **Triple crises:** When all types of events are associated with the same recession. Table 4.3 presents the detailed information on crisis episodes, which entails a better description of how financial crises are, overall, related to the business cycle.

**Table 4.3:** Crises episodes – by multiplicity, country group and BC localisation

Type of Episode	DM, 15c.			EM, 15c.			AM, 24c.		
	exp.	rec.	tot.	exp.	rec.	tot.	exp.	rec.	tot.
<b>crs.epds in total</b>	<b>11</b>	<b>28</b>	<b>39</b>	<b>9</b>	<b>25</b>	<b>34</b>	<b>22</b>	<b>49</b>	<b>71</b>
<b>Single</b>	<b>11</b>	<b>10</b>	<b>21</b>	<b>8</b>	<b>12</b>	<b>20</b>	<b>22</b>	<b>40</b>	<b>62</b>
Single – cur	7	6	13	4	11	15	20	23	43
Single – bkg	2	1	3	4	1	5	1	12	13
Single – sov	2	3	5	0	0	0	1	1	2
<b>Double</b>	<b>0</b>	<b>10</b>	<b>10</b>	<b>1</b>	<b>8</b>	<b>9</b>	<b>0</b>	<b>8</b>	<b>8</b>
Double – cur.bkg	0	5	5	1	3	4	0	5	5
Double – cur.sov	0	5	5	0	5	5	0	2	2
Double – sov.bkg	0	0	0	0	0	0	0	3	3
<b>Triple</b>	<b>0</b>	<b>8</b>	<b>8</b>	<b>0</b>	<b>5</b>	<b>5</b>	<b>0</b>	<b>1</b>	<b>1</b>

This table details the number of crises episodes by the number of financial crises that are associated to it. Episodes are counted:

- by country group – **developing**, **emerging** and **advanced** markets
- by regime – *exp* for expansions and *rec* for recessions
- by complexity – **single**, **double**, or **triple** financial crises episode

First, two main observations can be drawn on crisis episodes globally: (1) The majority of crisis episodes entail one single financial crises. The less advanced the markets, the more frequent are multiple crises (16% of the cases in advanced markets against 41% in emerging and 51% in developing markets) and (2) The wide majority of crises is associated with recessions whatever the income group (74/68/68% in E-/D-/A-M).

<sup>8</sup>There can be several currency crises per episode, whereas this is never the case for sovereign and banking crises. Overall, there are 6 episodes displaying 2 currency crises, and 1 has 3 crises. 3 recessions last longer than 10 quarters. 5 crises occur after the end of the recession. In 3 of these cases, a crisis also predates the initial entry in recession.

Second, using multiplicity to organize episodes, some specificities appear group-wise. Looking at **single crisis episodes**: (i) On average, there is 1.3/1.2 single crisis episode for emerging/developing markets against 2.4 for advanced markets. This is not taking into account the wider time coverage of this group. (ii) For all country groups, currency crises dominate single crisis episodes. This is particularly true for advanced markets. Given the particular nature of some currency crises I discussed earlier, I do not delve into a detailed analysis of this group for now. (iii) In emerging markets, sovereign crisis never occur alone. A fourth of single crisis episodes are banking crises, hitting countries mostly in expansion. In developing markets, sovereign crises often occur alone. Defaults occurring in expansion are often politically motivated.

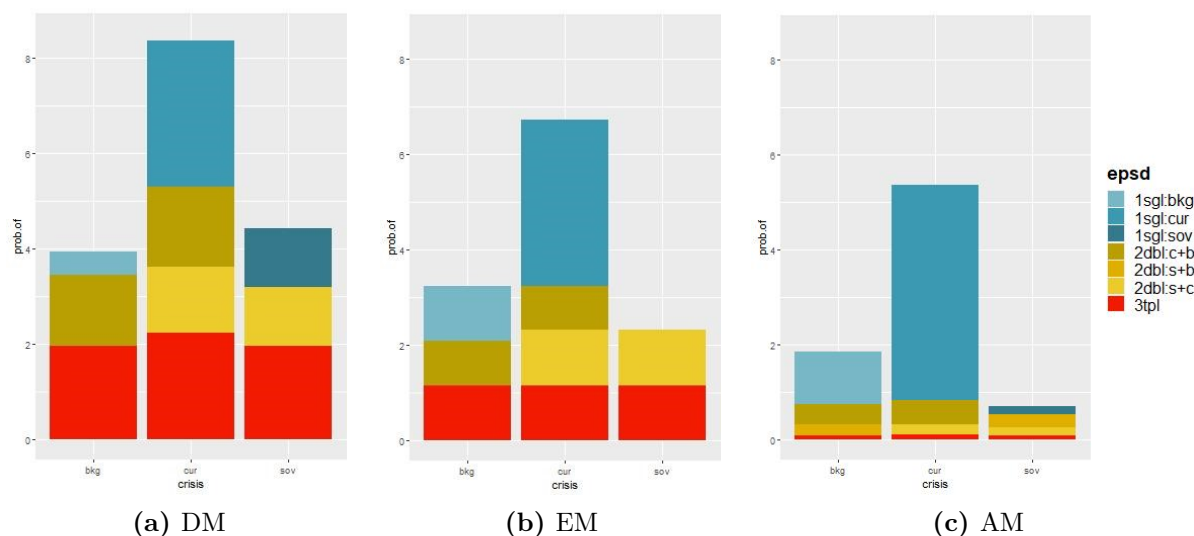
Finally on **double and triple crises**: (i) Multiple crises occur during recessions. This is true for all triple crisis episodes and the wide majority of double crisis episodes. (ii) On average there are 2.3/3.3 times more multiple crisis episodes per country in emerging/developing markets versus advanced markets (13/15 and 19/15 versus 9/24 crises/country by group). (iii) Triple crisis episodes are a key characteristic of emerging and developing markets. Note that the only occurrence of a triple crisis episode for an advanced market is that of South Korea in 1998. Hence in nature, the crisis is very similar to several other triple crisis episodes that occurred at the same time (see box below).

I now summarize my previous observations on crisis episodes by looking at the yearly probabilities of facing a crisis by type, multiplicity and country group.

### **What multiplicity shows about exposure to crises.**

This classification provides another interesting set of stylized facts illustrated in figure 4.5. The latter illustrates the previous figures. (1) The exposure to crises is the highest for developing economies followed by emerging and, last, advanced markets. DM are 3% more exposed to currency crises than AM (EM are 1.1% more exposed relatively) and 2% more exposed to banking crises when compared to AM (EM are 1.3% more exposed). (2) There is a clear difference when it comes to sovereign crises. Advanced markets face a very low exposure to sovereign crises (0.7%) which contrasts heavily with developing and emerging markets (4.4% and 2.1%).



**Figure 4.5:** Annual probability of a Financial Crisis, by type and episode

The figure decomposes the yearly probability of facing a given type of crisis – banking, currency and sovereign – by the multiplicity of the episode said crisis is involved in – **single**, **double** and **triple** crises – and by income group – developing, emerging and advanced markets.

Comparing countries, crises and multiplicity yields interesting results:

### Results – Financial crises and multiplicity

#### In **developing markets**:

- The majority of currency crises is associated with other financial crises: first with both sovereign and banking crises, second with banking crises only and third with sovereign crises only. Single currency crises remain a non negligible minority (the first one when all layers of the taxonomy are detailed).
- The vast majority of banking crises happen during multiple crises episodes, either with both sovereign and currency or just with currency crises.
- Comparing with emerging markets, beyond ‘multiple’ sovereign crises, developing markets face a non negligible share of single sovereign defaults.
- For developing markets, triple financial crisis episodes appear as a consequent contribution for all types of crises. This confirms the view of multiple crises being a true stigmata of developing markets’ recent history

#### In **emerging markets**:

- A short majority of currency crises are single episodes. Nevertheless they often associate with other financial crises (one third of the cases with a banking, a sovereign or both crises).

- A short minority of banking crises are single episodes.
- Sovereign crises are always associated with either a currency crisis or both banking and currency crises (in roughly similar shares)
- Triple crisis episodes are a salient marker of emerging markets recent history of crises

In **advanced markets**:

- Advanced markets provide the clearest picture of them all, with an almost completely blue sky of single crisis episodes. Only in advanced markets are all layers of the taxonomy observable, even if in little quantities.
- Sovereign crises are very rare and, in the majority of cases, they are associated with at least another type of crises.
- Currency crises denote a clear distinction for the group when compared to emerging and developing markets. The exposure to single currency crisis episodes is by far the largest in advanced markets. A potential reason behind this observation is the fact that there are fewer historical observations for emerging and developing markets.

Overall, **multiplicity** acts as a very resourceful layer of taxonomy to explore the heterogeneity among country groups. In the remainder of the subsection, I use the present set of information from the crisis episodes to showcase key characteristics of double and triple crisis episodes. The box page 115 presents in more detail the multiple crises episodes.

### **Some elements on the sequencing and taxonomy of multiple crises**

Tables 4.4 and 4.5 present, by country group and by multiplicity, information on, respectively, (4.4) the sequencing of episodes i.e. the number of cases which involved a financial crisis (by type) before/during/after the recession and (4.5) taxonomical elements on the duration of the crisis episodes and that of preceding/following expansions.

In **developing markets**, in two instances of twin currency and sovereign crises, both crises predate the switch. In the other four events both crises occur following the switch. For twin currency and banking crisis episodes, two times, do both crises signal before the switch and in one occasion only the currency crisis predates the switch. In the remaining two events, the crises trigger during the recession. In two out of eight triple crisis episodes, all financial crises trigger before the switch. In one case only the banking crisis does. In the remaining five instances, all crises trigger while the country is in recession.

In **emerging markets**, twin currency and sovereign crises occur after the recession starts. For twin currency and banking crises, all patterns are represented (currency before switch and banking ; banking before switch and currency ; banking and currency before switch). One triple crisis episode is such that all crises trigger before the switch. All remaining crises occur during the recession.

**Table 4.4:** Group wise information on the sequencing of multiple crisis episodes

episode		sovereign crises				currency crises				banking crises			
cplxty	(nb)	tot	bfr	drg	afr	tot	bfr	drg	afr	tot	bfr	drg	afr
<b>Developing markets (15 c.)</b>													
cur.sov	(5)	5	1	3	1	6	1	5	0	0	0	0	0
cur.bkg	(5)	0	0	0	0	5	3	2	0	5	2	3	0
tprl.crs	(8)	8	2	6	0	8	2	6	0	8	3	5	0
<b>Emerging markets (15 c.)</b>													
cur.sov	(5)	5	0	4	1	5	0	5	0	0	0	0	0
cur.bkg	(3)	0	0	0	0	3	1	2	0	3	2	1	0
tprl.crs	(5)	5	1	4	0	5	1	4	0	5	1	4	0
<b>Advanced markets (24 c.)</b>													
cur.sov	(2)	2	0	2	0	2	0	2	0	0	0	0	0
cur.bkg	(5)	0	0	0	0	8	1	5	2	5	3	2	0
sov.bkg	(1)	1	0	1	0	0	0	0	0	1	1	0	0
tprl.crs	(1)	1	0	1	0	1	0	1	0	1	0	1	0

The table details crisis episodes by country group and layer of multiplicity (double currency+sovereign *cur.sov*, currency+banking *cur.bkg*, sovereign+banking *sov.bkg*, triple financial crises *tprl.crs*).

The table details by type of financial crisis (sovereign/currency/banking) whether said crisis occurred before/during/after the recession *bfr/drg/afr*.

In advanced markets, twin currency and sovereign related crises trigger in recession for the two episodes considered. There are five twin currency and banking crises in advanced markets. In one case both a banking and a currency crisis trigger before the recession starts. In two other cases the banking crisis predates the switch. In the remaining two cases banking and currency crises occur in recession. Note that for Finland's episode (recession between 1990q2:1992q4) there are three currency crises: two in recession, one after. For Spain (recession over 1978q2:1982q1), the banking crisis and a first currency crisis hit the country before the recession begins. A currency crisis then hits the economy again as she has exited the recession. The unique twin banking and sovereign crisis episode of my database – Cyprus, recession: 2012q1:2013q2 – has a banking crisis occurring before the recession starts and the sovereign crisis triggering five quarters into the recession. For South Korea's triple crisis episode, the sovereign and the banking crises trigger the same quarter the recession begins. In the second quarter of recession, a currency crisis triggers.

There is also an interesting heterogeneity in the duration of the episodes. In emerging markets, triple crises are markedly longer than double crisis episodes. For developing and advanced markets only currency and banking crisis episodes tend to be associated with longer recessions. Overall, for all recessions including multiple crises, the preceding expansion last on average the same amount of time (12:24 quarters). Only the triple crisis of South Korea (AM) is preceded

**Table 4.5:** Group wise information on the taxonomy of multiple crisis episodes

episode		duration		txnmy.exp – durt	
cplxty	(nb)	avg (q.)	txny	bfr	afr
<b>Developing markets</b>					
cur.sov	(5)	5.60	2.60	4	3.20
cur.bkg	(5)	8.40	3	3.40	4.40
tprl.crs	(8)	6	2.62	3.43	4.88
<b>Emerging markets</b>					
cur.sov	(5)	5.40	2.40	3	2.75
cur.bkg	(3)	6	2.67	3.67	4
tprl.crs	(5)	11	3.40	4.60	4.20
<b>Advanced markets</b>					
cur.sov	(2)	6	3	4.50	5
cur.bkg	(5)	10.40	3.40	4.80	4.80
sov.bkg	(1)	6	3	3	4
tprl.crs	(1)	4	2	6	5

The table details crisis episodes by country group and layer of multiplicity (double currency+sovereign *cur.sov*, currency+banking *cur.bkg*, sovereign+banking *sov.bkg*, triple financial crises *tprl.crs*).

The table presents the average duration of a recessions in quarters. I also give the average index from the taxonomy on the duration of recession – 1 = 2q. ; 2 = 3:4q. ; 3 = 5:8q. ; 4 = 9:16q.

Finally the last two columns present the average index from the taxonomy on the duration of expansion for the expansion before/after the crisis considered – 1 = 1:4q. ; 2 = 5:8q. ; 3= 9:16q. ; 4 = 17:32q. ; 5 = 33:64q ; 6 = '>64q'.

by a protracted expansion. Expansions that follow recessions associated with multiple crises episodes are usually followed by average length expansions (16:32 quarters). In emerging and developing markets, twin currency and sovereign crises are followed by markedly shorter expansions (7:10 quarters).

### A look into the database – Multiple episodes

Multiple crises episodes are a salient illustration of the differences between country groups. Advanced markets are in a minority of cases (12.6%) confronted to double or triple financial crisis episodes. In emerging/developing markets, 47/46% of crisis episodes are multiple. Of particular interest, among multiple crises, emerging display 35.7% of triple crisis episodes ; developing markets 42.1%, figures **3 times bigger** than for advanced markets (triple crisis episodes represent 12.5% of multiple crises)

The next chapter will review in more detail what can be said on these crises and their determinants. This box presents, for the main multiple crisis episodes, some key information from the taxonomy and their sequencing.

The first table presents information on the sequencing of triple crisis episodes. Episodes are grouped along the chronology in section 4.1 according to the starting quarter of the recession they are associated with. The second table provides information regarding the income group, region and commodity type of the country. The second table also details the duration of the recession considered as well as preceding/ensuing expansions<sup>a</sup>.

In 1982q1, as Mexico enters a recession a currency crisis triggers. 2 quarters later, a sovereign and a banking crises hit the country. For Philippines, as the country enters its second quarter of recession in 1983q4, the three financial crises trigger.

During the second episode, the crisis starts with a recession in Thailand in 1997q1, 3 quarters later the country experiences all three financial crises. Out of contagion, Indonesia experiences a currency and a sovereign crises followed by a banking crisis and a recession. Malaysia suffers as well from the pandemic and experiences in 1997q3 all three financial crises as well. The country enters a recession two quarters afterwards. In 1997q3, South Korea enters a recession and triggers both a banking and a sovereign crises. The following quarter a currency crisis hits the country.

In 1997q3, again, Colombia experiences a currency crisis, the next quarter a sovereign crisis. In 1998q2 the country triggers a banking crisis and the next quarter enters a recession. In 1998q3, as Ecuador suffers from both a currency and a banking crises, the country moves into recession. 2 quarters later, the country defaults. In 1998q3, Russia, now at the end of a long recession, suffers from all three financial crises and soon sees the end of the recession and a rebound. In 1998q3, Argentina also enters a recession. Nevertheless as the country manages to maintain its consistency over 1 year of recession and the start of a rebound, the economic losses start to accumulate again as 2001 unfolds. In 2001q1, the country defaults, in 2001 q4 the banking system collapses and in 2002q1 the country exits the currency board and set a term to a violent currency crisis.

The last country of the panel is Turkey. The country first entered a recession over 1998q3-1999q1 followed by a transitive expansion lasting 6 quarters. After that, in 2000q4 the country reenters a recession as the banking system collapses and the sovereign defaults. The next quarter, the country faces a currency crisis.

**Triple crisis episodes, highlight on the sequencing**

episode iD		date		sovereign			currency			bkg.crs		
country	code	beg	end	tot	bfr	afr	tot	bfr	afr	tot	bfr	afr
Mexico	MEX	1982q1	1983q2	1	0	0	1	0	0	1	0	0
Philippines	PHL	1983q3	1985q3	1	0	0	1	0	0	1	0	0
Russia	RUS	1995q1	1998q3	1	na	0	1	na	0	1	na	0
Thailand	THA	1997q1	1998q2	1	0	0	1	0	0	1	0	0
Korea	KOR	1997q3	1998q2	1	0	0	1	0	0	1	0	0
Indonesia	IDN	1998q1	1998q2	1	1	0	1	1	0	1	1	0
Malaysia	MYS	1998q1	1998q3	1	1	0	1	1	0	1	1	0
Argentina	ARG	1998q3	2002q2	1	0	0	1	0	0	1	0	0
Colombia	COL	1998q3	1999q2	1	1	0	1	1	0	1	1	0
Ecuador	ECU	1998q3	1999q3	1	0	0	1	0	0	1	0	0
Turkey	TUR	2000q4	2001q4	1	0	0	1	0	0	1	0	0
Hungary	HUN	2007q1	2012q4	1	0	0	1	0	0	1	0	0
Latvia	LVA	2008q2	2009q3	1	0	0	1	0	0	1	0	0
Ukraine	UKR	2008q4	2009q1	1	0	0	1	0	0	1	1	0

The table details crisis episodes by country group and layer of multiplicity (double currency+sovereign *cur.sov*, currency+banking *cur.bkg*, sovereign+banking *sov.bkg*, triple financial crises *trpl.crs*).

The table details by type of financial crisis (sovereign/currency/banking) whether said crisis occurred before/during/after the recession *bfr/drg/afr*.

The last wave of triple crisis episodes affects Central and Eastern European countries around the Global Financial Crises. Hungary was the first affected by the crises as the country entered a recession in 2007q1. After close to two years of recession, a banking crisis hits the economy in 2008q3, followed the next quarter by a currency and a sovereign crises. The recessions lasted until 2012q4. In 2008q2, Latvia enters a recession, the next quarter the country suffers both a currency and a banking crises and the ensuing one, she triggers a sovereign crisis. The recession finished three quarters later in 2009q3. Ukraine, finally, experienced a banking crisis in the midst of the GFC in 2008q3. The next quarter the country suffers from a currency and a sovereign crises as it enters a short lived but very costly crisis episode.

If these sequencing prove interesting and diverse, it is vain to try to identify relevant patterns out of sheers comments on temporality.

**Triple crisis episodes, highlight from the taxonomy**

episode iD		dates		country			taxonomy		
country	code	beg	end	grp.	reg.	cmd.	durt	exp.bfr	exp.afr
Mexico	MEX	1982q1	1983q2	EM	LSA	N	3	5	3
Philippines	PHL	1983q3	1985q3	DM	Asia	Y	4	3	4
Russia	RUS	1995q1	1998q3	DM	CEE	N	4	na	5
Thailand	THA	1997q1	1998q2	DM	Asia	N	3	3	5
Korea	KOR	1997q3	1998q2	AM	Asia	N	2	6	5
Indonesia	IDN	1998q1	1998q2	DM	Asia	Y	1	4	6
Malaysia	MYS	1998q1	1998q3	EM	Asia	N	2	5	5
Argentina	ARG	1998q3	2002q2	EM	LSA	Y	4	3	4
Colombia	COL	1998q3	1999q2	DM	LSA	Y	2	4	6
Ecuador	ECU	1998q3	1999q3	DM	LSA	Y	3	4	5
Turkey	TUR	2000q4	2001q4	DM	AME	N	3	2	4
Hungary	HUN	2007q1	2012q4	EM	CEE	N	5	5	4
Latvia	LVA	2008q2	2009q3	EM	CEE	N	3	5	5
Ukraine	UKR	2008q4	2009q1	DM	CEE	N	1	4	4

The table details triple crisis episodes, providing information from the taxonomy on (i) the country: **income group** ; **region** (AME = Africa & the Middle East, Asia, CEE = Central & Eastern Europe, LSA = Latin & South America) and **commodity-dependence** and (ii) the duration of the recession and associated after-/before- expansions – recessions: 1 = 2quarters ; 2 = 3:4q. ; 3 = 5:8q. ; 4 = 9:16q.& expansions: 1 = 1:4q. ; 2 = 5:8q. ; 3= 9:16q. ; 4 = 17:32q. ; 5 = 33:64q ; 6 = '>64q'.

<sup>a</sup>The categories are taken from the taxonomy of economic crises.

I define as short-lived recessions, those lasting 2 quarters (index = 1), transitive (id2) for 3:4q., short (id3) for 5:8q., medium (id4) for 9:16q., long (id5) for 17:32q. and protracted recessions (id6) over 33q.

I define as double-dip expansions, those lasting 2:4 quarters (index = 1), transitive (id2) for 5:8q., short (id3) for 9:16q., medium (id4) for 17:32q., long (id5) for 33:64q. and protracted recessions (id6) over 64q.

I have identified that currency and multiple crises episodes are key features to understand the differences in the exposure to crises across developing, emerging and advanced markets. I now study how financial crises relate to economic fluctuations. In the rest of the section, I confront the location of the starting quarters of currency, banking and sovereign crises with the closest negative growth shock. Next section discusses how crises episodes fare along the lines of the taxonomy on recession's severity, duration and rebound.

#### 4.2.2 Financial crises: When? And which ones?

The first assumption I formulate when confronting the data is that the majority of financial crises should be linked to recessions, as they often entail disruptions and losses in the economic sphere. Against this postulate we should observe crises occurring either after a negative growth shock or not too soon before. The location of financial crises is presented in table 4.6.

**Table 4.6:** Number of Financial Crisis by type, regime and country group

(nb of)	episodes	sov.crs	cur.crs	bkg.crs
<b>Developing markets</b>				
fin.crs in total		18	33	16
fin.crs in expansion	12	3	10	2
fin.crs assoc. to recession	26	15	23	14
of.which (before)	9	4	6	5
of.which (during)	16	10	17	9
of.which (after)	1	1	0	0
<b>Emerging markets</b>				
fin.crs in total		10	29	14
fin.crs in expansion	9	0	5	5
fin.crs assoc. to recession	24	10	24	9
of.which (before)	7	1	6	3
of.which (during)	17	8	17	6
of.which (after)	1	1	1	0
<b>Advanced markets</b>				
fin.crs in total		8	62	22
fin.crs in expansion	28	1	23	1
fin.crs assoc. to recession	49	7	39	21
of.which (before)	18	1	9	7
of.which (during)	31	6	21	14
of.which (after)	9	0	9	0

episodes denotes the number of expansion/recession episodes associated with a crisis over country groups. xxx.crs indicates the total number of crises experiences in a given regime for a given group (xxx=sov for sovereign crises, cur for currency crises and bkg for banking crises.)

Several messages can be taken from the table: (1) The wide majority of financial crises can be associated with a recession:

- The picture is less clear for currency crises, as developing and advanced markets experienced one third of their currency crises while in expansion.
- For emerging markets, a third of banking crises occurs before the start of a recession.
- Overall, 2 (out of 35) sovereign crises are dated in expansions, 1 EM (Costa Rica), 3 DM (Bolivia, Thailand and Turkey) and 1 AM (Greece). 8 (out of 52) banking crises occur during expansions, 4 in EM (Costa Rica, Croatia, Latvia and Lithuania), 3 in DM (Bolivia, Paraguay and Turkey) and 1 in AM (United States). Annex O details these few cases<sup>9</sup>.

<sup>9</sup>Three main reasons can be given to explain these cases:

- There are crises occurring with sain fundamentals but little policy space thus forcing requests for external financing/bank troubles. These crises are not associated with significant shift in growth and indeed occur in expansion.
- The crises are associated with political shocks. These decisions (often defaults) are not necessarily backed by depressing economic conditions.



(2) A non negligible number of financial crises associated with recessions occurs before/after the episode: a fourth of all currency crises and a fifth of all sovereign and banking crises for emerging markets ; a fourth of all currency crises, a two fifth of all sovereign and banking crises and ; a third of all currency and banking crises for advanced markets

- Crises frequently precede regime switches. This is especially true for developing markets (sovereign and banking crises especially).
- For emerging and advanced markets this statement is valid for currency and banking crises only. The wide majority of sovereign crises occurs in recession.
- Overall, few crises succede to a recession. Currency crises in advanced markets mark a notable exception. To a lower extend, sovereign crises in developing markets also happen as the economy is restarting.

Note that observing currency crises associated with expansions in advanced markets is very much in line with the interpretations of early events (before the 1990's). Up until the collapse of the EMS in 1992 and the introduction of second-type currency crises models, the dominant paradigm followed the J-curve view that over time any negative effects of a devaluation would be compensated by positive developments stemming from an increase in competitiveness affecting net exports. More broadly, this illustrate the fact that in economies that are globalized, rigidities on the exchange rate can prevent existing (impairing) imbalances to adjust. Hence as a currency crisis entails a re-valorization of the external anchor, it can help evacuate existing pressures and frictions and result in expansionary developments.

#### **Stylized facts 7: Crises occur in recession**

The vast majority of crises is associated with a recession.

Currency crises in advanced markets form the main exception to this trend, as one currency crisis in two occurs during an expansion. This is a salient illustration of the dominant view until the beginning of the 90's of an overall, expansionary effect of a depreciation on output<sup>a</sup>.

<sup>a</sup>Glick and Hutchison (2011)

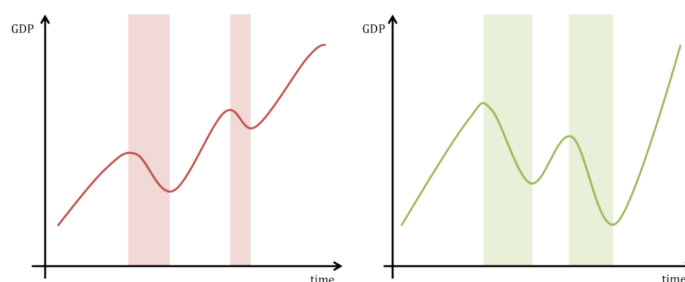
Before moving on to further results, I discuss how short expansions can bias the sample and how I address this issue. Particularly short expansions (2:4q.) might only be a mild positive jolt offering temporary and illusionary relief in an otherwise longer recession. In that case, the recessions before and after should be related. Of particular interest in my case: if the recessions around a double dip expansion display financial crises, the episodes might well be more complicated than recorded. I thus give some detail on the double-dips episodes from the database

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– The MSM estimated fail to signal a recession. This is notably the case when the time series exhibit significantly stronger recessions at other points in time.

(expansions lasting 2:4q.)<sup>1011</sup>. I now present the main characteristics of expansions lasting less than 1 years, and associated recessions. Annex Q details the list of episodes and characteristics. I also present the transitive expansions in the annex (i.e. expansions lasting 5 to 8 quarters). There are 10 double dips<sup>12</sup> in the sample. The majority of episodes can be found in advanced markets (6/10<sup>13</sup>). To first sort the episodes, I filter those for which the expansion's cumulated more gains fail to compensate for the losses accumulated before. The intuition for this filter can be taken from figure 4.6.

**Figure 4.6:** An illustration of double dips



The figures represent two imaginary real gdp time series illustrating two different cases of double dips. Shaded areas represent recessions.

The figure represents two different cases of double dips. These are two real GDP time series, shaded areas represent recessions. In the right panel, the expansion inbetween the two recessions is too mild to recover the losses endured before; The second recession worsens the situation and the recessions can be grouped. In the left panel, the expansion is strong enough to overcome the losses and the economy rebounds. The fact that a double dip is of a particular type offers no information on causal inferences between the two recessions. It only acts as a naive first proxy. Only two double-dips (Paraguay in 1999q3:99q4 and Greece in 2009q2:09q4) fall in this category. These episodes are indeed false expansions in the sense that the second recession continued the first one. Paraguay is associated with the emerging markets turmoil of the end 90's/beginning 2000's. The Greek case illustrates the GFC and the European sovereign debt crises that hit Western European countries consequently around 2010's.

Of particular interest to me, I discuss in which cases the recessions that precede/follow the short expansion display financial crises. First, there are no financial crises occurring during

<sup>10</sup>This threshold is not related to the classical definition of a *double dip*. I use it as an ad-hoc threshold.

<sup>11</sup>As I encroach on the expansions surrounding a recession – the forward/backward looking behavior of my filter – I also discuss briefly the transitive expansions, i.e. episodes that last inbetween 5 and 8 quarters. Indeed, all financial crises occurring during these particular episodes are associated either to the ensuing/preceding recession

<sup>12</sup>23 transitive expansions

<sup>13</sup>12/23 for transitive episodes

double-dip expansions. There are 4 cases without any financial crisis surrounding the expansion. For two episodes, the preceding recession displays a banking crisis and in one case the second recession displays a currency crisis. The first case that displays crises both in the first and second recession is Argentina around the expansion from 2014q4:15q2. As chapter 5 discusses, starting in 2012, Argentina is in a quasi constant state of crisis. I choose, for now, to discuss the episodes separately. The second case is Paraguay. During the first recession the country experienced a currency crisis. In the second recession, the country experienced both a sovereign and a currency crises. Finally, for Greece, the recession that precedes the expansion displays a banking crisis. The recession that follows displays a sovereign crisis. The GFC acted as the initial shock that troubled Greece and lead to the ensuing funest chain of events. Hence the database should record 1 more twin banking and sovereign crisis for advanced markets (and one less single banking/sovereign crisis).

For transitive expansions, as a first pass, I only focus on those expansions that fail to recover the previous losses. There are 5 cases. Venezuela is a beginning of sample situation. Given that I don't have enough historical observations, I leave the episodes as they are. The four other cases occurred in advanced markets. Luxembourg feeble expansion of 1975q4:76q4 is neither preceded nor followed by a crisis. Moreover if the expansion is followed by a recession, the latter is more akin to a stagnation episode. In New Zealand, no crisis occurs in the recession before the transitive expansion. At the end of the latter, a currency crisis hits the country before the recession starts. Moreover, the expansion inbetween fails at recovering previous losses at a margin of 0.03% (out of -5.34%). I do not change the database for these episodes. The last two cases are Italy and Portugal expansions inbetween the GFC and the European crises in 2009q2:10q3, respectively. This sequencing is very similar to the transitive expansions experienced by Greece over the same periods. For Italy, nevertheless only a banking crisis signalled which doesn't change the current classification. For Portugal, the GFC and the associated banking crisis definitely acted as one among many factors behind the ensuing debt crisis. As for Greece, I increase the count of twin banking and sovereign crises for advanced markets and decreased respective single episodes.

### 4.2.3 Distribution of crises and naive inference

Having associated the 3 types of financial crises with recessions, I can extract information on two aspects of these episodes: (i) when are financial crises located vis-a-vis the start of the recession? and (ii) how do financial crises intertwine/cumulate? First, Figure 4.7 locates financial crises with respect to the beginning of the recession they're associated with. Overall, the wide majority of crises occur in the two years around the switch (-4:+4 quarters). For EM and AM, crises keep arising the second year into the recession at a much lower frequency. DM, and EM to a lower extent, face several cases of late bloomer crises for all types of financial event (sovereign/currency/banking crises occurring after 8 quarters at least). For AM only currency

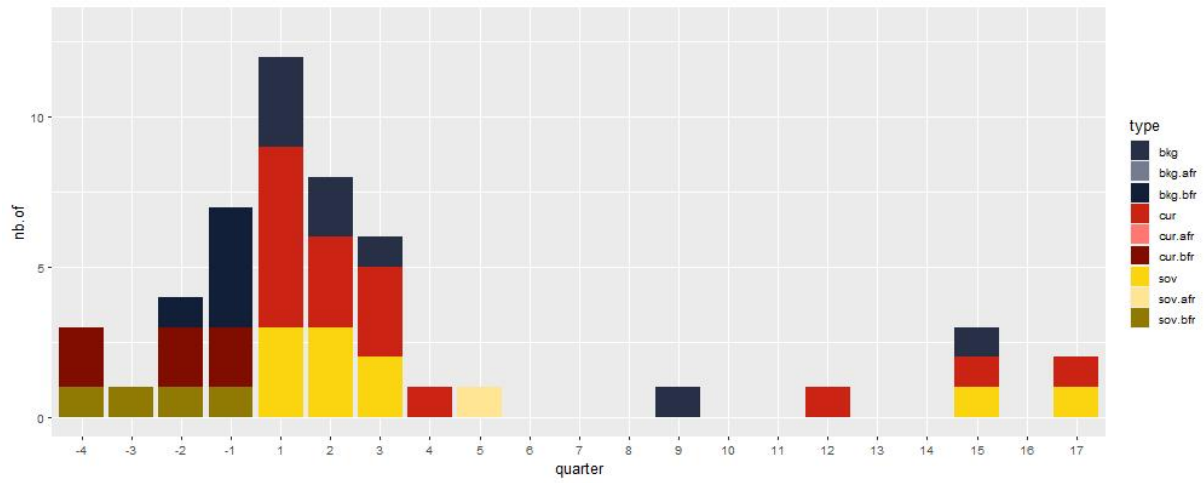
occur deep into/after the end of long recessions. The localisation of each type of crises might echo some of the theoretical considerations evoked at the beginning of this chapter regarding the sequencing of crises and growth shocks. For example, if a crisis occurs after 4 quarters of recession, the economy's growth fundamentals will have been weakened by a sequence of four low regime economic growth rates (eg output losses with respect to average growth).

**Currency crises** are usually distributed in the two years around the switch (-4:+4 quarters), even if there is some heterogeneity. In emerging markets, crises are usually contemporaneous to the switch (-2:+2 quarters). For developing economies 6 crises precede the switch and 13 occur in the year following it. For advanced markets, currency crises are roughly distributed in the two years around the switch. Nevertheless in advanced markets, there are an important share of currency crises occurring either after the first year of recession or in the first year following its end. For emerging and developing markets, all currency crises tend to occur during recession and in few cases after 2 years of negative shocks. Crises deep into recessions can illustrate the fact that countries fail to maintain a policy course over the expanded period of time, thus leading to a currency crises. Moreover, the high propensity for currency crises triggering around switches can partially illustrate self fulfilling phenomena. Because the latter entail speculative attacks, it is possible that the latter entail both real losses and an expectation realizing policy change triggering a crisis.

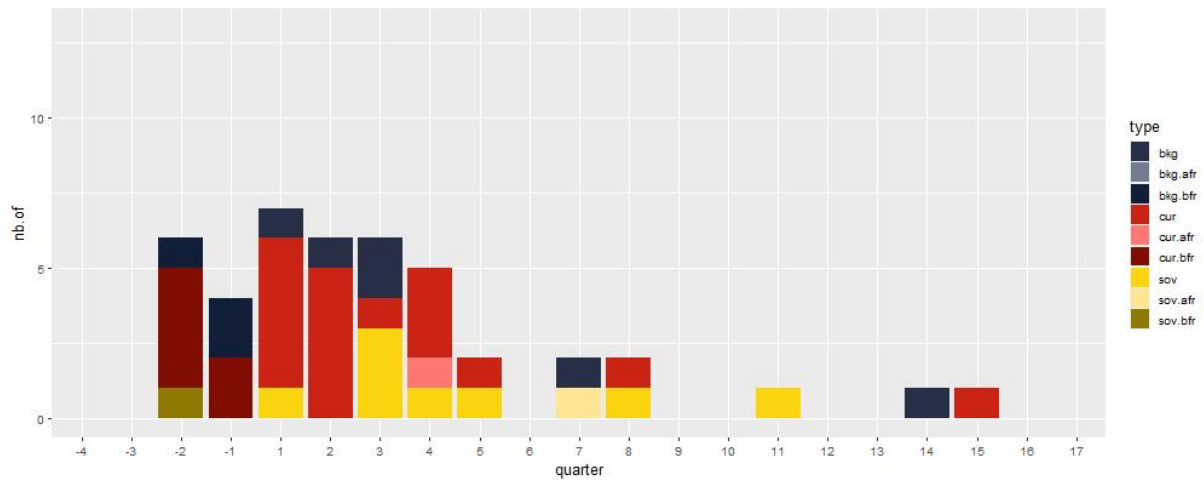
**Banking Crises** occur predominantly in the two years around the switch, but can also be found at various depth into a recession. In emerging and developing economies, except for 2 late blooming banking crises in each group, all events occur just before and after the switch (-2:+3 quarters). In advanced economies, there are twice as many banking crises as in other groups, occurring in the year up to a switch. The majority of banking crises can be found during the first year in recession, albeit two later crises trigger in a second year of recession. This duality can illustrate (i) credit boom reversals in which the build-up of fragilities and losses in the banking sector suffocate the economy into the recession, (ii) bank runs following signs of economic enfeeblement or (iii) drastic losses endured by banks facing weakened growth/income fundamentals.

**Sovereign debt crises** are distributed differently across country groups. In advanced markets, two crises surround the switch (before and on the same quarter), One crisis can be found deep into recession (>8q.). The rest of the crisis occurs in the two years after a switch. In emerging markets, two cases are located around the switch for one case when the crisis predates by one quarter the switch and a coincident crisis. There is one case of late blooming crisis. Else sovereign crises occur after a country has always been three quarters in recession. In developing markets, there are several cases of sovereign crises preceding the switch. The majority occurs in the three quarters following the entry into recession. Developing markets display two cases of late blooming sovereign crises (15q++).

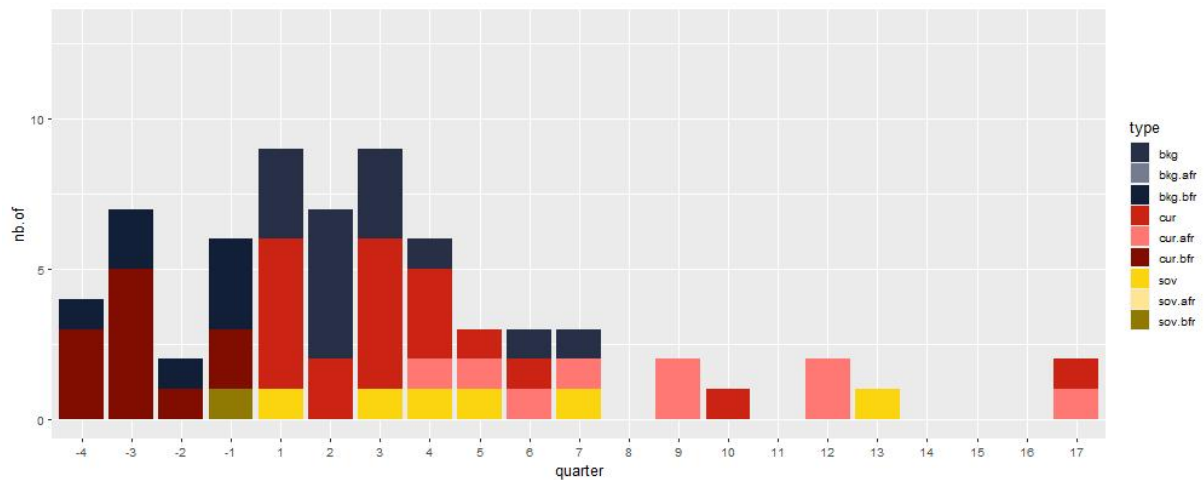
**Figure 4.7:** Financial crises location by type around recession starts



(a) DM



(b) EM



(c) AM

Quarter 17 includes all crises occurring after 4 years in recession (ie. 16q). Dark colors correspond to crises occurring before the switch. Light colors to crises occurring after the end of a recession.

Having studied the database from the point of view of the multiplicity of episode and their sequencing, I now exploit key characteristics from the database on business cycle episodes. Group comparisons allow me to understand how financial crises help characterize differences in economic volatility.

### 4.3 Financial and economic crises: duration, severity, volatility

When describing business cycle phases, I relied upon three main attributes: duration ; severity/amplitude ; steepness/slope. For recessions, I also discussed recoveries/rebounds<sup>14</sup>. I now discuss how crisis episodes fare along these characteristics. As a key reminder, previous chapter identified that the principal driver of the differences in volatility was the severity of recession episodes. A key difference of emerging and developing markets was the more frequent occurrence, at all durations, of very costly episodes. Expansions on the other hand were little responsible for business cycle volatility.

#### A graphical visualisation of crisis episodes

To conclude this long description of the database, figure 4.8 offers a summary plot, by country groups, of the variety of crisis episodes.

For each country group, the coordinate of a point indicate the severity and duration of the episode. Three additional information are displayed for each episode:

- the color of the point indicates the multiplicity of the episode:
  - green points denote **simple crisis** i.e. recessions/pure economic crises
  - blue points denote **single crisis** i.e. a crisis and 1 financial crisis
  - yellow points denote **double crises** economic + 2 financial crises
  - red points denote **triple financial crises**, i.e. full crisis episodes.
  
- the shape of the point indicates the exposure to currency crises:
  - denote episodes for which there are no crises on forex markets
  - ▲ denote recessions associated with only a currency crisis (the majority of single crisis episodes)
  - denote episodes in which currency crises combine with banking and/or sovereign crises.
  
- the size of the dot indicates the strength of the rebound:
  - the economy fails to rebound and stagnate
  - the recovery is sluggish with growth below average

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<sup>14</sup>Duration relates to the number of quarters in an episode. Severity/Amplitude characterizes the cumulated losses/gains over the episode. Slope/steepness relates to the average quarter-over-quarter real gdp growth rate in the episode. It is a by-product of amplitude and duration defining the steepness of an episode, i.e how quickly a country gains/looses.

- the rebound is slightly stronger than the average expansion (up to 1.5 times)
- the rebound is up to 2 times stronger than the average expansion
- the rebound is at least 2 times stronger than the average expansion

Interestingly, combining color and shape, it is possible to spot other types of crises. Indeed in emerging markets there are no single sovereign crises. All blue bullets are single banking crises. Else yellow bullets are double crisis episodes that do not entail currency crises. These twin banking + sovereign crises are most often found in advanced markets. Vertical blue lines delimits the duration of episodes inbetween 1, 2, 4, 8 years. Horizontal red lines delimit the amplitude of episodes: above -10%, above and below -20% cumulated losses. The figure also presents broader *hand-drawn* shapes that highlight the location of key groups of crises. They do not entail any information on the distribution of crises<sup>15</sup> and offer only illustrative purpose.

Some key messages can be taken from these figures:

- **Emerging markets'** recessions are, across multiplicity, widely distributed in the top 2 left panels (1-2years, above -10/15% in amplitude). There is little visible characteristics for single and double crisis episodes when compared to simple recessions (*dark grey shape*). Triple crises are episodes with very large amplitude or duration.
- In **developing markets**, simple recessions are very short and entail mild to large losses (top left panel *green shape*). Single and double crises do not display distinctive features. Associated recessions are often longer and costlier (*dark blue shape*). Triple crisis episodes are very costly crises that last usually up to 2 years (*red shape*).
- In **advanced markets**, simple recessions are short and entail mild losses (top two left panels, *dark green shape*, stiff line). There is a second group of less costly crises/stagnation episodes, that are associated with longer recessions (2 to 4 years, *light green shape*). Single and double crisis episodes can be found in the same panels as the majority of recessions (*blue shape*). They tend to be slightly costlier/longer. There are also a set of more severe single/double crises that are often long with large losses (*orange shape*). These episodes are most notably (post-)GFC.
- Overall, strong rebound are found in emerging markets after short recessions often with financial crises (up to 5 quarters). In developing and advanced markets, strong rebound are commonly observed at all covered amplitudes and durations. For emerging and advanced markets, sluggish recoveries are a recurring feature.

In the rest of the section, I take stock of the key differences in duration, severity, steepness and rebound across crises episodes.

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<sup>15</sup>Given the low number of episodes, plotting the projection of a fitted Normal on the figure do not yield any clear illustration

**Figure 4.8:** Country group scatter plots of crisis episodes by duration and amplitude – insights from the taxonomy

The scatter plots represent, by country group, crisis episodes by duration and cumulated losses. Shapes are hand-drawn and offer only illustrative purposes

– the color of the point indicates the multiplicity of the episode: ● denote **simple crisis** aka recession-s/pure economic crises ; ● denote **single crisis** i.e. a crisis and 1 financial crisis ; ● denote **double crises**, i.e. economic + 2 financial crises ; ● denote **triple financial crises**, i.e. full crisis episodes.

– the shape of the point indicates the exposure to currency crises: ● denote episodes for without currency crises ; ▲ denote recessions associated with a currency crisis only ; ■ denote episodes in which currency crises combine with banking and/or sovereign crises.

– the size of the dot indicates the strength of the rebound: (1) the economy fails to rebound and stagnate ; (2) the recovery is sluggish with growth below average ; (3) the rebound is slightly stronger than expansions (up to 1.5 times) ; (4) the rebound is up to 2 times stronger than the average expansion and (5) the rebound is at least 2 times stronger than the average expansion

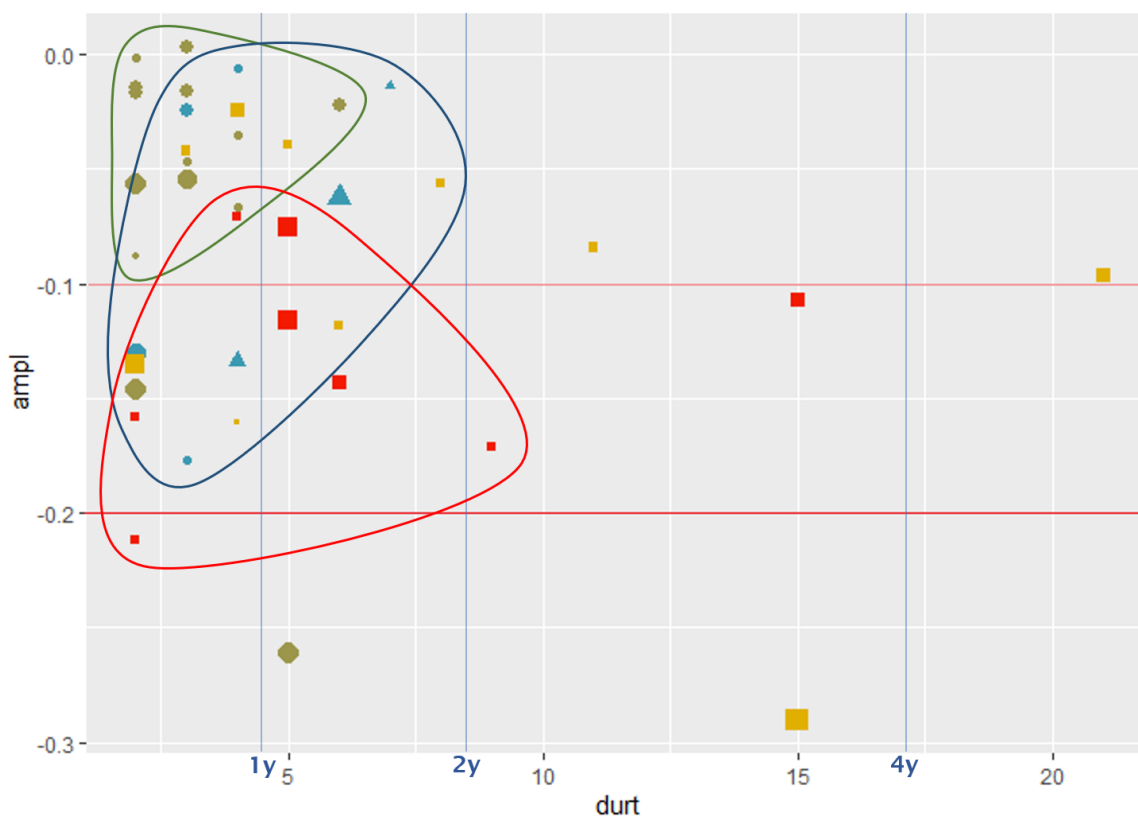
#### legend

rebound ● 1 ● 2 ● 3 ● 4 ● 5

complexity ● 0 ● 1 ● 2 ● 3

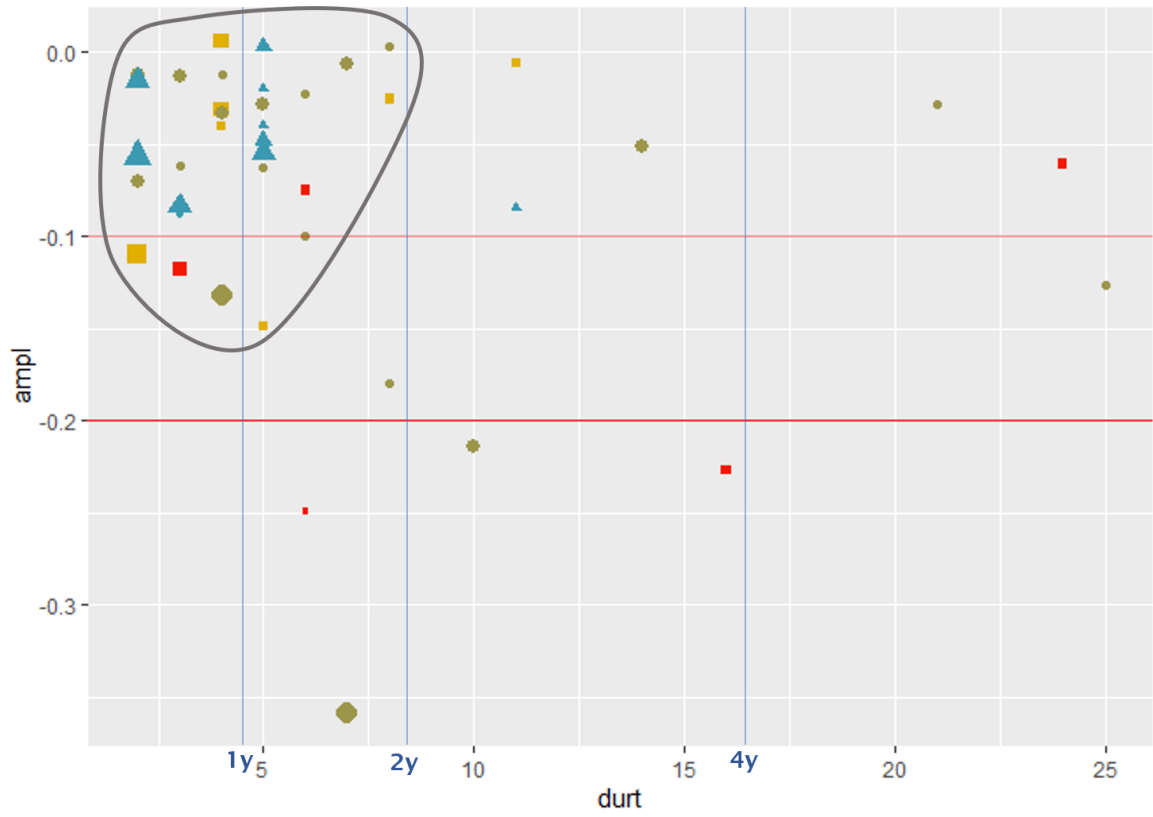
curexcity ● 0 ▲ 1 ■ 2

(a) developing markets

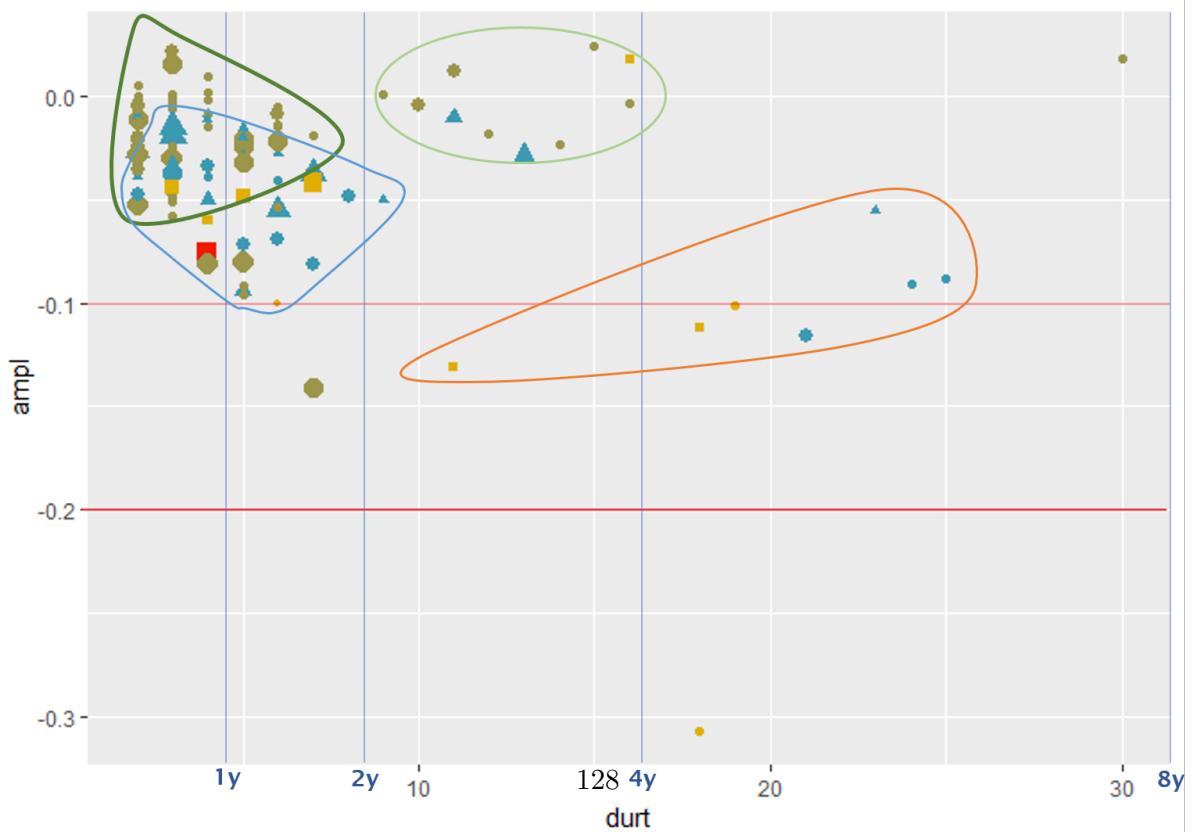




(b) emerging markets



(c) advanced markets



### 4.3.1 Business cycle phases under the lens of financial crises

Tables 4.7 and 4.8 present, respectively, the main characteristics of recessions and expansions, conditional on being associated or not with at least one financial crisis. Overall, the database contains 439 episodes: (e) 239 expansions – 55/54/130 in emerging/developing/advanced markets and (r) 200 recessions – 47/41/112 in E/D/A-M.

**Table 4.7:** Expansions and financial crises – duration, amplitude and steepness

	Expansions without FC			Expansions with FC		
	Duration	Amplitude	Slope	Duration	Amplitude	Slope
<b>All Countries</b>						
avg	24.53	26.94	1.19	44.34	46.78	1.09
std	17.41	23.67	0.80	21.54	28.07	0.37
nb	198	198.00	198	41	41	41
<b>Developing Markets (15c.)</b>						
avg	20.61	28.68	1.56	48.60	57.63	1.25
std	14.93	24.61	1.10	28.33	32.16	0.33
nb	44	44	44	10	10	10
<b>Emerging Markets (15c.)</b>						
avg	23.22	26.87	1.21	38.33	52.11	1.34
std	16.38	20.87	0.60	16.97	26.35	0.28
nb	46	46	46	9	9	9
<b>Advanced Markets (24c.)</b>						
avg	26.68	26.25	1.03	44.86	39.67	0.91
std	18.55	24.57	0.68	20.14	25.91	0.34
nb	108	108	108	22	22	22

The table presents, for **emerging**, **developing** and **advanced** markets, the average (*avg*) and standard deviation (*std*) of three characteristics of expansions.

**Duration** measures the number of quarters in an episode, **amplitude** the cumulated gains over the expansion and **slope** the average real gdp growth per quarter.

Around a sixth of expansions are associated with financial crises (41 vs 198), which confirms expectations and previous observations. On the other hand, one in two recession in the sample is associated with a financial crisis. The less advanced the market the higher the exposure to crisis episodes: 63/53/42% of the cases in D/E/A-M (26/41 ; 25/47 ; 47/112). Because expansions are not a key driver of business cycle volatility (see chapter 2), I do not detail completely the distribution of expansions by country group and type of episode. Annex R provides more information. Table 4.7 presents the average the standard deviation over the country groups for the key characteristics.

Expansions impacted by financial crises are longer and thus display higher gains. This might be an illustration of missed economic crises – recessions for which, the Markov estimates of the probability to be in the low regime fails to pass the threshold. Overall, expansions with a financial crisis are associated with slower growth, this is true for developing and advanced markets.

This observation can make sense if the missed recessions, which are associated with financial crises, are characterized by important losses and slower rebound effect. Emerging markets display a different pattern as average growth is higher on average when there is a financial crisis. In the line of previous comment, this could be true if there are missed recessions associated with a financial crisis which did not trigger important losses or perhaps a strong rebound.

For the rest of the chapter, I focus on recessions to discuss in more detail how financial crises shape economic fluctuations. I also discuss how countries bounce back after recession. If the rebound is strong after a financial crisis, then one might assume that the financial crisis alleviated some pressures that were slowing down the economy. On the contrary, if after a financial crisis, the economy fails to recover as quickly as usually, it can signal that the financial crisis has triggered more structural changes or that the resolution of the initial weaknesses takes more time to correct. Overall, financial crisis episodes make for one in two recessions. On average, these economic crises are 2\*\*\* quarters longer and 1.8\*\*\* times costlier (7.1 quarters and -6.9% losses versus 5.2 quarters and -3.93% losses). When associated with at least one financial crisis, each quarter in recession is 55%\*\*\* costlier (-1.50 vs -0.97% per quarter)<sup>16</sup>. Moreover, the rebound is slightly stronger on average without a financial crisis, this difference is however not significant<sup>17</sup> and none of the values for rebound are statistically different from 1<sup>18</sup>. I now discuss how the taxonomy helps identify similitudes and differences across the three country groups.

In **developing markets**, financial crises represent almost two-thirds of recessions (63% of 41 episodes). When at least one financial crisis hits a developing economy, the associated recession is 1\*\*\* year longer (7.2 vs 3.1 quarters). On average, the recession is associated with 1.7\*\* times bigger cumulated losses (-9.9 vs -5.7%). On average, this means a 32% steeper fall<sup>19</sup>. After a recession, growth is faster than during expansions, both with and without a financial crisis. The diversity of experiences nevertheless prevents any claim on statistical significance. In **emerging markets**, recessions associated with financial crises make for a short majority (53%) of the 47 episodes. Interestingly, for emerging markets, recessions cannot be told apart looking only at the occurrence of financial crises<sup>20</sup>. On average, complications on financial markets do not necessarily entail wider losses. This suggests that, for these countries, the economic and financial system might already have trouble attenuating macroeconomic fluctuations, e.g. lacking good macro-stabilizers. Structural weaknesses and frictions might exacerbate any shock greatly, irrespective of financial complications. Rebound is slightly smaller after a financial

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<sup>16</sup>The averages are different at the 1% level, using a one sided Wilcoxon test. Pvalues: 1.6e-3 for duration, 2.6e-7 for severity and 1.1e-3 for steepness.

<sup>17</sup>One-sided Wilcoxon test, p.value = 0.45

<sup>18</sup>One-sided Wilcoxon test, pvalues = 0.48 for recessions with crises and = 0.44 without.

<sup>19</sup>The differences are statistically significant at the 1% level for duration (t.test, p.value = 3.1e-3) and at the 5% level for severity (t.test, p.value = 4.1e-2). The difference is not statistically significant for steepness (p.value = 0.21).

<sup>20</sup>No p.value below 0.42, 0.20, 0.58 for severity, steepness and rebound.

crisis (5%) and stronger without (10%), but none of these figures are statistically different from another. In **advanced markets**, recessions associated with financial crises form a minority of cases (42% of 112 episodes). These episodes are 2 to 3 quarters longer (56%\*\*\* longer) and are 2.4\*\*\* times more severe. On average, recessions with financial crises are 1/3\*\* times steeper than without<sup>21</sup>. On average there is little rebound effect in advanced markets, once the recession ends, business goes back to normal.

**Table 4.8:** Recessions and financial crises – by country group

	Recessions $\cap$ No crisis				Recessions $\cap$ Crisis episode			
	Duration	Severity	Steepness	Rebound	Duration	Severity	Steepness	Rebound
<b>All Countries</b>								
avg	5.22	-3.93	-0.97	1.09	7.13	-6.94	-1.50	0.99
std	4.71	1.27	5.82	0.69	6.21	6.37	1.77	0.62
nb	102	102	102	97	98	98	98	96
<b>Developing Markets (15c.)</b>								
avg	3.13	-5.69	-1.93	1.27	7.23	-9.85	-2.55	1.04
std	1.25	6.81	2.14	0.96	6.86	7.70	2.76	0.64
max	6.00	0.31	0.10	3.48	32.00	8.92	0.28	2.11
qt3	4.00	-1.62	-0.62	1.82	7.75	-4.57	-0.73	1.49
med	3.00	-3.49	-0.87	1.14	5.00	-10.18	-1.64	1.00
qt1	2.00	-6.17	-2.32	0.70	3.25	-14.13	-3.11	0.82
min	2.00	-26.09	-7.33	-0.33	2.00	-29.02	-10.61	-0.83
nb	15	15	15	14	26	26	26	25
<b>Emerging Markets (15c.)</b>								
avg	7.55	-7.70	-1.26	1.10	6.00	-6.85	-1.56	0.95
std	5.82	8.84	1.34	0.78	5.02	6.39	1.48	0.62
max	25.00	0.27	0.03	3.82	24.00	0.59	0.15	2.35
qt3	8.00	-1.55	-0.37	1.15	6.00	-2.56	-0.67	1.24
med	6.00	-4.20	-0.58	1.05	5.00	-5.49	-1.01	0.97
qt1	4.00	-11.95	-1.95	0.62	3.00	-8.44	-2.79	0.61
min	2.00	-35.87	-5.12	0.42	2.00	-24.92	-5.47	-0.36
nb	22	22	22	19	25	25	25	24
<b>Advanced Markets (24c.)</b>								
avg	4.91	-2.24	-0.66	1.05	7.68	-5.39	-0.88	0.98
std	4.54	3.02	0.78	0.60	6.45	4.99	0.57	0.62
max	30.00	2.43	0.72	2.75	25.00	1.78	0.11	2.36
qt3	6.00	-0.42	-0.08	1.30	8.50	-2.68	-0.47	1.35
med	3.00	-1.49	-0.36	0.89	5.00	-4.17	-0.64	0.99
qt1	2.00	-3.02	-1.10	0.67	3.50	-7.05	-1.26	0.49
min	2.00	-14.13	-2.64	0.13	2.00	-30.71	-2.36	-0.42
nb	65	65	65	64	47	47	47	47

The table presents, for **emerging**, **developing** and **advanced** markets, information on the distributions – *average*, *standard deviation*, *maximum*, *3rd quartile*, *median*, *1st quartile*, *minimum* and the number of episodes *nb* – of four characteristics from the taxonomy of recessions.

**Duration** measures the number of quarters in an episode, **severity** the real gdp cumulated losses over the expansion and **steepness** the loss per quarter and **rebound** the strength of growth in the year after the recession when compared to average growth in expansion.

<sup>21</sup>All these differences are statistically significant when using a one-sided test: at the 1% level for duration (p.val = 6.7e-3) and severity (p.val = 1.3e-4), at the 5% level for steepness (p.val = 4.0e-2).

In a nutshell, following stylized facts can be dressed on countries crisis episodes:

### Stylized facts 8: Financial crises and recessions (1/2)

- Crisis episodes are frequent episodes worldwide. **Exposure to financial crises decreases by 10% as markets develop.**
- Without financial crises, recessions entail 3.4<sup>\*\*\*</sup>/2.5<sup>\*\*</sup> times bigger losses in emerging/developing markets when compared to advanced ones (-7.7/-5.7% vs -2.2%). Recessions are longer<sup>\*\*</sup> in emerging markets than in advanced markets (7.6 vs 4.9 quarters). In turn, recessions are shorter<sup>\*\*\*</sup> in developing markets (3.1 quarters) than in advanced markets. Recessions are 2<sup>\*\*</sup>/3<sup>\*\*\*</sup> times steeper in emerging/developing markets when compared to advanced markets<sup>a</sup>.
- With financial crises, recessions entail 1.8<sup>\*\*\*</sup>/1.4<sup>\*</sup> times bigger losses in developing versus advanced/emerging markets markets (-9.9 vs -5.4/-6.9%). On average recessions associated with a financial crisis last one year and a half longer (6 to 7.7 quarters). Recessions are 1.8<sup>\*\*</sup>/2.9<sup>\*\*\*</sup> times steeper in emerging/developing markets when compared to advanced economies<sup>b</sup>.
- Emerging Markets display very similar recessions with or without a financial crisis.
- In developing and advanced markets, financial crises markedly increase the duration, steepness and severity of a recession<sup>c</sup>

<sup>a</sup>P.values, in the same order: 4.7e-3 ; 3.7e-3 ; 3.1e-2 ; 3.9e-3 ; 2.9e-2 ; 2.0e-2. Rebound does not highlight statistical differences.

<sup>b</sup>P.values, in the same order: 5.8e-3 ; 6.8e-2 ; 1.8e-2 ; 2.7e-3. Rebound does not highlight statistical differences. Duration is not statistically across groups.

<sup>c</sup>Only statistically significant results are highlighted. The strength of rebound falls if the country experienced a financial crisis. None of the comparisons yield significant results.

### 4.3.2 Exploring the sources of heterogeneity

In this subsection, I consider how specific characteristics help shed light on differences/similarities across crisis episodes – by type of country: regional affiliation, commodity dependence ; or by type of crisis: exposure to currency crises, multiplicity.

#### Exploiting countries' heterogeneity: regionality and commodity

Tables 4.9 presents key characteristics for recessions without/with financial crises by region:

**Table 4.9:** Recessions and financial crises – by region

epsd char	Recession $\cap$ No Crisis		Recession $\cap$ Crisis Episode	
	average (std.dev)	[qt1 : med : qt3]	average (std.dev)	[qt1 : med : qt3]
Africa and the Middle East (3 c.)				
durt	5.86 (4.41)	[2.5 : 4 : 8]	4.33 (1.83)	[2.75 : 5 : 5]
svrt	-4.95 (5.34)	[-6.97 : -4.69 : -0.82]	-6.42 (5.1)	[-11.97 : -4.85 : -2.42]
stpn	-2 (2.83)	[-2.99 : -0.36 : -0.18]	-2.05 (2.33)	[-2.58 : -1.07 : -0.61]
rbnd	0.97 (1.32)	[0.39 : 0.6 : 1.02]	1.25 (0.45)	[0.94 : 1.19 : 1.58]
nb	7 (6)	7 (6)	12 (12)	12 (12)
Asia (7 c.)				
durt	2.75 (0.89)	[2 : 2.5 : 3.25]	5.09 (2.02)	[4 : 5 : 6.5]
svrt	-6.23 (1.23)	[-7.22 : -5.7 : -5.28]	-8.24 (5.84)	[-13.07 : -7.54 : -3.32]
stpn	-2.4 (0.62)	[-2.69 : -2.34 : -1.93]	-2.08 (2.22)	[-2.15 : -1.89 : -0.61]
rbnd	1.77 (0.74)	[1.18 : 1.76 : 2.38]	1.06 (0.41)	[0.94 : 1.09 : 1.32]
nb	8 (8)	8 (8)	11 (11)	11 (11)
Central and Eastern Europe (13 c.)				
durt	9.2 (7.63)	[4.25 : 6 : 9.5]	10.14 (8.9)	[3.25 : 7 : 14]
svrt	-9.58 (9.3)	[-16.67 : -5 : -2.82]	-11.23 (9.99)	[-17.3 : -9.77 : -5.76]
stpn	-1.39 (1.56)	[-2.03 : -0.69 : -0.46]	-2.59 (2.92)	[-3.75 : -1.95 : -0.71]
rbnd	1.08 (0.44)	[0.8 : 1.06 : 1.15]	0.59 (0.8)	[0.23 : 0.63 : 0.96]
nb	10 (10)	10 (10)	14 (13)	14 (13)
Latin and South America (10 c.)				
durt	4.22 (2.13)	[3 : 4 : 5.75]	5.95 (4.95)	[3.5 : 4 : 5.5]
svrt	-6.2 (8.63)	[-6.26 : -2.69 : -1.6]	-6.85 (5.39)	[-8.41 : -7.06 : -3.53]
stpn	-1.24 (1.27)	[-1.64 : -0.80 : -0.53]	-1.45 (1.3)	[-1.64 : -1.01 : -0.78]
slpe	1.22 (0.89)	[0.58 : 1.08 : 1.31]	1.18 (0.51)	[[0.9 : 1.08 : 1.57]
nb	18 (15)	18 (15)	19 (18)	19 (18)
Western Europe (17 c.)				
durt	5.49 (5.17)	[2 : 3 : 6]	7.86 (6.76)	[3 : 5 : 10]
svrt	-1.71 (3.1)	[-2.29 : -0.89 : -0.2]	-5.58 (5.65)	[-7.66 : -3.92 : -1.98]
stpn	-0.44 (0.65)	[-0.84 : -0.22 : -0.05]	-0.86 (0.56)	[-1.21 : -0.62 : -0.47]
rbnd	0.97 (0.53)	[0.66 : 0.87 : 1.2]	0.84 (0.59)	[0.43 : 0.75 : 1.32]
nb	47 (46)	47 (46)	35 (35)	35 (35)
Western Countries (4c.)				
durt	3.58 (1.51)	[2 : 3.5 : 4.25]	8.71 (7.16)	[5 : 6 : 10]
svrt	-2.36 (1.51)	[-3.26 : -2.17 : -1.43]	-4.35 (1.36)	[-5.53 : -4.06 : -3.34]
stpn	-0.77 (0.53)	[-1.12 : -0.66 : -0.36]	-0.77 (0.5)	[-1.12 : -0.68 : -0.39]
rbnd	1 (0.56)	[0.6 : 0.94 : 1.34]	1.47 (0.63)	[0.9 : 1.66 : 1.88]
nb	12 (12)	12 (12)	7 (7)	7 (7)

The table presents, for all regions, information on the distribution – *average*, *standard deviation*, 3rd *quartile*, *median*, 1st *quartile* – for four elements from the taxonomy of recessions.

**Duration** measures the number of quarters in an episode, **severity** the real gdp cumulated losses over the expansion and **steepness** the loss per quarter and **rebound** the strength of growth in the year after the recession when compared to average growth in expansion.

For countries in **Africa & the Middle East** and **Latin & South America**, there is no difference in the main characteristics of recessions based on financial crises' occurrence. Recessions last between one and one and a half year and entail on average important losses, circa -6% of GDP. In AME, the average rebound is stronger following a financial crisis, but the difference is not significant. For LSA, rebounds are very similar with and without financial crises.

In **Asia**, when associated with financial crises, recessions are 85%\*\*\* longer (+2 quarters). If these episodes are not associated with steeper losses, on average, as they are longer, they entail larger cumulated losses. Nevertheless, they are not associated with stronger rebound. Without a financial crisis, the countries bounce back 67%\*\* faster after the end of a recession. If a financial crisis has hit the country, it will neither endure slower growth nor recuperate faster than usual<sup>22</sup>. Another way of seeing this key Asian characteristic is to look at the interquartile information. Without financial crises, 50% of recessions are followed by, at least 18% faster than expansion growth, and up to 2.4 times faster! Never in another region does the third quartile pass the \*2 thresholds.

In **Central and Eastern European countries**, recessions are long: 9 to 10 quarters on average without/with financial crises. Recessions are 86% steeper<sup>23</sup> when associated with financial crises. Overall, this does not entail statistically larger cumulated losses<sup>24</sup>. On average, after a 'normal' recession, CEE countries do not bounce back strongly (8% faster than during the average expansion). Yet, after a crisis episode's recession, these countries grow 46%\*\* slower than during expansions. This suggest that, in CEE, financial crises have long lasting effects on growth.

In **Western Europe and Countries**, recessions are on average 3 to 4 quarters longer with financial crises (duration is multiplied by 1.4\*\* in WE and 2.4\* in WC). They entail 1.5\*\*\*/1.8\*\*\* bigger cumulated losses. In WE, this higher severity of recessions with financial crises is due both to longer recessions and 95%\*\*\* steeper falls. In WC, there is no difference in steepness with or without crises. Differences in cumulated losses stem from differences in duration only. On average, WE countries grow slower after a recession than during expansions, this is even more pronounced after financial crisis episodes but the difference is not statistically significant. In WC there is no slowdown after a recession. When associated with financial crises, rebound are usually 47%\* stronger. This can illustrate the fact that this group entail several small open advanced economies exposed to currency crises which can have ex-post liberating effects on growth.

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<sup>22</sup>The respective p.values for the two statistically significant results are 2.0e-3 and 1.6e-2

<sup>23</sup>p.value = 0.102

<sup>24</sup>Steepness is computed, by episode, as the ratio between amplitude and duration. It makes sense that the average steepness is not equal to the average amplitude divided by the average duration. There might be some combination effects (long but less costly recessions and short but very costly recessions).

Table 4.10 repeats the exercise by classifying countries based on their dependence on natural resources. Commodity dependence marks a key difference between countries.

**Table 4.10:** Recessions and financial crises – by commodity dependence

epsd char	Recession $\cap$ No Crisis		Recession $\cap$ Crisis Episode	
	average (std.dev)	[qt1 : med : qt3]	average (std.dev)	[qt1 : med : qt3]
Non commodity dependent (41c.)				
durt	4.92 (4.18)	[2 : 3.5 : 6]	7.56 (6.9)	[3 : 5 : 8]
svrt	-3.51 (4.9)	[-5.02 : -2.17 : -0.58]	-7.2 (6.61)	[-9.97 : -5.3 : -3.47]
stpn	-0.95 (1.26)	[-1.57 : -0.54 : -0.15]	-1.61 (1.86)	[-1.89 : -1.04 : -0.54]
rbnd	1.09 (0.65)	[0.69 : 0.94 : 1.38]	0.98 (0.66)	[0.5 : 1.01 : 1.41]
nb	84 (81)	84 (81)	70 (69)	70 (69)
Commodity dependent (13c.)				
durt	6.61 (6.64)	[3 : 4 : 7.75]	6.07 (3.91)	[4 : 5 : 7]
svrt	-5.86 (8.89)	[-6.26 : -3.47 : -0.57]	-6.3 (5.8)	[-8.43 : -4.76 : -2.35]
stpn	-1.11 (1.34)	[-1.55 : -0.73 : -0.14]	-1.23 (1.51)	[-1.44 : -0.79 : -0.58]
rbnd	1.09 (0.89)	[0.44 : 0.82 : 1.16]	1.01 (0.5)	[0.65 : 0.97 : 1.11]
nb	18 (16)	18 (16)	28 (27)	28 (27)

The table presents, for all regions, information on the distribution – *average*, *standard deviation*, *3rd quartile*, *median*, *1st quartile* – for four elements from the taxonomy of recessions.

**Duration** measures the number of quarters in an episode, **severity** the real gdp cumulated losses over the expansion and **steepness** the loss per quarter and **rebound** the strength of growth in the year after the recession when compared to average growth in expansion.

Non-dependent countries, when hit by financial crises, experience 1.5\*\*\* times longer recessions, that are 70%\*\*\* steeper and thus associated with 2\*\*\* times more severe economic crises<sup>25</sup>. Financial crises tend to slow recovery (1.09 vs 0.98) but the difference is not statistically different (p.val = 0.156). On the contrary, for dependent countries, there is little to no difference on average with vs without financial crises. This suggest that 'normal' recessions are already very costly, financial crises do not necessarily amplify the macroeconomic vulnerabilities and losses.

Looking at regional crises history, the following facts can be noted:

#### Stylized facts 8: Heterogeneity and regional disparities (ter)

- There is lot of heterogeneity among regions with emerging and developing markets.
  - Countries in Africa & the Middle East and Latin & South America experience costly recessions irrespective of the presence of financial crises
  - When hit by financial crises, Asian countries experience longer recessions. Financial crises' recessions are not followed by strong rebound as is the case without.

<sup>25</sup>p.values (in order): 3.0e-3 ; 6.4e-3 ; 8.8e-5.



– When hit by financial crises, Central and Eastern European countries experience steeper recessions followed by slow recoveries.

- The two regions that include predominantly advanced economies display greater homogeneity. Financial crises are associated with longer and more severe recessions. In Western Europe, these recessions are steeper and not followed by a strong rebound. In Western Countries, duration is the sole driver of higher economic costs during recessions with financial crises. Episodes are often followed by a stronger rebound.
- If countries are commodity dependent, financial crises are not associated with costlier or longer recessions. If not, recessions are costlier, steeper and more severe.

I now discuss how crises characteristics shed light on the similitudes/differences across country groups.

### 4.3.3 The characteristics of 'currencicity' and multiplicity

I rely upon two layers from the taxonomy on financial crises: *currencicity* – whether a recession is associated with a currency crisis (and other crises) – and *multiplicity* – how many crises among economic & financial are included.

**Currencicity:** Table 4.12 presents the key characteristics of crisis episode by country group based on *currencicity*. This element from the taxonomy characterizes whether episodes are or not associated with a currency crisis (1st/2nd columns). I also differentiate the cases for which other financial crises also signal (3rd column). The table concentrates on recessions<sup>26</sup>.

In **developing markets**, recessions without currency crises are short (3.1 quarters on average). They entail important and steep losses (-6.3% aggregated, -2.2% per quarter). On average, recessions are followed by a 22% stronger recovery. There are few cases of recessions with only a currency crisis. When the case, the recession is 4 times longer and half as severe, but the differences are not statistically significant (p.val = 0.13 ; 0.27). When other financial crises supplement currency crises, compared to recessions without currency crises, episodes are on average 2.3\*\*\* times longer (7.1 quarters) and 1.9\*\* times more severe (-11.7% cumulated losses). These episodes are numerous and as frequent as episodes without currency crises. They are not significantly steeper. On average, the rebound effect that was present without crisis is cancelled: countries do not benefit from stronger growth in the aftermath of recessions associated with financial crises<sup>27</sup>.

In **emerging markets**, recessions not associated with currency troubles are steep, long and

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<sup>26</sup>For expansions, see annex 14

<sup>27</sup>p.values (in order): 3.0e-3 ; 1.1e-2

**Table 4.11:** Recessions by country groups through the taxonomy: *currency*

epsd.	taxonomy – <i>currency trigger</i>		
	no.currency	currency.only	currency&co
<b>Developing Markets (15c.)</b>			
durt	3.11 (1.15)	12.25 (13.23)	7.06 (5.3)
svrt	-6.28 (6.98)	-3.01 (9.37)	-11.68 (6.68)
stpn	-2.23 (2.4)	-1.07 (1.61)	-2.7 (2.85)
rbnd	1.22 (0.86)	1.13 (0.69)	1.03 (0.7)
nb	19 (18)	4 (3)	18 (18)
<b>Emerging Markets (15c.)</b>			
durt	7.35 (5.77)	4.27 (2.65)	7.69 (6.16)
svrt	-7.75 (8.64)	-4.22 (2.83)	-8.91 (7.98)
stpn	-1.33 (1.36)	-1.23 (1)	-1.73 (1.8)
rbnd	1.03 (0.83)	1.16 (0.61)	0.87 (0.52)
nb	23 (20)	11 (11)	13 (12)
<b>Advanced Markets (24c.)</b>			
durt	5.93 (5.77)	5.74 (4.69)	8.5 (5.83)
svrt	-3.42 (4.6)	-3.16 (2.13)	-6.2 (4.59)
stpn	-0.74 (0.75)	-0.72 (0.53)	-1.02 (0.64)
rbnd	1.02 (0.6)	1.04 (0.67)	0.94 (0.53)
nb	81 (80)	23 (23)	8 (8)

The table presents, for **emerging**, **developing** and **advanced** markets, the *average* and *standard deviation* for four elements from the taxonomy on economic crises:

**Duration** measures the number of quarters in an episode, **severity** the real gdp cumulated losses over the expansion and **steepness** the loss per quarter and **rebound** the strength of growth in the year after the recession when compared to average growth in expansion. The number of events is given and in brackets the number of recessions for which rebound could be computed.

Episodes are classified based on the exposure of the recession to currency crises: (0) there are no currency crisis in the episode, (1) there is(are) only currency crisis(es) in the episode, (2) the recession is associated with a currency crisis and at least another financial crisis.

severe – on average, 7.4 quarters, -7.8% real cumulated losses and -1.33% per quarter. These recessions are not followed by stronger growth than during expansions. This is in line with previous observations as this category of recession includes recessions without financial crises or with only banking/sovereign crises, both costly for this group. When only a currency crisis hits the economy the recession is 42%\*\* shorter and 46%\*\* less severe. When the currency crisis combines with other financial crises, duration and losses fall in the same range as without currency crises. When crises multiply, the average episode is steeper and followed by slower growth than usually in expansion but these differences are not significant<sup>28</sup>.

For **advanced markets**, recessions without currency crises or with only a currency crisis are very much alike. They last on average 5.8 quarters, entail -3.3% cumulated losses at a -0.73% per quarter mean slope. They are not followed by sluggish growth. Moreover these episodes represent the bulk of recessions (out of 112: 81 without, 23 with one currency crisis). When

<sup>28</sup>p.values (in order): 2.0e-2 ; 4.4e-2 ;

other financial crises trigger, recessions are 2\*\*\* times more severe (-6.2% cumulated losses). If these episodes last 1.5 times longer on average (8.5 quarters), given the fewer observations, this difference is not significant.

Overall, through the lens of currency crises, key patterns emerge:

**Results: Currency, multiplicity and the intensification of economic losses.**

- κ In emerging and developing markets, recessions without currency crises are costly. When only a currency crisis triggers, this is not sufficient to entail significantly higher losses.
- κ For developing countries especially, in the majority of the cases, currency crises associate with other financial crises and long and severe economic crises.
- κ For advanced markets, only a currency crisis is not sufficient to affect the nature of recessions which remain, on average, short and half as costly (as in emerging/developing markets). In few cases, currency crises combine with other financial crises and entail twice as important cumulated losses.

**Multiplicity:** Table 4.12 presents the key characteristics of crisis episode by country group based on multiplicity. I define the multiplicity of a crisis episode as an index between 1 and 4. 1 means that the episode is ‘only’ an economic crisis, a recession. 2 means that the economic crisis is associated with only one other financial crisis – sovereign, currency or banking. 3 means there are two distinct financial crises and 4 means that all indicators flashed red.

‘Simple’ economic crises are the longest in emerging markets (7.6 quarters), followed by advanced markets (4.9 q.) and developing markets (3.1 q.). They are the most severe in emerging and developing markets (-7.7 and -5.7% cumulated losses) whereas for advanced markets, recessions are by themselves little costly (-2.2%). The less advanced the market, the steeper the fall experienced during recessions (-1.9/-1.3/-0.7% per quarter in D-/E-/A-M). Nevertheless, developing markets tend to grow 27% faster after a recession than on average during expansion. For emerging and advanced markets, this feature is, by far, less salient (+10/5%). These episodes represent a short minority of recessions for emerging markets (47%). Developing markets experience less simple economic crises (37%); advanced markets far more (58%). Beyond simple crises, it is interesting to observe that, as market develop, the less likely multiple crises are to occur. The pattern is striking when looking at the share of single/double/triple financial crises among crisis episodes by country groups: 31/38/31% for developing markets, 48/32/20% for emerging markets and 77/21/2% for advanced markets.

I now detail the characteristics of economic crises associated with financial crises by country groups. I am particularly interested in two questions: (i) whether financial crises amplify losses

**Table 4.12:** Recessions by country groups through the taxonomy: multiplicity

epsd.	taxonomy – multiplicity			
	1	2	3	4
<b>Developing Markets (15c.)</b>				
durt	3.13 (1.25)	7.62 (9.98)	7.9 (6.08)	6 (4.28)
svrt	-5.69 (6.81)	-5.74 (8.67)	-10.48 (7.89)	-13.18 (4.87)
stpn	-1.93 (2.14)	-2.21 (2.7)	-1.94 (2)	-3.64 (3.58)
rbnd	1.27 (0.96)	1.07 (0.48)	0.91 (0.83)	1.18 (0.51)
nb	15 (14)	8 (7)	10 (10)	8 (8)
<b>Emerging Markets (15c.)</b>				
durt	7.55 (5.82)	4.17 (2.55)	5.62 (2.88)	11 (8.77)
svrt	-7.7 (8.84)	-4.61 (3.02)	-5.36 (5.33)	-14.6 (8.69)
stpn	-1.26 (1.34)	-1.38 (1.08)	-1.44 (1.89)	-2.2 (1.74)
rbnd	1.1 (0.78)	1.03 (0.73)	0.98 (0.45)	0.72 (0.62)
nb	22 (19)	12 (12)	8 (7)	5 (5)
<b>Advanced Markets (24c.)</b>				
durt	4.91 (4.54)	6.94 (6.35)	10.7 (6.46)	4 (NA)
svrt	-2.24 (3.02)	-4.24 (2.71)	-9.29 (8.7)	-7.54 (NA)
stpn	-0.66 (0.78)	-0.82 (0.55)	-1.02 (0.6)	-1.89 (NA)
rbnd	1.05 (0.6)	1.06 (0.6)	0.64 (0.59)	1.54 (NA)
nb	65 (64)	36 (36)	10 (10)	1 (1)

The table presents, for **emerging**, **developing** and **advanced** markets, the *average* and *standard deviation* for four elements from the taxonomy on economic crises:

**Duration** measures the number of quarters in an episode, **severity** the real gdp cumulated losses over the expansion and **steepness** the loss per quarter and **rebound** the strength of growth in the year after the recession when compared to average growth in expansion.

Episodes are classified based on the multiplicity of the recession: (1) 'simple' economic recessions, (2) the recession is associated with either a sovereign, a currency or a banking crisis, (3) the recession is associated with two different financial crises and (4) the recession is associated with all types of financial crises.

and duration when compared with 'simple' recessions and (ii) whether multiplicity is positively correlated with duration/severity/steepness and negatively with rebound. The naive prior I formulate when making these assumptions is the following: Financial crises signal a worsening of a market to the point where drastic policy changes are needed. If more markets are dysfunctional, it is more likely that combined issues take longer to resolve. If more markets are hampered in their functioning, the number of constrained agents increases. These constraints can easily diffuse and amplify across agents in the economic and financial system. As multiple crises entail a broader coverage of agents, I expect them to entail larger losses, and steeper falls as negative feedbacks reinforce. Moreover, if crises multiply, it is more likely for the system's fundamentals to be damaged and for growth to struggle kickstarting again once the recession has ended (rebound < 1). An opposite view in defense of strong rebound after multiple crises episodes follows from the idea that if the drastic policy changes are large and efficient enough,

they can address structural vulnerabilities and inconsistencies. The resolution of these issues transforms existing pressures into a renewed source of growth dynamics (rebound  $> 1$ ).

For **developing markets**, all multiple crises episodes entail long recessions between 6 and 8 quarters, statistically longer than simple recessions<sup>29</sup>. Severity is positively correlated with multiplicity. If single crisis episodes entail similar losses as simple recessions, triple/double crises multiply the cumulated losses by  $2.3^{**}/1.8^{30}$ . Moreover, multiple crises episodes are the most numerous in developing markets (18 episodes for double+triple crises against 8 single episodes and 15 simple). Finally recessions display similar average steepness across simple, single and double crises. Triple crises are almost 2 times steeper than the others. Nevertheless the differences are not significant (p.values for triple vs simple/single/double: 0.122 ; 0.192 ; 0.128). When financial crises accumulate, the strength of the rebound falls until the effect reverses for double crises (19% slower growth in recovery than in expansion). Yet, for triple crisis episodes, on average, the recession is followed by a strong rebound.

In **emerging markets**, single crisis recessions are 45%<sup>\*\*</sup> shorter than simple recessions. Double crises recessions entail 1.4 quarter longer recessions on average (5.6 vs 4.2 quarters). Triple crisis episodes are 2.6\* times longer than single ones (11 quarters)<sup>31</sup>. Multiple crises (3&4) are not statistically shorter/longer than simple recessions (p.values = 0.12 ; 0.22). Single crisis episodes are also 40%\* less costly than simple recessions. As crises multiply losses accumulate: triple crisis episodes are 3.2<sup>\*\*</sup> times costlier than single episodes<sup>32</sup>. Double crisis episodes are costlier and longer than single crises but not statistically so. Finally I identify that steepness/rebound is positively/negatively correlated with multiplicity. As emerging markets experience multiple crises, they endure steeper falls and fail to bounce back. On average, for triple financial crises, recessions are followed by sluggish growth. After simple recessions, the strong rebound fails to signal as statistically higher than 1 (with a p.value of 15.77%).

For **advanced markets**, as discussed, there is only one triple crisis episode for advanced markets (South Korea). The episode displays a short and steep recession (1 year) with large losses. The recession is followed by a very strong rebound. I focus the remaining of my analysis on the other types of crises. Recessions' duration, severity and steepness are positively correlated with multiplicity. The average duration increases by 2 quarters as a recession associates with 1 crisis and by an additional 4 quarters if a second crisis hits the country<sup>33</sup>. Severity is multiplied by 1.9<sup>\*\*\*</sup> if a single crisis hits the country, and again by 2.2<sup>\*\*</sup> if a second crisis

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<sup>29</sup>p.values for simple vs single/double/triple duration 0.122/1.8e-2/5.1e-2

<sup>30</sup>p.values = 2.9e-2 ; 0.125

<sup>31</sup>p.values (in order): 1.3e-2 ; 7.9e-2

<sup>32</sup>p.values (in order): 7.4e-2 ; 3.0e-2

<sup>33</sup>Double crises are statistically longer than simple/single episodes at the 1/10% level (p.values = 1.0e-2 ; 6.2e-2). Single crises are longer than simple episodes at the 5% level (p.value = 4.8e-2).

triggers<sup>34</sup>. Overall, every time a crisis hits the country, the recession is 1.24 times steeper<sup>35</sup>. Finally, if simple and single crises are followed by a year of recovery in line with the average growth in expansion (5/6% faster), when the recession is associated with two financial crises, the recovery is sluggish and 40%\*\* slower than usually the case<sup>36</sup>.

Overall, looking at crisis episodes through multiplicity provides key insights:

### Results

Simple economic crises are very different across country groups and become more frequent as markets develop.

- ~ In emerging markets they are long and costly: 2 years and -7.0% real losses
- ~ In developing markets they tend to be transitive and costly: 3 quarters and -5.6% real losses
- ~ In advanced markets, they are short and mild: 5 quarters and -2.2% real losses.
- ~ The more developed the market, the higher the frequency of simple crises (37/47/58%).
- ~ The more developed the market, the lower the exposure to multiple crises: double and triple crises represent 23.4 / 52.0 / 69.2% of the episodes with financial crises for advanced/emerging/developing markets.

Multiplicity is broadly positively related to duration, severity and steepness and negatively related to rebound. There remains insightful differences across groups:

- χ In **developing markets**, single crisis episodes are two times longer as simple crises but they entail similar losses. Double and triple crises entail both two times longer recessions and two times bigger losses.
- χ The severity of double crises is driven by the longer duration of these episodes (2 years for -10.5% cumulated real losses on average) whereas, for triple crises, the steepness of the fall appears as a key driver (-3.6% per quarter, 6 quarters, 13.2% on average). Triple crises are followed by higher than average recoveries
- χ In **emerging markets**, single crisis episodes (11 currency crises, 1 banking crisis) are associated with short and less severe recessions. Double crises are as costly and long as simple recessions.
- χ Triple crises entail 2.6 times longer and 3.2 times costlier recessions when compared to single crisis episodes: close to 3 years and - 14.6% real losses on average.

<sup>34</sup>Simple vs single/double amplitude p.values = 5.2e-4 ; 1.5e-2. Single vs double crises amplitudes, p.value = 5.1e-2

<sup>35</sup>The difference is significant between simple and double recessions (p.value = 5.7e-2), but not between single and double (p.value = 0.181) nor between simple and single episodes (p.value = 0.115)

<sup>36</sup>p.values double vs simple/single rebound = 3.3e-2/3.4e-2.

- χ In **advanced markets**, single crises (23 currency, 1 sovereign and 12 banking crises) are 40% longer and 2 times costlier. Double crises entail 2.2 times longer and 4 times costlier recessions: 2 years and a half and -9.3% real losses on average.
- χ Multiple crises remain rare events. These recessions are followed by 40% slower recoveries, below the average growth rate in expansion.

In the final section, I use the different taxonomical elements and results to understand the key characteristics of financial crises that contributed to volatility differentials. To that end, I rely on the variance decomposition associated with Markov data generating processes presented in chapter 2.

#### 4.4 Quantifying financial crises' contribution to volatility – some variance decompositions

The Markov Switching Model variance decomposition I used in the previous chapter is an exact decomposition that relies upon two things (i) a stochastic non-linear Markovian process that captures growth shocks and business cycle fluctuations and (ii) White Noise shocks unexplained by the previous data generating process and constructed using the residuals of the estimation. What makes the variance decomposition exact, beyond the use of residuals, is the fact that the contribution of business cycle volatility can be analytically computed using information from the estimation procedure on the average growth per regime and ergodic probabilities. In practice, business cycle volatility will be explained if (Poisson) shocks, associated with a given regime, entail large deviations from the average growth rate. Another channel through which non-linearity generates volatility is through the frequency of the switches. If a country endures relatively not too costly losses during recession but enters the regime frequently, this will drive up aggregate volatility. Hence, the contribution of each regime to aggregate variance can be decomposed as the ergodic probability to be facing chosen regime multiplied by the squared deviation of regime-dependent growth from the average. To exploit the different layers of my taxonomy<sup>37</sup>, I compute for each category an ex-post/realized ergodic probability<sup>38</sup> and the average growth in the episode. Conceptually, I assume that once the growth shock has been realized I draw a 'crisis shock'. This random variable is taken from a uniform distribution over [0,1]. Depending on the representative share of each type of crisis episode considered, "and the realized value" of the 'crisis shock', the episode is labeled accordingly.

I will focus my variance decomposition along three main layers of analysis: (a) no financial crisis vs financial crises ; (b) *currency* and (c) **multiplicity**. Of particular interest here, I

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<sup>37</sup>An other, and perhaps preferable, approach to this question would entail endogenizing the transition matrix in the MSM estimation to introduce information from the database on financial crises.

<sup>38</sup>For example, the ergodic probability to have a double crisis episode will be the product of the ergodic probability to face a recession multiplied that the share of double crises in crisis episodes.

want to quantify how much financial crises contribute to business cycle volatility across country groups. And along what lines (crisis multiplicity? exposure to currency crises?). Given chapter 2's results and the present conclusions on financial crisis episodes, I expect recessions associated with financial crises to contribute importantly to aggregate volatility. The intensity/steepness of crisis episodes should appear as a key driver of business cycle volatility and a marked difference between emerging and developing versus advanced markets.

#### 4.4.1 Variance decomposition: the weight of crises

Table 4.13 presents variance decomposition results by splitting episodes between regime and association with financial crises. I do not discuss in detail the share of volatility that is unexplained by the model as it hasn't changed since chapter 2. As previously observed, expansions represent a minor share of aggregate variance<sup>39</sup> – 6.3/5.5/3.9% in emerging/developing/advanced markets.

**Table 4.13:** Variance decomposition of output growth emerging/developing markets based on expansions/recessions with/without financial crises

Group	vlt.gwth	$\sigma_g^2$	$\sigma_{E+NC}^2$	$\sigma_{E+FC}^2$	$\sigma_{R+NC}^2$	$\sigma_{R+FC}^2$	$\sigma_{rsdl}^2$
DM	1.80	3.24	0.17	0.00	0.37	0.93	1.76
(%)		(100)	5.3	0.2	11.4	28.8	54.4
EM	1.34	1.80	0.08	0.03	0.29	0.42	0.98
(%)		(100)	4.5	1.7	15.9	23.5	54.5
AM	1.05	1.10	0.04	0.00	0.15	0.14	0.76
(%)		(100)	3.7	0.2	13.7	13.2	69.2
Relative to AM			Relative contribution to $\sigma_g^2$ vs AM				
DM/AM	1.72	2.94	1.44	0.78	0.83	2.18	0.79
EM/AM	1.28	1.63	1.21	8.42	1.16	1.78	0.79

Variance decomposition for 15 **emerging**, 15 **developing** and 24 **advanced** markets.

vlt.gwth denotes growth volatility measured as the standard deviation of growth rates.  $\sigma_g^2$  denotes the second moment/variance of the growth rates time series.  $\sigma_x^2$  denotes the variance due to deviations from average growth in regime  $x$ .  $\sigma_{rsdl}^2$  denotes the variance unexplained by the Markovian process.

Regimes considered are expansions/recessions without/with financial crises.

The bottom part of the table gives, for each element of the decomposition, the ratio of emerging|developing characteristics relative to advanced markets.

Simple economic crises represent a non-negligible contributor to aggregate volatility – around 13.7%. In emerging/developing markets the contribution is 2.2 points higher/lower. When recessions are associated with financial crises, as expected, there is wider heterogeneity across countries. In advanced markets, financial crisis episodes do not contribute more to aggregate volatility than simple economic crises (13.2 vs 13.7%). In emerging markets, financial crises generate 23.5% of aggregate volatility (+7.6 points). These episodes are the first contributor to

<sup>39</sup> As a reminder, this is mechanic when considering the assymetry of the business cycle. Because expansions are long events they tend to drive the average growth more than do recessions. Hence, in expansion, deviations from the average are smaller.



business cycle volatility. In developing markets, the picture is even more striking, as financial crises are associated with 2.5 times more volatility (+17.4 points to 28.8%). They are, by far, the drivers of business cycle volatility. Whereas the contribution of simple recession is quite similar across countries (+16/-17% in EM/DM vis a vis AM), **financial crises contribute 1.78/2.18 times more to aggregate volatility in emerging/developing markets when compared to their advanced counterparts.**

A key interest of my approach is my focus on business cycle volatility, I now focus myself on this component of aggregate volatility that excludes unexplained residuals.

#### 4.4.2 Business cycle volatility through the lens of financial crises

Table 4.14 details how each type of phase (exp/rec , without/with crises) contributes to business-cycle volatility.

**Table 4.14:** Contributions to business cycle volatility: crises - no crises

Group	Relative to AM		Relative contribution to $\sigma_b c^2$ (in %)			
	bc.vlt	$\sigma_b^2 c$	<i>exp. + no.crs</i>	<i>exp. + crs</i>	<i>rec. + no.crs</i>	<i>rec + crs</i>
DM	1.21	1.47	11.5	0.3	28.1	63.1
EM	0.91	0.82	9.8	3.7	35.4	51.2
AM	0.58	0.33	12.0	0.2	45.2	42.2

Overall, business cycle volatility is 1.6/2.1 times higher in emerging/developing markets than in advanced ones. Expansions contribute to 1/8th of business cycle volatility. In emerging markets, financial crises occurring over expansions explain 1/4th of the contribution. As markets develop, the contribution of financial crises falls: from 63.1 to 51.2 to 42.2% in developing/emerging/advanced markets. Mechanically, the contribution of simple economic crises increase.

Table 4.15 details the components used to compute each regime's contribution to volatility: frequency and intensity of the deviations. The last two lines of each block of table 4.15 compare the level of frequency/intensity for a given episode in emerging/developing countries relative to advanced markets.

One message stems from this table and confirms previous observations: what matters with crises is their intensity. It is always 2/4 times more intense in emerging/developing markets relative to advanced markets. Crisis episodes are also 40% more frequent in emerging and developing markets. Hence the component of business cycle volatility which is associated with crisis episodes is 3/6 times bigger in emerging/developing markets relative to advanced ones. Simple recessions are often less frequent in emerging and developing markets which decreases their contribution to volatility. This is less the case for emerging markets: simple recessions are 'only' 12% less frequent than in advanced markets (42% less frequent for developing markets).

**Table 4.15:** Frequency vs intensity: contributions to business cycle volatility

Group	$\sigma_{E+NC}^2$	frq <sub>E+NC</sub>	int <sub>E+NC</sub>	$\sigma_{E+FC}^2$	frq <sub>E+FC</sub>	int <sub>E+FC</sub>
DM	0.17	0.72	0.24	0.00	0.16	0.03
EM	0.08	0.72	0.11	0.03	0.14	0.21
AM	0.04	0.73	0.06	0.00	0.15	0.01
relative to AM :						
DM/AM	4.27	0.99	4.30	2.30	1.11	2.08
EM/AM	2.00	0.99	2.01	13.84	0.96	14.50
Group	$\sigma_{R+NC}^2$	frq <sub>R+NC</sub>	int <sub>R+NC</sub>	$\sigma_{R+FC}^2$	frq <sub>R+FC</sub>	int <sub>R+FC</sub>
DM	0.37	0.04	9.00	0.93	0.07	13.10
EM	0.29	0.06	4.57	0.42	0.07	5.97
AM	0.15	0.07	2.11	0.14	0.05	2.81
relative to AM :						
DM/AM	2.47	0.58	4.27	6.47	1.39	4.67
EM/AM	1.90	0.88	2.17	2.93	1.38	2.12

$\sigma_{reg}^2$  denotes the variance due to deviations from average growth in regime *reg*. It is computed as the product of a measure of the frequency of the deviations (frq<sub>reg</sub> the ergodic probability of regime *reg*) and the intensity of the deviations (int<sub>reg</sub> is the square of the difference between growth in regime *reg* and average growth).

Expansions that display financial crises contribute little to business cycle volatility overall. For emerging markets, when compared to other markets, these episodes denote larger deviations from average growth and thus more volatility.

That financial crises matter for business cycle volatility is no surprise. The taxonomy of crises has identified four key characteristics to understand the role of the heterogeneity of crises episodes in driving volatility differentials. Before presenting the final results, I repeat these main contributions.

#### Contributions: The role of financial, currency and multiple crises

1. The wide majority of financial crises associate with recessions and more or less important losses. Recessions matter not because they are more frequent in less developed markets, but because they are more intense. Financial crises triggering during expansions are broadly currency crises and, in a minority of cases, associated with exogenous, often political, developments.
2. Currency crises, by themselves, are not associated with major economic losses. In more advanced markets, they are more likely to trigger during expansions. This expansionary feature of currency crises illustrates the ability of an external adjustment to evacuate accumulated pressure and allow the reallocation of liquidity and resources. In less advanced markets, currency crises are more likely to create panics and spillover

to other financial crises. In developing markets, this feature is particularly salient as currency crises rarely come alone. When they trigger, other financial crises follow. The exceptions are the results of shifts in market sentiment and external shock, e.g. the GFC<sup>a</sup>.

3. Banking and sovereign crises, a.k.a. pure financial crises<sup>b</sup>, impact country groups variously. In advanced markets, banking crises are more likely to trigger alone. They sometimes associated with sovereign crises, mainly after the GFC. Advanced markets are the only countries in my sample to experience double sovereign and banking crises. In less advanced markets, banking crises supplement other currency and/or sovereign crises. In emerging markets, sovereign crises never come alone and banking crises rarely do.
4. Multiple crises involving at least a currency crisis are a key characteristics of developing and emerging markets. Double and triple crises episodes are numerous and repeatedly associate with acute and/or longer recessions. The less advanced the market, the more likely are multiple crises. The more advanced the market, the more likely are ‘simple’ economic recessions.

<sup>a</sup>Among the DM currency crises occurring during expansions. In Armenia 2014q4, the crisis is purely the result of disorderly forex market conditions and associated capital outflows. Policy response failed to stabilize the situation and coordinate agents at first. Indonesia’s currency crises in 2005q3, 2008q4 and 2013q3 are all associated to high tensions on forex markets and shifts in market sentiments. In Colombia 2008q3, forex markets have historically been volatile but the GFC drove suddenly capital away from most of emerging and developing markets. Policy responses varied. In the Philippines, the currency crises in 2008q4 follows a similar rationale. Even if fundamentals were at a better level, pressures and stress coalesced around banks’ balance sheets.

<sup>b</sup>A currency crisis could be viewed as both a financial and nominal crisis.

I now use these characteristics to shed light on the key factors driving volatility differentials.

#### 4.4.3 Contributions to business cycle volatility: insights from the taxonomy

The main layers of the taxonomy that provided insightful hindsight are currency and multiplicity. Annex T presents the volatility decompositions along the lines of **currency** and **multiplicity**. I present here a summary of the results to focus in the rest of the sub-section on a combination of the two layers.

##### Results: Currency, multiplicity and volatility differentials

**On currency:** Currency crises are associated with **half of business cycle volatility in emerging and developing markets, against a fourth in advanced economies**. In developing markets, currency crises by themselves do not generate a lot of volatility. Nevertheless they are very often associated with other crises and a huge share of BC volatility. In emerging and advanced markets, single currency crisis episodes contribute the same amount to BC volatility, nevertheless, when crises cumulate, the contribution to volatility increases

more in less advanced markets. **In developing markets, currency crises are a necessary but non sufficient source of volatility. In emerging markets, currency crises are a necessary and sufficient source of volatility. In advanced markets, currency crises are non-necessary but sufficient source of volatility.**<sup>a</sup>

**On multiplicity: As markets develop, multiplicity matters less for BC volatility.** Multiple crises are associated with one half of business cycle volatility in developing markets, one third in emerging markets and one eighth in advanced markets. As crises multiply, they become relatively less costlier in emerging markets than in advanced markets. In developing markets, whatever the multiplicity, crises are at least 3 times more intense than in advanced markets. **In developing markets, economic and financial crises combine to generate excessive volatility. In emerging markets, simple economic crises are already an important source of losses and volatility. Multiple financial crises demultiply intensity to generate important macroeconomic volatility. In advanced markets, financial crises by themselves are not a key supplementary factor of volatility.** Multiple crises episodes are the only type of recession episode for which the contribution to BC volatility is bigger in DM/EM when compared to AM, respectively 5.46 and 3.58 times bigger.

<sup>a</sup>Another way of reading the last four lines is to say that, in DM, currency crises generate volatility only when they are accompanied by other crises (and it is frequent). In EM, they generate volatility irrespective of another crisis triggering. In AM, by themselves, currency crises generate volatility but as other financial crises and irrespective of combination effects.

To present the results on the volatility decomposition, I chose to pair the **currency** and **multiplicity** layers to identify 6 types of episodes.

1. *Simple* expansions, no financial crisis.
2. Expansions with financial crisis. This group will capture (i) mostly expansionary and self-fulfilling currency crises and (ii) politically driven financial crises.
3. *Simple* recessions, no financial crisis.
4. Recessions with a currency crisis only. This group isolates currency crises to question their role as a sufficient (or not) source of business cycle volatility, i.e. by themselves.
5. Recessions with a banking and/or a sovereign crisis/es, but no currency crisis. This group isolates the episodes associated to troubles stemming from the sovereign bond market and other financial markets. It includes, for developing and emerging markets, single crisis episodes, and for advanced markets, both single banking crises (1 sovereign) and double banking & sovereign crises.
6. Multiple crises, with at least a currency crisis. This group aggregates both the most acute crises (the triple crises episodes that distinguish less advanced markets) and the double currency & banking/sovereign crises, that have been widely debated in the theoretical and

empirical literature.

Table 4.16 presents the decomposition of business cycle volatility<sup>40</sup> based on Timmermann (2000) and the constructed 6 types of episodes. Table 4.17 provides additional detailed information on the frequency and intensity of each episodes.

**Table 4.16:** Business cycle volatility decomposition by type of crisis episode and country group

	BC		expansions		recessions			
	volat.	$\sigma_{bc}^2$	$\sigma_{nocrs}^2$	$\sigma_{crs}^2$	$\sigma_{nocrs}^2$	$\sigma_{cur}^2$	$\sigma_{bkg sov}^2$	$\sigma_{mtpl}^2$
DM	1.23	1.51	0.17	0.00	0.37	0.05	0.21	0.70
			11.36	0.33	24.46	3.34	14.18	46.32
EM	0.91	0.83	0.08	0.03	0.29	0.14	0.04	0.25
			9.70	3.62	34.42	16.85	5.03	30.39
AM	0.58	0.34	0.04	0.00	0.15	0.06	0.06	0.03
			11.92	0.64	44.30	16.95	17.71	8.48
DM/AM	2.12	4.48	0.95	0.51	0.55	0.20	0.80	5.46
EM/AM	1.57	2.45	0.81	5.65	0.78	0.99	0.28	3.58

BC volatility 'volat. =  $\sigma_{bc}$ ' and variance  $\sigma_{bc}^2$  is decomposed as the sum of components reflecting volatility associated with six given types of episode: ( $\sigma_{nocrs}^{2 exp}$ ) simple expansions ; ( $\sigma_{crs}^{2 exp}$ ) expansions with financial crisis ; ( $\sigma_{nocrs}^{2 rec}$ ) simple recessions ; ( $\sigma_{cur.only}^{2 rec}$ ) recessions with currency crises only, ( $\sigma_{bkg|sov}^{2 rec}$ ) recessions with banking &/or sovereign crises and ( $\sigma_{mtpl}^{2 rec}$ ) multiple crises (at least a currency crisis).

For each country group, the first line gives the values of each component. The second line gives the share of bc volatility each episode type identifies with. The darker the shade, the more frequent the event.

The bottom part of the graph gives the relative (EM or DM vs AM) contributions to bc volatility (columns 4:8). Columns 2/3 give the relative volatility/variance.

**Table 4.17:** Contributions to BC volatility: frequency & intensity

	$\sigma_{nocrs}^{2 exp}$	frq <sub>nocrs</sub> <sup>exp</sup>	int <sub>nocrs</sub> <sup>exp</sup>	$\sigma_{crs}^{2 exp}$	frq <sub>crs</sub> <sup>exp</sup>	int <sub>crs</sub> <sup>exp</sup>	$\sigma_{nocrs}^{2 rec}$	frq <sub>nocrs</sub> <sup>rec</sup>	int <sub>nocrs</sub> <sup>rec</sup>
DM	0.17	0.72	0.24	0.00	0.16	0.03	0.37	0.04	9.00
EM	0.08	0.72	0.11	0.03	0.14	0.21	0.29	0.06	4.57
AM	0.04	0.73	0.06	0.00	0.15	0.01	0.15	0.07	2.11

<sup>40</sup>The volatility that was unexplained by the model remains unchanged as the episodes are constructed ex-post on the dated BC episodes after the use of the filtering algorithm in section 4.3. Future work entails estimating endogenous MSM with the dummy for financial crises.

	$\sigma_{cur}^2{}^{rec}$	$frq_{cur}^{rec}$	$int_{cur}^{rec}$	$\sigma_{bkg sov}^2{}^{rec}$	$frq_{b s}^{rec}$	$int_{b s}^{rec}$	$\sigma_{mltpl}^2{}^{rec}$	$frq_{mltpl}^{rec}$	$int_{mltpl}^{rec}$
DM	0.05	0.01	4.61	0.21	0.01	19.57	0.70	0.05	14.20
EM	0.14	0.03	4.48	0.04	0.00	14.69	0.25	0.04	6.83
AM	0.06	0.03	2.28	0.06	0.02	3.42	0.03	0.01	3.27

$\sigma_{epsd}^2$  denotes the variance due to deviations from average growth in episode  $epsd$ . It is computed as the product of a measure of the frequency of the deviations ( $frq_{epsd}$  the ergodic probability of episode  $epsd$ ) and the intensity of the deviations ( $int_{epsd}$  is the square of the difference between growth in episode  $epsd$  and average growth).

Episodes include: (i) simple expansions ; (ii) expansions with financial crisis ; (iii) simple recessions ; (iv) recessions with currency crises only ; (v) recessions with banking &/or sovereign crises and (vi) multiple crises with at least a currency crisis.

**Expansions contribute 1/8th to business cycle volatility across country groups.** In developing and advanced markets, expansions associated with financial crises are negligible vis-à-vis BC volatility. In emerging markets, expansions associated with financial crises (single currency or banking crises) tend to generate additional volatility (a fourth of the volatility associated with expansions). If expansion episodes contribute to BC volatility differently across country groups, this stems mainly from fluctuations being wider in less advanced markets. In more advanced markets, expansions tend to be associated with stable growth. **Simple economic recessions contribute to an important part of BC volatility: 24/34/44% in developing/emerging/advanced markets. As markets develop, simple recessions matter more for volatility.** This is partially because they become more frequent: 4% of episodes in DM against 6/7% in EM/AM. In the latter groups, they are the most frequent type of recession. In developing markets, they are only the second most frequent type of recession. The role of simple economic recessions towards BC volatility stems from the fact that they entail much more stable growth as markets develop: fluctuations are 4.3/2.2 times less stable in developing/emerging markets relative to advanced countries. As markets develop the intensity of their simple economic recessions falls. The build-up of macroeconomic stabilizers, of proper market institutions and regulations etc form key theoretical explanations to this result. **Recessions associated with only currency crises are significant contributor to BC volatility in emerging and advanced markets.** In developing markets, currency crises only are insufficient to generate volatility. These episodes are three times less frequent in these countries. They entail similar intensity across developing and emerging markets, twice that of advanced markets. For emerging and advanced markets, the intensity of these recessions is similar to that of simple economic recessions. For developing markets, these episodes are both less frequent and less intense than simple economic recessions. On the contrary, **recessions associated with banking &/or sovereign crises are significant contributors to BC volatility only in developing and advanced markets.** In developing and emerging markets they are associated with acute fluctuations but their frequency makes them relevant solely for developing markets. In advanced markets, these episodes are more frequent and as intense as other multiple crises

episodes. **Multiple crises episodes are key drivers of BC volatility in developing and, to a lower extent, in emerging markets. They explain almost one half of the volatility for the former group and one third for the latter.** What drives the contribution of multiple crises to BC volatility in less advanced markets is both the intensity of the episodes (1.6/1.5 times more intense than simple recessions in DM/EM) and their frequency (first/second most frequent type of recession in developing/emerging market). In advanced markets, these episodes are as intense as other recessions with banking and/or sovereign crises (1.5 times the intensity of simple recessions or recessions with a currency crisis), yet they are half as frequent, and contribute mechanically half as much to BC volatility.

Overall countries' experience of financial crises is diverse and a major driver of volatility (differentials):

**Recessions, currency crises, financial complications, multiple crises and volatility differentials:**

**Simple economic recessions** are important contributors to BC volatility worldwide. As market develop, they represent a bigger share of BC volatility as they become frequent enough to drive down the average intensity of fluctuations during recessions (the build-up of stabilizers and feed-back mechanisms). Simple recessions are 4.3/2.2 times more intense in developing/emerging relative to advanced markets.

**Currency crises** entail frequent **fluctuations in emerging and advanced markets**, similar to the intensity of simple economic recessions. In these countries, currency crises by themselves do not generate additional volatility relative to simple economic crises. In developing markets these episodes are both relatively less frequent and intense to generate significant volatility. The panic often contaminates other financial markets or the shifts in market sentiments fail to drive the country onto a bad equilibria.

**Banking and sovereign crises** entail intense fluctuations whatever the country group. By themselves, they prove a **significant source of volatility in developing and advanced markets**. In the former because they are acute, in the latter, because they are frequent and relatively more intense (1.5 times vs simple recessions). In emerging markets, they occur too little to matter significantly (5% of BC volatility).

In developing and emerging markets, banking &/or sovereign crises frequently associate with currency crises. **Multiple crises episodes drive the bulk of volatility differentials across groups**. These episodes are 5/4 times more frequent in developing/emerging markets and 4.34/2.09 times more intense than in advanced markets.

## Conclusion

Our history is one of financial crises and they matter for economic volatility.

In present chapter, I have taken stock of the key facts on currency, banking and sovereign crises over recent history (1970q1:2020q1) for an unbalanced panel of 54 economies. I combined the database on business cycle phases from chapter 2 with the database on financial crises from chapter 3 to create a new database including 439 BC phases episodes: 198 expansions without crises, 102 recessions without financial crises and 98 recessions with and 41 expansions with one.

I have used the sequencing of the episodes to identify two layers in the taxonomy of episodes: if crises entail troubles on forex markets, *currencicity*, and if crises cumulate upon another, *multiplicity*. These characteristics highlight key differences across countries' recent crises histories. I also study how financial crises relate to the start of recessions. Crises are, broadly, concentrated in a 2-year window centered around the negative growth shock. Yet, when the crises episodes are then studied using the layers from the taxonomy in chapter 2, interesting features appear. Most notably when studying volatility decompositions and differentials.

Economic fluctuations are *per se* more volatile in less advanced markets. They stabilize and repeat more frequently as markets develop. Currency crises are frequent events. They do not generate additional volatility by themselves. In developing markets, they are too rare and mild to matter. On the contrary, banking and sovereign crises, by themselves, contribute significantly to volatility in developing and advanced markets. Out of intensity for the former and frequency for the latter. Their rarity prevents a significant contribution in emerging markets. When crises multiply, they contribute strikingly more in less developed markets (46/30 vs 8.5% in developing/emerging vs advanced markets). Financial crises matter for business cycle volatility because, in less advanced markets, panics often spillover from forex markets through to other markets. When financial crises multiply, intense fluctuations provoke acute losses.

In the final chapter, I rely upon the narrative methodology and sources from chapter 3 to study the shocks and vulnerabilities at the origin of crises episodes. I also discuss the transmission and unfolding of the crises and associated policy management/decisions.





*Regardons [le XXème siècle], mais d'un regard binoculaire: à supposer qu'un oeil de l'esprit ne voit que l'aspect continu, l'autre que l'aspect discontinu, nous avons autant de difficultés à lier ces deux aspects que nous avons de difficultés à comprendre qu'un phénomène microphysique puisse être à la fois onde et corpuscule.*

[...]

*Le passé prend son sens à partir du regard postérieur qui lui donne le sens de l'histoire. [...] Il y a fragilités dans le savoir historique le plus assuré. Celui-ci, comme tout savoir scientifique, est, en dépit de ses corrections et vérifications, sans cesse remis en question sous l'effet de documents nouveaux, ou, plus encore, du nouveau regard sur les documents anciens.*

[...]

*La réalité sociale est multidimensionnelle ; elle comporte des facteurs démographiques, économiques, techniques, politiques, idéologiques... Il y a rotation de la dominante. [...]*  
*Tout ce qui est évolutif est polycasual.*

[...]

*Chaque crise nécessite l'étude concrète de sa complexité propre. [...]*  
*Chaque crise est non seulement l'ensemble de [ses] composantes, mais aussi leurs interactions, leurs combinaisons, le jeu à la fois complémentaire, concurrent et antagoniste de ces processus et phénomènes, c'est-à-dire, leur dialectisation.*

*Sur la crise, EDGAR MORIN (2020)*



## Chapter 5

# Elements of causality

In the first four chapters of this dissertation, I have taken stock of a large set of (i) hindsights from the literature and (ii) stylized facts and observations on economic and financial crises. Three main results catch the eye:

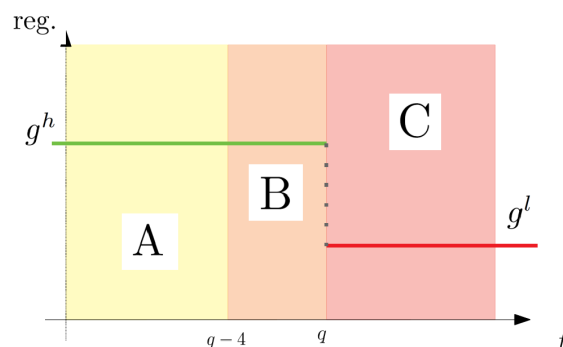
1. Higher macroeconomic volatility in less developed markets is explained, not by more frequent growth reversals, but by increased volatility during recessions.
2. Currency crises are the most frequent type of crises. They play a critical role in less advanced markets.
3. Multiple financial crises are very frequent in emerging and developing markets, where they are always associated with severe recessions. They drive half (a third) of business cycle volatility in developing (emerging) markets against a sixth in advanced markets.

These results are very informative in the sense they make for an undeniable case in associating crisis episodes to hectic and volatile growth patterns in less advanced markets. In particular they shed light upon two elements to explore more thoroughly: the role of currency crises and the bursting of multiple crises episodes.

Yet, they do not provide sizable information on what lies at the roots of these episodes. In particular, the database, as it is, only allows to use information on the sequencing of the economic and financial shocks to gauge causal links. This is but a naive inference as these shocks do not make for a comprehensive/detailed approach of the determinants of crises: temporality is not causality.

### A pedestrian approach to causality

As a pedestrian approach to causal links between negative growth shocks and financial crises, it can be useful to compare conditional and unconditional probabilities of observing a given event (in the spirit of Cerra and Saxena (2008), Kaminsky and Reinhart (1999)). For example, for a financial crisis, it might be interesting to consider whether the additional information of having observed a switch before increases the probability of observing a crisis. If this is the case and the probability increases by  $X\%$ , then we can assume that this magnitude is an upper bound for the causal effect of regime switches on financial crisis occurrence. Similarly we can capture a naive estimate of the causal effect of financial crises on regime switches. The rationale can be better understood with figure 5.1. The basic idea of this decomposition is the fact that crises that occur in period B, and which are closer to the exogenous growth reversal but predate it, are more likely to be financial crises driving the economic situation.



**Figure 5.1:** A classification of financial crises using discontinuities

Define  $q$  the quarter when the country enters the low-regime, I define crises of type:

- A; if the financial crises starts in a high regime growth, and precedes the regime switch by 4 quarters or left.
- B; if the financial crises starts in a high regime growth, and precedes the switch by more than 4 quarters.
- C; if the financial crises starts in a low regime growth.

For episodes C, financial shocks hit the country at the same time as growth shocks, it is thus harder to disentangle the two if the crisis occurs in the quarters after the recession. Nevertheless episodes C can approximate the measure of growth shocks that are followed by financial shocks. Finally, episodes A are financial shocks, unexpected and unexplained but that are not associated with recessions.

Table 5.1 provides for the three country groups (1) the unconditional probability of facing a financial crisis  $P(fin.crs)$ ; (2) the probability of facing a financial crisis conditional on having entered a recession beforehand  $P(fin.crs|econ.crs)$ ; (3) the unconditional probability of facing an economic crisis  $P(econ.crs)$ ; (4) the probability of facing an economic crisis conditional on having faced a financial crisis in the previous year  $P(econ.crs|fin.crs)$ . Annex U details the computation of the probabilities.

**Table 5.1:** (Un)conditional probabilities of facing financial and economic crises

country group	P(fin.crs)	P(fin.crs   econ.crs)	P(econ.crs)	P(econ.crs   fin.crs)
Developing Markets	16.5	52.9	<b>2.9</b>	<b>26.8</b>
Emerging Markets	12.2	62.3	3.3	14.9
Advanced Markets	7.8	50.5	2.8	15.2

The table presents for the three country groups the probability of observing a crisis (*economic* or *financial*), conditional (or not) on having observed the other type of event beforehand.

For emerging (advanced) markets, the probability of facing a financial crisis increases 5.1 (6.5) times after a regime switch, from 12.2 to 62.3%, ie +50% (from 7.8 to 50.5%, ie + 43%). Similarly, the probability of entering a low growth regime increases 4.5 (5.4) times after a financial crisis: from 3.3 to 14.9, ie +11.6% (from 2.8 to 15.2, ie +12.4%). For developing markets the pattern is different. Financial crises are 3.2 times more likely after growth switches whereas recessions are 9.2 times more likely after financial crises.

#### A pedestrian approach to causality

- Whatever the country group, once a recession hits, a financial crisis is a toss of a coin away (62, 53 and 51% for emerging, developing and advanced markets).
- Developing markets are more likely to see financial crises degenerate into economic recessions than emerging and advanced counterparts.

These probabilities also offer a pedestrian look at self-fulfilling probabilities. Consider a naive agent looking at future premises with this information set. Faced by an uncertain economic and financial environment, he evaluates the probabilities for growth outcomes to be bad (3% in developing markets). He knows that this increases the probability of a financial crisis by 36%. Should he expect a financial crisis, this would increase of facing a negative growth shock by 24%. Overall, expecting negative outcomes reinforces (self-fulfilling) negative realizations by 8.7% ( $0.36 \cdot 0.24$ ). For emerging and advanced markets, the figure is lower with 4.7 and 5.3% respective self-fulfilling increases.

The pedestrian approach confirms there is a causal link between financial and growth shocks, more peculiarly so in developing markets. As chapter 4 highlighted, there is interesting heterogeneity to uncover when looking at crisis episodes along the lines of multiplicity.

### A naive inference and the case of multiple crises

As a reminder and before moving with a more in-depth study of the origins of crises, I now briefly showcase the database's sequencing of economic and financial shocks in crisis episodes (single vs multiple). Table 5.2 presents the number episodes associated with financial crises by multiplicity and type: (A) financial crises occur during expansions, (B) financial crises are associated with recession and at least one predates the growth reversal and (C) financial crises are associated and occur during recession.

**Table 5.2:** Crisis episodes, by multiplicity and location of financial crises vis a vis closest regime switch

FCBC typo	A			B			C		
country group	EM	DM	AM	EM	DM	AM	EM	DM	AM
<b>Single financial crises</b>									
<b>currency</b>	4	2	20	4	1	10	7	3	13
<b>banking</b>	4	1	1	0	1	2	1	0	10
<b>sovereign</b>	0	3	1	0	2	1	0	1	0
<b>Multiple financial crises</b>									
<b>currency &amp; banking</b>	1	1	0	2	3	3	1	2	2
<b>currency &amp; sovereign</b>	0	0	0	0	1	0	5	4	2
<b>banking &amp; sovereign</b>	0	0	0	0	0	2	0	0	1
<b>triple crises</b>	0	0	0	1	3	0	4	5	1

The first striking difference is that of column A considering single and multiple crises (overall 36 single vs 2 multiple). To no surprise now, multiple crises are associated with recessions. Overall, for the majority of multiple crises (10/13 in EM, 11/19 in DM and 6/11 in AM), all financial problems start while in the recession (C).

When looking at episodes for which at least a crisis predates the entry into recession (B), an interesting observation can be taken for multiple episodes. In advanced markets, 4 out of 5 cases display a banking crisis before the recession and the last case has both the currency and the banking crisis predating the growth shock. In emerging and developing markets, there is no clear pattern among banking and currency crises as to which predates recessions more often. Looking in detail at the narrative evidence on double currency and banking crises (combining

my database with elements from Laeven and Valencia (2020)), it is striking to note that these episodes are often characterized by self-fulfilling mechanisms: The Czech banking crisis in 1996 follows the revelation of fraud and the failure of a small bank that lead to runs at other smaller banks. In Bulgaria 1996, bad loans and troubled illiquid banks lead to the CB refinancing two weaker institutions. Overall, CB's policy decisions lead to wide runs on banks and the currency. In the Philippines 1998, as banks had been largely borrowing internationally over the past 2 years, they were heavily subject to market sentiment. The deterioration of economic prospects and conditions lead to a run on the currency. The Spanish crises that started end-1977 were the results of "widespread expectations of sizable exchange rate depreciations" (IMF (1979) *Spain: Article IV consultation – Staff Report*). The last event in advanced markets is associated with the UK during the GFC. Note that the twin banking and sovereign crises that start before the recession in advanced markets are also related to the GFC and its unfoldings. What this rapid overview highlights is the fact that in many cases when a banking or currency crisis predate a recession they display self-fulfilling characteristics (a wide role for expectations, fears and herding behaviors).

Finally, the table showcases one last interesting fact: in emerging markets, there are fewer occurrences of crises predating regime switches (4 single currency crises, 2 banking + 1 currency in double crises episodes).

### Moving forward

With these main facts from the database in mind, this chapter aims at providing more adapted information on the causes that hide behind them. I pave the road to bridging this gap along three main questions:

#### Research Questions: On the origins of crises

- What shocks and vulnerabilities can be found at the origin of multiple crises episodes?

To answer this question, I rely upon the narrative methodology I developed in chapter 3. Section 5.1 presents how narrative contributions and IMF archives can help identify the shocks and vulnerabilities behind crises episodes. The section also presents the conceptual framework used to lead the narrations. Section 5.2 presents in detail the case of Argentina as well as some insights from the narrations on key factors behind multiple crises.

## 5.1 A narrative approach to the origins of crisis episodes

In the forthcoming two sections, I use IMF archives and insights from the literature to identify, episode wise, the main triggers and vulnerabilities that gave rise to the sequence of economic and financial crises. Section 5.1.1 presents the main concepts I rely upon to discuss and define



episodes of crises. Section 5.1.2 discusses the source I use and how my conceptual framework relate to its methodology. Section 5.1.3 details the sample considered, the questions to the narrative sources and the methodology and output.

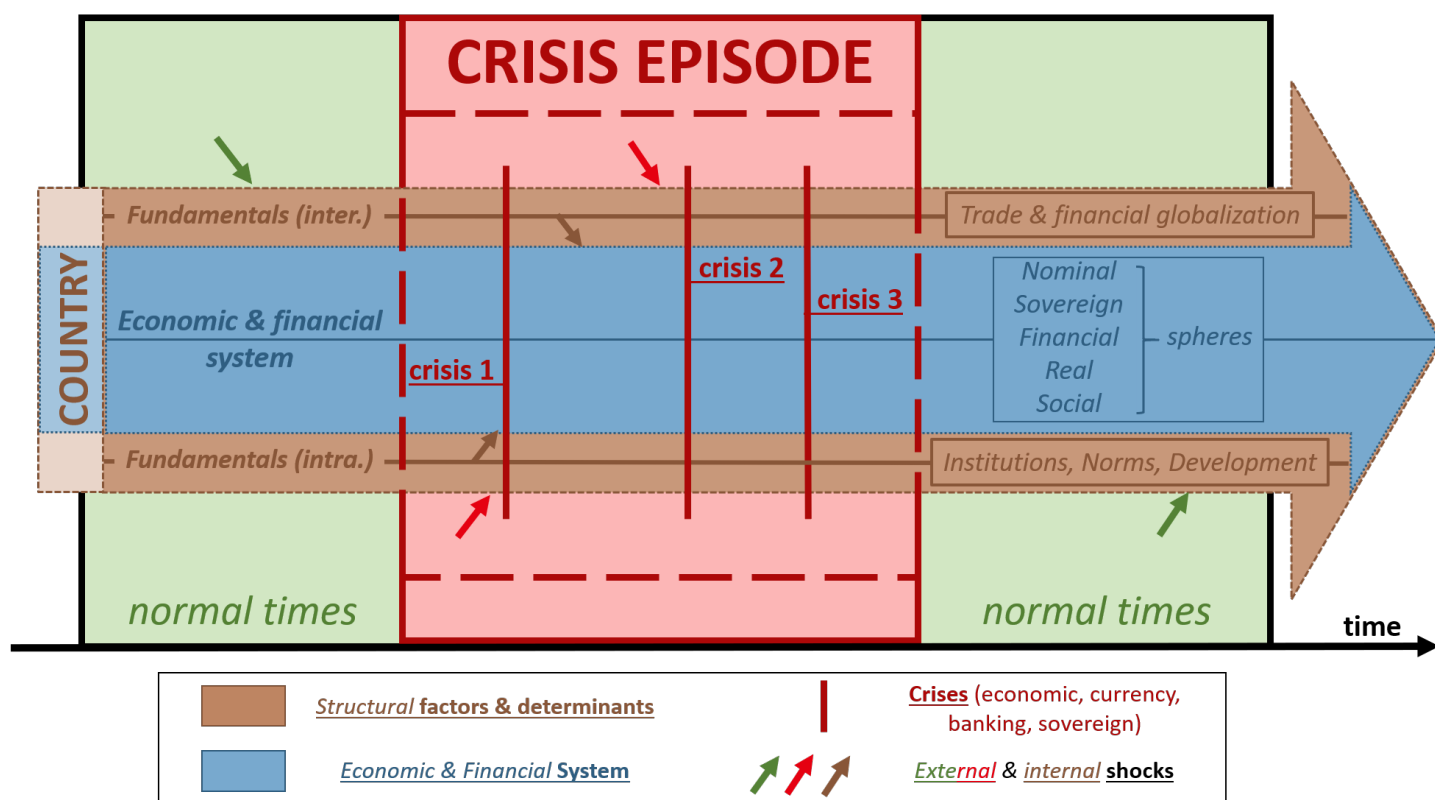
### 5.1.1 A conceptual narrative of a crisis

Figure 5.2 illustrates the conceptual framework I use to discuss crises in this chapter.

In time, a country is characterized by a set of structural/fundamental characteristics that define its limits, place and exposure to the rest of the world. In itself, the country can be represented as a set of interrelated (simplifying) spheres – nominal, sovereign, financial, real, socio-political – that cover most of the activity that make the system adapt and evolve.

**Figure 5.2:** Crises episodes: a first look

The schematic identifies a crisis episode in time (x axis). It represents how a changing economic and financial system (blue), shaped by internal and external fundamentals (brown) is exposed to shocks (red/external and darker brown/internal). At times, financial and economic crises signal (red bars).



**Crises** are episodes in time during which the system is brought to the edge of collapse by unforeseen conditions. Crises are times of heightened uncertainty and speculation about potential futures. During crises, initial shocks magnify as they spill over the economic and financial system. The perturbations come to pressurize existing vulnerabilities and inconsistencies. Hence, crises often constrain agents' policy space and are the source of drastic decisions and policy

reactions.

#### SHOCKS AND PERTURBATIONS:

Crisis episodes often start because **perturbations** disrupt the economic and financial environment of some agents. These **shocks** are unexpected events or experiences that entail an abrupt update of agent's information set. These shocks are diverse and conditional on the point of view that is considered. For agents in a country, this can take the form of internal shocks – such as a surprised policy announcement (monetary/fiscal shock), a sudden news of wide-coverage corruption or the falsification of important data – or external – such as a natural disaster, a fall in external demand from an important trade partner or exogenous changes on world financial markets. Shocks often form the first triggers to agents taking new actions and decisions. Countries and agents are subject to shocks and perturbations all the time (there is little room for certainty in an interconnected system). Shocks in crisis episodes are often either of a very large magnitude or able to affect a broad coverage of agents. As such they always entail a sudden and important change in the information available to agents when forming decisions.

#### VULNERABILITIES AND FRICTIONS:

How an economic and financial system is affected by a shock depends on its fundamentals. As countries developed through history, they defined<sup>1</sup> the rules that would organize their structure and how agents interact for different purposes: (i) internally – political and legal institutions; norms and considerations on redistribution and property rights; infrastructures and demographics etc and (ii) externally – trade development and dependency; financial markets development and interconnectedness; trade/financial liberalization and globalization. Each interaction involving one or several domestic agent is asymmetric in essence: some will hold more information or power and objectives might differ and contradict among participants. Over time, these asymmetries might have resorbed, been (partially) corrected or, on the contrary, might have accumulated into: (i) structural **frictions** – market specificities that prevent an interaction to be optimal given agents' objectives and (ii) **vulnerabilities** – fundamental weaknesses that increase the exposure of agents to uncertainties and decrease their ability to manage associated risks. In normal times, these vulnerabilities and frictions are counteracted by feedback/stabilizing mechanisms that ensure the whole system functions. During crisis episodes, shocks and perturbations pressurize existing vulnerabilities and amplify the constraints that frictions impose on specific agents. Shocks, even if small, can have broad and devastating effects if they interact well enough with underlying weaknesses.

#### TRANSMISSION AND POLICY CHANGES:

Overall, the combination of shocks and vulnerabilities forces agents to adapt their policy decisions, which then affects other agents involved on associated markets. Because shocks en-

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<sup>1</sup>actively or passively

tail a new wave of (un)evenly distributed information, this also blurs what could have been expected of others' actions, which creates uncertainty. These perturbations are **transmitted** through markets and agents to the whole system, they might be amplified through new vulnerabilities/shocks. During crisis episodes, there comes a time when the cumulated effects (threaten to) block the system from functioning. National authorities are forced to intervene and adapt their policy course, be it sustainable in itself or inconsistent and part of the problem. Policy action is meant to counteract the negative effects and coordinate agents' expectations on a new course, away from the vicious cycle of crises transmission. An intervention has a direct impact on the targeted market – because it affects demand/supply/price setting/etc. An intervention can have spillover effects as participants affected by the policy action update their choices on other relevant markets. Finally an intervention can have an effect because it provides additional (new) information on the views and objectives of the national authorities.

A policy intervention is in no way a synonym of crisis resolution. In practice, the measures can have detrimental effects on other markets. An ill-devised policy could end up missing target or constrain other agents – for example, if corruption or fraud captures an inflow of liquidity, if it is reinvested in speculative activities or for example when liberalization and austerity policies came at the expense of past accumulated social gains in Greece or, in Argentina, at the expense of the fight against poverty and inequality. The signal might also fail to coordinate agents – if the authority has little credibility/a history of misconduct. In itself, the intervention can also create more uncertainty if it signals an undesired mandate reorientation – e.g. if a government increases public spending backed by an increase in printed money. As such policy interventions (and announcements) can act both (i) as triggers for the resolution of a crisis and the definition of a new equilibrium or (ii) as a determinant transmission mechanism of the overall crisis. Two determinant aspects to take into account when discussing the role of policy action in the unfolding of a crisis episode are (1) the policy space of the authority concerned and (2) the type and scope of the measure introduced at the time of announcement (conventional/unconventional). The policy space characterizes how the fundamentals of the system shape the ability of authorities to act – if there is a deficit/inflation target for example – and how the current state of the system allows adjustment. The type and scope of intervention help agents identify how the authorities position themselves vis-à-vis ongoing announced/organic mandate.

Next subsection details the source and the methodology used by the authors of the source I use. I discuss how it relates to my conceptual framework.

### 5.1.2 Source and building blocks of the economic and financial systems

For my narrative contribution, I rely upon the same source as in chapter 3, section 3.3.3: IMF's article IV publications and staff reports, country reports (Recent Economic Developments), program associated reports (stand-by arrangement requests and reviews) and the IMF's In-

dependent Evaluation Office's reports. Hence I do not repeat the main information on these documents that has already been provided (go-to-guide: a. source – i:iv.). Yet, my previous presentation of the article IV country reports was oriented towards factors and developments related to currency crises. I now complete my presentation of the conceptual principles underlying IMF publications to adapt the focus to current chapter's objectives. I also discuss potential biases that might be more relevant to the current research question.

Today, when writing country reports, the IMF staff relies upon the overall risk evaluation architecture provided by the institution's publications: global and topical cross country coverages (*World Economic Outlook*, *Regional Economic Outlook*, *Global Financial Stability Report*, *Fiscal Monitor*), article IV's reference methodology (Country and Global *Risk Assessment Matrices*), and specific topical risk assessments (*Financial Sector Assessment Program*, *External Sector Report*). This infrastructure allows the authors of my sources to identify the main developments and topics of interest for the countries they cover at the time of writing. This infrastructure moreover ensures that the considerations are consistent across countries. The documents that make the previous list were introduced over time. This doesn't mean that the infrastructure lacked these elements and considerations before that. The IMF adapted its portfolio of publications and communications to clarify its position and help stimulate debates on policy practices. (Ahuja et al., 2017) details the main sectors of considerations for country evaluations: external/contagion, public/fiscal, financial/asset prices, real/macro sectors. The IMF risk assessment methodology is the result of an evolutionary conceptualization. For example financial elements and considerations on asset prices are but recent additions. These 'new' elements were often introduced after significant economic and financial troubles in member economies. Former editions discussed and analyzed economic and financial developments comprehensively but spent less ink on those elements when not at the very center of the action.

Annex V presents the table of contents for article IV consultations and Recent Economic Development staff reports as illustration for the coverage of the documents and the evolution through time. Of particular interest, the main trends are towards including more narrative elements (description and analysis of events as in the Recent Economic Developments' series) in the article IV consultations. Moreover, as time passed, the documents have discussed banking and financial considerations with greater emphasis. I extract from the table of contents the main topics that are being discussed. I identify broad {1} categories of fundamentals: (a) internal, e.g. "*Structural reforms*", "*Institutional and legal structures*", "*statistical issues*" and (b) external, for example "*trade relations*"; and {2} categories of topic/areas of interest: (a) nominal developments – e.g. "*monetary policy*", "*exchange rate policy*" – (b) sovereign developments – e.g. "*fiscal policy*", "*government finance*", "*external debt and claims*" – (c) financial developments – e.g. "*financial sector reforms*", "*financial and corporate sector issues*", "*capital market*", "*capital account*" – (d) real developments – "*domestic economic development*",

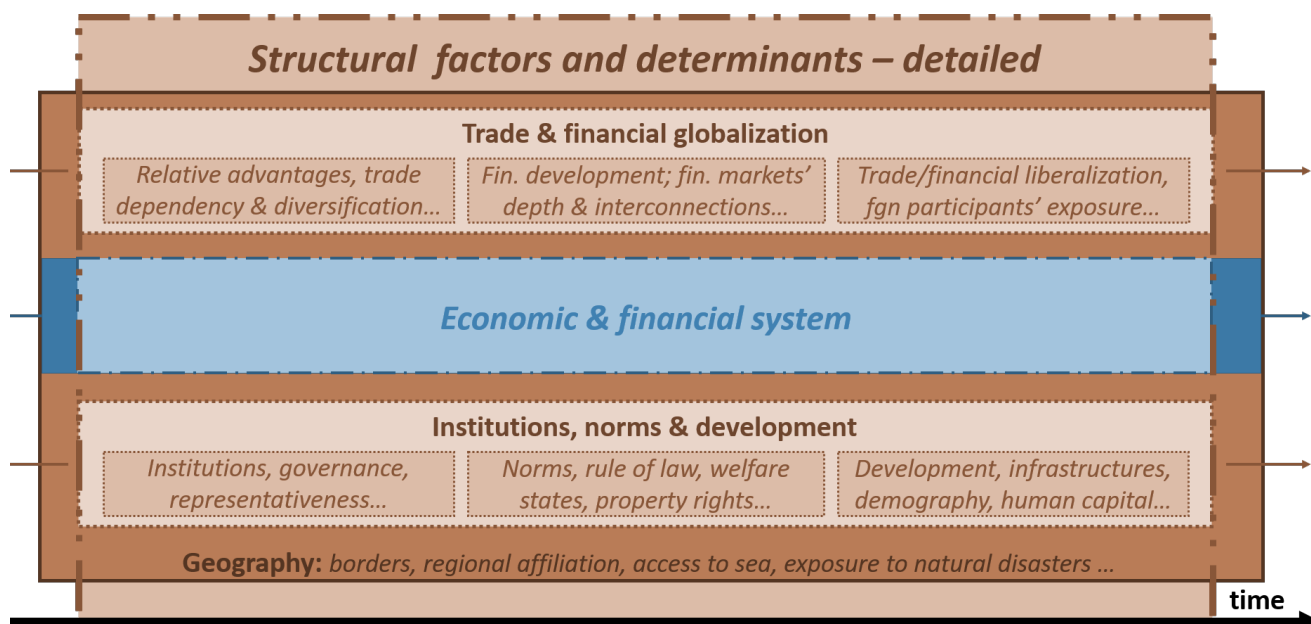
"macroeconomic developments", "production, employment situation, wages", "current account" – (e) socio-political developments – e.g. *social unrest, poverty issues, elections*.

To lead my narrations and study consistently the variety of countries and cases using my conceptual framework, I combine the main elements from their methodology and the literature to identify the main categories of factors playing a role in crises. The next two figures continue conceptualizing my approach.

**STRUCTURAL FACTORS AND DETERMINANTS:**

Figure 5.3 summarizes the main factors that define the structure within which the economic and financial system evolve. They too change over time, even if usually at lower frequencies than previously discussed business cycle patterns. I identify the main categories of elements, from the literature, that can justify spikes in growth (and financial) volatility and contribute to crisis episodes. From the point of view of my narrations, structural factors and determinants matter because they identify a first layer of vulnerabilities and shocks behind crises. In particular, fundamentals might determine the magnitude and the coverage of the impact of a shock. The following list details associated factors and provides examples of shocks and vulnerabilities (in the figure from the bottom upwards).

**Figure 5.3:** Fundamentals and structural determinants: a basic taxonomy



- A. **Geography and 'exogenous' characteristics:** The first element that defines a country is its geographic boundaries and the distribution of land by type (mountains, access to sea, plains etc.). Usually exogenous through time, the recent *unilateral* annexation of Crimea by the Russian Federation reminds how little things remain constant through time. Beyond these dramatic and rare extremes, geography matters as the environment is a non-negligible and growing source of shocks. At the level of humanity, these shocks are now sadly endogenous to man-driven climate change. At the level of a country, these shocks are often exogenous as they remain unexpected, even the man-made natural disasters (Mauritius, this summer 2020 acts as another reminder). Given a country's localization, it might be more exposed to disasters of variable sizes (tyoons, tsunamis, earthquakes, droughts etc.). These shocks are a key element to consider when analysing the build-up and unfolding of crises. Another key related feature is the fact that countries are endowed with rare and prized natural resources, which, as identified before, makes countries more exposed to currency and sovereign crises.
- B. **Internal Factors:** Institutions, norms and structural features make for the underlying architecture that supports the whole system. They define how the system's spheres organise among themselves, their boundaries and how they develop through time. They set the grounds upon which agents interact and groups of power allocate resources. These factors also define the information that is available to agents and how it should be available. Given that, theoretically, the transmission of crises comes first and foremost through information flows and shocks, for my crisis episodes this is crucial. I identify three main categories to analyze potential shocks and vulnerabilities for crises.
- *Institutions* engulf all developments that are related to the legal settings that bind agents' actions. I identify several sub-layers, among which: *political regime, governance and representativeness* – a shock could be, for example, a coup d'état or the regular conduct of democratic elections – ; *bureaucratie, corruption and quality of information* – for example an overcomplicated multilayered tax collection system that complicates fiscal policy space management, or the revelation of manipulated tax collection data or the safeguards that should prevent an official president in office to cut funding to a major public service provider essential to the proceeding of a true democratic election – ; *Central Bank mandate and objectives* – for example a country's CB organic law or its exchange rate regime, a key vulnerability could stem from accumulated discredibility that endangers a CB's effectiveness in achieving objectives etc...
  - *Norms* define the values that govern and coordinate the behavior of the majority of domestic agents. It can be set in fundamental texts or be social constructs inherited from centuries of exposure to a dominant paradigm. Fundamental rights often discuss topics from *social organization to property rights* – in times of crises, when capital might be tempted to flow a country, a government might renege on the rights of, say,

foreign investors to protect capital still present in the country. As societies develop economically and socially in an unequal manner, considerations on redistribution and welfare state characteristics prove determinant in conceiving crises – for example this defines part of the objectives of a benevolent government. In some cases, poverty prevents a country from building a resilient productive base, hence hampering any sustainable recovery and setting the stage for future crisis episodes – Argentina is but a painful illustration of this kind of vicious cycle. A value that can be of importance in times of uncertainty, such as crisis episodes, is the *freedom of press*. More globally the possibility for a system to enable *enlightened access to information*, *democratic representation of heterogenous views* and discourses ...

- In the last category, I aggregate other fundamental characteristics shaping growth and agents considerations around two main lines: *demographic and structural developments*. The first sublayer engulfs several demographic factors that can prove important in transmitting crises, for example a country with a young population might be more prone to lead current account deficits, a large active workers base makes for a wider tax base etc. The second sub layer coins all topics that are the object of structural reforms. For example these include infrastructures (roads etc.) ; the economic structure of an economy (structural change) ; the education system and how the youth is educated, trained and informed ; healthcare and hospitals etc.

C. **External Factors: trade and financial development, liberalization and globalization** define how the system considered interacts with other foreign systems. Trade and finance are the main two channels through which a country is exposed to foreign perturbations and opportunities. I aggregate fundamentals around three main lines, the development and characteristics of each attribute, and the degree to which they are liberalized and integrated into the international system.

- Among the main *trade related factors* of interest for crises, relative advantages and a country's dependency on trade will amplify the exposition of an economic system to fluctuations in world demand and prices and potentially affect greatly a country. The less an economy's trade portfolio is diversified, the more it is vulnerable to the predominant good/service produced. For example, countries that relied predominantly upon tourism are currently, due to the Covid 19 pandemic, particularly stressed, but history displays several episodes during which this costed a lot to economic systems – for example Jamaica in 2009. If a country is highly dependent on imported energy this can also act as a key fragility, for example Greece in 1985.
- As already discussed intensively in chapters 2 and 3, the *development of financial markets* is a key area to look after. In particular, several factors prove key to the triggering and unfolding of crisis episodes: the diversity of financial markets and the possibility for market participants to access a diversified portfolio of assets and better insure against underlying ; the depth of financial and the turnover that characterize

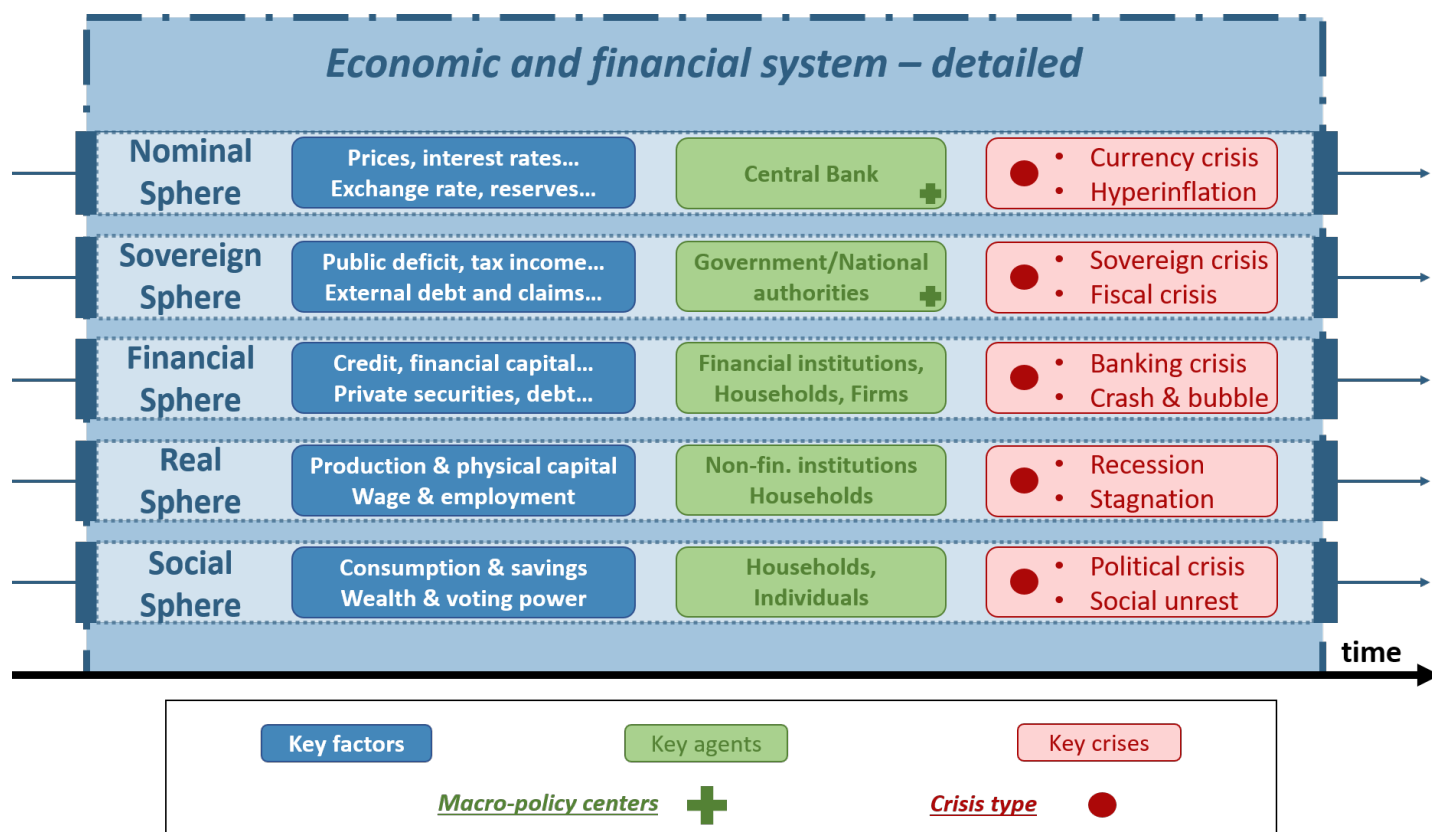
how efficient market participants absorb and price fluctuations in liquidity ; the higher the interconnectedness of markets the more crises and pressures can diffuse in a financial system ...

- Finally, conditional on trade and financial developments, the intensity of a country’s exposure to foreign perturbations is driven by its advancement in the *liberalization and globalization processes*. In particular, the share of foreign participants allowed on domestic markets or reversely the regulations within which domestic residents are allowed to invest or trade abroad will be both the results of institutional and legal arrangements and the sources of greater flows at times of uncertainty. Financial and trade liberalization also increase the potential for currency mismatches in agents’ balance sheets. A full financial liberalization and openness when domestic markets are too little advanced is often the exposure to predatory movements and a source of deregulation and volatility.

ECONOMIC, FINANCIAL AND SOCIO-POLITICAL SYSTEM:

Figure 5.4 identifies the main blocks that I use to structure the analysis of the development and unfolding of crises. Each block focuses on one key topic: nominal anchors, sovereign and fiscal matters, financial markets and assets, real development (production and employment) and socio-political factors (consumption and wealth).

**Figure 5.4:** Economic and financial system – conceptual framework of analysis





1. the **nominal sphere** discusses all developments and factors that concern the nominal anchors of a country. The nominal sphere comes first in the list as the currency acts as a reference unit and value in all transactions in and out of a given system. The currency is the fundamental element around which agents coordinate expectations and manifest their trust in the economy. Hence, the nominal sphere often concentrates pressures on the system and act as part of the transmission of the crisis. Because of its central place, any shock or policy intervention can have broad and wide-covering impacts, both effectively and on agents' considerations on the current and future environment.
  - *Key topics:* Prices and exchange rates, monetary aggregates and interest rates, money and forex market.
  - *Key agents:* the Central Bank is the main agent that is responsible for the stability of the countries nominal anchors. Its mandate can include price stability and/or exchange rate stability and can include issues on macroeconomic and financial stability (spheres 3 and 4).
  - *Key crises:* Hyperinflation and currency crises.
  
2. the **sovereign sphere** aggregates topics and considerations on the governing authorities of the country. These include all developments on the fiscal side: tax collection and government spending (from and to sphere 4 and 5 mainly). As discussed in chapter 3, governments also participate on domestic and financial markets by issuing debts (sphere 3). Elected or not, the sovereign authority is the one narrating the dominant economic discourse. Hence she acts as a major reference in (dis-)coordinating agents effectively and in expectations. Often the sovereign authority is held accountable for her acts by the population and its, if existing, representative organs (social sphere) or by more or less extreme processes (assassinations, coups, impeachments, elections). The sovereign sphere concentrates all agents' considerations and trust in the stability of the state and the country.
  - *Key topics:* fiscal developments such as tax collection and evasion, government spending and infrastructure/investment policies ; debt developments on domestic and/or foreign currency government securities markets ...
  - *Key agents:* the national authorities that are charged with the provision of public goods and finance themselves with tax collection and government securities.
  - *Key crises:* Fiscal and sovereign crises.
  
3. the **financial sphere** entails all developments that are bound to key financial markets excluding the money, forex and government securities. These include the markets in which financial and non-financial institutions exchange owned and owed assets among bank/-corporate debt/equity, financial derivatives, insurances, housing and mortgages ... The fundamental role of financial markets – enabling agents with different endowments and

preferences to trade assets – makes them fundamental in the functioning of the overall system. In particular, through financial institutions, they allow the allocation of liquidity from savings to investments. Financial markets allow for the distribution of wealth within and across periods and the sphere concentrates agents considerations and trust in the future.

- *Key topics:* Financial institutions' balance sheet developments (inter alia commercial and investment banks), households' financial wealth and liquidities, firms' equities, debt securities, FDI and other capital flows ...
- *Key agents:* Banks and other financial institutions, corporates as supplier of financial assets and consumer of liquidity for investment purposes, households as consumer of investment and placement opportunities.
- *Key crises:* Banking crises, financial crash and bubbles.

4. the **real sphere** entails factors and developments that relate to productive activities. It includes the contributions of non-financial private institutions to aggregate production of goods and services for domestic and foreign consumption. Developments on the labor markets and associated prices form the second main subcategory within the real sphere. This sphere aggregates agents' considerations and (dis-)trust in growth prospects and increasing productivity. At times of crisis, several of the transmission mechanisms behind the unfolding of the unfortunate events take roots in or are diffused by the real sphere.

- *Key topics:* Production of goods and services, physical capital ; (Un)Employment and wages ; trade balance, remittances and other primary income ...
- *Key agents:* Non-financial private institutions, from small to large enterprises, workers and labor unions
- *Key crises:* Stagnations and recessions.

5. the **socio-political sphere** entails considerations and activities by households and individuals, as themselves and as groups in the society. In the present conceptual framework, this layer is the one that includes the highest level of disaggregation possible. Hence, it supports indirectly all the other spheres and covers/affects (indirectly) a wide range of topics. Given the institutional fundamentals of the country, individuals might aggregate as groups to express discontent and differing views and actions with respect to ongoing course of action. Extreme actions might even be taken when significant pressures accumulate and are rightly channeled/not oppressed.

- *Key topics:* Consumption, leisure and saving ; wealth, inequality and redistribution ; education, health, legal rights and safety ; Voting power, activism and self-coordination ...
- *Key agents:* Households, individuals as consumers, voters, groups of interest ...

- *Key crises*: Social unrest and political crises.

I now focus on how, during crises, shocks get transmitted to particular sector of the economy, how they unfold and transmit to other sectors pressuring agents and triggering policy action.

### 5.1.3 Research questions and methodology

The question goal of this chapter is to identify **what lies at the origin of economic and financial crises?** As crises are complex episodes with several interconnections and combining effects, answering that question is difficult. Relying sheerly on hard data prevents a more thorough study of all the determinants that make crises unfold.

What the narrations bring to the table is the ability to get an insider's view on the elements that came into place to trigger financial and economic crises. Because the soft information is produced 'on-the-spot', descriptions and analysis are more likely to reproduce the information as available and conceived by agents. Moreover, textual sources discuss in detail the particular sequencing and interrelations of shocks, vulnerabilities and policies.

#### The schematic of a crisis

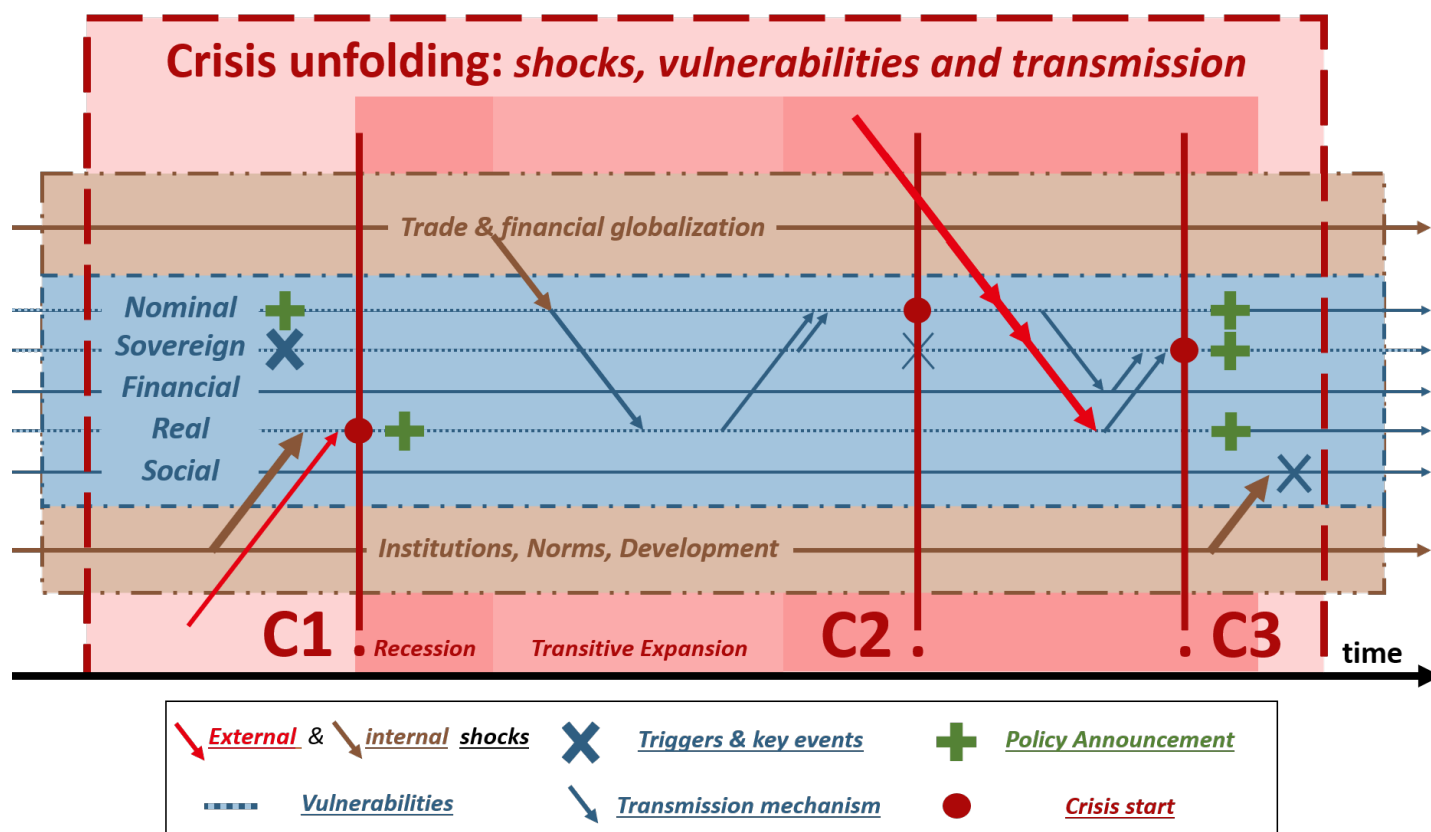
Backed by previously presented conceptual framework, figure 5.5 illustrates my definition of crisis episodes. Doing so, the figure summarizes the key elements that a narration should identify: fundamental vulnerabilities, key shocks and events, agents reactions, transmission of the perturbations and policy changes. Because an example is often the best way into a methodology, I used the Argentinean crisis of 2014 to model 'simplistically' and schematically a crisis episode.

At the beginning of the episode, in 2012, the economy has recovered from the GFC and is growing well (6-8%), but still suffers from several vulnerabilities. After the 2002 default, the country has lost access to world financial markets. National authorities have limited fiscal space and despite a favorable debt dynamics, the government is forced to exploit various means of funding. At the same time, the central bank which had been 'addressing' inflation concerns and exchange rate stability, saw her mandate evolve to include "the pursuit of economic development with social inclusion" (*Key Policy* – green plus). This change, early 2012, enshrined the ongoing inconsistent policy mix and further weakened existing vulnerabilities on the nominal and real side (*vulnerabilities* – dashed blue lines).

Around the crisis start, Argentina suffered from three main shocks/triggers: (i) news were released of inaccurate official statistics (*internal shock* – brown arrow on schematic), (ii) the country was exposed to severe droughts that impaired production and a fall in demand from Brazil (*external shocks* – red arrow) and (iii) foreign investors sued the country for unresolved

claims, the *Vulture Fund episode* that started end 2011 – blue 'cross' event. The first crisis (*crises* – C1 red bar) is a short recession that ensued from the external shocks. Authorities answer the shock with an expansionary policy mix (second green plus) and the economy grows again (transitive expansion in lighter red).

Figure 5.5: Crises' unfolding: a conceptual framework



Present example is a **simplified** version of Argentina 2014: crisis 1. is a 2 quarter recession in 2012q1-2. In 2013q4, the country entered a recession again (not displayed here). In 2014q1 the central bank devalued the currency (currency crisis 2.) and in 2014q3, the country defaulted on a part of the debt held by *Vulture Funds*.

Structural weaknesses (controls on forex transactions) constrain private investment and the real sphere. The pursuit of a stable exchange rate pressurizes further the central bank (second brown arrow), confidence falls and economic performances stall as domestic and external pressures keep rising (*transmission mechanisms* – blue arrow continuing the brown arrow). The inconsistent policy mix forces the central bank at the same time (i) to increase deficit financing, (ii) to increase the money base and (iii) to sell foreign reserves and increase small nominal depreciation adjustments (*transmission mechanisms* – two blue arrows pointing towards the nominal

sphere).

As the tightening of capital controls end 2013 failed to tame depreciatory pressures, the central bank, faced in January 2014 with an unexpected fall in reserves, completely changes policy course (*crises* – C2 red bar): she devalues the peso, raises policy rates and further tighten capital controls. The measure failed to have the expected impact because, over 2014, the country was exposed to a fall in demand from major Chinese and Brazilian trade partners as well as a marked fall in commodity prices (*shocks and triggers* – second large red arrow).

At that point the whole real and social spheres collapsed: key exporting sector collapsed, real income and consumer confidence fell, aggregate demand fell. The increase in policy rates was associated with a rise in nominal wages. Only an increase in public employment managed to contain the fall in the labor force participation. The lack of external funding – ongoing court ruling on the *Vulture Funds* case – became even more stifling for the government as spending kept growing. To minimize the public deficit, the central bank continued financing the government demand crowding out private credit as banks' exposure to the government grew (*transmission mechanisms* – last three (simplified) blue arrows).

Despite a proposal to the Paris Club in January (*key events* – second blue cross, simultaneous to the currency crisis), in June 2014 the US Supreme Court refused to consider Argentina's appeal confirming the end of the grace period on July 31st. At that date, despite having enough available resources, the government refused to repay the *Vulture Funds* and defaulted (*crises* – C3, third red bar). Following the default in the summer, Balance-of-Payments pressures cumulated, uncertainty rose (as a rough proxy, the gap between the official and parallel exchange rates widened), confidence fell sharply in September.

As the economy started recovering during the last quarter of 2014, several measures were implemented to boost the recovery, ensure access to liquidity and the build up of reserves. Nevertheless, despite a good appeal to the population for denying repayments, the government faced intense critics for its crisis mismanagement, the shadow of manipulated data hiding not far away. Over the year, scandals and revelations of corruption shook the social sphere and voters as the next election neared (*Shocks and events* – last brown arrow and last blue cross).

### **Sample, questions and output**

Based on the previous framework, the figure and narrated example provide a glimpse at how I match the key concepts I defined: vulnerabilities, shocks, events, crises, policy reactions and transmission mechanisms. To bounce back on my go-to-guide (chapter 3), I now present the initial sub-sample for the study, the sub-questions and the output methodology.

## INITIAL SAMPLE FOR CONSIDERATION:

Given the undeniable importance of multiple crises identified in chapter 4, I first concentrate on this set of episodes to lead my narrative study. At the date of completion of the dissertation, I could not cover all cases and completing the database remains work in progress. In particular, I focused extensively on the history of Argentina. Annex W presents a subsample of crisis episodes with similar narrative evidence that are ongoing treatment. The next step includes extending the study of shocks and vulnerabilities for all multiple crises episodes<sup>2</sup>.

## QUESTIONS TO KEEP IN MIND WHEN READING:

As the previous Argentinean example, if a crisis can only be understood as a global and complex episode, the key information can be organized around three main lines of questions identified in the following box.

**Methodology – Questions towards the narrative sources**

- **In what context did crises take root? Were there salient existing vulnerabilities, pressures, uncertainties or inconsistencies?**
  - Did institutions, norms or globalization advancement entail structural vulnerabilities exposing the economy to internal or external perturbations?
  - On the run-up to the first crisis, which spheres of the system are under pressure and why?
  - Are there any existing policy inconsistencies? Are there any existing sources of uncertainty?
  
- **What are the key shocks and triggers behind all crises? Overall, were there any key events that helped shake the system beyond the point of rupture?**
  - Were there any external shocks – natural disasters, t-o-t shocks, pandemic, foreign interest rate shock ... – that affected the country throughout the window considered?
  - Were there any internal shocks – wars, social unrest, scandals, strikes ... – that affected the country throughout the window considered?
  - Are there key events, surprised policy announcements etc. that significantly updated agents' information set?

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<sup>2</sup>To speed up production, my future treatment of the remaining crises entails focusing first on identifying and listing shocks and vulnerabilities in quotes. Detailing narratively the transmission mechanisms and the role of policy interventions can be discussed in a second step.

- **How do perturbations diffuse through the economy? What is the role of policy intervention in transmitting/resolving the crisis?**
  - Which constrained agents do shocks and perturbations affect at first? Through which mechanisms do the perturbations spill over to the other spheres?
  - Are structural factors (frictions) responsible for a magnification of the shocks? What made perturbations amplify?
  - What are the major relevant policy interventions by national authorities? Did they succeed and why? Were there any negative feedbacks effects?
- **How do economic and financial crises relate?** *(this last line of questions is the one I use to analyze previous information to summarize the episode)*
  - Are they the results of common shocks and vulnerabilities?
  - Are there key inconsistency/regularities?
  - Was there a role for expectations and confidence in driving the crisis?

#### METHODOLOGY AND OUTPUT:

By now, the elements to record from the narrative sources that the methodology should record are conspicuous: context and vulnerabilities, shocks and triggers ; transmission, frictions and policy reactions. The box below provides a template of how the key information is recorded.

Each crisis is described in four steps: (A) a summary of the episode detailing crises start dates, business cycles dates. The summary provides a list of shocks and vulnerabilities at the origin of the crisis and a short summary of the event. (B) a narration of the crisis detailing the context, vulnerabilities and key shocks and triggers using quotes and references as well as the unfolding, transmission and policy management of the crisis. (C) a list of the main sources.

#### Methodology - Template for narrative contributions

Country – Year:

(A) Crisis iD

- Crisis type (economic &/or currency &/or banking &/or sovereign): dates and key fact.
- Business cycle turning points as derived from chapter 2.
- Origins of the crisis
- In a nutshell

- List of key triggers and events
- List of structural vulnerabilities and policy inconsistencies

(B) Narration

- Context and vulnerabilities
- Triggers: key news, shocks and decisions
- Unfolding and crisis management

(C) Main sources

This dissertation aims at laying the ground for my future research projects. A key input of my narrative contribution would be to code the list of shocks and vulnerabilities by episode, and at a later stage code the narrative description of the sequencing/transmission of the crisis using the layers from the conceptual framework (fundamentals, spheres ...).

*"Any evaluation necessarily benefits from hindsight. While hindsight can be useful in drawing lessons for the future, in evaluating the past, and especially in determining accountability, it must be kept in mind that much of what we know now may not have been known to those who had to make the relevant decisions."*

## 5.2 A case study and some regularities

Having discussed extensively my approach, I now move onto the results. As previously stated, I focus principally on the Argentinean history. Argentina sadly offers a broad coverage of potential crises-related shocks, vulnerabilities, frictions, policy reactions, transmission mechanisms etc. Annex 5.4 at the end of present chapter aggregates narrative elements on the 5 Argentine crisis episodes in the database. Next subsection offers a short summary of the Argentine crises and is followed by a discussion of key shocks and vulnerabilities.

The consistency of cross country comparisons and external validity are structural concerns when using a narrative approach<sup>3</sup>. Given my current country coverage, I cannot yet provide detailed and quoted descriptions of salient patterns and culprits. As I still got to read numerous country reports, I conclude the chapter on the key patterns and factors that deserve a place at the table and in my direct future research agenda.

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<sup>3</sup>I am sorry if a senior reader found most of my previous 'conceptual' discussion as adding, per se, little contribution to the literature. Part of my motivation lied with ensuring a clean enough conceptual framework to discuss the many different cases consistently. Writing these lines surely came at the cost of more cases treated but are also a side contribution of the number of pages I ended up reading. At least, I hope these elements could perhaps prove an interesting contribution for more junior economists and researchers.

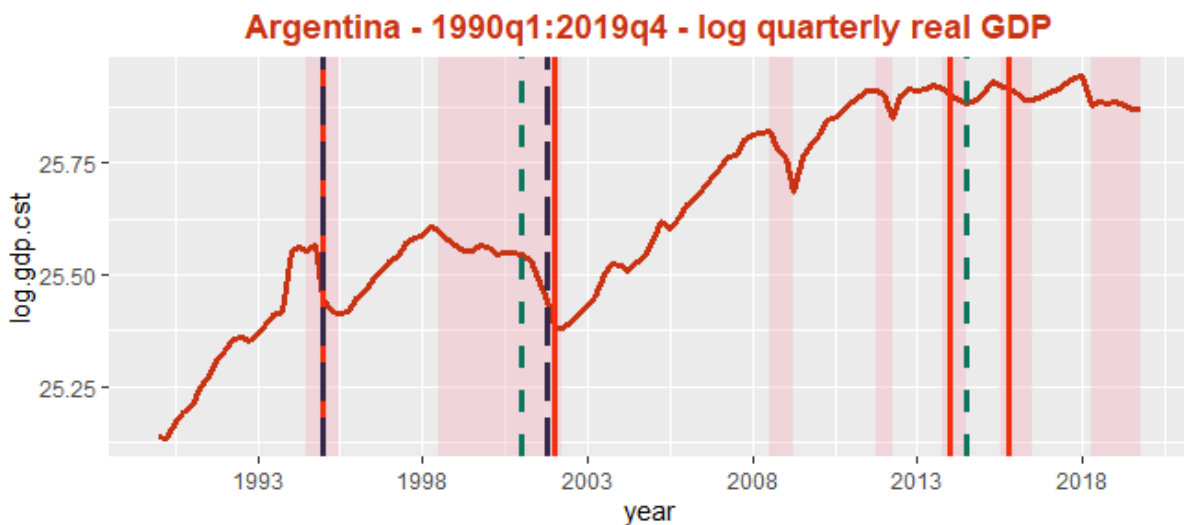


### 5.2.1 A brief history of Argentina: Crises or crisis?

#### GENERAL INFORMATION

As a guide through the narration, figure 5.6 illustrates the log of real GDP for Argentina inbetween 1990q1 and 2019q4. Markkov-switching dated recessions are indicated by shaded areas and crises by vertical bars (in red for currency crises, dark blue for banking crises and gray for sovereign crises). Table 5.3 lists business cycle turning points and financial crises' start quarters.

**Figure 5.6:** Argentina – log real GDP, recessions and financial crises



**Table 5.3:** Business cycles and financial crises dates

Dates Episode	Business Cycle dates		Financial crises start date		
	Start	End	Currency	Banking	Sovereign
Expansion	1990q1	1994q2	.	.	.
Recession	1994q3	1995q3	1995q1	1995q1	.
Expansion	1995q4	1998q2	.	.	.
Recession	1998q3	2002q2	2002q1	2001q4	2001q1
Expansion	2002q3	2008q2	.	.	.
Recession	2008q3	2009q2	.	.	.
Expansion	2009q3	2011q3	.	.	.
Recession	2011q4	2012q2	.	.	.
Expansion	2012q3	2013q3	.	.	.
Recession	2013q4	2014q3	2014q1	.	2014q3
Expansion	2014q4	2015q2	.	.	.
Recession	2015q3	2016q3	2015q4	.	.
Expansion	2016q4	2018q1	.	.	.
Recession	2018q2	2019q4	2018q2	.	2018q2

Business cycle turning points are derived from Markov switching estimations.

## NARRATION

Argentina forms a compelling case. Since the 80's, the country has endured a wide variety of crises: hyperinflation, currency, banking or sovereign crisis. Crises have hit the country every 5 to 10 years, often multiplying upon another. Looking at history, the unfolding of each crisis proves key to understanding the following one. Policy choices and measures implemented to tackle initial vulnerabilities often either failed to stick in time or undermined other sectors and spheres of the economic and financial system. In the years following a crisis, these policy-limitations combined with other underlying vulnerabilities. When faced with unexpected developments, these new weaknesses often proved key in precipitating Argentina in the next crisis.

### The return to democracy and the lost decade

After years of military dictatorship, repression and violence, Argentina elected democratically a new president, Raul Alfonsin, in 1983. This marked a new era for the country.

Faced with several gloomy macroeconomic vulnerabilities, the economic system was in bad shape. In 1984, the country managed to obtain external financing from the IMF and in 1985 adopted a new currency, the Austral. Macroeconomic policies, spoiled by large off-budget populist interventions and loose monetary policy, were broadly inconsistent and growth stagnated.

In July 1987, the country managed to launch a new program with the IMF but failed to

respect conditionality and, 8 months later, the agreement collapsed. The government then introduced a broad set of heterodox policies, which failed to ameliorate economic conditions.

Hyperinflation ensued as social unrest sparked over the country. The dire economic and political situation led to the resignation of president Alfonsín in June 1989. Opposition candidate, Carlos Menem, was elected the same year with the purpose of solving economic problems.

### **The 1989 crisis and the rise of the currency board**

In 1989, Argentina's real GDP is the same as in 1980. The hyperinflation episode of 1989 followed a decade of stagnant growth, high inflation and failed macro-stabilization attempts. With the help of the IMF, Argentina introduced in April 1991 the convertibility plan that pegged her external nominal anchor to the USD. Autonomous money creation by the central bank became very constrained and monetary policy oriented towards foreign reserves management.

A package of reforms backed the currency board so as to form a comprehensive macro-stabilizing policy framework. These measures fell in line with the Washington Consensus dogma, which the IMF was extensively promoting. The deregulation, privatization and liberalization processes greatly impacted and fragilized the banking and financial systems, which proved decisive for future crises. Nevertheless, as confidence returned, growth resumed.

From her past, Argentina inherited corrupt<sup>4</sup> and "failing"<sup>5</sup> fiscal institutions as well as a parcelled federal organization which lacked appropriate debt and fiscal management tools. Given the costs of the many ongoing structural reforms, little scope was given to building safety nets during expansions.

### **1995, passing the credibility test**

In the context of a fixed exchange rate regime, the conduct of monetary policy is intimately linked to the circulation of private capital flows. Due to its relentless liberalization and privatization, Argentina's economic and financial system was greatly exposed to sudden stops and capital flow volatility.

When the Tequila crisis hit Mexico in 1994-95, troubles spilled over to Argentina's financial system. The crisis brought to light inherent weaknesses in the financial and fiscal architecture. Confidence fell and the country experienced bank runs. The authorities intervened as soon and as strongly as possible to maintain credibility of the peg. While exiting the crisis, the government committed to reforming the fiscal and tax-collection system and addressing fiscal weaknesses.

### **1998:2002, from recession to complete collapse: a system bound to fail**

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<sup>4</sup>Provincial banks were often used by local and/or regional governments to provide liquidities for public expenditures.

<sup>5</sup>Reuters [www.reuters.com/article/us-argentina-debt-chronology/chronology-argentinas-turbulent-history-of-economic-crises-idUSKBN0FZ23N20140730](http://www.reuters.com/article/us-argentina-debt-chronology/chronology-argentinas-turbulent-history-of-economic-crises-idUSKBN0FZ23N20140730)

*"Under President Raul Alfonsín, public payrolls swelled while government revenues remained stagnant. In 1989, only 30,000 out of 30 million Argentines paid any income taxes."*

If growth bounced back strongly after the 1995 crisis, the trade sector had failed to develop accordingly and remained too small to provide sufficient forex revenues in times of trouble. The government backed down on several tax-reforms. Fiscal vulnerabilities and nominal rigidities persisted. The end of president Menem second term was also marked by socio-political tensions. Increased political uncertainty and social tensions slowly dented agents confidence in future economic prospects.

Nevertheless, trust in the currency board didn't erode. The latter had proven a very efficient tool to tame inflation and expectations but had driven a strong dollarization of private agents' and the government's balance sheets. Moreover, by constraining monetary policy through the exchange rate regime, macro-stabilization was left on the sole hand of fiscal policy.

In 1998, faced with external trade and financial contagion, the economy entered a recession. Room for manoeuvre was too small to avoid a deepening of problems. Crisis management was marked by huge political crises and scandals and misconceived policies. Strikes, bank runs and social protests shook the country as the economy collapsed. Between end December 2001 and the beginning of January 2002, five presidents succeeded each other at the job. The country partially defaulted on its debt. The convertibility plan and associated currency board were terminated.

#### **2012:14, policy inconsistencies and crisis in a financially closed economy**

After the 2000's debacle, Argentina lost access to world financial markets. The new president, Nestor Kirchner, managed to launch the economy back on track as well as reduce poverty. When the Global Financial Crisis hit the world economy, Argentina weathered the shock without suffering major disturbances.

Yet, in 2012, the country faced a severe drought and a fall in external demand. The export sector was too small to generate enough forex revenues and pressures on the currency accumulated. Moreover to face the recession, national authorities had launched a expansionary policy mix, which soon prove to be inconsistent. As balance of pressures accumulated, the gap between the official and the parallel exchange rates widened.

The time was also marked by deep corruption scandals and revelations of falsified statistics. This completed the erosion of confidence and precipitated the political demise of Cristina Fernandez de Kirchner. Unresolved debt problems with *the Vulture funds* forced the country in legal default in July 2014. This politically motivated decision received broad support in the population but crisis management critics were too strong.

#### **2015, political U-turn and austerity**

With political uncertainty at very high levels, the country was shocked by severe rainfalls and a costly terms-of trade shocks over 2015. As balance of payments pressures accumulated, domestic and external imbalances culminated. The country entered a recession in 2015q3. Soon after his election end October, Mauricio Macri launched a wide pro-business reform plan. The

program included a currency devaluation, structural reforms and a plan to reaccess world capital markets. If austerity measures deepened economic losses and weakened the social sphere, they allowed the country to bounce back in 2016 by rebuilding private agents confidence and allowing the country to return to world financial markets.

### **2018:19, the debt trap ... again**

Driven by private consumption and investment, growth resumed strongly over 2017. Yet, despite improving conditions, the government failed to obtain broad political support. Thus, to maintain social cohesion, the authorities enforced reforms only gradually, notably on the fiscal side. This had perverse effects as it (i) prevented the reduction of several key vulnerabilities, (ii) halted the disinflationary trend and (iii) eroded market's confidence in the national authorities' commitments.

As the government relied evermore on foreign currency debt for financing, interest payments increased. This occurred at a time when the current account was widening and capital flew strongly inwards, driving an overvaluation of the currency. Beginning of 2018, the country was faced with a tightening of global financial conditions and the worst drought in the country's history. Faced with confidence losses, market panics and a negative debt dynamics, the country was forced into currency and sovereign crises as the authorities called for external financial assistance in 2018q2. As the situation deteriorated, the government announced rabid measures which failed to sooth expectations and volatility maintained. Over the end of 2018, contractionary monetary policy helped rebuild the economy and reverse external imbalances.

Yet, as 2019 began, inflation (expectations) started increasing again and world financial conditions worsened. Capital flows reversed by the end of the first quarter. With major presidential at the end of the year, political uncertainty was at its highest. Financial markets calmed down temporarily as the central bank committed to a more consistent monetary policy and exchange rate regime. Political uncertainty and volatility were too strong and the recession continued. By the end of 2019, the opposition candidate, Alberto Fernandez was elected. He was then faced with a highly unsustainable stock of debt as well as a population having suffered for a long time economic losses and austerity measures.

Looking back at Argentina's recent history, over 1995-2002 and 2010-2020 the country did not grow and experienced several currency, banking and sovereign crises. Several factors have repeatedly hindered the country's performance. Next sub-section details the shocks and vulnerabilities behind each episode and discusses underlying patterns.

### **5.2.2 Shocks and vulnerabilities in Argentina's history**

To shed light on the patterns behind the origins of crises, shocks and vulnerabilities must be considered together. I now detail and discuss the lists of shocks and of vulnerabilities.

Table 5.4 presents the key shocks and news associated with Argentina's last 5 crises. Each line provides a short description of the event, stylized information on the origin, dimension and type of perturbation, as well as indications on the main spheres and agents affected.

I use two main layers of information to categorize the shocks alongside chapter 1: the origin (domestic/foreign) and the dimension of the perturbation (political/institutional/environmental/trade/financial). The third layer – type – provides additional precision within broader categories.

Argentina has faced three main types of **domestic perturbations**. The first batch relates to developments associated with Argentina's geography. The second aggregates perturbations to the norms and institutions of the country. The last group aggregates shocks stemming from the political sphere.

- Argentina has been exposed to numerous **environmental** shocks. These shocks have a strong effect on the real sphere and the agricultural sector as they are associated with sudden production losses. Note that Argentine exports have historically been concentrated on agricultural commodities (36% of total merchandise exports in 1995, 43% in 2017 ; commodities as a whole represented 66 and 71% of total merchandise exports in given years).
  - **natural disasters:** In 2012, 2015 and 2018, Argentina has faced several episodes of severe rainfalls or droughts that greatly destabilized agricultural production of soy, corn and maize, and hence part of the export revenues.
- Argentina displays many **institutional** perturbations over the sample. There were several smaller perturbations (e.g. social unrests, riots etc.) but they would often ensue from other shocks and developments, or be too small to provide information by themselves on the origin of the crisis. Two events deserve notice as they entail general losses in confidence by all agents across spheres. These shocks often have large effects on voters in the social sphere.
  - **announcements:** In 1998, President Menem declared he wanted to change the constitution to be able to conduct a third term as Argentina's president. The news severely disrupted households' and firms' confidence and contributed to fueling the 1998's recession. Menem's case was ruled out in November 1999.
  - **news/scandals:** In 2011, scandals erupted on corruption and the production, by the national statistics agency, of fallacious statistics. In July of the same year, the country was declared in breach of the IMF article VIII which, inter alia, stipulates member economies must furnish national data [of good quality] to the IMF.
- Argentina's **political** sphere has often been agitated by unforeseen news and developments ranging from policy announcements that either failed to take root and triggered massive volatility or that acted as a drastic change in the economic ideology of the country to

corruption scandals that shook the political system. These shocks often have broad covering effects as they disrupt confidence. The social sphere and the voters are often the primary agents affected, even if these perturbations also strongly disrupt financial market participants.

- **announcements:** Over most crisis episodes, Argentine national authorities have rapidly made new policy announcements. Some can be identified as major shocks behind a particular crisis because: (i) They failed to coordinate agents and impact the economy as expected. These announcements were thus the trigger of drastic confidence shifts as agents doubted the authorities commitment and truth. (ii) In 2015, the election of Mauricio Macri and the associated announcement of a wide pro-business policy plan mark a drastic shift in the country's political ideology. Associated measures helped restore market confidence but widened economic losses, austerity and poverty.
- **news/scandals:** In 2014, Argentina's political system was shook by a wave of corruption scandals and news of political division and critics. At the time they caused the widening of the socio-political wedge between governing authorities and the population. This series of shocks proved determinant to the allocation of voters across political forces for all ensuing elections.

All of Argentina's recent crises are associated with major **foreign**-originated perturbations, stemming from international trade and/or finance exposition.

- Argentina's foreign trade sector has long been poorly developed and diversified and has been affected by several foreign **trade** shocks. These shocks affect particularly the real sphere and the agricultural and export sectors and contribute to fueling pressures on the currency and the nominal sphere.
  - **contagion:** In 1999 and 2012, Brazil crises greatly affected Argentina's own trade and forex income. Part of the importance of these shocks stem from the fact that regional trade integration was strong (Mercosur).
  - **terms-of-trade/commodities:** Argentina has repeatedly been affected by terms-of-trades and commodity prices shocks. Argentine export have long been heavily dependent on agricultural commodities. During 2013:14, the country was heavily dependent on imported energy and associated world market prices.
- Argentina's involvement in the international financial system is a key source of vulnerability (see following table), all crises are associated with at least one **financial** shock. There are two main types of foreign financial perturbations: contagion and financing costs fluctuations. These shocks either entail direct changes on the equilibrium market prices or affect market participants' confidence and destabilizes market functioning. The nominal sphere is often greatly affected by these perturbations as they entail changes in agents' trust towards the country's assets and currency.

- **contagion:** Emerging markets have historically been victims of waves of panics and confidence losses often spilling over regions and markets. In Argentina, this has been decisive in several occasions: in 1995 with the Tequila crisis when asset manager's risk aversion towards the country rose ; in 1998 the country weathered relatively well financial contagion from the Russian default and the Asian crises, yet they acted as a major source of additional constraints and volatility ; in 2019, emerging markets' prospects were deemed gloomy by most economic/financial news, this was associated with huge spikes in volatility in emerging financial markets, including Argentina.
- **financing costs:** Beyond financing costs shocks associated with contagion, Argentina was harmed foreign interest rates shocks. These proved decisive in 2001, when the Federal reserves cut interest rates to deal with the ongoing dot-com bubble. Over 2018, as the US normalized their monetary policy, foreign investors' appetite for Argentine assets fell.

The shocks that lie behind Argentina's crises can be grouped into three main categories:

**EXTERNAL FINANCING SHOCKS:** All of Argentina's crises are associated with foreign financial shocks. These entail either (i) a direct unexpected change in the costs of external financing for the public and private sector or (ii) shifts in market participants' confidence towards domestic financial assets. They are associated with heightened market volatility and often contagion from other emerging markets. They mark the start of an acceleration of increasing external pressures on the currency and domestic financial markets.



**Table 5.4:** Argentina's crisis origins – Shocks

short description	Characteristics			Effects	
	origin	dimension	type	Sphere.s affected	Agent.s constrained
<b>1995 – double currency + banking crises</b>					
Contagion from the <i>Tequila crisis</i>	foreign	financial	contagion	nominal, financial	banks
<b>1998:2002 – triple crises</b>					
Russian and Asian crises	foreign	financial	contagion	financial	market participants
Menem's attempts at 3rd presidency	domestic	institutional	news/scandal	socio-political	voters, confidence
Fall in key commodity prices	foreign	trade	ToT/commodity	real	export sector
Regional slowdown and crisis (Brazil 1999)	foreign	trade/financial	contagion	nom., real, social	firms, consumers
US policy rate changes	foreign	financial	financing costs	sov., financial	market participants
Failed policy announcements	domestic	political	announcement	global	agents' confidence
<b>2012:14 – double currency + sovereign crises</b>					
Severe drought	domestic	environmental	disaster	real	primary/export sector
Terms-of-trade/commodity prices shocks	foreign	trade	ToT/commodity	real	export sector
Economic slowdown in Brazil and China	foreign	trade	contagion	nominal, real	export sector
<i>Vulture funds</i> related court rulings	foreign	financial	financing costs	sovereign	government
Revelations of inaccurate official statistics	domestic	institutional	news/scandal	global	national authorities
<b>2015 – single currency crisis</b>					
Summer flash foods	domestic	environmental	disaster	real	export sector
Terms-of-trade shocks	foreign	trade	ToT/commodity	real	export sector
Corruption scandals and political divisions	domestic	political	news/scandal	sov., social	government, voters
Policy U-turn announcement	domestic	political	announcement	global	wide covering
<b>2018:19 – double currency + sovereign crises</b>					
Worst drought in 50 years	domestic	environmental	disaster	real	export sector
US monetary policy normalization	foreign	financial	financing costs	financial	market participants
High volatility on emerging markets	foreign	financial	contagion	financial	market participants
Failed policy announcements	domestic	political	announcement	global	agent's confidence

See appendix 5.4 for a detailed description of the shocks and their role in crisis unfoldings.

**CONFIDENCE SHOCKS AND POLITICAL FAILURES:** Argentina's political sphere is a major source of perturbations that contribute to the build-up and the magnification of crises. They are associated with (i) corruption and other political scandals and revelations, (ii) failed policy announcements that blur confidence in the authorities or (iii) a drastic shift in the political ideology. These shocks entail unexpected news and development that update drastically agents' information set and confidence in future developments. Voters often react strongly to the news and domestic unrest ensues. Markets are globally shaken by these perturbations, which increase risk aversion and volatility.

**FOREX REVENUES SHOCKS:** Argentina's export sector has been historically small and highly dependent on agricultural commodities. Over the last 40 years, the country has been faced with (i) sudden and unexpected production losses, (ii) sudden and important fluctuations in world prices and (iii) unexpected fall in external demand from major trading partners. These perturbations are associated with heavy constraints on firms and a widening of current account deficits. In turn, these perturbations augment external pressures on the currency.

Table 5.3 provides a short description of key vulnerabilities. I detail whether the vulnerability covers internal/external developments and which sphere.s are the most affected. I also detail whether, during the episode, the vulnerabilities are associated with (i) trust destabilization mechanisms, (ii) macro-stabilization hindrances, (iii) policy-making inconsistency and (iv) the accumulation of pressures. Argentina's vulnerabilities can be grouped into six main categories: low domestic financial market development ; poorly developed/diversified trade sector ; fiscal instability ; nominal anchors stability ; political uncertainty and weakening social contract.

All of Argentina's crises are associated with the build-up of external vulnerabilities. These rose for two reasons: (i) underdeveloped domestic financial markets and (ii) a small and undiversified export sector. Argentina's **domestic capital markets** have historically been **shallow and poorly developed**. This characteristics can be traced back to the liberalization and deregulation process that marked the 90's. Growing under the auspices of the convertibility plan, Argentina's financial markets benefited from major capital inflows that oriented it towards foreign sources and investors. In turn domestic financial institutions failed to grow significantly. A history of repeated crises and trust debacles had also drawn most of domestic savings towards foreign currency assets, preventing the development of local currency financial markets. Foreign currency exposure and sudden capital outflows have proven determinant in most crisis episodes. The redistribution of currency-risks (from firms to banks) after the 2001:02 debacle, constrained the banking system and prevented its growth in the ensuing years. Yet this period of restructuring led to the banking system being, if small, resilient to most shocks throughout the 2000's and 2010's.

**Table 5.5:** Argentina's crisis origins – Vulnerabilities

description	scope	sphere.s	effect
<b>1995 – double currency + banking crises</b>			
Constrained policy space (currency board) and growing fiscal instability	int.	sovereign	macro-stabilization hindrance
Weaknesses in financial architecture (overburdened provincial banks)	int.	financial	trust destabilization
Overdependence on foreign capital, dollarization	ext.	real, financial	pressure accumulation
<b>1998:2002 – triple crises</b>			
Endangered social contract (political uncertainty, social unrest, widely perceived corruption)	int.	sovereign, social	trust destabilization
Complex fiscal architecture (federal/provincial) and shallow tax base	int.	sovereign	macro-stabilization hindrance
Small underdeveloped and underdiversified export sector, strong import growth, widening trade deficit	ext.	real	pressure accumulation
Shallow and underdeveloped domestic financial markets fueled dependence on external financing	ext.	financial	pressure accumulation
Important downward nominal wage rigidities	int.	nominal	macro-stabilization hindrance
Constrained policy space entailed by the convertibility plan (fiscal dominance, no lender of last resort)	int. ext.	nominal, sovereign	policy-making inconsistency
Overly optimistic expectations	int. ext.	global	trust destabilization

**Table 5.5:** Argentina's crisis origins – Vulnerabilities

description	scope	sphere.s	effect
<b>2012:14 – double currency + sovereign crises</b>			
Interventionism and inconsistent expansionary monetary and fiscal stance	int./ext.	nominal, sovereign	policy-making inconsistency
Overvalued exchange rate, strong import growth, widening trade deficits, BoP pressures	ext.	nom., fin., real	pressure accumulation
Lack of access to world financial markets	ext.	sovereign, financial	macro-stabilization hindrance, pressure accumulation
Weak institutions and historical lack of confidence in the country	int. ext.	sovereign, global	trust destabilization
<b>2015 – single currency crisis</b>			
Interventionism and expansionary policies driving domestic imbalances	int.	nom., sov., real	pressure accumulation, policy-making inconsistency
Lack of access to world financial markets	ext.	sovereign, financial	macro-stabilization hindrance, pressure accumulation
Weakening external demand increasing BoP pressures	ext.	nom., fin., real	pressure accumulation
Microeconomic distortions	int.	nominal	macro-stabilization hindrance
<b>2018:19 – double currency + sovereign crises</b>			
Growing fiscal needs (negative debt dynamics)	int./ext.	sovereign	pressure accumulation
Growing external financing needs (widening current account deficit and debt amortization)	ext.	financial, real	pressure accumulation
Overvalued currency (inflation inertia and strong capital inflows)	ext.	nominal, financial	pressure accumulation
High political uncertainty (presidential elections)	int.	sovereign, social	trust destabilization

Second, Argentina's **export sector** has historically been **shallow and poorly diversified**. Overall, the sector has remained *dominated by agricultural commodities* export and, thus, a shallow and volatile source of foreign currency inflows. Two key reasons explain these characteristics. The convertibility plan and Argentina's entry in the Mercosur in 1991 protected the trade sector for some time. This intensified the reliance upon existing relative advantages and prevented a diversification of revenues. Until the end 90s, firms were exposed to heightened currency-mismatches on their balance sheets and particularly exposed to currency risks. This changed after the 2002 crisis, but the sector remained small and highly dependent upon few major partners, Brazil and China notably.

All of Argentina's crises are associated with **fiscal needs instability**. In practice, this translated into the national authority (i) facing limited revenues or access to finance and (ii) spending (unvoluntarily) more than expected.

During the first two crises in the 90's, weaknesses in the fiscal architecture overburdened the national authority. A misallocation of spending and revenues between the provincial and federal levels, combined with a shallow tax-base and frequent tax-evasion, weakened continuously the ability of the government to cope with shocks. Part of these weaknesses were targeted during the resolution of and recovery from the crises, even if these structural reforms remained a common item in the IMF's recommendations. In the ensuing two crises mid 2010's, lack of access to world capital markets severely constrained the government's fiscal stance and possibility to finance growing needs. The structure of the governments' public debt (foreign currency exposure) also proved determinant in several occasions when the context launched a negative debt dynamics. With slowing growth, little forex revenues and exchange rate depreciation, the value of debt repayments mechanically augmented and further constrained the government and its ability to roll-over existing debt.

**Fiscal needs instability** was not only driven by structural and conjunctural factors but also because the fiscal policy stance was constrained and/or often inconsistent. During the first cycle of crises, the convertibility plan shifted the task of dampening all macroeconomic fluctuations upon fiscal tools and turned the government as a lender of last resort for financial institutions. During the first two episodes, but markedly more so over the 2010's, the fiscal stance was deemed unsustainable. Governments were often judged for populist expansionary interventionism. Under the government of Mauricio Macri, committed to fiscal stability, credibility and respect of the targets was highly debated by market participants and a source of additional uncertainty and volatility.

Vulnerabilities threatening **nominal anchors stability** also determined the country's policy space and decisions throughout most crises. In the 90's the convertibility plan managed to tame inflation expectations that had precipitated the previous debacle. The plan concentrated agent's confidence in the economy around the currency's peg to the USD. This worked wonders and these

beliefs ended up deeply rooted in the population's own considerations.

In the 1995 episode and when the 'Russian crisis shock hit', the convertibility plan, and associated nominal anchor stability, proved determinant in helping the country weather fluctuations and support trust. Yet, over the unfolding of the 1998:2002 episode, nominal rigidities, e.g. downward wage rigidities, prevented internal price adjustment as the currency faced depreciatory pressures. This increased pressures upon the central bank and the monetary stance, revealing the adjustment limitations imposed by a currency board.

During the second wave of crises, nominal rigidities, e.g. price controls, prevented a fast-enough reduction of inflation, constraining the conduct of monetary policy. As Argentina relied heavily upon foreign resources, with external pressures accumulating easily, the currency's stability on forex market was also determinant to the conduct of the central bank's policies. As a result of the repeated crises and the 2002 debacle, trust in Argentina's currency has continuously been low, jeopardizing its stability by increasing the probability and scope of panics.

The first four sets of vulnerabilities relate to external and policy vulnerabilities. Internally, **weak institutions and heightened political uncertainty** have proven determinant in the start and unfolding of many crises. With confidence in the country being historically low or weakened, Argentina was often in a general climate of defiance. This aroused foreign and domestic agents' risk aversion and susceptibility to new information. On the eve of major elections, these vulnerabilities grew significantly. With it uncertainty, volatility and the potential for sudden changes in agents' decisions.

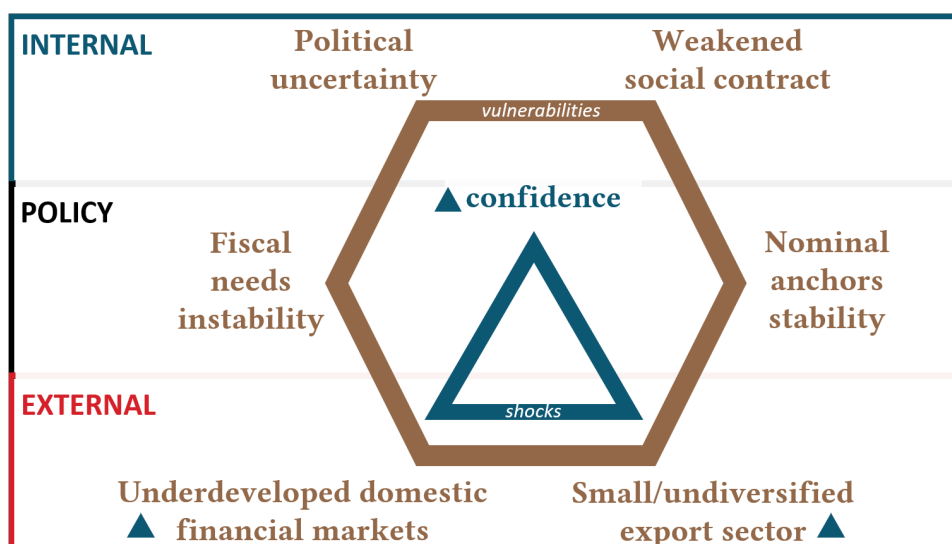
The two waves of crises share a final common particularity. Before the 1998:02 debacle or before the sequence of crises over 2012:14:15:18:19, investment and economic development stalled, and with it the reduction of poverty and inequality. The latter two further **weakened the social contract** which proved determinant for the crises in two ways. First, by weakening trust in the performances of current economic policies, this boosted support for dissenting opinions, labor union manifestations and more broadly social unrest. In turn this reduced governing authorities' political support and room for manoeuvre. Second, to tame waves of distrust and discontent, populist and interventionist claims proved politically more beneficial. As such, the weakening of the social contract increased greatly the marginal gains in confidence, image and political support for disruptive political announcements, for example deemed-heterodox economic policies in 2001. These announcements often proved fatal to agents' confidence and future ballots.

Overall, when the country was exposed to confidence shocks or a weakening economic and financial environment, weak institutions, political uncertainty and a weakening social contract often coordinated foreign and domestic agents' expectations around bad prospects. Crises coagulate around elections and political turmoil.

### 5.2.3 Waves of crises

Argentina's crises are the result of a combination of three main shocks and six main vulnerabilities, represented in figure 5.7.

**Figure 5.7:** Shocks and vulnerabilities fueling the credibility gap before Argentina's crises



Shocks (blue triangle) include: (i) political failures and **confidence** shocks ; (ii) external **financing** costs and (iii) forex revenues/**trade** shocks. Vulnerabilities are represented on the brown hexagon. Internal vulnerabilities include ( $\alpha$ ) **political** uncertainty ; ( $\beta$ ) weakened **social** contract. Policy vulnerabilities include ( $\gamma$ ) **fiscal** needs instability ; ( $\delta$ ) **nominal** anchors stability. External vulnerabilities include ( $\epsilon$ ) low domestic **financial** markets development and ( $\zeta$ ) small and undiversified **trade** sector.

#### Shocks, vulnerabilities and the credibility gap

In **1995**, external financial shocks pressurized banks that were highly dependent upon foreign capital. Ongoing transformations in the fiscal architecture constrained governing authorities. This contaminated part of the banks were overexposed to provincial governments This also further pressurized fiscal policy, that was left as the only stabilization tool by the currency board. The latter also, de facto, tasked the government with acting as lender of last resort when needed. This policy 'inconsistency' and these vulnerabilities combined and increase the lack of credibility in the financial system. Several banking institutions struggled meeting balance sheet requirements. To sooth expectations and halt the troubles, the government introduced new funds to groom the current imperfect policies arrangement.

In **1998**, Argentina faced several external trade and financial shocks. The convertibility plan successfully protected the financial system from heightened volatility and absorbed part of the shocks. The small export sector was nevertheless deeply affected and economic prospects deteriorated. As the economy slowed down, political uncertainty about upcoming elections

darkened agents' expectations. Together, these drove the upcoming recession. Whereas the policies arrangement guarded the economy from foreign shocks, it was structurally unable to absorb long lasting economic losses. The country was bound to be highly dependent upon foreign currency resources: domestic financial markets were too small to diffuse local liquidity, the trade sector generated little forex revenues, imports were important, firms and the governments faced severe currency-mismatches, the central bank had no room for intervention given the unconditional trust in the currency board. The latter coalesced agents confidence and was deemed by a wide majority as meant to stay in place. Yet, with growth slowing down and depreciatory pressures, a negative debt dynamics further constrained the government. If other external shocks hit the country afterwards, once the first recession had started, what drove the second wave of crises – double dip plus all three financial crises – was the inability and inconsistency of policy response. This impacted both domestic and foreign agents, fueled risk aversion, social unrest and the trust debacle as credibility collapsed with the entire system in **2001:02**.

**During the first two crisis episodes**, the sovereign sphere is faced with internal vulnerabilities, in the fiscal architecture mainly. The currency board, that binds the forex stability, constrains fiscal policy as the only macro-stabilizing tool. In the first episode, after a foreign financial shock, confidence losses and the inability to provide adequate immediate response precipitate the financial crises and a brief recession. The structural policy misconception (lack of a lender of last resort) is quickly resolved. In the second episode, the global policy framework partially protects the economy from foreign financial shocks. Yet, deteriorating trade perspectives, renewed foreign financial shocks and high political uncertainty turn the economy to a recession. Subsequently policy inconsistencies and crisis mismanagement precipitate and intensify the losses.

Over 2011:12, the country is faced with all three shocks (forex revenues, confidence, external financing). Argentina enters a brief recession and the authorities introduce an inconsistent expansionary policy mix to support the economy. Yet, credibility has been critically damaged. As domestic and balance-of-payment pressures accumulated, pressures and gaps in the dual exchange rates widened. Authorities were forced to intervene in **2014** and crisis management was heavily criticized. In parallel, and a further constraint on the conduct of fiscal policy, the government battled *Vulture Funds* in court over unresolved claims. This resulted in a de facto default but the president's position remained broadly supported in the population. This didn't compensate other confidence losses and shocks.

End 2014, the economy started recovering from past crises, but external and domestic imbalances rose, driven by inconsistent expansionary interventionism, nominal rigidities and difficult external conditions. In the run-up to the **2015** elections, a series of forex revenues and confidence shocks precipitated a recession. The win of the opposition candidate was associated with a drastic ideological and political shift, soon followed by important austerity measures, widening



but shortening the losses.

Over 2017, frail political support forced governing authorities to implement reforms at a gradual pace. Due to nominal rigidities and liberalization measures, this accelerated the build up of domestic and external imbalances. Over **2018**, a series of external financial and trade shocks as well as failed policy announcements precipitated credibility losses, speculative attacks and panics. Despite rapid interventions, credibility losses persisted as the recession deepened until upcoming presidential elections. Associated debates, announcements and news fueled the general climate of uncertainty and prevented an efficient adjustment to deteriorating conditions.

**During the three last crisis episodes**, fiscal policy is severely constrained by impossible, or suddenly costlier, external financing. Monetary policy targets a reduction in inflation, but nominal rigidities and external balance of payments pressures often constrain room for manoeuvre. The banking and financial systems remain small and structurally resilient. The crises originate in disruptions in forex revenues (natural disasters and t-o-t shock) driving the slow down of the economy. Political uncertainty, news or scandals fragilize the credibility of the governing authorities and constrain policy space. When the cumulated uncertainty spikes and credibility collapses, the country experiences capital outflows. The currency, once stable, comes into intense pressures and is bound to jump to allow a partial adjustment.

Overall throughout Argentina's crises, confidence and uncertainty play a determining role in economic decelerations and recessions or directly in the burst of financial crises. Considerations and confidence in the currency/sovereign/future/economic prospects/social progress vary across agents. The magnitude and scope of these dissensions determine whether the current policy conduct is credible. When the CREDIBILITY GAP widens too much or too quickly, the country experiences crises. All crises in Argentina's history are associated with episodes of important confidence losses, panics and sudden stops. Since the end of the currency board, trust in the currency is the most frequent and easiest trigger. In turn, trust in the sovereign has been a determinant feature as the government was often confronted with a need for external financing. External exposure and dependency further constrained firms' and agents' in economic prospects. Whereas the weakening of the social contract shook the trust in the political and redistributive systems. During episodes of heightened stress and confidence losses, banking institutions and financial markets were confronted with sudden confidence losses in the value of Argentine assets.

Over each wave of crises, the **credibility gap** widens as governing institutions management of economic developments becomes inconsistent and highly criticized. After each crisis episode, part of the confidence in the system remains persistently eroded. When the next series of imbalances and external shocks start pressurizing existing vulnerabilities, constraints on agents' policy spaces accumulate. Future economic prospects are deemed somber by firms and households, confronted with stalling poverty and inequality. At the eve of major elections, political scandals and/or populist announcements weaken confidence and increase dissensions. When confidence first cracks, usually on forex and/or financial markets, troubles and confidence losses

soon spillover agents and spheres. Until elections are over, policy interventions fail to convince agents. Social turmoil and market volatility alternate and fuel upon another. Once the situation cumulates, a drastic ideological and policy change is needed to tame the wave and reset the credibility gap. A new governing authority coordinates agents on a new alternative plan supposedly aimed at better crisis management and reforms to address structural concerns, notably on poverty and inequality.

### **Commonalities and differences inbetween waves of crises**

All crises entail, as a shared foundation, a combination of **external** trade and financial shocks and vulnerabilities. These developments intensified external pressures and imbalances. In the first wave, they were more or less absorbed by the convertibility plan, as long as it remained credible. During the second wave of crises, external shocks precipitated the difficulties by slowing economic growth. Often these shocks combined with domestic rigidities and uncertainty to precipitate recessions. They also accentuated balance-of-payment pressures on the exchange rate. Foreign capital and currency resources remained scarce and a repeated motive making an easy trigger for currency crises.

Each wave of crises is characterized by a different set of constraints and shocks on the **policy** space. During the first wave, the convertibility plan constrained both monetary and forex policy, leaving fiscal policy as the only, rigid, macro-stabilizing tool. Nominal anchors stability had managed to tame inflation expectations and coordinated the trust of domestic and foreign agents. Meanwhile, this greatly deepened their exposure to foreign resources. This amplified the costs and mechanisms of the ensuing crisis. In the second wave of crises, fiscal policy, mainly expansionary, was either constrained by a ban from world capital markets or shocked with rising external borrowing costs and faced with negative debt dynamics. In turn, monetary policy was challenged internally by nominal rigidities and externally by lack of confidence and a tendency to panic. These, if diverse, repeated policy inconsistencies were key drivers in the multiplication and repetition of crises. Over the last four episodes, these policy vulnerabilities were further pressurized by failed policy announcements or news/scandals that tainted governing authorities and past policy decisions. Overall, these developments proved to be the determinant factor in precipitating most crises.

The fact that crises multiplied upon another inbetween 1998 and 2002 or that they followed after another over 2012:2019 can be traced back to **internal** vulnerabilities and shocks. Political uncertainty, particularly high around presidential elections, was perpetually entertained by news, scandals and revelations. These fragilized greatly the trust in many members across governments, fueled political dissensions, social unrest and the probability of political regime changes. Mauricio Macri was, since the new democratic era, the first president not to be re-elected after a first full term, a signal for the underlying important political activities and

changes. The obvious counterfactual of this higher uncertainty is a lower credibility in governing authorities adding further constraints to policy making (and crisis management). Moreover, crises aggregate and cumulate when the social contract weakens too much. Major (sequences of) crises unravel when growth alongside poverty and inequality reductions halt. As the social sphere is repeatedly hit by economic recessions and/or currency/financial crises, trust in the capability of governing authorities to solve problems shrinks. So does the trust in the overall system. Often a source of great domestic instability, social and political troubles always trigger before intense crises. They widen the credibility gap widely.

### Looking beyond Argentina

If these conclusions are subject to external validity limitations when considering countries beyond Argentina, they shed light upon key characteristics of major crises episodes. I highlight four of these aspects, to be developed in future more thorough analysis (and extension of the narratives database).

**Importance of data & information quality:** Data and news are the first sources of information used by agents when analyzing ongoing development and forming policy decisions. Lack of data or lack of consideration for certain topics has prevented the detection of imbalances and developments behind crises in history (IEO, 2016a). Part of this lack of consideration can be traced back to IMF's internal institutional rigidities – the IMF surveillance and data activities were significantly updated after each global crisis. Moreover data manipulation by country authorities or reticences to provide sensitive data also hindered the identification of issues, e.g. Ukraine 1996-98. Often these situations lead to dramatic scandals and revelations that increased drastically the credibility gap and volatility, e.g. Greece 2004, 2009. Finally, manipulation of the news and of the information provided to economic and financial agents is often associated with higher risks of scandals, political dissensions, social unrest...

**Contagion, spillovers and the importance of regional factors:** A key characteristic of crises is that, within a country for a given episode, they multiply and spread to different markets. Crises also spread across countries. Contagion is a repeated pattern in Argentina and more broadly. Contagion mechanisms are various. They can be associated with slowdown in major trade or financial partners. Contagion is often associated with shifts in market participants' sentiments towards a type of asset. Usually, the features that fuel market participant's fears and risk aversion are common within income groups. Episodes of heightened volatility across emerging and developing markets are a key source of crises in economies with growing imbalances and shrinking policy space. By impacting resembling economies at the same time, the effects of the shocks are often magnified as the trade and financial interconnections among emerging and developing markets have been increasing over time.

**Natural disasters and climate change:** A key aspect of the history of Argentina is its exposure to climate and natural disasters, in particular droughts and rainfalls. This feature manifests as well in several narrative quotes on currency crises. These perturbations generate important sunk losses and a need for financing to rebuild the economy. They are determinant for countries whose economy is poorly diversified and/or reliant upon key agricultural commodities. If natural disasters are a common pattern throughout history, climate change is bound to increase their frequency. As such delving deeper in the specificities of their impact in past episodes proves important. In Argentina, because the trade sector was small and heavily dependent upon agricultural commodities, this was a major source of forex revenues currency shortfalls. In other countries, differing situations might very well be at play.

**The social contract, poverty and inequality:** Financial crises and associated recessions often widen inequality and drive a new part of the population into precarious situations. If the system fail to boost confidence in future better prospects, social unrest and political dissension might arise. These events are more likely to be triggered if the society fails to tackle social issues. That is if the credibility of the current policies arrangement in alleviating the population needs comes to be questioned. If the social contract is weakened, unexpected developments in the socio-political sphere are also more likely to result in drastic shifts in confidence or policy interventions. As recent and present developments illustrate, when countries are frequently hit by economic and financial crises or external unexpected shocks, most vulnerable parts of the society come under additional pressures. Protests and unrests are easily triggered and policy implementation often debated and hampered.

### 5.3 Conclusion and future steps

In the present chapter, I developed a narrative methodology to treat IMF textual archives and extract causal information on the sequencing of crisis episodes. In particular, I identify the shocks and vulnerabilities at the origin of crises and their unfolding. Given the importance of policy decisions in empirical and theoretical approaches of crises, the narrations pay attention to the role of policy announcements and implementations and how they shape ongoing developments and transmission mechanisms. I provide a case study for Argentina over 1990q1:2019q4. The country experienced 5 crisis episodes cumulating 7 recessions, 5 currency, 3 sovereign and 2 banking crises. The country experienced two main waves of crises, the first one in the 90's the second in the 2010's. I identify three main types of shocks: external financing costs shocks, political failures & confidence shocks and forex revenues shocks. Vulnerabilities can be grouped into three pairs: two external vulnerabilities, underdeveloped domestic financial markets and a small and undiversified trade sector ; two policy vulnerabilities, fiscal needs instability and nominal anchors stability and two internal vulnerabilities, political uncertainty and a weakening

social contract. In each episode, various combinations of shocks and vulnerabilities fuel the credibility gap between what ongoing policies arrangement enable, what narrative governing authorities adopt to guide their actions, and what domestic and foreign agents believe in. Agents' trust (and confidence losses) manifest in many ways as it captures several features of the system: the currency, the sovereign, future economic and financial prospects, development and social progress. Further work is needed to replicate (and refine) the methodology over other complex crises episodes. Doing so will imply extending and refining the categories and types of shocks and vulnerabilities. The narrations' sequencing and identification of transmission mechanisms and key policy interventions could also be treated in a similar 'taxonomizing' way.

## 5.4 Argentina – a narrative case study

The following narration aims at discussing the history of financial crises in Argentina since the 90's. The objective underlying the following presentation of events is to shed light on the roots of crisis episodes: which triggers for which vulnerabilities? The note will carry great attention to identifying the roles of macro-economic policies, exchange rate policies, financial development and liberalization as well as agent's expectations, institutions and the social/political spheres.

### 5.4.1 Argentina – 1995

#### A. Crisis iD

##### Financial crises:

- 1995q1 – Banking crisis:

*"a decline of some Arg\$8 billion or 18 percent of deposits of the domestic banking system from late December 1994 to mid-May 1995. [...] In the face of this crisis, in mid-March the Government implemented measures to strengthen the public finances and accelerate structural reforms. [...] The financial crisis in early 1995 revealed the structural weakness of some segments of the financial system. [...] Interest rates rose to peak levels in March, a number of banks experienced difficulties, and credit became virtually unavailable for many small- and medium-sized firms"*

- 1995q1 – Currency crisis<sup>6</sup>

*"The margin for further BCRA support was virtually exhausted without violating the Convertibility Law. It was at this point that the government implemented a new program with the Fund and sought large scale financial assistance from multilateral organizations and the international financial community to set up trust funds as a backstop to the Central Bank and a way to facilitate the restructuring of the banking system. Following the announcement of this program and accompanying measures, the decline in peso deposits halted."*

##### Business cycles:

(*exp.*) 1990q1:1994q2 – strong expansion (+2.3% per quarter on average)

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<sup>6</sup>None of the empirical methodologies I used dated an event around that episode. Kaminsky et al. (2009) and Boonman (2019) do identify a currency crisis. My rationale behind this choice follows: per se the currency was not attacked on forex markets, what the foreign investors fled was the financial instability of the banking system. The currency was only the vehicle of these fears. Nevertheless, the fact that (i) the Central Bank was forced to the limits of her mandate (ii) following a fall of 41.6% in reserves (inter alia due to reductions in reserve requirement and other interventions) and (iii) the government only intervened at the latest moment but failed to completely tame the dynamics (iv) only international support allowed the CB to manage the period. Overall the crisis was short-lived and the fact that the currency crisis didn't bloom completely is partially related to some regained confidence through the currency board.

(*rec.*) 1994q3:1995q3 – 5 quarter long recession, -14.9% cumulated losses<sup>7</sup>, rebound in line with growth in expansion<sup>8</sup>.

### Origin of the crisis:

- Key shocks and events:
  - External Shock (contagion): The Mexican crisis in 1994q4 impacted Argentina by increasing stress on financial markets and risk aversion towards banks.  
*"there was a sharp reversal in early 1995 as the Mexican crisis triggered an outflow of capital from the country."*
- Vulnerabilities
  - Growing fiscal instability in an otherwise constrained policy space.
  - Relentless financial liberalisation and privatisation that exposed the financial and real spheres to sudden stops and capital flow volatility.
  - Weaknesses in the financial architecture (overburdened provincial banks).

### In a nutshell:

*"Coming on the heels of the weakening of financial policies in the second half of 1994, the Mexico crisis in December sharply affected confidence in Argentina, and led to an outflow of capital in early 1995."*

If the trigger of the Argentinan banking crisis was the Mexican devaluation in 1994q4, the contagion could only permeate the economy given three main sources of vulnerabilities (without any ordering of importance). First, unstable and inconsistent fiscal policies burdened the private and the banking sectors, e.g. provincial banks were often required to provide liquidity to finance government deficits. Second, through the liberalization and deregulation process, private capital flows insulated the banking sector without any well-endowed mechanism to absorb potential trouble. The Argentinan economy was prone to experiencing bank runs which unravelled end 1994. Third, and as exemplified through the currency/convertibility board, confidence acted as the pivotal gear in the functioning of the Argentinan economy. If the initial shock is purely external at first, it shook the Argentinan economy through the banking sector. The bond-holder closure at the start of the chain of events in January 1995 was soon followed by a generalized liquidity shortage in the banking sector. The prompt government reaction aimed at strengthening the financial system architecture and the disbursement of further international financial

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<sup>7</sup>I fear that seasonal adjustment might be responsible for an overestimation of real GDP before the recession start, hence falsely increasing losses and pre-dating the recession.

<sup>8</sup>The strength of the rebound is given by the ratio of growth in the year following the end of a recession and the average growth in expansion. In the present case, the ratio is equal to 0.97.

assistance backed by commitment to reforms in fiscal policy and the fiscal administration.

For international institutions and some market participants, the crisis unfolding proved the success of the convertibility plan confronted to a test of resilience, robustness and credibility. The V-shaped recovery comforted this view and market expectations improved.

There is undoubtedly a role for self-fulfilling expectations mechanisms in this crisis as exemplified by the bank runs and large capital outflows.

## **B. Narration**

### **Context:**

#### CURRENCY BOARD AND THE RETURN OF TRUST AND CREDIBILITY

Since 1991q1, Argentina is under an Extended Fund Facility agreement with the IMF, backed by her Convertibility Plan and a commitment to stabilization efforts and structural reforms. Argentina has pegged her currency to the USD and increased CB independence. Hence the country successfully tamed (hyper)inflation and soothed agents expectations<sup>9</sup>. To boost domestic and foreign agents' confidence in the economy and the currency board (seen as the keystone of Argentina's renewal), the initial program also aimed at alleviating fiscal imbalances and reducing authorities' interventions in the economy. A key aspect of the convertibility plan was the tight limits under which the central bank could purchase government bonds. Through the currency board, the central bank had nevertheless lost potential room for manoeuvre as Lender-of-Last-Resort for the banking sector. The convertibility board also prevented the use of the exchange rate as an adjustment tool to foreign shocks.

#### THE RETURN OF GROWTH...

In the years following the adoption of the convertibility plan, the country intensified its privatization program, regularized its position with external creditors through the Paris Club and Brady operations and finally renewed access to the international capital markets in these years, alongside other developing countries. In 1994, the central government also started issuing floating bonds on international markets. In its article IV consultation, the staff notes that "Serious shortcomings in available information pose problems for the presentation and interpretation of Argentina's balance of payments, [...] for example, data on public sector debt.". If these considerations do not play a particular role in the present crisis, they are worth noting for ensuing cases.

By the end of the 3-year program, economic conditions had greatly improved and growth

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<sup>9</sup>The september 1992 adoption of the amended Central Bank Charter comforted and strengthened the commitment to the value of the domestic by editing the CB's mandate (parity objective, no financing of provincial and municipal governments nor of private fin & non-fin agents ), giving it independence over the authorities (growth of dollar-denominated Argentina government bonds limited to 10% and a monetary base always backed by two thirds of foreign reserves). Additionally the two legal acts limited the role of the central bank as a lender of last resort in order to curb potential moral hazard in the private sector.



was expected to maintain its increasing trend. One concern remained as the current account deficit had been constantly increasing as well. Financial liberalization and globalization had driven private capital inflows towards the real sector, acting as a key engine to the production and exports chains.

#### AND THE RETURN OF FISCAL SPACE CONSTRAINTS:

Conditionnal assistance is renewed in 1994 so as to further reduce inflation and decrease the CA deficit through fiscal policy. The introduction of limits to direct monetary financing had nevertheless constrained national authorities, committed to a 1% balance on the federal government's accounts. Hence, over 1991-1994, the federal government increased tax collection and reformed the tax system architecture.

Two aspects of the structural fiscal developments prove key in the upcoming crisis: (1) The program entailed a reallocation of revenues – e.g. employer social security contributions – to the federal level and expenditures – e.g. pension-related expenditures – at the provincial level. Yet, for the provinces, the contributions fell faster than expected and expenditures overran in the run up to 1994. Used to relying upon discretionary and earmarked transfers, this constrained provincial governments to cut expenditures and wage payments. Civil unrest ensued. (2) Provincial governments had been also "*encouraged to privatize and deregulate provincial finances*", which had boosted the interconnections between provincial governments and local banks.

With monetary and exchange developments under mandate, pressure on fiscal policy was even greater and mid 1994, the federal government further accelerated the privatization process. In its recommendations, the IMF often suggested reforms to facilitate wage adjustment on labor markets, so as to alleviate the real rigidities preventing macro-stabilization.

#### FINANCIAL DEREGULATION, BANKING SYSTEM REFORMS AND INCREASED CAPITAL INFLOWS.

As of 1994, Argentina reformed her banking system actively. In February 94, the CB was mandated with regulating the opening of new banks and branches, legal differences between domestic and foreign-owned banks were also removed. In June 1994, new regulations refined the classification of banks borrowers and extended required loan loss reserves to include guarantees on financial firms as well. From July to December 1994, the capital requirement was set to 10.5% of total bank risk-weighted assets (above the Basle recommendation of 8%). In January 1995, the capital adequacy rule reached 11.5% and banks were to lead interest rate risk-*stress-tests*.

#### **Triggers: key news, shocks and decisions:**

##### EXTERNAL SHOCK AND SWIFT CONTAGION

The crisis that affected Mexico at the end of 1994 initially shocked the banking system

through bond traders. Those exposed to Mexico first lost access to bank credit. Others followed thereby impacting larger banks relying largely on bond transactions. Provincial banks also struggled raising funds (structurally as they had long funded unsustainable government deficits, and conjoncturally due to the fall in confidence). Overall, starting in January 1995, Argentina faced a tightening of bank liquidity, a fall in bank deposits, a surge in interest rates and a sharp fall in asset prices.

### **Unfolding and crisis management:**

#### FINANCIAL STRAIN, CONFIDENCE LOSS AND CB INTERVENTION

In the wake of the Tequila crisis and given remaining fiscal instability, Argentina faced a fall in confidence that translated into large private capital outflows and bank runs beginning in 1995. A February 1995 amendment of the Financial Institutions Law gave substantial bank-restructuring power to the CB. In the first few months of 1995, the Central Bank intervened in 14 private banks. This extensive liquidity supply came at the expense of a strong fall in international reserves and monetary liabilities (as soon as the Mexican crisis hit end-December 1994). By mid-March, the fall had been so important that *"the margin for further [CB] support was virtually exhausted without violating the Convertibility Law"*.

#### CRISES, INTERVENTION AND EXTERNAL LIQUIDITY:

At that time, the situation in the real sphere was particularly stern. "The credit squeeze and fiscal tightening, together with the uncertainty surrounding the presidential elections in mid-May, triggered a sharp decline in both consumption and investment in the second quarter of 1995." And "the credit squeeze and decline in consumption had a strong adverse impact on public sector revenues" further constraining the government. Following the weakening of the economy, the unemployment rate had jumped.

With Central Bank's liquidity completely constrained and evident risks for the currency, national authorities were forced to intervene greatly and seek external assistance to provide relief to the financial system and the CB. In early March, the government created two trust-funds to act as lender of last resort. The first managed the privatization of provincial banks and the second helped restructure and/or merge distressed private banks. Banks were suspended. The government negotiated as well an extension of the EFF with the IMF and "large scale financial assistance from multilateral organizations and the international financial community."

In April 1995, the CB set up a limited mandatory program of deposit insurance. To ensure liquidity provision, the CB opened contingent repurchase agreements with 13 international banks, to be used discretionarily. Authorities also took policies to reinforce public finances. These measures were further complemented and reinforced as part of the SBC conditional program approved in April 1995. The latter aimed notably at restoring liquidity in the financial

sector and increasing the system's robustness. The program managed to increase financial stability and agents' confidence. What truly marked the bounce backs of confidence and deposits was the victory in May 1995 of President Menem. This news managed to coordinate expectations on a new path.

#### FINANCIAL RESTRUCTURING, AND REBOUND.

From mid-May on, as deposits recovered, the liquidity constraints that weighed on the central bank diminished. The government regained access to world financial markets on August 1995. The financial system exited the crisis segmented and profoundly changed. By the end of the year deposits had completely recovered but lending still lagged behind prior-crisis levels.

Nevertheless, if external financial conditions worsened, Argentina's external current account adjusted rapidly from a deficit to a surplus. This reflected "the slackening in domestic demand, strong foreign demand (particularly from Brazil) and good agricultural crops." Overall through the year, exporting firms gained on external competitiveness, which put the economy back on previous tracks.

#### C. Main sources

- \*\*IMF (Sep. 10, 1995), *"Argentina: Recent Economic Developments"*. SM/95/248
- \*\*IMF (Sep. 11, 1995), *"Staff Report for the 1995 Article IV Consultation and Request for Modification of the Extended Arrangement"*. EBS/95/150
- IEO (2003), *"The role of the IMF in Argentina 1991-2002"* (draft issue paper for IEO (2004)).
- IMF (Oct. 8, 2003), *"Lessons from the crisis in Argentina"*
- IMF Press Releases: PR/95/18 and PR/96/15

### 5.4.2 Argentina – 1998:2002

#### A. Crisis iD

##### Financial crises:

- 2001q1 – sovereign debt default: IMF emergency program in January + partial default/debt moratorium in December.  
*The augmentation [ in IMF external financial assistance ] announced in December 2000 and formally approved in January 2001 had a favorable effect, but it was short-lived. [...] At the end of December, following the resignation of President Fernando De La Rúa, the country partially defaulted on its international obligations.*
- 2001q4 – banking crisis: in November, bank runs leading, inter alia, to a deposit freeze and a bank holiday.

*In late November 2001, there was a renewed bank run in which more than \$3.6 billion in deposits was lost over three days, bringing the cumulative decline since the beginning of the year to \$15 billion (or 20 percent of total deposits). On December 1, the government introduced wide-ranging controls on banking and foreign exchange transactions, placing limitations on deposit withdrawals and purchases of foreign exchange for travel and transfers abroad.*

- 2002q1 – currency crisis: in January, the president announced the end of the convertibility plan.

*In early January 2002, Argentina formally abandoned the convertibility regime and replaced it with a dual exchange rate system.*

### **Business cycles:**

*(exp.)* 1995q4:1998q2 – strong expansion (on average, +1.7% per quarter)

*(rec.)* 1998q3:2002q2 – worst economic crisis in recent history: 4 years, cumulated losses of -22.7% of real GDP. After an initial year in recession with -1.3% losses per quarter (98q3:99q2), the country stagnated between 1999q3 and 2000q4 (-0.07% per q.). From 2001q1 to 2002q2, economic losses skyrocketed (-2.9% per q.).

*(exp.)* 2002q3:2008q2 – strong recovery associated with important poverty reduction.

### **Origins of the crisis:**

- Key shocks and events:
  - External shocks (financial contagion): As Russia defaulted on emerging market bonds in August 1998, Argentina, as other EM, suffered from capital outflows and an increase in spreads and interest rates. This hampered private investment and consumption (closely related to the sovereign debt spread, a proxy for consumer's confidence in the economy). Note that the currency board helped dampen the effect on the domestic economy.
  - External shocks (t-o-t. and commodity prices): Argentina underwent t-o-t depreciation of 6% driven mostly by falls in world prices for commodities upon which Argentina depended.
  - External shocks (trade and financial contagion): Through the Mercosur, Argentina was dependent on regional demand, especially from Brazil. When the latter experienced in 1998-99 a crisis and later devalued its currency in 1999, these perturbed Argentina. If the export sector was too small to transmit and amplify these shocks, their lowered confidence in economic prospects and increased real interest rates, thus decreasing sharply domestic demand and revealing the evermore precarious state of

the public sector's external indebtedness. Overall these external shocks prolonged economic malaise.

- External shocks (financing costs): the US Federal Reserve's intervention (increasing policy rates inbetween mid-99 and mid-00) exogeneously constrained Argentina's financing costs.
- Failed crisis management: throughout the crisis, the national authorities announced measures that either failed to impact the economy enough, &/or were fundamentally inconsistent, signaled deviations from existing mandates and program targets, &/or acted as signal for desperate measures which multiplied confidence losses.
- Vulnerabilities
  - Political uncertainty acted as a key trigger behind the 1998 economic downturn. President Menem's aspirations to a third mandate awoke past political crises' ghosts, increased political uncertainty and undermined confidence. Inbetween February 1998 and November 1999 (Court ruling against the possibility of a second reelection), several political campaigns shed light upon deep political divides and fractions. These latter prove a key hindrance to an effective government command of economic and political developments. Overall, several deep-rooted social and political factors helped magnify and transmit the crisis: social unrest, widely perceived corruption... These structural tensions had historically been solved through high inflation periods, but had now forced an increase in the public sector's indebtedness.
  - Weak political institutions, a complicated fiscal architecture – provincial deficits transferred to the central government<sup>10</sup>, low data quality/availability – and a shallow tax base – widespread tax evasion and noncompliance – weakened greatly the fiscal sphere. This increased the reliance upon foreign capital inflows and financing. If off-budget transfers tapered off over time, on-balance spending and interest rates kept increasing, further constraining policy space. Overall, the fiscal vulnerabilities were such that:
    - (i) the system was bound to be vulnerable to slower growth,
    - (ii) room for fiscal maneuver was hampered by the previous decentralization process and structural weaknesses both on the expenditure and the revenue side
    - (iii) a rising debt ratio, generated steadily increasing financing needs and vulnerability to shifts in market confidence.
  - Argentina faced an ever widening trade deficit as the growth of imports overthrewed that of exports.

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<sup>10</sup>Fiscal problems can, inter alia, be rooted to the provincial level and to (i) the little success met by the federal government in its efforts to enhance fiscal discipline, (ii) constitutional limitations and (iii) lack of reliable and timely data.

- \* In particular, the export sector was very small which (i) limited its ability to act as a buffer when domestic demand fell, (ii) increased vulnerability to shifts in market sentiment and (iii) implied a high debt-to-export ratio, hence conditioning external sustainability on export growth.
  - \* These issues stem from the fact, when it liberalized, the sector was underdeveloped and firms faced a real appreciation which prevented exports expansion and diversification. Moreover, being part of the Mercosur also diminished the incentives to diversify exports.
  - \* Finally, the strong growth of imports, highly responsive to income changes, was a key driver behind the rise in the external debt ratio during the 1990s. Economic growth, while mechanically decreasing the debt-to-gdp ratio, contributed to debt accumulation through a wider trade deficit.
- The shallowness of underdeveloped domestic financial markets, low domestic financial intermediation, low profitability of banks, little recourse to equity financing and a high exposure to the public sector participated to the build up of the country's extensive reliance upon foreign currency securities (and the dollarization process). This also prevented the build up of domestic savinds and increased internal imbalances. This increased the vulnerability of the banking system to an economic slowdown, an exchange rate devaluation and a public sector default.
  - Structural reforms petered or regressed after 1995 leaving important nominal rigidities behind. In particular, the labor market faced high downward frictions preventing adjustment through wages. After the doubling of the unemployment rate to 12% around the Tequila Crisis, employment did not recover over the 90's. The labor market had, historically, been protective of workers out of a political desire for social cohesion and fairness – a key pillar of the Argentine 'social' pact, coined by the IMF as "*an additional element hampering Argentina's ability to cope with external shocks*". This left too little place and flexibility for enhanced job creation.
  - The Currency Board compounded vulnerabilities and inconsistencies across the system. It had been narrated as the fundamental keystone of the whole system and concentrated and associated all existing pressures. The implied impossibility of an exit of the board, due to associated high costs, cristalized all problems. Note that, given side vulnerabilities across the whole system, legal and institutional costs to change the regime were not the most important issue here.
- \* The convertibility plan entailed, in downturns, fiscal dominance of the policy regime, left as the only macro-stabilizing tool. Second, it prevented the CB to act as Lender of Last Resort for the financial system, hence requiring the government to have low public debt and enough margin for intervention should liquidity conditions worsen. Third the currency board's viability depended upon

government credibility, itself a function of fiscal solvency.

- \* The currency board acted as a major engineer of the dollarization of the economy, which later proved lethal to mismatched private and public balance sheets. Hence it accentuated vulnerabilities on the financial and real spheres and ensured that any devaluation would deal a fatal blow to the economy.
  - \* Exiting the currency board remained an impossible idea until late in the crisis (2000's) and associated to huge costs. Political at first as President Menem had built his success upon the exchange rate regime. Political again as there was strong support for the plan both domestically and internationally, and no politician would have rationally chosen to exit. Finally, before 1998, there were very little times at which both emerging markets were not stressed and the idea of setting an exit path was on the table.
- Argentina benefitted from an overly optimistic view on its growth potential that (i) deflected interest from the public debt dynamics ; (ii) maintained a false impression on policy-makers skills to face and adapt to pressures – a trust bonus associated to the 1995 crisis ; (iii) decreased the incentive to reform the economy at a sustained pace and magnifying the government complacency bias – which was reinforced by the IMF's weak enforcement of fiscal conditionality in its programs and (iv) mistook the impressive growth gains as an indication of a new steady state whereas they resulted from temporary windfalls – catch-up from a low level of growth (post hyperinflation bounce back) and a temporary increase in durable consumption and private investment.

### **In a nutshell:**

*"Like other recent financial crises in emerging markets, the Argentine crisis stemmed from a combination of fragility in balance sheets and the inability to mount an effective policy response. In Argentina, the fragility that turned out to be critical was in the public sector debt dynamics, which were made explosive by the effects of a prolonged economic slump and the difficulties in rolling over debt. The inability to mount a policy response stemmed from a combination of economic constraints and political factors – notably, as in many previous crises, insufficient political support and resolve."*

Argentina's crisis was associated with one of the worst recent recessions. The episode lasted over four years. The initial economic downturn was caused by external shocks compounding with political uncertainty and cyclical correction. Argentina had been coined a growth success story and the country's performances and the currency board were lauded as an example for others.

Over the 1990s, the currency board came to be the cornerstone of the entire Argentine system, concentrating the trust of all agents in the currency, the sovereign, future prospects etc. Yet, this came at the expense of several missed (or under-discussed) vulnerabilities and imbalances. The trade sector had failed to grow and diversify, labor market were still facing high nominal downward frictions, the financial system if apparently well capitalized, had remained shallow and highly dependent on foreign capital.

More importantly fiscal performance/sustainability was impaired by structural weaknesses and deeply rooted socio-political tensions. This was all the more problematic as the convertibility plan transferred macro-stabilization and emergency liquidity provision mandates to the government. The dollarization of the government's balance sheet moreover forced the government to fiscal solvency to avoid any damaging increase in risk premia and external borrowing costs.

As soon as the economic recession settled in, there was little room to maneuver to avoid a crisis. Crisis management was marked by huge political crises (resignations, corruption scandals, dislocation of political support groups...) and misconceived policies that contributed to the fall in confidence and economic activity. Strikes, bank runs and social protests shook the country as economic activity collapsed. Elected President de la Rúa resigned on December 20th. In three weeks that followed, four other presidents occupied the post and subsequently announced and confirmed partial default and a change in the exchange rate regime.

## **B. Narration**

### **Context:**

#### THE PERKS OF FULL-ON WASHINGTON CONSENSUS: NARRATING A GROWTH SUCCESS

Over the 90's, growth in Argentina was impressive. The economy bounced back well from the 1995 crisis. High inflation had been tamed and the introduction of a currency board, by limiting money-financed deficits, had rebuilt confidence. Once inflation had resorbed, despite less rationale for maintaining the peg, the convertibility plan was strongly encouraged by (inter)national authorities as a strong confidence enhancer.

The financial system was small in size but banks were, in appearance, sound and well capitalized. Yet many of the reforms suggested by the IMF to boost the stability of the financial system through the mid 90's involved a discussion/renewals of the CB mandate. This already hinted at some limits of a pure currency board and might have participated to private agents' future crises expectations.

The country benefitted from low cost access to world capital markets. The Washington Consensus view dominated the broad policy agenda of deregulation, liberalization and structural



reforms. In 1996, Michel Camdessus, acting managing director at the time, strongly lauded Argentina's economic and financial feats. His speech, available here, is perhaps the best illustration of (1) the bias that blurred the IMF policy view before the crisis and (2) the best prediction of what would precipitate a costly crisis.

*For a number of years, the Fund shared such lessons with Argentina to spread the word about the "silent revolution" that was transforming countries from inward-looking, heavily regulated, undercapitalized economies into stable, outward-oriented, rapidly growing ones. (...)*

*And a few years ago, Argentina became part of this revolution, moving decisively to overcome structural impediments and eliminate distortions. (...)*

*My intention, then, is not so much to disseminate the lessons we have learned elsewhere - but to draw lessons from Argentina's experience that we can share with others. (...)*

*And finally, a word on governance. Without question Argentina has come a long way in deregulating its economy: establishing a more transparent regulatory system; introducing a legal system that is not only independent and impartial but swift to the task and in step with the times, thereby ensuring certainty as to the law; and otherwise enhancing the confidence of savers and investors. Nevertheless, there is still work to be done. Is it not reasonable to believe that this recovery of confidence also reflects to some extent the expectation that this process will continue to be strengthened? This expectation of good governance ought not to be disappointed in this new environment where all countries are competing for the market's confidence.*

Michel Camdessus (May 27th 1996), Speech on *Argentina and the Challenge of Globalization*

The IMF support to Argentina was in part driven by the responsibility assumed by the institution in directing the country's policies away from crisis. At the eve of the crisis, despite a widespread recognition of vulnerabilities and imbalances, Michel Camdessus kept 'coordinating' economic and financial agents' expectations around a success story. *"On October 1st, 1998, the performance of Argentina received the attention of the world when President Carlos Menem shared the podium of the Annual Meetings with the IMF Managing Director, who characterized "the experience of Argentina in recent years" as "exemplary". The Managing Director further remarked: "Argentina has a story to tell the world: a story which is about the importance of fiscal discipline, of structural change, and of monetary policy rigorously maintained".*" (IEO, 2004).

In truth, reality was dire.

#### THE TRUTH BEHIND GROWTH: FRAGILITIES, INCONSISTENCIES AND RIGIDITIES

Since 1991, the country had been deregulating and liberalizing heavily under the auspices

and external manna from the IMF. With underdeveloped domestic markets, this nevertheless came at the cost of heavy dependence upon external financing flows, both for the private and the public sector. With the dollarization of the economy, the currency board self-reinforced itself as the cornerstone of the whole system's sustainability.

Under these terms, fiscal policy proved to be (1) the sole tool for macro-stabilization and liquidity insurance on financial markets and (2) theoretically bound to government credibility and fiscal solvency. In practice, fiscal policy was constrained by (i) a complex and inefficient fiscal architecture ; (ii) frequent off-budget transfers and (iii) widespread tax evasion and non-compliance. Over the 1990s, the government rarely met its fiscal targets, but this never sullied markets' and agents' confidence nor the IMF support to the country, disregarding formerly stated program conditionalities.

Faced with a real appreciation of the currency after the liberalization, Argentina's export sector failed to diversify and grow. With little foreign currency revenues from trade, external debt sustainability was (i) dependent on the continuous growth of the sector and (ii) made vulnerable to shifts in market sentiments. Moreover, the dollarization of the economy had exposed private agents' balance sheet to drastic risks in case of a devaluation.

In a currency board framework, without any possible external adjustment, one needs to be done internally. Yet, the real economy also suffered from nominal rigidities and especially downward frictions on wages. Structural reforms had always been on the agenda. After the unemployment increase in 1995, the country never recovered as reforms petered out or even regressed. Overall political decisions often depended upon a commitment to further social cohesion and fairness. The public sector absorbed a huge share of employment up until in the crisis.

Overall, the currency board relied heavily on trust: in the currency, in the sovereign, in economic and financial prospects and in social betterments. Private agents expectations would thus be a core transmission channel for the crisis. An overconfidence in the present situation drove the national authorities to complacently avoid reforms while the IMF turned a blind eye.

**Triggers: key news, shocks and decisions:**

*"With the economy operating above potential in the first half of 1998, the initial downturn occurred as consumer confidence was sapped by external financial shocks and domestic political uncertainties, compounded by tighter monetary conditions and traderelated shocks; thereafter, the structural weaknesses came into play."*

After the 1997 Asia-originated Emerging Countries International Financial Crisis, even if prospects looked a bit more worriwome, the currency board managed to shed the economy from

wide fluctuations. In february 1998, an IMF program expected a recovery to potential output as soon as 2000 with continuously improving domestic and external macroeconomic indicators.

#### EXTERNAL SHOCKS, POLITICAL UNCERTAINTY AND ECONOMIC DOWNTURN

Beyond a cyclical correction, a series of external financial shocks came to disrupt Argentina's financial markets (Russia's default in 1998q3, LCTM crisis in 1998q3, fall in commodity prices, later increased with Brazil 1999 devaluation) and trigger the downturn. As foreign investors risk aversion increased, Argentina faced an increase in risk premia interest rates and borrowing costs, partially losing access to markets. This further constrained private investment and increased the spread vis-a-vis US-Treasuries. Overall, as market confidence fell, so did private consumption. The effect of trade contagion from the Brazilian partner were dealt with an announcement by the CB to further commit to an even starker dollarization of the economy. If this temporarily soothed expectations, the perturbations had settled in.

These shocks affected the economy because they combined with a global politically uncertain environment in which news of tensions and dissensions frequently agitated the socio-political spheres. In particular President Menem's relentless push for adapting the constitution to allow for a second reelection bashed domestic and foreign agents' confidence. It exacerbated oppositions between and inside political parties. These more than ever visible divisions contributed to undermine trust and confidence in better days.

Overall these shocks and uncertainties proved damaging for fiscal solvency. In the run-up to the elections in October 1999, an increase in government spending limited the downturn and set the ground for a very mild pick up. Yet, the elections that concluded on the nomination of President De la Rúa in December 1999 were the theater of many internal fragilities and the show of the political authorities' inability to aggregate broad political support.

#### **Unfolding and crisis management:**

##### GROWTH STALL, DEBT DYNAMICS AND POLICY DILEMMA

Once the recession had started, depression and regression were almost unavoidable. As growth slowed down, a vicious debt dynamics set into place, driven by an adverse differential between interest rates and growth. The government first responded timidly and started contractionary fiscal policies only in 2000. Meanwhile, despite sizable structural tightening, government financing needs skyrocketed, further speeding up debt dynamics.

In parallel, the appreciation of the USD and a dry-out of emerging financial markets kept increasing Argentina's borrowing costs. The national authorities had literally no policy instrument to stimulate the economy without compromising debt sustainability. The accumulated stock of sovereign debt combined with the currency board's constraint on policy mix forced the

government into status quo, unable to give any decisive impulse to the economy. Small patches failed to reverse confidence losses, and risk premia kept rising to the continuous slippages. As the economy deteriorated, the disappointing news on real growth and inflation reinforced the policy dilemma faced by the government. At that point, faced with the unbearable stigma and political cost of negotiating pre-emptive debt restructuring, the sole remaining hope to stop vicious debt dynamics and bolster agents' confidence was an economic recovery.

#### CURRENCY BOARD, ADJUSTMENT AND STRUCTURAL WEAKNESSES

The modest room for monetary policy entailed in the currency board was also exacerbated by global emerging markets conditions. In practice, the exporting sector was too small to absorb the fall in domestic demand. Even if external adjustment had been possible, the necessary devaluation would have been far too big to be conceivable. At the same time it struggled with increased pressure from real exchange rate appreciation and falling commodity prices, underlying a need for downward adjustment. Yet nominal and real rigidities prevented any adjustments, unemployment rose and consumer confidence maintained its fall. At that point, the exchange rate regime had moved from "confidence-enhancer" to "confidence-damaging".

Yet, no doubt were expressed towards the currency arrangement so far. The foreign currency exposure of both public and private agents made it impossible to exit the peg without default.s and worse consequences. It was too late to use the exchange rate to provide potential relief. Structural weaknesses hampered policy reactions and prevented economic stimulus. Negative labor prospects had nevertheless agitated the social sphere beyond repair. National strikes and manifestations regularly halted the economy from February to June 2000.

In August and September 2000, allegations on bribes and corruption were carried against the government. The latter was forced to justify itself in any way necessary to maintain political trust. In October, the coalition in power collapsed as the prime Minister resigned. At the same time during fall 2000, the country lost access to voluntary sources of funding, pushing the government to ask for a new program at the IMF.

Late 2000, grave concerns about exchange rate and debt sustainability contaminated the whole system.

#### 2001: THE CACOPHONY OF POLICY INTERVENTIONS

Throughout 2001, as economic and financial conditions deteriorated, national authorities announced a wide set of measures to curb the now high economic losses. In January 2001, the IMF granted the country additional financing backed by a program including fiscal adjustment and structural reforms. Markets reponded positively. Yet, the hiatus was elusive as strong political opposition manifested against the measures. The government's actions prove too small to disrupt the vicious cycle on increasing interest rates, falling growth and fiscal underperformance.

Very quickly, it became obvious that the program's objectives would end up exceeded.

In March, over three weeks, two ministers of Economy resigned, afflicting yet another fatal blow to the current political situation. The latter was starting to drown in chaos as political alliances faltered and national strikes were announced. On March 20th, Domingo Cavallo was appointed as minister of Economy. The nomination aimed at using his experience as the 'founder of the convertibility plan' to gain popular support both domestically and internationally. Yet, he introduced a series of heterodox policy measures that were perceived by market participants as desperate, impractical or counterproductive. As confidence eroded throughout the first quarter, spreads continued to widen and positive prospects to falter away.

In April 2001, the central bank implemented a pseudo-devaluation by introducing, for foreign trade on non-energy goods, a parallel reference exchange rate based on a basket of USD and EUR<sup>11</sup>. Rather than stimulating the economy, this measure further harmed confidence. Until mid 2001, the banking system had proven relatively resilient, capitalization & liquidity wise. The modification of the parity initiated bank runs. Later in the month, the CB Governor was replaced over alleged charges of money laundering<sup>12</sup>. In June, the CB managed to implement a voluntary debt swap, offering temporary breathing space to the economy. Yet, as the amount traded exceeded markets' expectations, the measure increased concerns over public sector solvency. Mid-2001, the CB charter was amended to give more room for maneuver and liquidity injections.

In July 2001, the government passed a law setting a path to a zero-deficit target. There were considerable skepticisms regarding how social sphere would respond to the program, thus questioning its feasibility. Moreover, spreads were already too high for the policy to have any effect. Soon large-scale deposits withdrawals resumed. Banks relied upon government securities to meet liquidity requirements. Any haircut to sovereign bonds would entail serious liquidity problems for financial institutions. For market participants, banks' balance sheets were weak and highly exposed to the government due to politically motivated lending decisions.

In September 2001, the IMF provided new funding to restore market confidence. Given present circumstances, the program displayed evident weaknesses. In particular, the IMF introduced USD 3 billion to help restructure debt, which was misinterpreted by market participants and fueled risk aversion. With upcoming elections, political support for the government collapsed and manifestations spread out. In November, as a last attempt, the government announces additional efforts to restructure public debt.

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<sup>11</sup>Exporters received a transfer for the difference between the two rates, whereas importers had to pay the difference. By reducing (increasing) the cost of foreign trade for exporters (importers), the CB reproduced the price effect a devaluation would have had on the foreign trade sector.

<sup>12</sup>At this stage it feel redundant, but every single news added to risk aversion and confidence losses.

The worst case scenario was now unavoidable.

#### THE DEBACLE

Beginning of November, the country's long term grading was lowered by Standard & Poor's to Selective Default. By the end of the month, the country witnessed both a run on private sector deposits and flight to quality (November 28/30). National authorities introduced a set of controls on banking and forex transactions, but the population's discontent vis-a-vis overall policy management was too high. Strikes, riots and protests took the streets as economic activity collapsed. Tax revenue fell, provincial and federal governments' deficits exploded. On December 5, the IMF announced no further disbursement would be made under ongoing program.

The social tragedy culminated with a count of 20 deaths on December 20th, when President de la Rúa resigned. Three days later, interim president announces a partial default on external debt. He resigned a week later. (alongside the president of the Senate). Interim president Duhalde is elected on January 1st, 2002 for a one year mandate. On January 3rd, the new president confirms the debt moratorium and announces the end of the convertibility plan (for a dual exchange rate regime). A month later, the dual exchange rate regime is unified but the government introduces an asymmetric pesoisation of banks' balance sheets to spare firms and corporates from currency mismatches. This policy shifted the trouble from the non-financial institutions to banks, which finished overkilling troubled institutions. Impaired banks prevented any strong recovery after the crisis as they had no longer the means to circulate liquidity.

#### C. Main sources

Given the severity of the episode and the implication of the IMF in the crisis, I rely upon the Fund's own evaluation and that of the Independent Evaluation Office (IEO). The IEO was introduced after questions on the implications of Fund recommended policies in the making, management and solving of the crises that hit emerging markets at the end of the 90's. The IEO is an internal department in the IMF, which is independent and has a critical view on the Fund's Policy Views. Its staff relies on similar risk assessment methodologies but aims at providing a critical role and evaluation of the Fund's policy views and recommendation.

In particular, the report on present episode has a huge level of details on the unfolding and the sequencing of events. I substitute the report (and similar IMF publications that aimed at taking stock of the Argentina disaster) to usual article IV and Recent Economic Development (numerous over the period 1997:2003).

- IEO (2004) (as well as the draft issue: IEO (2003) *"The role of the IMF in Argentina 1991-2002"*).
- IMF (Oct. 8, 2003), *"Lessons from the crisis in Argentina"*
- IMF (May 27, 1996), Speech by Michel Camdessus, managing director of the IMF titled

"Argentina and the Challenge of Globalization" at the Academy of Economic Science – 96/11.

- IMF (February 04, 1998), "IMF Approves Three-Year Extended Fund Facility for Argentina" – PIN 98/01
- Numerous other IMF Press Information Notices covering 1996-1998<sup>13</sup>.
- CB Governor P. Pou's article in *Finance and Development* (IMF, March 2000). "Argentina's Structural Reforms in the 1990s".

### 5.4.3 Argentina – 2012:14

#### A. Crisis iD

##### Financial crises

- 2014q1 – currency crisis (devaluation in January 2014)  
*Policy inconsistencies were exposed in early 2014 when mounting balance of payments pressures culminated in a sharp devaluation of the peso. To curb the rapid fall in reserves, the central bank devalued the currency by 23 percent in January, tightened some foreign exchange regulations, and raised policy interest rates.*
- 2014q3 – sovereign crisis (July 31st - arrears of payments with *Vulture Funds*.)  
*In the ensuing days, the Argentine government refused to offer the holdouts better terms than those of the 2005 and 2010 debt exchanges, and the inability of interested parties to reach a negotiated settlement by July 30, 2014 (when the grace period for end-June interest payments expired), resulted in the non payment of any obligations on Argentina's foreign-law governed restructured bonds from that day onward.*

##### Business cycles:

(*exp.*) Slowdown over 2011

(*rec.*) 2011q4:2012q2 – Short and costly recession (-6.1% cumulated losses) followed by a slightly slower recovery (0.8 times average expansion growth).

(*exp.*) 2012q3:2013q3 – Rebound followed by stagnation at a ca. 0.7% growth over 2013 (+7.5% cumulated gains).

(*rec.*) 2013q4:2014q3 – Recession, -4.0% cumulated losses, followed by a slow recovery (0.5 times average growth in expansion).

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<sup>13</sup>I do not rely intensely on Press Information Notices, Speeches and Transcripts as a source for my narration. I did read an important number of such press releases for Argentina when defining the initial methodology. I didn't chose to follow this line given the extreme cost of reading dozens of press conferences transcripts. For Argentina, given the peculiarity of the country and the often troubled relations with the Fund, they do offer an interesting complementary hinsight. They also shed light vividly on the bias and the ideologies that might have blurred the IMF's staff in writing the reports.

(*exp.*) 2014q4:2015q2 – Expansion (+4.6% cumulated gains).

### Origins of the crisis:

- Key shocks and events:
  - Natural Disaster (severe drought 2012)
  - Commodity prices windfall and t-o-t shocks
  - Change in trade with major partners (Brazil (2012+14), China (2014))
  - "*Vulture Fund*" related Court Rulings
  - Revelations of inaccurate official statistics
- Vulnerabilities
  - Inconsistent monetary/fiscal/forex policy mix
  - High BoP pressures on the exchange rate
  - Lack of access to international financial markets
  - Historical lack of confidence in the economy

### In a nutshell:

Overall the currency crisis that affected Argentina in 2014 can be seen as the direct consequence of three things:

- an economic slowdown exacerbating pressures on the exchange rate
- an inconsistent expansionary policy mix backed by inexact data
- the lack of access to world markets at a time of favorable debt dynamics and need for financing.

The sovereign debt crisis can be impeded upon three main elements that interacted as Argentina was completely cut out from international financial markets:

- the conflicting ideologies of the Argentine authorities and people with that of a minority of international investors.
- an economic recession affecting all spheres of the economic and financial system - banks excluded – and preventing any room for manoeuvre
- looming expectations and a loss in confidence by most economic agents

I chose to treat the 2014 and 2015 events separately as my opinion is that they differ in nature. Yes, the elements that made the 2014 crises and the associated vulnerabilities (transferred and/or amplified) are detrimental explanations of the 2016 event. But, quite similarly, the 2014 events can be dated back to the 2002 crises and even to the accumulated Argentine past of crises and confidence losses. Nevertheless, the policy management and the events that lead to the 2016 devaluation deserve a different narration.



## B. Narration

### Context:

After the 2002 deep economic crisis, Argentina bounced back well. At the time of the 2006 article IV mission, the outlook is positive and most sectors are said to be recovering. The main concern made by the board of the IMF looks at the inflationary pressures that increasing aggregate demand puts on the economy vis-à-vis a slow-paced change in supply.

The executive board concludes that a continuous process of structural adjustment and a coherent macropolicy framework, should secure Argentina's future. The 2002 financial crisis has left the country traumatized and the authorities and the population blame the IMF. After the 2006 article IV mission, it will take 10 years for the IMF to return to the country.

### GROWTH AND EXTERNAL EXPOSITION:

Over the years leading to the 2014 crisis episode, Argentina grows at a high growth rate (6 to 9% over 2007-2010). The economy is highly dependent upon her foreign exchange revenues and recovers well from the GFC shock in 2009. The country benefits from positive and unexpected terms-of-trade gains and good performance among trade partners (Brazil and China).

A still depreciated exchange rate and expansionary government's initiatives support the manufacturing sector's growth. Meanwhile, reflecting good economic performances and negative real interest rates, public and private consumption have grown steadily. Government interventions have alleviated poverty and the income distribution slowly ameliorated.

Overall if exports grew steadily, imports outpaced them and trade surpluses slowly transformed into deficits, fueling the decrease in current account balances over the years. After the 2002 crises, Argentina has lost access to world financial markets. The financial account balance remains weak in the period leading to the 2014 crisis and mostly signals capital outflows. The banking sector remains small with respect to historical standards but banks benefit from good conditions (available liquidity, high intermediation spreads as well as little non-performing loans).

### POLITICAL BLOC AND POLICY MIX:

During negotiations in 2005 and 2010, Argentina's authorities manage to exchange a great majority of remaining sovereign debt (91%). If access to foreign financing remains nihil, to finance important public expenditures in face of decreasing primary surpluses, the government has exploited various means of financing (transfers and debt from public firms and banks, temporary advance and borrowing at the central bank, "arrears of payments"). Overall, strong real growth and low borrowing costs create a favorable debt dynamics. Argentina's public debt to gdp ratio falls.

Over the years the central bank has seen her mandate evolved. In March 2012, a new Charter is adopted that expands the existing monetary and financial stability mandates with "the pursuit of economic development with social inclusion". Beyond 'fighting' inflation, she also intervened frequently on foreign exchange markets to preserve nominal exchange rate stability. Finally the

increase in central bank credit to the government during 2010–11 and the ensuing numerous foreign exchange measures aimed at containing the domestic demand for dollars confirmed a loose expansionary monetary stance.

### **Triggers: key news, shocks and decisions:**

Three main triggers explain the ignition of the 2014 crises:

#### **EXTERNAL SHOCKS AND ECONOMIC SLOWDOWN:**

Facing a **lower demand from Brazil** and a **severe drought in 2012**, the economy enters a brief recession in 2012. If exports fall subsequently to this slowdown, the introduction and tightening of controls on imports in early 2012 increases their fall. Both the trade and the current account balances ameliorate. Nevertheless associated controls on foreign exchange transactions further constrain private investment and key sectors of the economy (e.g. construction).

To fight off the recession and boost economic recovery, both monetary and fiscal policies continue to be expansionary. The primary balance keeps deteriorating, central bank's deficit financing continues and broad money stock increases. Faced with changing BoP imbalances, the central bank is forced to sell foreign reserves and increase the pace of nominal depreciation. However the tight forex controls question the coherence of the interventions and a gap widens between parallel market and official exchange rates.

Overall, following the economic slowdown in 2012, external fragilities have exacerbated the pressures on national authorities. This further highlighted existing policy inconsistencies that would pertain should growth remain low.

#### **ISSUES ON DATA QUALITY:**

Since early 2007, CPI and GDP data provided by the National Statistics Institute is being heavily debated and contradicted by private estimates. Bad-quality CPI data proved to be key in the misunderstanding and mismanagement of the rising crises (e.g. underestimated measures for the real exchange rate). As a result, in July 2011, the IMF considers Argentina as having breached her obligation to provide data of accurate quality (cf article viii of the IMF statute). Despite the technical assistance provided by the Fund, the Executive Board addresses Argentina a statement of concern in september 2012. Soon after, in february 2013, the Board sets off a procedure for a declaration of censure. This procedure constrained national authorities to ammend and correct existing data if to avoid a declaration of ineligibility to use the general resources of the Fund. The revision process lead to the provision in early 2014 of a new national CPI indicator and revised GDP data.

As stated by the IEO in 2016, "data deficiencies were identified among the contributing factors for failing to foresee and/or mitigate the severity of the major economic crises of recent times." In the case of Argentina, the struggle to back policy decisions with data of good quality surely impacted the ability of the authorities to manage well the unfolding of the crisis. Moreover, the inability of economic agents to rely firmly upon the information provided by the government

hampered their decisions and trust in the future, which surely nurtured households and firms' concern as well as risk perception by financial agents.

#### *VULTURE FUNDS AND REMAINING SOVEREIGN DEBT PROBLEMS*

The last set of triggers that explain the 2014 episode relates to the follow-up of the 2010 debt renegotiation. In 2011, a group of hold-out investors, that had not participated in the debt exchange operation, filed a case against Argentina. They argued the authorities had violated the *pari passu* clause by conditioning debt repayment to the sole creditors involved in the debt renegotiations. In december 2011, the Southern District Court of New York ruled in favor of the investors which lead to a series of appeals by Argentina up to the US Supreme Court over 2012-2014. As explained below, this series of events directly lead to the 2014q3 default. The fact that the procedure started in 2011, as the economy was slowing down, further prevented Argentina from gaining access to world markets at a time when she desperately needed to.

#### **Unfolding and crisis management:**

##### POOR ECONOMIC PERFORMANCES AND FALL IN CONFIDENCE:

Following the 2012 recession, the economy bounced back in 2013 although growth stalled in the second semester. Exports to Brazil temporarily recovered, agricultural output as public spending increased before the october 2013 Congressionnal Elections some sectors were positively affected (e.g. construction). Nevertheless the economy remained vulnerable in an environment defined by the lack of confidence in the data and trust shocks to the authorities (even so Fernandez's party and allies manage to win the majority of seats during the elections). This climate of incertitude as well as interventionist policies still prevented the growth of private investment. The latter failed to boost economic performances with a contribution of less than 20% of GDP since 2006. 2012-13 confirmed the lack of confidence in the economy of domestic real actors of the economy.

##### INCONSISTENT POLICIES, RISING DOMESTIC AND EXTERNAL PRESSURES

The continued expansionary policy mix heavily pressured inflation and the balance of payments. Private inflation estimates reached 28% by end 2013, against 11% for official statistics. Net capital outflows increased drastically over 2013 despite a tightening of capital controls. FDI inflows also declined. The financial account balance deteriorated. At the same time the current account deteriorated as well, reflecting a widening in both primary income balances and the trade balance. The latter deteriorated significantly as the government simultaneously crowded out private investment and domestic production through price regulation and boosted private energy consumption through subsidies.

##### PARALLEL EXCHANGE RATE DISSONANCE AND CURRENCY DEVALUATION 2014Q1

All these BoP pressures impeded the central bank's room for manoeuvre and foreign reserves

depleted at an increasing pace over 2013. At the same time the price of the USD kept rising on parallel markets. The fact that the authorities allowed for a faster depreciation rate of the official exchange rate only partially tackled the problem. The tightening in capital controls that was decided inbetween March and December failed to alleviate the pressure. In January 2014, following no apparent trigger, central bank reserves declined again and at an accelerated rate. By the end of the month, the central bank devalued the peso by 23%, capital controls further tightened and policy interest rates were raised.

#### EXTERNAL SHOCKS AND DETERIORATING DOMESTIC IMBALANCES

If deemed appropriate (WEO - April 2014), the intervention failed at stabilizing the economy. Over 2014, Argentina was impacted by a fall in demand of major trade partners (China and Brazil), and a fall in commodity prices (starting June 2014). Despite the devaluation, the currency steadily appreciated in real terms over 2014. Harmed by an overvalued currency, exporting firms' competitiveness fell. The sector, a keystone of the Argentine economy, was gravely affected. Yet, net exports contributed positively to growth, as imports contracted more given the fall in private consumption. With consumer confidence and real income falling, aggregate demand contracted. All the more so than fixed investment receded as well reflecting terms-of-trade shocks, a fall in business confidence and difficulty in accessing credit. In 2014, only financial intermediation, other services and agriculture contributed positively to growth.

#### MONEY & INFLATION ; WAGES & EMPLOYMENT

The January devaluation was followed by a burst of inflation (80%). To protect the currency, the central bank associated the devaluation with an increase in policy rates (from 16 to 20 percent). They remained high over the year. Inflation reversed as soon as February and decreased over the year, stabilizing around 18% (new official estimates). It was associated with a rise in nominal wages of around 30%. On the labor market, a sharp fall in the labor force participation and a spike in public employment managed to contain the increase in unemployment to only +0.5% over 2014.

#### ACCESS TO CREDIT, CROWDING-OUT AND FISCAL DEFICITS

To further prevent inflation, the central bank contained money creation and sterilized most of her activities. Nevertheless, she continued financing the growing government demands as the public deficit reached -2.5% of GDP. Without contributions from the CB and the social security system, the deficit would have reached -5.6%. This crowded out private credit as banks' exposure to the government grew. Measures implemented to constrain banks to lend to the private sectors failed at taming the decline. With domestic financing drying up, resorting on international markets was still not an option and FDI inflows were low. The lack of external financing was becoming even more stifling for the government, whose spending kept growing. This reflected, on one hand, gross transfers to the private sector, two thirds of which were

directed at the already imbalanced energy sector. On the other, increasing nominal wages and public employment paced real spending on wages and pension which accelerated quickly. In March, June and September the government was able to tap domestic financial markets.

#### LEGAL CONSTRAINT AND POLITICAL CHOICE: SOVEREIGN DEFAULT 2014Q3

Over 2014 and its pungent recessionary economic environment, the authorities struggled with the country's past problems with debt. Argentina submitted a proposal to the Paris Club as soon as January 23rd as the central bank tackled the currency crisis with a forced devaluation. The agreement concerned the Paris Club, Repsol and the International Center for the Settlement of Investment Disputes. As 2014 unfolded, stories of corruption and a badly managed crisis resulted in a rise in social and political turmoil. Given the high political cost of settling with the remaining hold-out investors, Fernandez' government continuously refused changing her proposal based on the grounds of already high economic losses. This stance was supported by the population, who manifested against the "*vulture funds*". In June, the US Supreme Court refused to consider Argentina's case, leading to a status-quo situation. On July 31st the grace period ended and Argentina defaulted again, although the authorities had the resources prepared to repay non-holdout investors. The default occurred during the last quarter of recession with all economic and financial indicators depressed.

#### BOP PRESSURES, CONFIDENCE LOSSES AND CRISIS MANAGEMENT

With continuous current account deficits and increased payments over dollar denominated debt, pressures on the balance of payments kept increasing. This precipitated the fall in foreign reserves and a widening of the gap between the official and parallel exchange rates. This dire loss of confidence peaked in september 2014. Several measures were then implemented as the economy recovered starting in 2014q4. The government negotiated and activated a RenMinBi swap with the People's Bank of China. Authorities agreed with exporters of cereals and oilseeds to sell more of their inventory stocks and surrender a certain amount of dollars during the last quarter of 2014, as well as the sale of 4G telecommunications licenses at the end of 2014. Intensified foreign exchange controls complemented the set of reforms. This allowed gross international foreign reserves to recover, narrowed the gap between official and parallel exchange rates and tamed futures markets' expectations.

#### RECOVERY AND POLITICAL CHANGE

As 2014 ended and 2015 started, the economy recovered. Due to high political uncertainties as well as large and rising domestic and external macroeconomic imbalances, concerns remained high. Upcoming october elections would prove key in the rebound. Fernandez's decision to uphold the hold-out investors up to a default certainly gained her support in the population but she could not run for a third mandate. Ongoing revelations on corruption and the crisis missed management weakened her party's position greatly. In october a new president, Mauro Macri

took power. He introduced a vast plan of reforms and austerity measures. End 2015 the country entered yet another recession leading to yet another currency crisis. This further augmented losses but the recession ended in 2016q2.

Overall the two episodes are fundamentally linked. I treat them as separate, because the shocks that gave rise to the economic and currency crisis are different in nature (more detail provided in next section).

### C. Main sources

- IMF – PR11/279, PR212/319, PR13/33, WEO Conf. Apr. 16 2013, ST13.01.25, ST13.10.12, PR13/497, ST14.01.23, PR14/102, ST14.04.11, PR14/267, ST14.07.24
- IMF – Staff Report on "Strengthening the Contractual Framework to Address Collective Action Problems in Sovereign Debt Restructuring "
- IMF – Country Reports 16/67 "Argentina: Economic Developments 2013"
- IMF – Country Reports 16/68 "Argentina: Economic Developments 2014"
- IMF – Country Reports 16/69 "Argentina: Economic Developments 2015"
- IMF – Staff Report for the 2016 Article IV consultation
- IEO (2016) "Behind the Scenes with Data at the IMF: An IEO Evaluation"

## 5.4.4 Argentina – 2015:16

### A. Crisis iD

#### Financial crises:

- 2015q4 – currency crisis  
*Remove the various FX controls and let the exchange rate float, unifying the official and parallel exchange markets, and correcting the overvaluation of the peso through a 40 percent depreciation of the official rate in December 2015.*

#### Business cycles:

- (*exp.*) Slow but steady increase in growth in 2014q4:2015q2 (+4.6% cumulated gains)  
(*rec.*) 2015q3:2016q3 – Recession, -4.0% cumulated losses.  
(*exp.*) 2016q4:2018q1 – Expansion; +5.4% cumulated gains.

#### Origins of the crisis:

- Key shocks and events:
  - External shocks (summer flash foods, terms-of-trade shocks)

- Political news and shocks (corruption scandals, political divides) in the run-up to the October 2015 elections
- Political U-turn after president Macri's election
- Vulnerabilities
  - Build up of external imbalances and BoP pressures: No access to international capital markets, weakening external demand (Brazil, China), widening current account deficit, dual exchange rate market, depleting international reserves...
  - Microeconomic distortions: *Distortions at the micro level included an extensive network of administrative controls (for example, trade barriers, foreign exchange restrictions, and price controls) and a business environment that eroded competitiveness and undermined medium-term growth.*
  - Political interventionism, inconsistent policy mix and domestic imbalances: *unsustainably high consumption levels, historically low levels of investment, and large fiscal deficits financed by money creation, which led to high inflation" ; weakening of the institutional framework for economic policymaking, perhaps most evident in the loss of credibility of the national statistics agency.*

**In a nutshell:**

*In the first few months of the new administration, bold steps were taken. (...) These measures, while necessary to lay the foundation for robust future growth, inevitably had an adverse impact on the Argentine economy which had already began to contract in the last quarter of 2015.*

*While the exact form of the counterfactual is difficult to predict, failing to address the unsustainable path that the Argentine economy was on would have led to even worse outcomes that have been all-too-familiar to Argentina – potentially a run on local currency assets, spiraling inflation, an abrupt fiscal adjustment as financing sources were exhausted, and/or a depletion of foreign exchange reserves and balance of payments crisis.*

The 2015 crisis episode takes roots in the political gridlock that ensued from the previous crisis. With no access to financial markets, accumulating imbalances and heavy microeconomic distortions, economic prospects soon deteriorated. Summer floods fragilized further the economy.

Despite wide support in the population after denying *Vulture Funds* their legal due, president Fernandez's crisis management rose several critics. Scandals of corruption further weakened and divided the Peronist party as elections narrowed at the end of 2015. The leader of the opposition, president Macri, got elected with a frail majority.

He implemented a wide reform agenda including an exchange rate devaluation and a commitment to float. The austerity measures that meant to rebuild confidence precipitated the recession but allowed the economy to start recovering mid-2016.

Based on the IMF's analysis, had the country not changed policy course, losses would have been much greater.

## **B. Narration**

### **Context:**

#### RECOVERY, EXPANSIONARY POLICIES AND THE REGAIN IN CONFIDENCE

Most of the policy steps taken to resolve previous balance-of-payments pressures – currency crisis in January 2014 – fueled an economic slowdown over 2014. Inflation spiked and harmed consumer confidence. Terms-of-trade shocks, lack of foreign financing and limited domestic credit, and deteriorating confidence contributed to a fall in private investment. Growth rekindled at the end of the year as the government intervened importantly to support the productive sector. As balance-of-payment pressures soothed over the year and agents expected policy-changes at the end-of-2015 presidential elections, confidence rekindled.

#### INTERNATIONAL SITUATION, LOOMING GROWTH PROSPECTS AND INCONSISTENT POLICIES

As 2015 started, Argentina's external economic situation deteriorated, driven by a slowdown in main trading partners, deteriorating terms-of-trade and generalized defiance vis-a-vis emerging markets. This weighed negatively on agents' expectations. Committed to tackling the growth engine, the authorities maintained their expansionary policy mix and a high degree of intervention. As a result, the primary sector deficit widened and inflation remained high. Growing fiscal demand and a decrease in Central Bank sterilization efforts further constrained the credibility of the forex regime. The gap between official and parallel exchange rates widened.

#### BOP PRESSURES, ACCUMULATING IMBALANCES AND INCREASING DISTORTIONS

Without any proper access to financial markets<sup>14</sup>, as the trade balance slowly turned into widening deficits, balance of payments pressures resumed and accumulated again. Steady real appreciation and an overvalued currency hampered external adjustment. Late april, the government negotiated and activated a renminbi swap line with the People's Bank of China which alleviated temporarily the tensions. Yet, to hold together the inconsistent policy mix, the authorities deepened administrative controls (trade tariffs, forex and price controls). This further pressured the business environment, competitiveness and medium-term growth prospects.

#### POLITICAL STATUS QUO AND POLICY ORIENTATION

Previous crisis had signalled a weakening of the institutional policy-making framework, which undermined globally trust in the government. The end of the year general elections prevented any important policy changes and imbalances kept accumulating. Over 2015, revelations of

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<sup>14</sup>A trauma inherited from the 2014 "Vulture funds" related default.



corruption and critics of Fernandez crisis management weakened her party's position greatly. Sergio Massa gave a voice to the anti-Kirchner wing of the Peronist movement opposing Daniel Scioli's promises to pursue ongoing policies. This fragilized the governing Peronist party. The majority of candidates avoided criticizing Fernandez's past position on the hold-out investors. Yet, many political debates discussed the limits of Fernandez economic policies as the reduction in poverty had stalled.

### **Triggers: key news, shocks and decisions:**

#### FLASH FLOODS

In August 2015, the country experienced record rains that precipitated floods in the provinces north of Buenos Aires. The natural disaster further destabilized the economy, already struggling with difficult external conditions, by constraining agricultural export revenues. A state of emergency was declared but runner-up and city mayor Mauricio Macri criticized the government's reaction to the natural disaster and the role of Daniel Scioli – Fernandez's party candidate – as Buenos Aires governor. If flash floods proved destabilizing for the ongoing political debates, they more importantly marked the beginning of an economic deceleration. This further constrained the costs of political inaction and accumulated domestic and foreign imbalances.

#### 2015 GENERAL ELECTIONS: FROM STATUS QUO TO DRASTIC POLICY CHANGE

In the October 25, 2015 elections, Scioli and Macri ran toe to toe (37.1 vs 34.2%) with Massa lagging behind. The ensuing month, Macri won the ballotage vote. He claimed to end the preceding era of macroeconomic 'mismanagement' with a strong political commitment to reforms. Even without a clear political majority – Peronist candidates had obtained two thirds of the votes in the October elections – Macri's win marked a shift towards pro-business policies and away from interventionist policies.

### **Unfolding and crisis management:**

#### POLICY U-TURN AND THE DECEMBER 2015 DEVALUATION

Macri's economic program aimed at (i) reducing strains on the exchange rate regime ; (ii) kickstarting private investment ; (iii) increasing fiscal discipline and (iv) restoring central bank credibility. Table 5.6 presents the main policies Macri's government implemented over the beginning of its mandate. Interestingly, they echo item per item the concerns alluded to by the previous IMF staff report<sup>15</sup>. The 2016 article IV consultation commented on said reforms as being "indispensable" and the sole way to avoid usual 'inflationist spirals', 'run on local assets' and 'balance of payments crisis'. As a cornerstone to exit present economic and financial gridlock, on December 17th 2015, the government unified exchange rates, devalued the currency by 40% and let it float (currency crisis).

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<sup>15</sup>In 2016, for the first time since 2006, national authorities agreed to resume relations with the Fund. Previous staff reports were published publicly ex-post on February 26th, 2016.

**Table 5.6:** 1st measures of Macri's economic program

Exchange rate	40% depreciation in Dec.2015 Removal of main FX controls Commitment to floating FX regime
Fiscal position	Fiscal consolidation plan Zero primary balance objective for 2019 Increase in utility tariffs, except for the poorest.
Monetary policy	Transition towards inflation targeting Reverse fiscal deficit monetization
Institutions	Provision of new data on inflation, GDP, etc
BoP	Eliminate export taxes on agricultural products Negotiate a settlement with bond-holders Regain access to financial markets

Selected measures identified in the 2016 Article IV consultation staff report.

#### RECESSIONARY EFFECTS OF AUSTERITY MEASURES

If deemed unavoidable by the Fund, the reforms had a negative effect on the economy. Alongside weaker demand from trading partners and bad weather conditions, these measures exacerbated the recession that had started just before the elections. The depreciation and the rise in utility tariffs pushed inflation up. To control prices, the central bank quickly reduced money aggregates' growth, which impacted adversely the economy. With real wages and consumer confidence falling, consumption contracted in the first half of 2016. At the same time, public spending fell as the government tracked corruption and waste spending, further constraining the aggregate economy.

#### REBOUND, CONFIDENCE AND RECOVERY

In the second half of 2016, the government adapted policy course. They provided moderate fiscal stimulus through public infrastructure projects, transfers to the provinces, an increase in selected benefits and subsidies and a reduction in the tax-burden for small and medium enterprises. Soon, as confidence restocked, private consumption and investment gained momentum. With inflation expectations falling, the central bank lowered interest rates and contributed to stimulating the economy. Occasionally, the central bank managed to build-up reserves, notably as the government issued external sovereign debt.

#### DANGEROUS DYNAMICS AND CONCERNS

If the trade balance and balance of payments developments ameliorated, the government's halt in deficit reduction increased the risks that future increases in financing costs might engender a negative debt dynamics.

Moreover, if employment managed to recover partially during 2016, most of the jobs created were low income and self-employed. These further constrained the social sphere as poverty rates remained high and heralded future political struggle.

### C. Main sources

- IMF (Feb. 29, 2016) "*Argentina: Economic Developments*". CR/16/69
- IMF (Oct. 19, 2016) "*Argentina: Staff Report for the 2016 Article IV Consultation*". CR/16/346
- IMF (Dec. 1, 2017) "*Argentina: Staff Report for the 2017 Article IV Consultation*". CR/17/409

### 5.4.5 Argentina - 2018:19

#### A. Crisis iD

##### Financial crises:

- 2018q2 – currency crisis  
*The central bank responded to these pressures by raising interest rates by 300 bps on April 27, accompanied by substantial sales of international reserves amidst disorderly market conditions. This was insufficient to relieve pressures on the peso. On May 3, the central bank raised rates a further 300 bps. What was intended as a mechanism to stabilize markets, however, became a source of panic, and investors rushed to offload peso assets. On May 4, the government announced a package of measures to restore investor confidence.*
- 2018q2 – sovereign crisis  
*The Executive Board of the International Monetary Fund (IMF) today [June 20, 2018] approved a three-year Stand-By Arrangement (SBA) for Argentina amounting to US\$50 billion (equivalent to SDR 35.379 billion, or about 1,110 percent of Argentina's quota in the IMF). The Board's decision allows the authorities to make an immediate purchase of US\$15 billion (equivalent to SDR 10,614 billion, or 333 percent of Argentina's quota).*

##### Business cycles:

(*exp.*) 2016q4:2018q1: cumulated gains +5.4%

(*rec.*) 2018q2:2019q4 (end of sample): cumulated losses -7.3%

##### Origins of the crisis:

- Key shocks and events:
  - Natural disasters: worst drought in 50 years during the summer 2018.
  - Difficult external financing conditions: In 2018, USD strengthening and US monetary policy normalization. In the summer 2019, higher volatility on all emerging financial markets.

- Various policy announcements often shocked the economy by increasing volatility and uncertainty as they often failed to convince market participants. Corruption scandals also shocked social cohesion.
- Vulnerabilities
  - Growing gross fiscal financing needs driven by rising interest payments as the government relied increasingly on foreign currency public debt. Combined with a depreciating exchange rate, this heralded risks of negative debt dynamics.
  - Widening current account deficit and higher debt amortization increased gross external financing needs.
  - Nominal frictions and the government's gradual fiscal adjustment policy prevented disinflation.
  - Overvalued currency (driven by the inflation inertia and strong capital inflows).
  - High political uncertainty associated to the 2019 presidential election cycle.

**In a nutshell:**

*Despite these efforts, a gradual approach to fiscal consolidation, combined with a tightening of global financial conditions, a poor harvest, and the introduction of a tax on nonresident holdings of short-term central bank paper, generated significant anxiety among market participants. Starting in mid-April [2018], Argentina came under abrupt balance of payments pressures as both domestic and foreign investors decided to liquidate their position in onshore peso assets.*

Faced with mixed political support and high poverty, Macri's government implemented fiscal adjustment gradually over 2017. This fueled macroeconomic vulnerabilities, including rising gross fiscal and external financing needs. In particular, interest payments on foreign currency debt increased, exposing the country to a negative debt dynamics should the currency depreciate and the economy slow down. Overall, if the government managed to boost confidence, the latter remained frail and markets often doubted policy announcements. The central bank commitment to disinflation and the exchange rate regime came to be particularly questioned.

Over 2018, following prospects of US monetary normalization, external financial conditions worsened for Argentina. The country was also exposed to natural disasters (hot and dry conditions followed by a drastic drought). This impacted the agricultural exporting sector a lot and meant a fall in foreign exchange revenues. Overall, these drove a peso depreciation and soon after a generalized run on short term peso liabilities which forced the central bank to increase interest rates hugely and the government to request external assistance at the IMF.

**B. Narration****Context:**

### RECOVERY, MIXED POLITICAL SUPPORT AND GRADUAL ADJUSTMENT

Over 2017, the economy recovered driven by strong private investment and consumption as well as increasing job creation. By the end of the year, the government managed to win senatorial elections in large population areas. Yet, the coalition failed to secure a majority in both houses of Congress. With mixed political support, the government set about reforming the economy in a gradual way to maintain social consensus. This was especially true for fiscal adjustment reforms.

### RISING FINANCING NEEDS, IMBALANCES AND VULNERABILITIES

Largely as a by-product of gradualism, several vulnerabilities failed to resorb. If the primary deficit remained broadly unchanged, interest spending increased rapidly, as monetary financing and financial repression were not possible any longer. To compensate, the government issued foreign currency debt obligations. As a result, the overall fiscal deficit and fiscal financing needs increased strongly. In parallel, with the abolition of most FX controls and a regain in imports, the current account deficit widened. If capital inflows allowed the central bank to rebuild part of its reserves, a high current account deficit combined with debt amortization increased markedly external financing needs. Over 2017, strong nominal wage growth, insufficient fiscal retrenchment and a continued normalization of utility tariffs resulted in inflation inertia and a slowdown of disinflation. Combined with strong capital inflows (used to finance the government budget), this led to an overvaluation of the peso.

### **Triggers: key news, shocks and decisions:**

#### POLICY CHANGE AND THE RETURN OF DOUBTS AND UNCERTAINTY

On December 28, 2017, the government revised inflation targets upwards, which was followed by the central bank decreasing interest rates over January 2018. Overall, these policy changes rose concerns on central bank independency and commitment to stable inflation. As agents started expecting higher future inflation and with a high inflation inertia, the country moved away from its disinflation path: inflation stalled at 25% over most of 2018.

#### RISING US INTEREST RATES, NATURAL DISASTER AND AND EXTERNAL PRESSURES

By the end of 2017, global financial conditions tightened as the US dollar strengthened and markets expected (and priced) a faster pace of US monetary policy normalization. This dented investors' appetite for Argentina's international bonds.

Starting in November 2017, up until March 2018, the country faced hot and dry conditions which reduced drastically crop yields. Heavy rains later in 2018 – one of the worst droughts over recent decades – further precipitated agricultural production and hence commodity exports revenues.

### **Unfolding and crisis management:**

#### SPECULATION AND PANICS

With high interest rates, short term central bank paper became a crowded carry-trade among asset managers. Yet, as the peso depreciated, returns shrank. Announced in December, the introduction in late April of a tax on nonresident holdings of short-term central bank paper further discouraged investors. By early April, domestic and foreign agents looked to exit their peso position. The run on short term peso liabilities accelerated. This pressurized national authorities, notably forcing the central bank to intervene importantly and sell reserves over the month. On April 25 alone, the central bank sold up to USD 1.5 billion.

#### RABID INTERVENTION AND CURRENCY CRISIS

As April ended, the portfolio rotation out of domestic currency short term liabilities turned into a generalized run on Argentine assets. The central bank tried to halt the dynamics by raising interest rates but failed at doing so. On May 4th, the government announced a new set of measures including another increase in interest rates bringing the total cumulated increase to 1275 bps in one week (currency crisis). The government also announced a decrease in the fiscal deficit target. Yet, this announcement failed to convince market participants as rising interest payments had not been taken into account when estimating fiscal needs.

#### EXTERNAL ASSISTANCE AND MODERATING PRESSURES

On May 8th, president Macri announced having started discussing a financial arrangement with the Fund. If this didn't halt the depreciating trend of the peso, the information was welcomed by financial markets and pressures on the currency waned. On May 16th, the government was even able to roll over maturing short-term central bank papers, confirming the moderation of exchange rate pressures. On June 7th, the country was granted an exceptionally large Stand-By Arrangement with the IMF (sovereign crisis), which helped a regain in confidence. The program was notably backed by several austerity measures. Over July, spreads fell and market indices started rising again.

#### UNANTICIPATED DEVELOPMENTS AND THE EROSION OF CONFIDENCE

In August, the country faced several perturbations. Emerging markets worldwide were confronted with increased volatility on financial markets, which reduced available external financing for Argentina. Several corruption scandals irrupted over the summer as well, further fragilizing social cohesion. Moreover, the government's communication on the new program was insufficient to gain the trust of market participants. As the central bank intervened on forex markets inconsistently with newly established rules, this further fueled the erosion of confidence as risk premia and currency pressures rose once again.

#### MISSED ANNOUNCEMENTS, VOLATILITY SPIKES, AND MONETARY TIGHTENING

At the end of August, president Macri announced having reached an agreement with the IMF to draw program resources in advance to fund government's fiscal needs for 2018-19. Yet,

the uncertainty surrounding the announcement amplified exchange rate volatility and further augmented spreads. On September 3rd, the president announced a cabinet reshuffling and a new tightening of fiscal policy targets, with little effects on forex markets.

By the middle of the month, the central bank started implementing new measures to counter disorderly market conditions and tightened the monetary stance.

#### RECESSION DEEPENING AND THE TASTE OF RECOVERY

Contractionary monetary policy helped strengthen the peso, the stability of which helped reduce inflation. Nevertheless, driven by the negative weather shock and tight financial conditions, the recession had deepened greatly by September. Private consumption and investment contracted strongly, labor market conditions worsened and poverty rose. Alongside the peso depreciation, the recession helped reverse existing external imbalances as the trade deficit lowered. Yet, as 2018 ended, the economic environment seemed to ameliorate. In January and February 2019, capital started flowing back into the country. This was driven by positive global financial conditions, a stable currency and high interest rates. In turn this caused a fall in the benchmark rate and appreciation pressures.

#### THE RETURN OF POLITICAL UNCERTAINTY

Yet, over 2019q1, inflation and inflation expectations rose again. Combined with worsening financial conditions, flows into peso assets reversed in March. With elections ahead, political uncertainty started increasing as well, which intensified the dynamics. This led to a sharp sell-off of Argentine assets in late April. Over May and June, financial markets calmed down as, notably, changes were made to increase the consistency of the monetary policy and FX intervention framework.

#### CONFIDENCE SHOCK AND MACROECONOMIC INSTABILITY

On August 12th, at the open primary elections, opposition candidate Alberto Fernandez dominated the results against Mauricio Macri. During the campaign, Fernandez had taken a strong stance against the IMF's program which increased concerns and uncertainty. As a result, capital flight accelerated and the exchange rate kept depreciating as balance of payments pressures accumulated. On August 17th, after a week of extreme volatility on forex market, the ministry of finance resigned. As market access became severely curtailed, in September the government announced several measures including the postponement of payments on short-term local notes, the reintroduction of capital flow measures and the intention to extend the maturity of existing debt. The measures were not enough to reverse the dire economic situation the country was in.

#### POLITICAL ALTERNATION, SOCIAL CHALLENGES AND DEBT SUSTAINABILITY

On October 27th, as expected, Alberto Fernandez got elected president. His economic pro-

gram aimed mainly at alleviating the costs on the population of the recession and austerity measures. Yet the government faced an unsustainable debt situation and, in February 2020, legislation was adopted so that the executive has the power to negotiate a debt restructuring.

### C. Main sources

The latest publicly available country report detailing economic and financial developments is dated July 3rd 2019. A Staff technical note on public debt sustainability, published in March 2020, provides incomplete information on recent events. Hence the narration stops at the beginning of 2020. On August 4th, 2020, a debt restructuring agreement was reached which ensured the country would not, once again, be cut from world financial markets.

- IMF (Dec. 1, 2017) "*Argentina: Staff Report for the 2017 Article IV Consultation*". CR/17/409
- IMF (Jun. 13, 2018) "*Argentina: Request for Stand-By Arrangement*". CR/18/219
- IMF (Jul. 30, 2018) "*Argentina: Stand-By Arrangement - Review under the Emergency Financing Mechanism*". CR/18/298
- IMF (Oct. 17, 2018) "*Argentina: First Review under the Stand-By Arrangement*". CR/18/297
- IMF (Dec. 11, 2018) "*Argentina: Second Review under the Stand-By Arrangement*". CR/18/374
- IMF (Mar. 26, 2019) "*Argentina: Third Review under the Stand-By Arrangement*". CR/19/99
- IMF (Jul. 3, 2019) "*Argentina: Fourth Review under the Stand-By Arrangement*". CR/19/232
- IMF (Dec. 12, 2019) *Transcript of IMF Press Briefing* <https://www.imf.org/en/News/Articles/2019/12/12/transcript-of-imf-press-briefing>
- IMF (Mar. 19, 2020) "*Argentina: Technical Assistance Report – Staff Technical Note on Public Debt Sustainability*". CR/20/83





## Chapter 6

# Unconventional times, unconventional approaches

In the journey that has been this PhD, someone once mentioned the idea of a theory of crises. Writing the final lines of this dissertation, I cannot change my view that such an idea is impossible. A task too complex to quantify (over such a reduced sample... 54 countries is a bit more than a fourth of existing cases, and the timespan (and data quality) severely degrade the reality of facts). Hence, I tried building a precise (or as precise as possible) set of stylized facts on business cycles, financial crises and volatility, worldwide. Facts that, taken together, could help identify striking patterns, that would call for further enquiries.

Last chapter aimed at drawing potential conclusions on causality-related issues. As informative as the Argentinean case can be, when considering other cases its conclusions remain indisputably subject to critics on external validity. These ideas and the broader question on a theory of crises deserves naturally more work and research. Hence, this chapter aims at addressing future work. To unconventional times, unconventional approaches.

### 6.1 Conventional Policies

The current/imminent/next step:

#### 6.1.1 To macro or not to macro

So far, I have considered real GDP as a ‘good’ proxy for economic activity and have such discussed business cycles from a very aggregated point of view. This is an obvious and undisputable shortcoming of my approach. I plan on extending the data coverage to usual quarterly available data: consumption, credit, debt, current account, interest rates, trade balance, measures of capital flows, investment etc. The first step will consist in applying an event study methodology on these indicators. I will focus on windows surrounding the start of a crisis episode to showcase

what are the main macro-financial characteristics and developments, by crisis characteristics. To that end, I will consider the normalized cumulated change of the main variables since the quarter lagging the initial shock, compared to average historical changes. These variables will be used to estimate Markov Switching VAR.

### **6.1.2 Towards a comprehensive coverage of the narrative database**

Continue to expand the narrative database on crises episodes following the methodology developed in chapter 5, section 5.1.

### **6.1.3 Of pathologies, suspects and crises: broadening the scope**

Because I make the stance that the key characteristics of crises is multiplicity, I am bound to extend the number of sources of shocks, vulnerabilities etc. The narrative approach partially tackles this issue. Nevertheless, a first step in this direction could consist in extending the database of crises to include dates (from the literature) on natural disasters, stock-market crashes, housing bubbles, political crises, coups, wars, social unrest, terms-of-trade shocks etc. So far in this dissertation, there is little of the heterogeneity of countries that I have exploited. So far I have considered income groups, (non-)commodity exporters and regional appartenance as the principal components of my analysis. Future databases adressing other fundamental features and sources of heterogeneity will be used, frequency-wise, to complement the database of crises episodes. I have collected data on (i) banking system supervision and regulation (Barth et al) – (ii) market capitalization (World Bank) – (iii) historic sovereign ratings for rating agencies – (iv) exchange rate regimes & capital flow measures & financial and trade openness and liberalization – Chinn-Ito index, trade exposures and Wacziarg-Welch index – (v) measures of institutions – including executive constraints, democray/autocracy, expropriation rights, government effectiveness and judicial independence (La Porta et al, Hall and Jones, World Governance Indicators) – (vi) political regimes (Keefer) – (vii) political institutions (Cruz, Keefer, Scartascini) – (viii) political risk (ICRG) – (ix) political crises and social unrest (INSCR) – (x) Industrialization and Diversification (Temple, and Imbs/Imbs-Wacziarg).

## **6.2 Unconventional policies**

As mentioned several times in previous chapter, understanding the potential effects and limitations of a country's policy arrangement is detrimental to the understanding of the crises that hit the system. National authorities often try to reform and innovate on existing tools to adapt to new situations. During the Covid 19 period, inbetween March and June 2020, 31 developing and emerging market ans 9 small ope advanced economies introduced Asset Purchase Programs to cope with heightened stress on financial markets (Fratto et al., 2020). In many countries, these policies were new and often questioned the central bank's mandate and objectives. In

the article, with my co-authors at the IMF, we analyzed the flow of information provided to market participants on the programs. Interestingly, beyond the volume of information which is easily quantifiable, the style in which the authorities communicated is harder to quantify. A narrative analysis of the textual sources, using hindsight from political science and the tools behind rhetorical analysis, could provide the first steps towards analyzing the construction of the communication of national authorities.

What is important in the case of these asset purchase programs is that they have been coined unconventional ever since their (re-)introduction around the GFC by major advanced economies. Since then, their efficiency and future has been heavily discussed but few countries had ever added it to their tool box. The recent Covid 19 episode shows that these policies do have an effect over the yield curve and in some cases some second round effects on forex and other financial markets. The unconventionality of these measures is bound to be questioned as they offer an ‘easy’ crisis policy. Jamaica has already early terminated its program after a successful implementation, proving that the measure is not bound to structurally change a CB’s mandate, conditional on the program’s implementation criteria.

Beyond monetary policies, other policies have been heavily debated over the years, capital flow measures make for an actual acute illustration of this point. Historical hindsight on the use of these policies during crises could provide significant information and requires a more thorough initial literature review. Unconventional policies are important because they are structurally biased in the conception of most economic and financial agents. As such, the analysis of the role of policy in crises management should concentrate on the relative importance of these policies as potential source of uncertainty/volatility versus a source of innovative crisis resolution.

### **6.3 Unconventional approach for a complex question**

Unconventional, because if this PhD dwells in economics (at least I hope), the last item before the conclusion will draw from a different field. During the lockdown, I happened to read Edgar Morin’s book *Penser la crises* (2020, Champs essais). I felt great echo in the book in many discussions that had underlined my work and in many concepts I had been questioning myself with the stylized facts at hand. As a final reference, this short book is a more thorough and witty jump into questioning the concept of crisis.



# Conclusion

*Choc. Nous y sommes en plein. Nous voici en état de choc. Un état qui se manifeste d'abord par une suppression du temps. Il nous coupe du passé et de ses repères, du présent et de sa routine, mais aussi de l'avenir dont on ne sait pas grand-chose, si ce n'est que rien ne sera plus comme avant. D'imprévisible il est devenu irréprésentable.*

*Du choc à l'expérience, Arthur Dénouveaux & Antoine Garapon (2020/03/26, Tracts de Crise n°17)*

[...]

*La prudence, c'est fait. À présent, il est temps de passer à l'étape suivante: penser, comprendre, interpréter le chaos et prendre le risque de fournir à tous(tes) un minimum de certitudes. C'est le rôle des intellectuels.*

*Le temps de l'Audace, Alessandro Baricco (2020/04/07, Tracts de Crise n°36)*

[...]

*La tragédie est là, au présent, épique. Elle se déroule sous nos yeux dans sa réalité. Mais elle n'est pas nouvelle. C'est le déraillement d'un train qui roule en vacillant sur les rails depuis des années.*

*La pandémie, portail vers un monde nouveau, Arundhati Roy (2020/04/08, Tracts de Crise n°39)*

[...]

*Les grandes crises renversent les doxas des époques qui les ont vu naître. Ainsi, au cours des années 1930, le libéralisme économique hérité du XIXème siècle avait-il volé en éclat.*

*Dans les années 1970, avec la fin des trentes glorieuses et la poussée d'inflation qui avait suivie le choc pétrolier, le keynésianisme avait-il lui aussi été remis en question par un néo-monétarisme jetant l'opprobre sur l'État et l'intervention publique. [...]*

*L'État, source de nos maux selon Milton Friedman, revient en force dans la gestion de la crise.*

*Vertu de crise – définir notre modèle, Daniel Cohen (2020/05/11, Tracts de Crise n°68)*

# Conclusion

*Our history is one of (economic and financial) crises.*

## **Motivations – ex-post**

When asked about my occupation and research interests, the reaction of many persons, often outside the field, is to say that I shouldn't ever struggle to find a job. I am as happy as sad about the fact that I think that this is true. At the very least, it was one of my motivation when starting this research: not the quasi-perpetual job opportunity but the recurring issue that still impacts and threatens many. When compared to advanced markets, developing and emerging markets have historically been more volatile and exposed to currency, banking and sovereign crises. In this dissertation, I review the theoretical and empirical literatures on the structural and conjunctural determinants of economic volatility differentials. I document the importance of business-cycle volatility in shaping varying growth patterns. Theoretically, this is explained by underlying frictions magnifying more hectic and persistent growth shocks as well as external financing costs shocks. The importance of financial frictions and the acknowledged role of financial crises behind important economic losses and volatility settled my research interests upon business cycles and financial crises.

## **Dating crises episodes – a taxonomy**

To analyze empirically the relation between financial crises and economic volatility, I create a new database of 439 (non-)crises episodes covering 15 developing, 15 emerging and 24 advanced markets over 1970q1:2020q1. **I date 200 recessions, 124 currency, 52 banking and 36 sovereign crises.** To date business cycles, I use Markov switching models, which provide a better fit for the heterogeneity of growth patterns. Surprisingly, volatility differentials do not stem from varying dynamics, i.e. more frequent switches between expansion/recession, they can



be traced back to intense fluctuations during recession episodes. **Developing and emerging (vs advanced) markets are, respectively, 8 and 5 times more likely to endure an acute recession**, i.e. with cumulated losses above 10% of GDP. To date financial crises I rely upon empirical approaches for banking and sovereign crises and create a new database of currency crises using a narrative methodology and IMF archives. Currency crises are frequent events, irrespective of the income group. Banking crises occur on average once per country. Sovereign crises are a key stigmata of developing and emerging markets' history. By matching the two databases and focusing on episodes of crises, I am able to analyze countries and episodes over 6 main layers: duration, severity/amplitude, steepness, rebound, **currency**, **multiplicity**. With this taxonomy, I take stock and contribute new facts and results on the relation between financial & economic crises and volatility.

#### **Four crises and a funeral**

**The wide majority of financial crises associate with recessions** and more or less important economic losses. Financial crises triggering during expansions are broadly currency crises and, in a minority of cases, associated with exogenous, often political, developments. **Currency crises, by themselves, are not associated to major economic losses**. The expansionary feature of currency crises in more advanced markets illustrates the ability of an external adjustment to evacuate accumulated pressure and allow the reallocation of liquidity and resources. In less advanced markets, currency crises are more likely to create panics and spillover to other financial crises. In developing markets, this feature is particularly salient as currency crises rarely come alone. Currency crises are associated with half of business cycle volatility in emerging and developing markets, against a fourth in advanced economies. **In developing markets, currency crises are a necessary but non sufficient source of volatility. In emerging markets, currency crises are a necessary and sufficient source of volatility. In advanced markets, currency crises are non-necessary but sufficient source of volatility**. Banking and sovereign crises, a.k.a. pure financial crises, are always associated with intense fluctuations. In less advanced markets, when a banking &/or a sovereign crisis hits the country, the recession is two to three times more intense! Hence, multiple crises involving at least a currency crisis are a key characteristics of developing and emerging markets. Double and triple crises episodes are numerous and repeatedly associated with acute and/or longer recessions. **As markets develop, multiplicity matters less for BC volatility**. Multiple crises are associated with one half of business cycle volatility in developing markets, one third in emerging markets and one eighth in advanced markets. **In developing markets, economic and financial crises combine to generate excessive volatility. In emerging markets, simple economic crises are already an important source of losses and volatility. Multiple financial crises demultiply intensity to generate important macroeconomic volatility. In advanced markets, financial crises by themselves are not a key supplementary factor of volatility**.

### Narrative evidence on the origins of crises

What I capture using this taxonomy and database is a set of characteristics associated with important episodes in time, coined as crises. Crises can be severe, long, multiple, but intrinsically they are complex. **Crises** are episodes in time during which the economic and financial system is brought to the edge of collapse by unforeseen conditions. Crises are times of **heightened uncertainty** and speculation about potential futures. During crises, initial **shocks magnify** as they spill over the economic and financial system. The perturbations come to **pressurize existing vulnerabilities and inconsistencies**. Hence, crises often constrain agents' policy space and are the source of **drastic decisions and policy reactions**. Understanding what gave rise to these pivotal episodes demanded a different approach. To complement the insights from hard data and the sequencing of episodes, I chose to rely upon narrative methodologies and the treatment of the *forgotten soft data*. Narrative contributions complement empirical approaches by extracting information, from qualitative and often neglected textual sources, on agents' perceptions, sentiments and motivations. Given the current momentum of this literature, I contribute by proposing a go-to-guide for the key elements entailed in such methodologies. These approaches rely on textual sources to shed light on the global narrative of ongoing developments. To provide a meaningful and representative proxy, the sources are often diffused among a wide panel of agents, written by reliable authors and/or by insiders to key decision processes. Narrative approaches rely upon a conceptual framework derived from the theoretical literature to treat this qualitative forgotten soft data. Narrative contributions study how agents' perceptions of their environment and underlying motivations drive aggregate developments. I provide two applications of my go-to-guide on IMF archives: a first with the datation of currency crises and a second with the study of the shocks and vulnerabilities at the origins of Argentina's crises.

### Waves of crises, trust debacles and the credibility gap

I write a detailed history of Argentina over 5 episodes of crises in between 1990q1 and 2019q4. I identify the central role of the credibility gap in the country's repeated trust debacles. Argentina's crises cumulated 6 economic, 5 currency, 3 sovereign and 2 banking crises. The country experienced an additional major economic, currency and sovereign crises in 1989 just before the start of the sample. All episodes originate as the result of three types of shocks – (i) political failures and confidence shocks ; (ii) external financing costs shocks ; (iii) forex revenues shocks – and six key vulnerabilities – ( $\alpha$ ) political uncertainty ; ( $\beta$ ) weakened social contract ; ( $\gamma$ ) fiscal needs instability ; ( $\delta$ ) nominal anchors stability ; ( $\epsilon$ ) underdeveloped domestic capital markets ; ( $\zeta$ ) underdeveloped and undiversified export sector. Argentina experienced two cycles of crises. The first cycle was driven by constraints on monetary and forex policies and the concentration of all trust in the currency. Dire financing needs constrained fiscal policy throughout the second cycle. At the end of each cycle of crises, before the final debacle, poverty and inequality

rise threatening an ever weakened social contract. When the latter is about to break, political incentives and biases towards populist interventionism increases. The marginal gains in image, confidence and support appear at their greatest. As soon as confidence shocks hit such a system – and they always do when uncertainty increases – political divides and social unrest cumulate. These developments fuel and feed upon ongoing pressures and transmission across economic and financial markets. For crises to unravel, external financial or trade shocks and discontinuities are needed to precipitate the country from an apparently stable path into a self-fulfilling cumulation of crises and losses. All spheres sub-/con-sequently fall to drastic developments. When trust fails, four horsemen bring down the apocalypse: economic crises on the white horse of conquest, currency crises on the red horse of war, banking crises on the black horse of famine and sovereign crises on the pale horse of death. The herald said to announce their venue seems to be the rumor driving animal spirits in their retrenchments, risk aversion at its highest.

Confidence and uncertainty play a determining role in economic decelerations and recessions or directly in the burst of financial crises. Considerations and confidence in the currency/sovereign/future/economic prospects/social progress vary across agents. The magnitude and scope of these dissensions determine whether the current policy conduct is credible. When the CREDIBILITY GAP widens too much or too quickly, the country experiences crises. Several key crises are associated with episodes of important confidence losses, panics and sudden stops. Trust in the currency is the most frequent and easiest trigger, as are currency crises. Over each wave of crises, the **credibility gap** widens as governing institutions management of economic developments becomes inconsistent and highly criticized. After each crisis episode, part of the confidence in the system remains persistently eroded. When the next series of imbalances and external shocks start pressurizing existing vulnerabilities, constraints on agents' policy spaces accumulate. Future economic prospects are deemed somber by firms and households, confronted with stalling poverty and inequality. At the eve of major elections, political scandals and/or populist announcements weaken confidence and increase dissensions. When confidence first cracks, usually on forex and/or financial markets, troubles and confidence losses soon spillover agents and spheres. Until elections are over, policy interventions fail to convince agents. Social turmoil and market volatility alternate and fuel upon another. Once the situation cumulates, a drastic ideological and policy change is needed to tame the wave and reset the credibility gap. A new governing authority coordinates agents on a new alternative plan supposedly aimed at better crisis management and reforms to address structural concerns, notably on poverty and inequality.

*I am partially sorry if the reader finds the next last section of the conclusion/dissertation too unconventional and anti-academic, he/she can/should stop here.*

### **A final taste of narrative economics**

When I devised the conceptual framework to treat the IMF textual archives and analyze crises episodes, my nieces and nephews asked what it was that I was doing, for work they meant. Words, at that time, failed to structure well enough to make sense for these >10year old children. Given that chapter 6 highlighted future avenues of research this dissertation opens, I take the occasion to conclude this dissertation with the story I will now be able to tell them, as unconventional as it might be.

During my research, I visited a village called Earth, in which countries; which can be thought of as big families; lived, consumed, worked, rested, voted, manifested etc... I went to the village square and visited a local institution's archives, the IMF. The Fund's role in the village is akin to that of a doctor that specializes in treating the economic and financial system that make countries function, develop, grow and sustain. Part of its mandate is to provide technical and financial assistance when a country is in crisis or dire needs of assistance. Part of its mandate includes the surveillance of the health of the global community and of each of its members. The IMF teams of doctors monitor and exchange information with the representatives from the countries to best help the country adjust to unforeseen and ongoing developments, like if the country is catching a cold. Of course, because the institutions has a given/biased view on certain topics, its recommendations can fail to meet the target and even create additional strains on the country. This has happened before, but the institution has and is still evolving.

A country's economic and financial system can be easily understood if you think of a human body<sup>1</sup>. The first two things that define the shape of the country is (1) its skeleton, the structural characteristics and determinants: geography, the institutions, norms, values etc... and (2) part of the integumentary system – the skin and nails – that protects the body and defines part of its interactions with foreigners ; trade and financial development, markets, liberalization, deregulation and globalization. Having given a shape to the country, five spheres are used to describe the aggregate system and articulate how it functions: (3) The first sphere is the nominal sphere. It matches the hearts, blood vessels and the cardiovascular system. The latter irrigates all the body and allows cells and organs to exchange and communicate is the nominal sphere. The currency, as red blood cells, allow agents to exchange goods, services etc... When persons from different countries interact with each other they also exchange information, liquidities resources etc. This comes at a price, which is the effort and trust (more or less important) to put when communicating (verbally and non-verbally with sweat and pheromones) with foreigners. What decides the speed and the allocation of resources throughout the body is the central bank. (4) The second important part of the system is the sovereign sphere, which matches in the human body with the endocrine, urinary and lymphatic systems. Systems of entities in the body

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<sup>1</sup>This paragraph entails some neo-physiocratic aspects as a reference to François Quesnais (18th century).

regulates distant organs according to feedback loops rules and adequate hormones. In practice, the government decides how to allocate resources and best run the day. It collects revenues in different organs and redistribute it in others. The sovereign sphere also regulates part of what is bought from foreigners to sustain and develop when domestic production is insufficient. (5) The next sphere is the financial sphere, which is akin to the lungs and respiratory system. It provides air/liquidity and allows a better/increased allocation of resources throughout the body. Banks and financial institutions act as the intermediaries between cells that prefer saving their wealth for future use and others that are in present need of liquidity for a new project. When the respiratory system functions well, liquidity circulates. When a person catches a cold, alongside a fever, its muscles often cramp. (6) The fourth sphere is the real sphere that entails all economic production-related activities: labor, investment... Firms, workers, unions are well matched with the muscular system that allows the country to grow and adapt to its environment, regulate the temperature, maintain posture etc... Physical activity is what produced the goods, services, financial and intangible wealth that countries produce. (7) The socio-political sphere concludes the description of our system/body. Agents and households in their actions echo several biological systems: they consume (digestive system), save and express (integumentary system – fat and hair), reproduce and transmit (reproductive system), vote and manifest through their political decisions as well as learn and develop human capital (nervous system and the brain). (8) A final element needs to be described if we want to understand how countries sometimes experience crises. What drives the actions and the countries forward through time is a more abstract concept: the mind – conscious & unconscious. In practice, beyond the biological constraints, what drives one's actions is arguably less easy to conceptualize and to measure: hard data and quantitative figures are more difficult to construct for sentiments, spirits, motivations and intents: subjective elements that make the narration that drive a person's day-to-day life.

Often, as humans do, countries drop ill. They might have faced an exogeneous shock, the Covid 19 pandemics for example. They could have put up too much of an effort, over-burnt and be tired for a long time (a.k.a. recession and/or stagnation). They could have caught a pneumonia, as banks closed throughout the country, forcing households and firms into deep liquidity issues (a.k.a. a banking crisis). The country could have severely depleted its currency reserves and be in need of an external transfusion of funds and liquidity. The country could even have been severely bullied on the school playground and be lead to believed the situation was too dire to dodge attacks and critics. The country might faint or the panic might be more costly if the loss in confidence is too wide and sudden (a.k.a. currency crises). In other cases, the country starves so much that the sovereign system fails to regulate and reallocate resources. Poverty and inequality leaves horrid scars on country's body parts (a.k.a. sovereign crises). Finally depression and anxiety attacks are common diseases in village Earth as many countries often fall ill in part because they fail to build sufficient trust in themselves (depressions and trust debacle).

Part of the job the IMF is to keep track of how un-/well countries are going and to monitor the potential sources of trouble in the near future. They usually exchange with the countries and can provide assistance if the country is in need and agrees to undergo a program/treatment of reforms. Yearly or bi-yearly, countries consult with the IMF doctors and staff members. They discuss the current and prospected health of the economic and financial system, ongoing policies and decisions as well as potential reforms, think for example a diet. In my research, I went ahead and consulted these archives for a panel of countries over the last 50 years. I identified episodes in times in which different spheres/systems were highly stressed and forced to adapt drastically. I studied the archives to understand the shocks and vulnerabilities at the origins of economic and financial crises. I also recorded information on the transmission of the crisis through the spheres/systems, the key agents and events that marked the country and the crises, as well as how policy management eased or fueled the crises. As a taxonomist – wannabe doctor in international macroeconomic and financial psychology– I looked up for mention of particular symptoms and developments. What cures, even if artisanal, had been administered? What was the general state of mind of the country and its main agents at the time of the crises? What drove the country to lose confidence? What affected its credibility?

Understanding why these episodes matter and how they unravel is important to understand past policy decisions and 'solutions' and to ideally come up with innovative solutions to better model, understand and adapt to the diseases that plague countries in village Earth. In my work, I try to document the first key facts and results on the key episodes of troubles so as to launch new, perhaps more precise, research projects. This dissertation is, hopefully, but a first try-out.

Crisis as usual



Banksy (1974, 2016)







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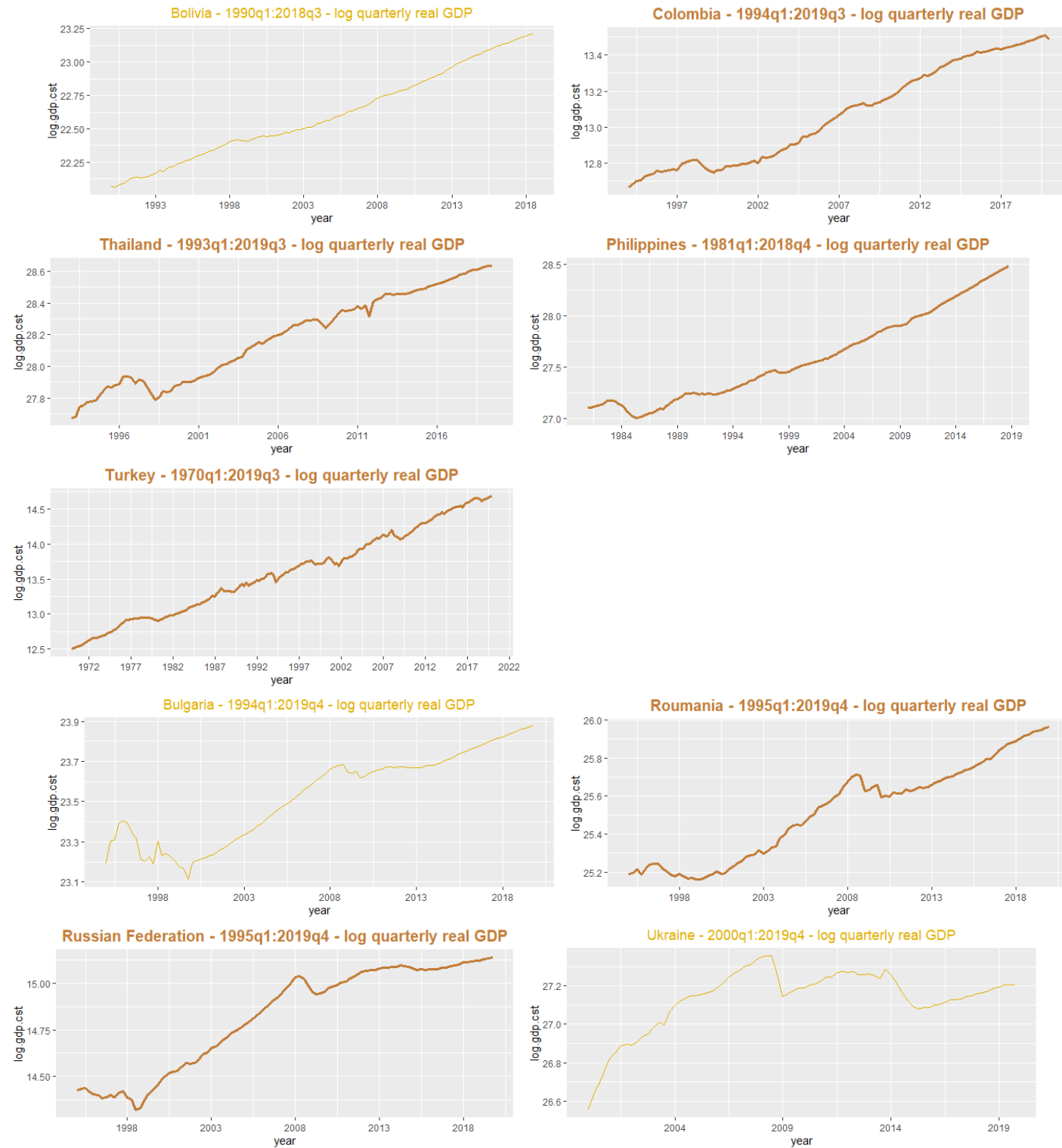


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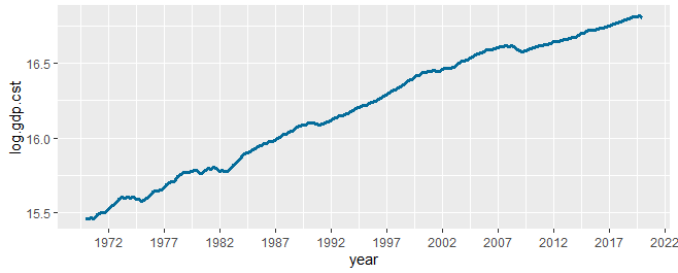
# Annexes

## A Time series for the countries, with crises dates

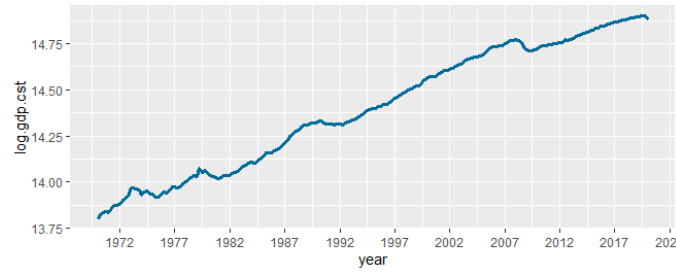




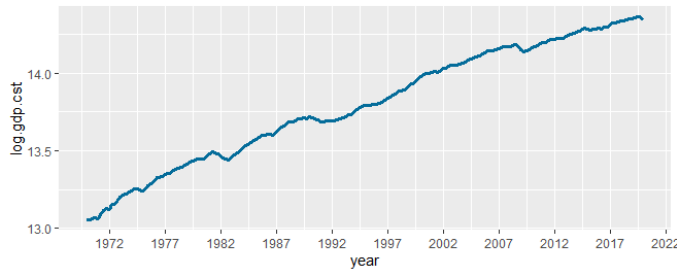
United States - 1970q1:2020q1 - log quarterly real GDP



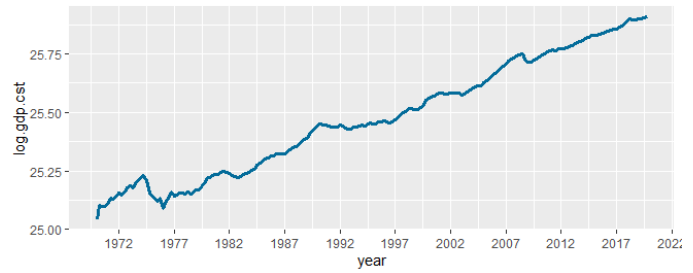
United Kingdom - 1970q1:2020q1 - log quarterly real GDP



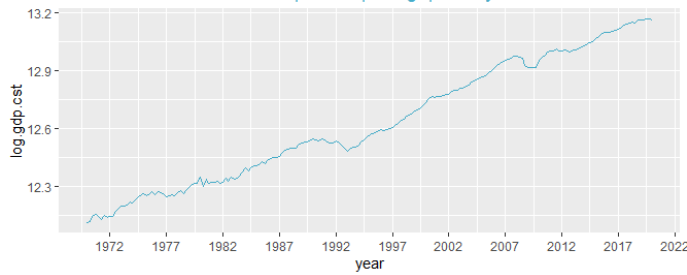
Canada - 1970q1:2020q1 - log quarterly real GDP



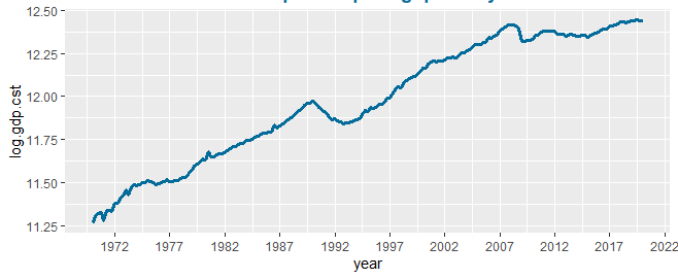
Switzerland - 1970q1:2019q4 - log quarterly real GDP



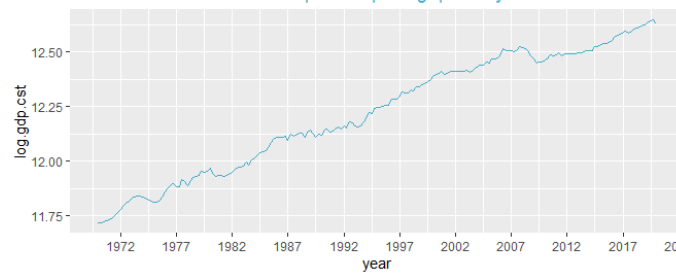
Sweden - 1970q1:2020q1 - log quarterly real GDP



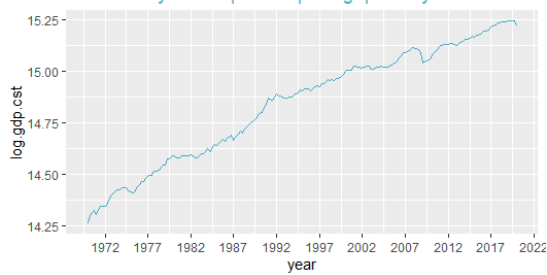
Finland - 1970q1:2020q1 - log quarterly real GDP



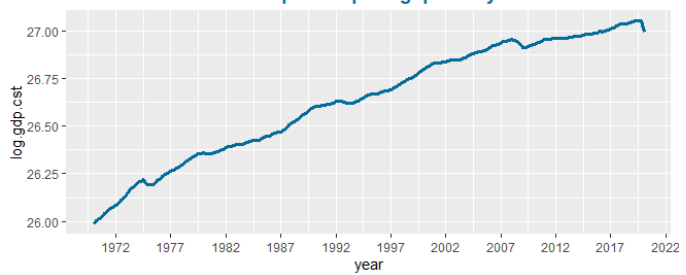
Denmark - 1970q1:2020q1 - log quarterly real GDP

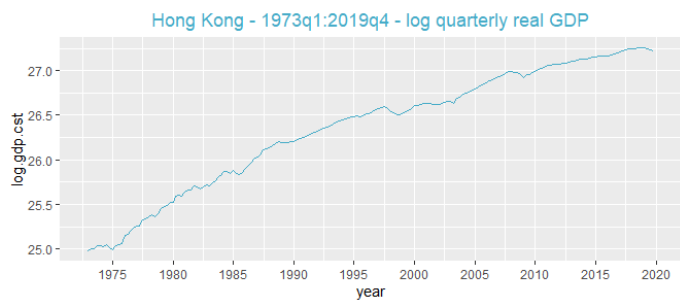
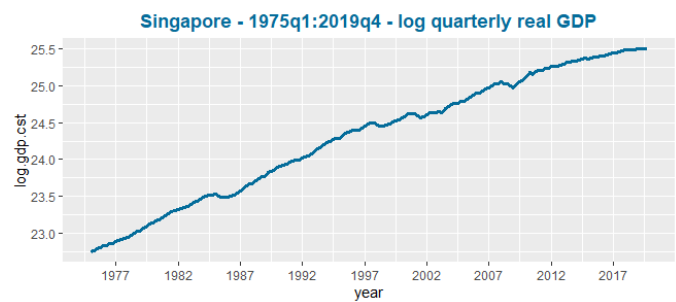
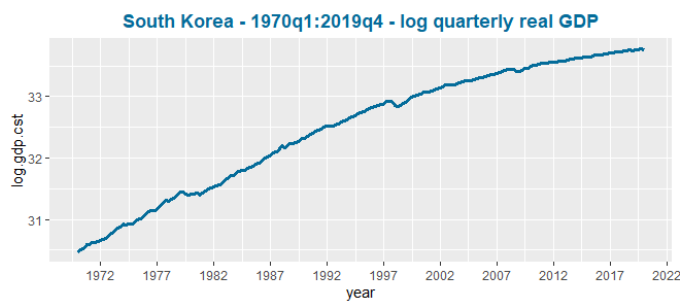
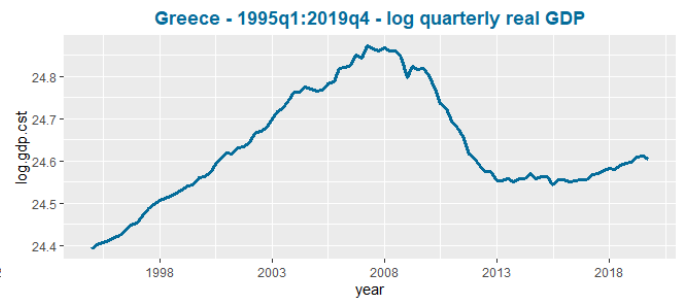
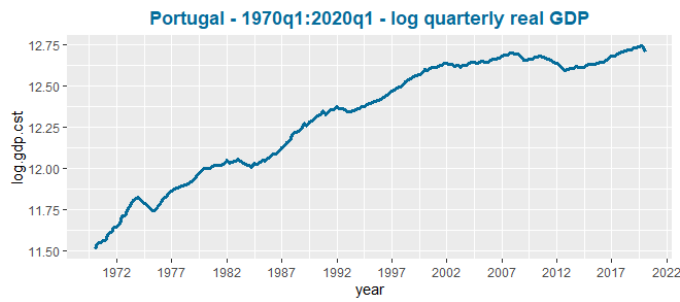
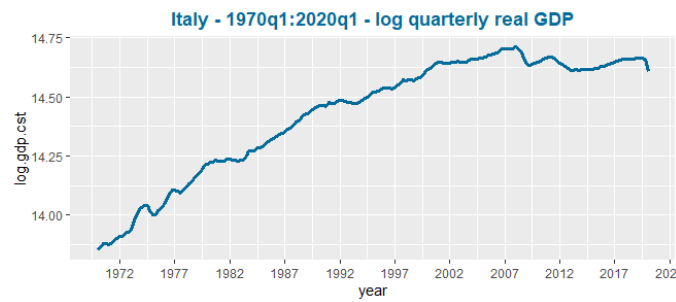
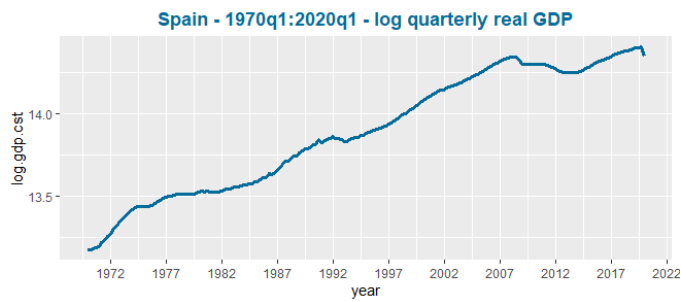
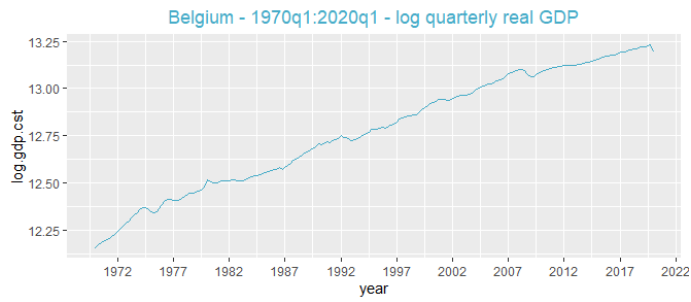


Germany - 1970q1:2020q1 - log quarterly real GDP

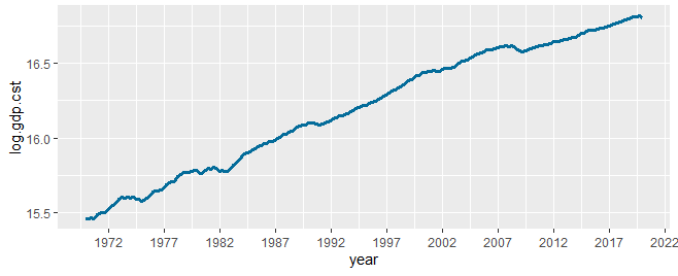


France - 1970q1:2020q1 - log quarterly real GDP

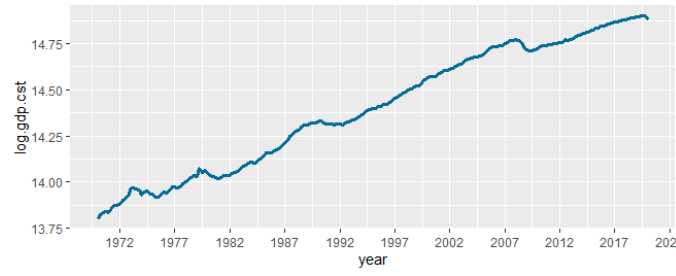




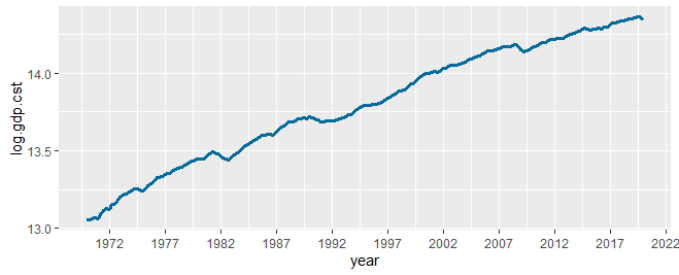
United States - 1970q1:2020q1 - log quarterly real GDP



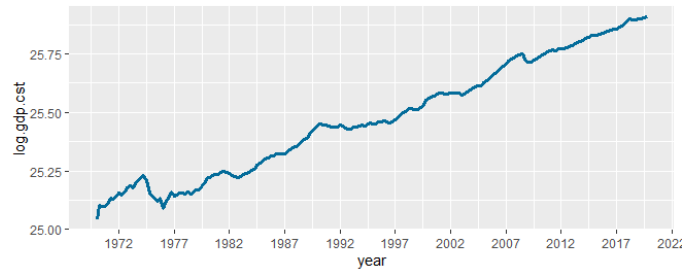
United Kingdom - 1970q1:2020q1 - log quarterly real GDP



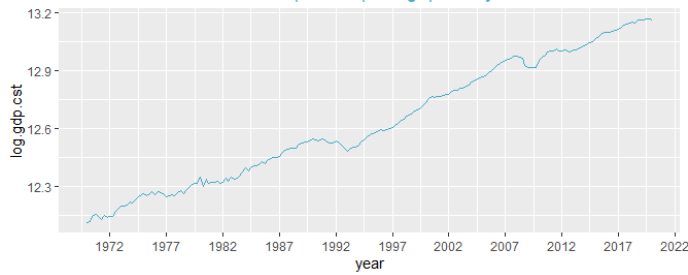
Canada - 1970q1:2020q1 - log quarterly real GDP



Switzerland - 1970q1:2019q4 - log quarterly real GDP



Sweden - 1970q1:2020q1 - log quarterly real GDP



## B The Composite Leading Indicators by the OECD

### B.1 Presentation:

The Composite Leading Indicators (CLI) is a monthly index that aims at **predicting economic activity's turning points** (as measured by GDP and, before 2012, the index of Industrial Production). It is developed by the OECD for its members and six major emerging economies<sup>2</sup>.

Business cycles and turning points (in economic activity and in the CLI) are then measured on deviation-from-trend time series (derived using the Hodrick-Prescott filter) and identified with the Bry-Boschan procedure (identifying local minima and maxima).

### B.2 Data components:

For each country a set of series are selected<sup>3</sup>. The scope and number of included series varies country by country.

Component series are selected with respect to their predictive ability and four economic rationales<sup>4</sup>. Pre-selected candidates are evaluated for their cyclical performance using diverse statistical methods. The aim is to construct leading indicators whose lead times<sup>5</sup> are on average between 6 to 9 months and have relatively small variances.

### B.3 Construction of the CLI:

In case a component series is not of the right frequency, it is either aggregated or extrapolated linearly to a monthly frequency. Afterwards, they are filtered to remove the seasonal component and outliers, using X12 or TRAMO/SEATS methodologies. Finally series are detrended and smoothed using a Hodrick-Prescott filter, as a band-pass filter with parameters set, such that the frequency cut-off occurs at frequencies higher than 12-months and lower than 120 months<sup>6</sup>. The Bry-Boschan procedure is then applied to identify peaks and troughs<sup>7</sup>. Finally, the CLI

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<sup>2</sup>Members: Australia, Austria, Belgium, Canada, Chile, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Israel, Italy, Japan, South Korea, Luxembourg, Mexico, the Netherlands, New-Zealand, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, the United Kingdom, the United States.

Non-members: Brazil, China, India, Indonesia, Russia, South Africa.

<sup>3</sup>These time series relate to different economic areas: Domestic production in the manufacturing or the service sector; Housing and construction sector; Domestic trade and utilities; International trade; Finance, interest rates and money; Labor Market; Confidence and Expectations; Prices and selected commodities.

<sup>4</sup>Capturing early stages of production, responding rapidly to changes in economic activity, capturing/reacting to agents' expectations and/or relating to prime movers of economic activity

<sup>5</sup>The lead time is the length in months between the turning point in the component and the reference series.

<sup>6</sup>Up to November 2008, the OECD used the Phase-Average Trend methodology. It yielded however too many turning points under the BB approach and as such a too variable long term trend.

<sup>7</sup>The algorithm constrains a phase to last at least 5 months and a cycle at least 15.



index is constructed as a simple average of the normalized component series<sup>8</sup>.

#### **B.4 Conclusion:**

The CLI is a monthly indicator which does not aim at identifying cycles but at predicting them using a minimum set of indicators representative of a country's economic drivers. The component series differ country by country even if some are common to a wide set of countries (interest rate spreads or production in the manufacturing sector for example).

Both the aim of the approach (prediction vs dating) and its replicability on a wider set of countries (the unautomated selection procedure of component time series) make it inappropriate with respect to the goal of this article.

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<sup>8</sup>Component series are de-meant, divided by the mean standard deviation of the series and centered around 100.

## C Data sources and MSM specification

Data on real GDP is collected from two main sources:

- OECD - Seasonally Adjusted quarterly GDP.
- IMF - Not Seasonally Adjusted (NSA) quarterly real GDP.
- IMF\* - NSA quarterly nominal GDP divided by NSA quarterly GDP deflator.

Time series were seasonally adjusted using X13-ARIMA.

Country Groups are derived using World Bank Income classification as of 1995. When data was not available at that date, classification was derived with information from 2000. AM stands for advanced markets (high-income), EM for emerging markets (upper-middle) and DM developing markets (lower-middle and low income).

Countries are also split into the following regions: Africa & the Middle East (AME); Asia; Central and Eastern Europe (CEE); Latin & South America (LSA); Western Europe (WE) and Western Countries (WC) which includes the english speaking countries of North America (Canada, United States) and the Pacific zone (Australia, New Zealand).

Country.Name	name.source	y.beg	y.end	tot.obs	Grp	Reg.	is.cmd	has.msm
Albania	IMF - hist.	2005Q1	2019Q4	60	DM	CEE	0	0
Argentina	IMF - hist.	1990Q1	2019Q4	120	EM	LSA	1	1
Armenia, Rep. of	IMF - hist.	1999Q4	2017Q2	71	DM	CEE	0	1
Australia	IMF - hist. sa	1970Q1	2019Q4	200	AM	WC	0	1
Austria	OECD	1970Q1	2020Q1	201	AM	WE	0	1
Belgium	OECD	1970Q1	2020Q1	201	AM	WE	0	1
Belize	IMF - hist.	2000Q1	2015Q4	64	DM	LSA	0	0
Bolivia	IMF - hist.	1990Q1	2018Q3	115	DM	LSA	1	1
Bosnia and Herzegovina	IMF - hist.	2008Q1	2018Q4	44	DM	CEE	0	0
Botswana	IMF - hist.	1994Q1	2016Q4	92	EM	AME	1	0
Brazil	OECD	1996Q1	2019Q4	96	EM	LSA	1	1
Bulgaria	IMF - hist. sa	1995Q1	2019Q4	100	DM	CEE	0	1
Canada	OECD	1970Q1	2020Q1	201	AM	WC	1	1
Chile	IMF - hist.	1986Q1	2019Q4	136	EM	LSA	1	0
China, P.R.: Hong Kong	IMF - hist.	1973Q1	2019Q4	188	AM	Asia	0	1
China, P.R.: Macao	IMF - hist.	1998Q1	2019Q3	87	AM	Asia	0	0
China, P.R.: Mainland	IMF - hist.	2000Q1	2019Q3	79	DM	Asia	0	0
Colombia	OECD	1994Q1	2020Q1	105	DM	LSA	1	1
Costa Rica	OECD	1991Q1	2019Q4	116	EM	LSA	1	1
Croatia, Rep. of	IMF - hist.	1997Q1	2019Q4	92	EM	CEE	0	1
Cyprus	IMF - hist. sa	1995Q1	2019Q4	100	AM	WE	0	1
Czech Rep.	IMF - hist.	1994Q1	2019Q4	104	EM	CEE	0	1

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Country.Name	name.source	y.beg	y.end	tot.obs	Grp	Reg.	is.cmd	has.msm
Denmark	OECD	1970Q1	2020Q1	201	AM	WE	0	1
Dominican Rep.	IMF - hist.	2007Q1	2017Q4	44	DM	LSA	0	0
Ecuador	IMF - hist.	1991Q1	2019Q1	113	DM	LSA	1	1
Egypt, Arab Rep. of	IMF - hist.	2002Q1	2013Q4	48	DM	AME	0	0
El Salvador	IMF - hist.	2000Q1	2018Q4	76	DM	LSA	0	1
Estonia, Rep. of	OECD	1995Q1	2020Q1	101	EM	CEE	0	1
Finland	OECD	1970Q1	2020Q1	201	AM	WE	0	1
France	IMF - hist. sa	1970Q1	2020Q1	201	AM	WE	0	1
Georgia	IMF - hist.	1996Q1	2018Q3	91	DM	CEE	0	0
Germany	OECD	1970Q1	2020Q1	201	AM	WE	0	1
Greece	OECD	1995Q1	2019Q4	200	AM	WE	0	1
Guatemala	IMF - hist.	2001Q1	2018Q3	71	DM	LSA	1	0
Hungary	OECD	1995Q1	2020Q1	101	EM	CEE	0	1
Iceland	OECD	1970Q1	2019Q4	200	AM	WE	1	1
India	OECD	1996Q2	2019Q4	95	DM	Asia	0	0
Indonesia	OECD	1990Q1	2020Q1	121	DM	Asia	1	1
Ireland	OECD	1970Q1	2019Q4	200	AM	WE	0	1
Israel	IMF - hist.	1980Q3	2019Q3	199	AM	AME	0	0
Italy	OECD	1970Q1	2020Q1	201	AM	WE	0	1
Jamaica	IMF - hist.	1996Q1	2016Q3	83	DM	LSA	0	0
Japan	OECD	1970Q1	2020Q1	201	AM	Asia	0	0
Korea, Rep. of	IMF - hist. sa	1970Q1	2020Q1	201	AM	Asia	0	1
Kyrgyz Rep.	IMF - hist.	2000Q1	2014Q1	57	DM	Asia	0	0
Latvia	OECD	1995Q1	2020Q1	101	EM	CEE	0	1
Lithuania	IMF - hist. sa	1995Q1	2020Q1	101	EM	CEE	0	1
Luxembourg	OECD	1970Q1	2019Q4	200	AM	WE	0	1
Malaysia	IMF - hist.	1988Q1	2018Q4	124	EM	Asia	0	1
Malta	IMF - hist. sa	2000Q1	2019Q4	80	EM	WE	0	0
Mauritius	IMF - hist.	2000Q1	2018Q2	74	EM	AME	0	0
Mexico	OECD	1970Q1	2020Q1	201	EM	LSA	0	1
Morocco	IMF - hist.	1990Q1	2014Q4	100	DM	AME	0	1
Netherlands, The	OECD	1970Q1	2020Q1	201	AM	WE	0	0
New Zealand	OECD	1970Q1	2019Q4	200	AM	WC	0	1
North Macedonia, Rep. of	IMF - hist.	2000Q1	2019Q4	80	DM	CEE	1	0
Norway	OECD	1970Q1	2020Q1	201	AM	WE	0	0
Paraguay	IMF - hist.	1994Q1	2019Q4	104	DM	LSA	0	1
Peru	IMF - hist.	1979Q1	2017	153	DM	LSA	1	0
Philippines	IMF - hist.	1981Q1	2018Q4	152	DM	Asia	1	1
Poland, Rep. of	OECD		2020Q1	101	EM	CEE	0	0
Portugal	OECD	1970Q1	2020Q1	201	AM	WE	0	1
Romania	IMF - hist. sa		2020Q1	101	DM	CEE	1	1
Russian Federation	OECD		2019Q4	100	DM	CEE	0	1
Serbia, Rep. of	IMF - hist. sa		2019Q4	100	DM	CEE	0	0
Singapore	IMF - hist. sa	1975Q1	2019Q4	180	AM	Asia	0	1
Slovak Rep.	OECD	1993Q1	2020Q1	109	EM	CEE	0	1
Slovenia, Rep. of	IMF - hist. sa		2019Q4	100	EM	CEE	0	1
South Africa	OECD	1970Q1	2019Q4	200	EM	AME	1	1

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Country.Name	name.source	y.beg	y.end	tot.obs	Grp	Reg.	is.cmd	has.msm
Spain	OECD	1970Q1	2020Q1	201	AM	WE	0	1
Sweden	OECD	1970Q1	2020Q1	201	AM	WE	0	1
Switzerland	IMF - hist. sa	1970Q1	2019Q4	200	AM	WE	0	1
Tanzania, United Rep. of	IMF - hist.	2001Q1	2013Q3	51	DM	AME	0	0
Thailand	IMF - hist. sa	1993Q1	2019Q3	107	DM	Asia	0	1
Tunisia	IMF - hist.	2000Q1	2010Q4	44	DM	AME	0	0
Turkey	OECD	1970Q1	2020Q1	201	DM	AME	0	1
Ukraine	IMF - hist.	2000Q1	2019Q4	80	DM	CEE	0	1
United Kingdom	OECD	1970Q1	2020Q1	201	AM	WE	0	1
United States	OECD	1970Q1	2020Q1	201	AM	WC	0	1
Uruguay	IMF - hist.	2005Q1	2018Q4	56	EM	LSA	1	0
Venezuela, Rep. Bol. de	IMF - hist.	1998Q1	2015Q4	72	EM	LSA	1	1

## D Looking at the Cycle - the Bry-Boschan Quarterly Algorithm

### D.1 Learning about recessions from a dating algorithm

As explained the Bry-Boschan Quarterly algorithm consists in two consecutive steps:

- Dating local extrema – i.e. identifying candidate turning points from expansion to recession and reversely
- Selecting cycles – given each potential phase duration, turning points must ensure a minimum cycle length of 5 quarters.<sup>9</sup>

Define  $y_q$ , the log of GDP in quarter  $q$  and the lag operator  $\Delta$  such that  $\Delta y_q = y_q - y_{q-1}$  and  $\Delta_{-2} y_q = y_q - y_{q-2}$ .

A local maximum is identified in quarter  $q$  if following set of conditions is verified (and similarly for minima):

$$\begin{cases} \Delta_{-2} y_q > 0, \\ \Delta_{-1} y_q > 0, \\ \Delta y_q < 0, \\ \Delta_2 y_q < 0. \end{cases}$$

Given the list of potential peaks and troughs, phases first ensure a minimum length of two quarters by definition. Second a sequence of two phases – i.e. a cycle – must last at least 5 quarters.

As explained, this article concentrates on discontinuities and the use of Markov Switching Models. The main difference with MSM datation is first and foremost conceptual. MSM dates identify switches from the inherent growth process described as a stochastic Markov process. BBQ dates identify switches between recessions, defined as declines in economic growth, and expansions. They provide an approximation of the dating of data-generated output growth rates which will be addressed later.

### D.2 Stylized facts – a variety of recessions

Table 2 gives group-wise descriptive statistics of the two regimes identified using BBQ.

All characteristics are initially derived from BBQ datation:

- Country average growth per regime, is defined as the average growth rate experienced by the country when in said regime

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<sup>9</sup>The initial constraint defined by Bry and Boschan (1971)'s seminal work is a minimum five month duration for each phase (i.e. two quarters) and a total cycle of min fifteen months. Stock and Watson (2010b), 2010a, provide an extensive discussion of dating algorithms for the US business cycle.

- Probabilities to enter/exit a recession are defined insample as

$$P_{\text{enter}} = \frac{\text{Cardinal(Quarters entering a Rec)}}{\text{Cardinal(Quarters in Exp.)}} \text{ and } P_{\text{exit}} = \frac{\text{Cardinal(Quarters exiting a Rec)}}{\text{Cardinal(Quarters in Rec.)}}$$

	Mean $g_{Exp}$	Mean $g_{Rec}$	P(Enter Rec)	P(Exit Rec)
<b>Advanced Economies</b>				
Average	0.91	-0.79	4.55	29.60
Median	0.83	-0.74	4.65	29.10
std.dev	0.25	0.22	1.45	7.07
Min	0.63	-1.57	1.60	15.79
Q1	0.73	-0.88	3.56	24.86
Q3	0.98	-0.68	5.49	34.40
Max	1.45	-0.51	7.35	44.44
#obs	24	24	24	24
<b>Emerging Markets and Developing Economies</b>				
Average	1.46	-1.67	6.92	40.59
Median	1.26	-1.42	3.85	33.33
std.dev	0.61	1.52	13.31	24.81
Max	3.94	-0.17	100.00	100.00
Min	0.59	-10.20	0.89	7.14
Q1	1.03	-2.04	2.30	25.00
Q3	1.68	-0.78	6.67	44.44
#obs	57	57	57	57

**Table 2:** BBQ datations - Regime Analysis

As illustrated in table 2, if EMDE grow at a median rate fifty percent higher than AE during expansions, the average loss per quarter of recession is twice as high (-1.42 vs -0.74%). Interestingly the probability to enter and to exit a recession is similar between country-groups (respectively 3.35 vs 4.65% and 33.3 vs 29.1%).

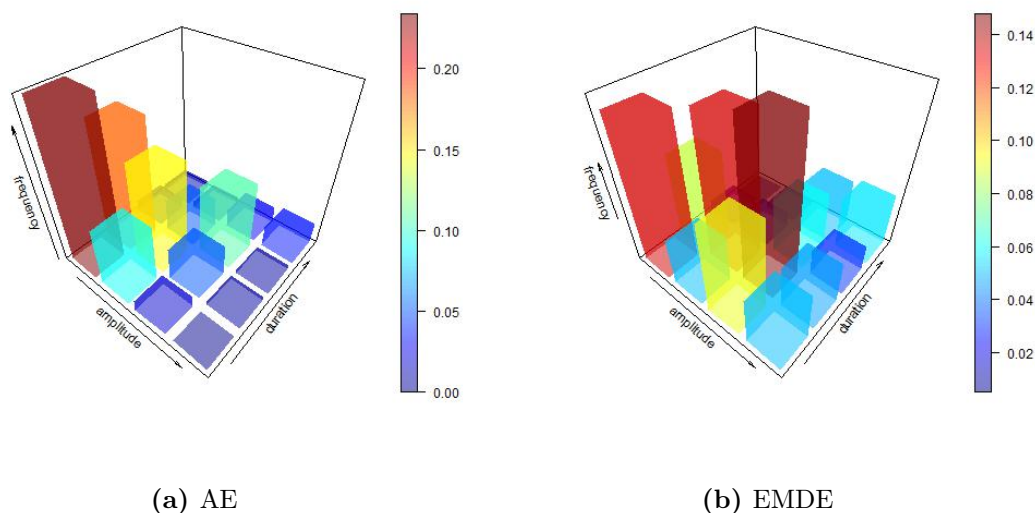
If recessions are equally likely events for AE and EMDE, they prove to be very different and much costlier for the latter group as shown in figure 2. Recessions are classified by duration (length in quarter) and amplitude (cumulated losses)<sup>10</sup>.

Advanced economies experience mostly short-to-medium duration and low-amplitude moderate recessions: losses above -4% and duration below 4 quarters. Emerging markets and economies have also an overwhelming majority of short-to-medium recessions, associated economic losses tell a very different story. A third are associated with severe to high losses (< 4%). Another 20% of recessions are defined as both very costly and long-to-protracted. Twice as much as advanced economies. "Normal recessions"<sup>11</sup> are a common pattern of both types of business cycles. They're more common for advanced economies, two thirds of all episodes against a third only for emerging markets and developing economies.). Consequently, "economic crises"<sup>12</sup> are

<sup>10</sup>I follow Calderon and Fuentes (2014) in defining thresholds to classify recessions' duration as short (2 quarters), medium (2-4 quarters), long (5-6 quarters) and protracted (more than 7 quarters) and their amplitudes as mild ( $x > -2\%$ ), moderate ( $-2 > x > -4\%$ ), severe ( $-4 > x > -10\%$ ) or high ( $-10\% > x$ )

<sup>11</sup>Duration: 2 to around 4- quarters, Losses: > 4%.

<sup>12</sup>Duration: long and protracted recessions ; Severe to high economics losses

**Figure 2:** Frequency of recession by amplitude and duration - BBQ datation

Recessions are classified according to: 1. duration: short (2 quarters), medium (2-4 quarters), long (5-6 quarters) and protracted (more than 7 quarters) and 2. amplitude: mild ( $x > -2\%$ ), moderate ( $-2 > x > -4\%$ ), severe ( $-4 > x > -10\%$ ) or high ( $-10\% > x$ )

twice as frequent in EMDE as they are for AE. A true distinction of business cycles.

### Stylized facts – the real costs of recessions

As explained, on average country growth rates form a wider distribution for emerging markets and developing economies. I now look into detailed information on the different episodes – expansions and recessions – identified using BBQ. Table 3 presents for expansions (84% of all episodes) and recessions (the remaining 16%) alike, statistics on length, slope and duration. It details as well how much is recovered in the year following the end of a recession.

If shorter, EMDE expansions are characterized by 53% higher amplitude and slope (1.28 vs 0.84% per quarter). This could very well capture the idea of convergence of emerging markets towards advanced economies levels.

Sadly, recessions darken the picture once again. Of similar duration for both AE and EMDE, they are twice as costly for the latter. Per quarter EMDE lose -1.19% (against -0.67%) in recession. The amplitude of a recession is thus twice as high than it is for AE (-4.7 vs -2.3%). And economic crises are easily identified when considering the distribution of amplitudes. For EMDE, 50% of recessions are associated with total losses of more than 4%. For AE, 75% of the episodes fit this description: fifty percent more of economic crises.

In the year following a recession's end, both country groups recover slightly more than initial losses. Recoveries are as such occurring at a faster pace in emerging markets and developing economies (+1.3% per quarter vs +0.7%) This reminds of existing literature on the specificities

of economic recoveries besides booms and crises, see (Cerra and Saxena, 2017).

Having derived stylized facts using BBQ dating, I now address Markov Switching Models (MSM). I briefly present the advantages and inconvenients of this methodology. Then I discuss estimation results.



	Expansions				Recessions				
	Time (% of Obs)	Amplitude (%)	Duration (quarters)	Slope (%)	Time (%)	Amplitude (% of Obs)	Duration (%)	Slope (quarters)	Recovery (%)
<b>All Countries (81c.)</b>									
Average	83.44	22.65	19.46	1.26	16.56	-4.97	3.98	-1.35	4.91
Median	85.20	16.40	14.00	1.03	14.80	-2.95	3.00	-0.85	3.97
std.dev	12.28	22.16	16.90	0.86	12.28	5.69	2.66	1.58	4.48
Min	12.50	0.37	2.00	0.12	2.08	-35.87	2.00	-10.62	-5.12
Q1	79.59	7.30	7.00	0.71	10.20	-6.18	2.00	-1.57	2.16
Q3	89.80	29.75	26.25	1.51	20.41	-1.42	5.00	-0.45	6.43
Max	97.92	151.92	110.00	6.69	87.50	-0.05	26.00	-0.03	35.41
#obs	81	428	428	428	81	371	371	371	357
<b>Advanced Economies (24c.)</b>									
Average	84.77	17.93	19.98	0.95	15.23	-3.23	3.95	-0.80	3.39
Median	84.69	12.83	16.00	0.84	15.31	-2.32	3.00	-0.67	2.85
std.dev	5.28	17.71	17.70	0.63	5.28	3.68	2.72	0.70	3.22
Min	69.39	0.37	2.00	0.12	4.59	-32.11	2.00	-4.96	-0.31
Q1	82.53	6.55	8.00	0.59	12.24	-4.06	2.00	-1.15	1.50
Q3	87.76	23.28	25.75	1.17	17.47	-1.00	5.00	-0.29	4.35
Max	95.41	131.05	110.00	5.93	30.61	-0.08	26.00	-0.04	35.41
#obs	24	194	194	194	24	175	175	175	172
<b>Emerging Markets and Developing Economies (57c.)</b>									
Average	82.88	26.57	19.02	1.51	17.12	-6.52	4.01	-1.83	6.32
Median	86.46	19.54	13.50	1.28	13.54	-4.66	3.00	-1.19	5.12
std.dev	14.25	24.62	16.23	0.94	14.25	6.66	2.60	1.96	5.01
Min	12.50	0.47	2.00	0.14	2.08	-35.87	2.00	-10.62	-5.12
Q1	78.26	7.82	7.00	0.89	8.57	-8.31	2.00	-2.34	2.98
Q3	91.43	36.01	27.00	1.87	21.74	-2.10	4.25	-0.62	8.06
Max	97.92	151.92	81.00	6.69	87.50	-0.05	22.00	-0.03	30.67
#obs	57	234	234	234	57	196	196	196	185

Table 3: Business Cycle characteristics - BBQ datation - Results

### D.3 Economic and Financial Crises

I first describe general stylized facts on crises episodes based on BBQ dating. Financial crises are as such associated to real economic losses, i.e. ‘conventionnal’ recessions.

#### Financial crises and economic losses

Table 4 presents the number of financial crises occurring in expansions and recessions. If it ignores notions of multiple crises episodes, these figures offer a first interesting look at the data.

	Sov. C.	Cur. C.	Bkg. C.
<b>AE</b> - Expansion	0	46	0
<b>AE</b> - Recession	2	36	22
<b>EMDE</b> - Expansion	6	42	3
<b>EMDE</b> - Recession	22	74	26

**Table 4:** Number of FC by type and by regime

First, for all countries, currency crashes are a common pattern of both expansions and recessions.<sup>13</sup> In other words currency crashes are often not associated to output losses.

Second, for AE, all other crises are associated with economic losses, which comforts existing theories.

Third, this is not the case for EMDE. Almost 20% of banking and sovereign are not linked to any economic losses. I conduct an extensive discussion of these ‘costless’ financial crises later.

Overall, the majority of crises are associated to economic losses. Consequently, I now discuss when they occur with respect to the start of recessions.

Figure 3 plots the number of crises captured by economic recessions and dates them with respect to the beginning of the recession  $t = 1$ .

#### Advanced economies:

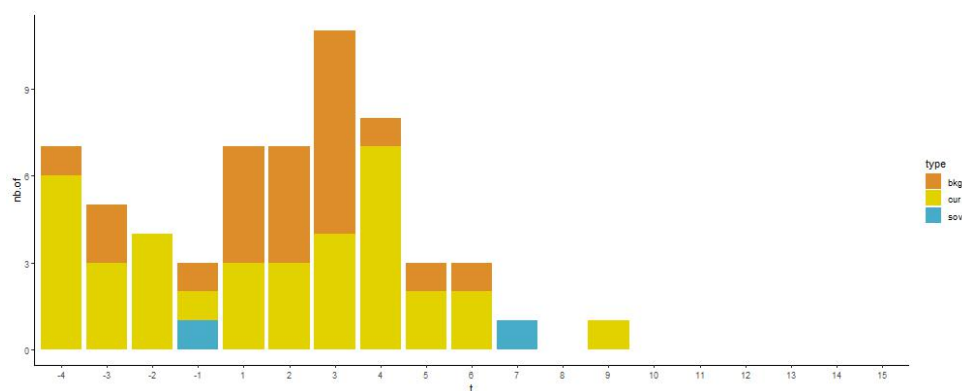
The most striking observation is the fact that the great majority of banking crises is triggered after growth falls.

Currency crises are evenly distributed in the years before and after the change of regime, with slightly more events one year before/after the recession start. Finally, sovereign crises tell a different story. The first precedes by one quarter the start of economic losses. The second is triggered as the economy had already been in recession for 7 quarters.

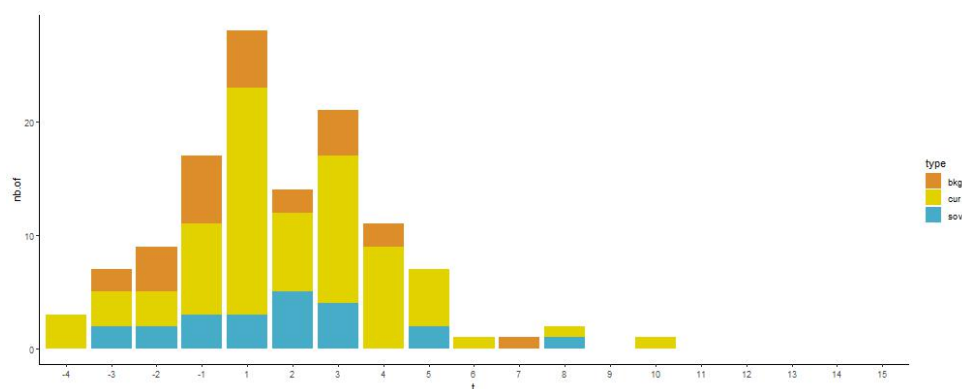
#### Emerging markets and developing economies:

Again, an overwhelming amount of crises is distributed in the years before and after the start of the recession.

<sup>13</sup>Further discussion of specific crisis episodes can be found in sections ??, ?? and annex ??

**Figure 3:** Location of Financial Crises (by type) around Recessions

(a) AE



(b) EMDE

Note that this figure ignores an EMDE default occurring at quarter 22.

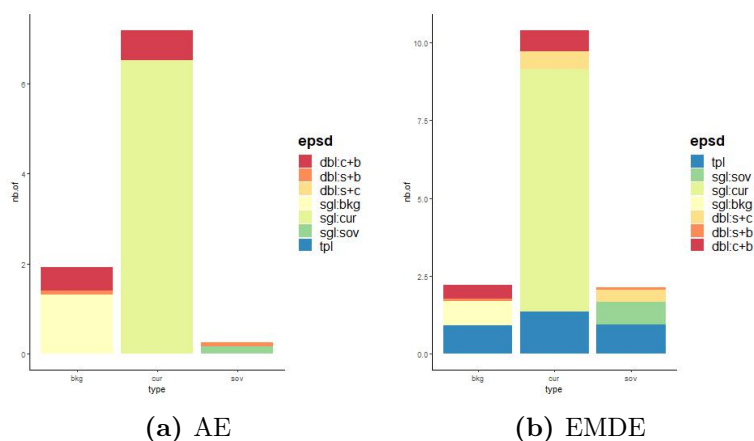
Nevertheless, for EMDE, financial crises are mostly distributed between  $q - 1$  and  $q4$ . That is financial crises trigger as economic losses start accumulating.

Interesting, all types of crises (sovereign, currency and banking) are distributed ‘evenly’ around recession starting quarter.

If the latter figure offers a reading by looking at all single events, crises often occur together, as illustrated by figure 4.

For advanced economies, except for twin Crisis, crises are single episodes. This echoes the fact that AE’s recessions are less characterized by severe and high economic crises – a marker of costly multiple crises episodes.

Emerging markets and developing economies on the other hand are characterized by several triple crises episodes as well as numerous twin Crisis and twin D’s.



**Figure 4:** Annual probability of a Financial Crisis, by type and episode - BBQ datation

### BBQ cycles and financial crises

Tables 6 and 5 present the main characteristics for BBQ identified expansions and recessions interacted or not with financial crises.

Interestingly, expansions associated or not to a financial crises have similar quarterly growth rates for both advanced economies and emerging markets and developing economies (0.88 and 0.82% vs 1.22 and 1.29%). Two major differences characterize these episodes. First their length. For both country-groups, the length of an expansion is twice as important when hit by a financial crises. This translates evidently into higher cumulated gains during said expansions (2.6 times for AE and 1.6 times for EMDE).

It might seem surprising that advanced economies grow more than emerging markets and developing economies in expansions with a financial crisis. A potential explanation to this higher reaction could be explained as follows. AE benefit potentially more from some cleansing effects of these particular crises when contrasted to EMDE.

This might relate to a key debate in the literature studying the costs and benefits of financial liberalization&globalization and financial development. In a nutshell, the main advantage of having liberalized financially your economy is to access foreign private capital at a world interest rate below that of autarky, possibilities for diversifying risk and portfolios and the opportunity to invest in longer term higher yield projects.

If financial development lags behind, the benefits can promptly disappear. Foreign investors might fear the situation going awry, for bad economic news arrived or for some self-fulfilling circle of beliefs. If foreign investors fly out of the country, capital dries out and a crisis hits the economy.

	Expansions w/o FC			Expansions w FC		
	Amplitude	Duration	Slope	Amplitude	Duration	Slope
All Countries						
Average	20.11	16.81	1.28	34.65	31.91	1.15
Median	14.45	13.00	1.03	29.27	28.00	1.02
std.dev	20.53	14.21	0.91	25.53	22.31	0.57
Min	0.37	2.00	0.12	2.45	2.00	0.27
Q1	6.53	6.00	0.69	16.83	14.50	0.79
Q3	24.65	23.00	1.54	47.70	41.00	1.38
Max	151.92	102.00	6.69	131.05	110.00	3.38
#obs	353	353	353	75	75	75
Advanced Economies (20c.)						
Average	14.29	16.62	0.93	34.47	35.29	1.05
Median	10.94	14.00	0.82	29.27	31.00	0.88
std.dev	12.17	13.61	0.62	27.36	24.97	0.65
Min	0.37	2.00	0.12	2.45	2.00	0.27
Q1	5.94	7.00	0.57	17.32	16.50	0.77
Q3	19.73	22.00	1.14	43.31	44.00	1.21
Max	74.22	102.00	5.93	131.05	110.00	3.38
#obs	159	159	159	35	35	35
Emerging Markets and Developing Economies (40c.)						
Average	24.87	16.97	1.57	34.80	28.95	1.23
Median	17.95	11.00	1.29	29.62	21.00	1.22
std.dev	24.43	14.71	1.00	24.16	19.52	0.47
Min	0.47	2.00	0.14	4.99	5.00	0.36
Q1	7.30	6.00	0.88	16.24	13.75	0.94
Q3	33.67	25.75	2.01	54.12	38.25	1.53
Max	151.92	78.00	6.69	103.46	81.00	2.32
#obs	194	194	194	40	40	40

**Table 5:** Expansions and Financial Crises - BBQ estimations - Results

Beyond this example of *sudden stops*, financial crises are the costly dark side of financial development, liberalization, globalization and deregulation. It is possible to analyze AE's expansions with financial crises, a cleansing mechanism - perhaps in terms of currency alignment - might trigger a crisis, that the system accommodates for through perhaps better stabilization policies.<sup>14</sup>

Moving onto recessions, table 6 confirms that those associated to financial crises are much more protracted.

For both groups, quarterly losses are higher by around 33% with financial crises. (-0.81 vs -0.59% in AE and -1.37 vs -1.02% in EMDE). In accordance with previous results, financial crises or not, EMDE lose 70% more per quarter in recession than AE do. A feature that is well captured when looking at the distribution: AE median slope is of the same level as EMDE's

<sup>14</sup>Loayza et al. (2007), Ranciere et al. (2008), Levchenko et al. (2009), Broner and Ventura (2016), Loayza et al. (2018), Buera et al. (2011)

third quartile. In other words, it is twice as probable that EMDE experience a twice as costly crisis.

Recessions in times of crisis are also longer. If medians differ only by 1 quarter, the distribution of duration offers interesting insights. With a crisis, 50% of recessions last more than 4 quarters. Without, only 25% do.

When comparing amplitudes, we find a similar picture. For AE, recessions amount to 85% more cumulated losses when hit by a crisis. For EMDE, the median increase is slightly smaller (71%). Nevertheless, cumulated losses are much more spread.

Finally, recoveries are steeper among emerging markets and developing economies. Irrespective of a crisis having occurred, AE grow at around +0.70% after the end of a recession. After a '*normal*' recession, EMDE recover at a rate of +1.20%. Following a financial crisis, the recovery is even stronger and twice that of AE. Overall if countries recover all losses in the year following a '*normal*' recession, this is not the case after FC.

This echoes well Jones and Olken (2008)'s discussion of the start-stop growth process of developing economies.

So far, I have studied the impact of financial crises broadly defined. I have observed that the majority of financial crises are associated to economic crises. The latter are in turn costlier than without financial shocks. As noted however, there are many different types of crises depending on the number of events triggered (sovereign, currency, banking and/or economic). The next subsection aims at providing descriptive elements of financial crises by type (single, double or triple crises).

	Recessions w/o FC				Recessions w FC			
	Amplitude	Duration	Slope	Recovery	Amplitude	Duration	Slope	Recovery
All Countries								
Average	-3.91	3.58	-1.16	4.76	-7.14	4.80	-1.73	5.20
Median	-2.54	3.00	-0.72	3.78	-5.04	4.00	-1.16	4.20
std.dev	4.70	2.29	1.31	4.14	6.86	3.13	1.99	5.12
Min	-33.08	2.00	-10.51	-5.12	-35.87	2.00	-10.62	-3.13
Q1	-4.97	2.00	-1.42	2.14	-8.73	3.00	-1.85	2.20
Q3	-1.17	4.00	-0.39	6.19	-2.47	6.00	-0.71	6.99
Max	-0.05	22.00	-0.03	26.69	-0.24	26.00	-0.12	35.41
#obs	250	250	250	239	121	121	121	118
Advanced Economies								
Average	-2.56	3.46	-0.77	3.31	-5.01	5.23	-0.90	3.58
Median	-1.99	3.00	-0.59	2.87	-3.70	4.50	-0.81	2.84
std.dev	2.54	1.90	0.74	2.19	5.34	3.93	0.55	5.01
Min	-14.18	2.00	-4.96	-0.31	-32.11	2.00	-2.35	0.34
Q1	-2.97	2.00	-0.99	1.51	-7.07	3.00	-1.26	1.41
Q3	-0.84	4.00	-0.28	4.53	-1.51	6.00	-0.45	4.20
Max	-0.08	12.00	-0.04	10.44	-0.24	26.00	-0.12	35.41
#obs	127	127	127	124	48	48	48	48
Emerging Markets and Developing Economies								
Average	-5.31	3.71	-1.57	6.32	-8.55	4.52	-2.27	6.32
Median	-3.47	3.00	-1.02	4.80	-5.94	4.00	-1.37	5.68
std.dev	5.88	2.64	1.62	5.08	7.40	2.47	2.37	4.92
Min	-33.08	2.00	-10.51	-5.12	-35.87	2.00	-10.62	-3.13
Q1	-6.33	2.00	-1.95	2.83	-11.62	3.00	-2.61	3.24
Q3	-1.64	4.00	-0.54	7.98	-3.59	6.00	-0.83	8.19
Max	-0.05	22.00	-0.03	26.69	-0.53	14.00	-0.14	30.67
#obs	123	123	123	115	73	73	73	70

Table 6: Recessions and Financial Crises - BBQ datation - Results

Having identified in more detail how financial crises relate to recessions and economic losses, I turn now to their link to regime switches. Doing so might help uncover causal links between growth and financial shocks.



## E Estimation Procedure of Markov Switching Models

Define:

$$y_t = \nu_{s_t} + \sum_{j=1}^p a^j y_{t-j} + \epsilon_t^{s_t} \quad (1)$$

where  $y_t$  represents the quarterly growth rate of GDP;  $s_t \in \{1, 2\}$  the regime;  $\nu_{s_t}$  regime-specific intercept;  $p$  the number of lags considered, ranging between 0 and 4;  $a^j$  the autoregressive coefficient of the  $j^{\text{th}}$  lag and  $\epsilon_t$  an i.i.d. process with variance  $\sigma$ .

The estimation of the model is obtained by using the filtered probabilities of the unobserved state. Let  $\Psi_{t-1}$  be the variable containing the past history of  $y_t$  such that  $\Psi_t = \{y_t, \Psi_{t-1}\}$ . Then the filtered probability of the unobserved state at time  $t$ ,  $Pr(s_t|\Psi_t)$ , offers an inference about the unknown state given the information available up to time  $t$ . Given  $Pr(s_{t-1}|\Psi_{t-1})$ ,  $Pr(s_t|\Psi_{t-1})$  derives from:

$$Pr(s_t = j|\Psi_{t-1}) = \sum_{i=1}^2 Pr(s_t = j|s_{t-1} = i) * Pr(s_{t-1} = i|\Psi_{t-1}), \forall j \in \{1, 2\} \quad (2)$$

Then the joint conditional density-distribution of  $y_t$  and  $s_t$  is given by:

$$f(y_t, s_t = j|\Psi_{t-1}) = f(y_t|s_t = j, \Psi_{t-1}) * Pr(s_t = j|\Psi_{t-1}), \forall j \in \{1, 2\} \quad (3)$$

Summing over  $j$ , i.e. all the possible states  $s_t$ , we obtain the conditional density of the  $t^{\text{th}}$  observation on the past information:

$$f(y_t|\Psi_{t-1}) = \sum_{j=1,2} f(y_t, s_t = j|\Psi_{t-1}) \quad (4)$$

This allows us to derive the filtered probability of the state at time  $t$ , conditional on the information available at this time:

$$Pr(s_t = j|\Psi_t) = \frac{f(y_t, s_t = j|\Psi_{t-1})}{f(y_t|\Psi_{t-1})}, \forall j \in \{1, 2\} \quad (5)$$

At this stage we can also derive the smoothed probabilities  $Pr(s_t|\Psi_T)$ ,  $t = 1, 2, \dots, T$ , which provides an inference on the unobserved state using all the information in the sample upon time  $T$ :

$$Pr(s_t = j|\Psi_T) = Pr(s_t = j|\Psi_t) \times \frac{f(y_{t+1}|s_t = j, \Psi_t)}{f(y_{t+1}|\Psi_t)} \times \frac{f(y_{t+2}|s_t = j, \Psi_{t+1})}{f(y_{t+2}|\Psi_{t+1})} \times \dots \times \frac{f(y_T|s_t = j, \Psi_{T-1})}{f(y_T|\Psi_{T-1})} \quad (6)$$

The sample conditional log-likelihood can then be derived from the previous computations as:

$$\log f(y_T, y_{T-1}, \dots, y_1 | \Psi_0) = \sum_{t=1}^T \log f(y_t | \Psi_{t-1}) \quad (7)$$

This can be maximized numerically with respect to the unknown parameters so as to estimate the model.

## F Frequency of recession by group, amplitude and duration

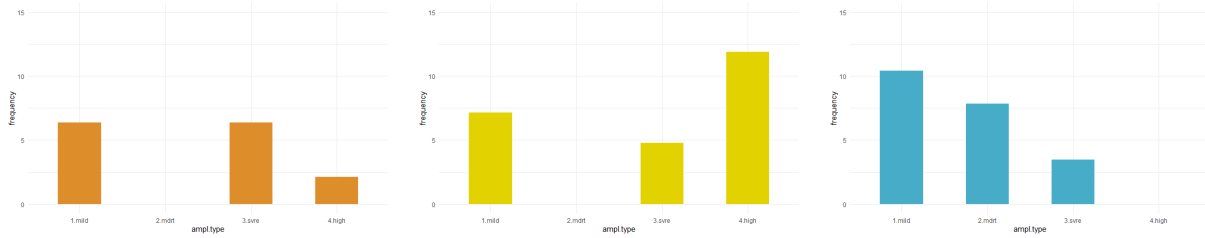
Figure 5d plots the distribution of recession by country group, each associated to a column/color (EM left, orange ; DM middle, yellow : AM right, blue). I separate the recessions along two characteristics:

- durations: (i) short recessions (2 quarters), (ii) medium recessions (2 to 4q.), (iii) long recessions (4 to 6q.) and (iv) protracted recessions (above 6q.);
- amplitude: recessions associated with (j) mild losses (above -2% of GDP), (jj) moderate losses (between -2 and -4% of GDP), (jjj) severe losses (between -4 and -10% of GDP) and drastic losses (below -10% of GDP).

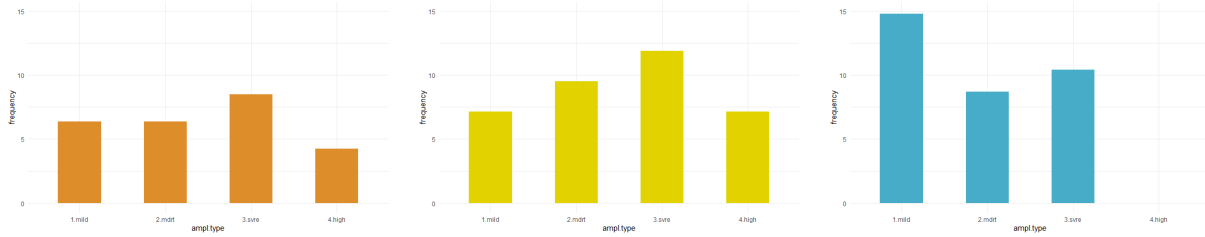
As a naive prior, I would assume that duration and amplitude to be positively related, id est shorter recessions associated with lower losses and longer recessions with higher losses. Hence recessions should be distributed along the diagonal from short&mild- to protracted&drastic-losses recessions: for each color/column, the distribution should be more concentrated from the top left to the bottom right, leaving the bottom left and top right areas loosely populated.

Three main observations can be made to summarize deviations from my initial assumption:

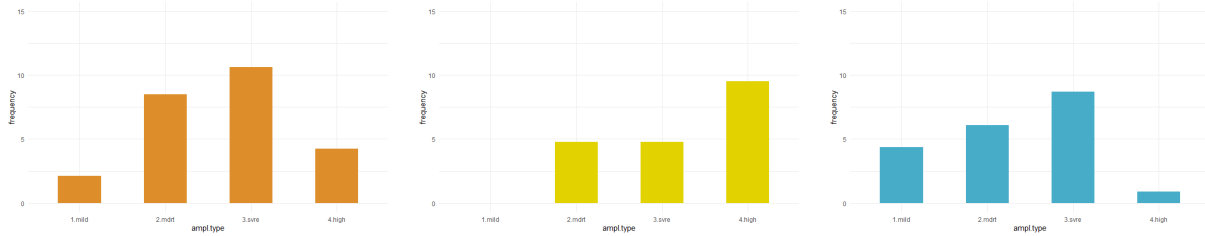
- AM's distribution is skewed to the top left of the distribution. AM's distribution displays a higher frequency for short to medium duration recessions associated with mild to moderate cumulated losses (first two lines, first two bars).
- EM and DM distributions are much more skewed to the right (drastic losses). Their distributions display a much higher fraction of very costly recessions (above 10% of GDP). When cumulating over all durations, EM(DM) experience 5(8) times more recessions associated with drastic losses than AM (25% of the cases for EM and almost 40% for DM against 5% for AM).
- All countries display a spike in the bottom-left of their distribution (first bar, last line). All country groups display a high number of protracted and mild recessions. The picture is even more striking for DM, whom has no long & mild- and protracted & moderate-losses recessions.



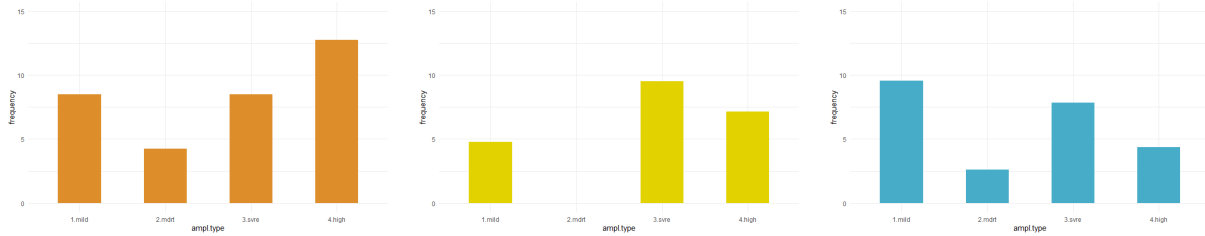
(a) Short recessions (2 quarters)



(b) Medium recessions (2 to 4 quarters)



(c) Long recessions (4 to 6 quarters)



(d) Protracted recessions (above 6 quarters)

(e) Frequency of recession by group, amplitude and duration

Left column (orange) corresponds to results for Emerging Markets, Middle Column (yellow) for Developing Markets and right column (blue) to Advanced Markets).

Recessions are classified according to: 1. duration: short (2 quarters), medium (2-4 quarters), long (5-6 quarters) and protracted (more than 7 quarters) and 2. amplitude: mild ( $x > -2\%$ ), moderate ( $-2 > x > -4\%$ ), severe ( $-4 > x > -10\%$ ) or drastic ( $-10\% > x$ )

## **G – Estimation results by country and selected specification**

Country.Name	spec	Intrcpt H.	Intrcpt L.	Lag 1	Lag 2	Lag 3	Lag 4
Argentina	AR0	0.016 *** (0.00271)	-0.0152 *** (0.00271)				
Armenia	AR1	0.0451 *** (0.00616)	-0.0764 *** (0.00616)	-0.412 *** (0.0165)			
Australia	AR3	0.00824 ** (0.00262)	-0.00622 * (0.00262)	-0.0231 (0.0695)	-0.0374 (0.0667)	0.0478 *** (0.00116)	
Austria	AR0	0.00741 *** (0.000987)	-0.00367 *** (0.000987)				
Belgium	AR0	0.00624 *** (0.000502)	-0.0128 *** (0.000502)				
Bolivia	AR3	0.00901 *** (0.0015)	-0.00538 *** (0.0015)	-0.262 *** (0.0761)	0.193 * (0.0815)	0.331 *** (0.00233)	
Brazil	AR0	0.00962 *** (0.00101)	-0.00817 *** (0.00101)				
Bulgaria	AR0	0.0102 *** (0.00109)	-0.0272 *** (0.00109)				
Canada	AR0	0.00778 *** (0.000456)	-0.00891 *** (0.000456)				
Hong Kong	AR0	0.015 *** (0.00154)	-0.0159 *** (0.00154)				
Colombia	AR0	0.00938 *** (0.000859)	-0.0188 *** (0.000859)				
Costa Rica	AR3	0.00705 *** (0.00156)	-0.0121 *** (0.00156)	0.0423 (0.0894)	0.142 (0.0875)	0.201 *** (0.00543)	
Croatia	AR0	0.00956 *** (0.00102)	-0.00497 *** (0.00102)				
Cyprus	AR4	0.00628 *** (0.0012)	-0.0133 *** (0.0012)	0.0319 (0.0896)	0.102 (0.0816)	0.241 ** (0.0826)	0.0764 ** (0.00374)
Czech Rep.	AR0	0.0104 *** (0.00133)	-0.000884 (0.00133)				
Denmark	AR1	0.00634 *** (0.000954)	-0.0153 *** (0.000954)	-0.103 *** (0.00437)			
Ecuador	AR0	0.0102 * (0.00498)	-0.00922 . (0.00498)				
El Salvador	AR3	0.0116 *** (0.00205)	-0.00766 *** (0.00205)	-0.37 ** (0.109)	-0.356 * (0.135)	-0.0484 *** (0.00316)	
Estonia	AR0	0.0142 *** (0.00147)	-0.0185 *** (0.00147)				
Finland	AR3	0.00612 *** (0.0015)	-0.00613 *** (0.0015)	-0.0392 (0.0757)	0.139 * (0.0683)	0.175 *** (0.00226)	
France	AR2	0.00207 *** (0.000616)	-0.00495 *** (0.000616)	0.382 *** (0.0658)	0.284 *** (0.00259)		
Germany	AR0	0.00813 *** (0.00201)	-0.000608 (0.00201)				
Greece	AR0	0.0064 * (0.00299)	-0.0216 *** (0.00299)				
Hungary	AR0	0.00963 *** (0.000961)	-0.00199 * (0.000961)				
Iceland	AR1	0.0178 *** (0.00284)	-0.00134 (0.00284)	-0.379 *** (0.00469)			
Indonesia	AR0	0.0135 *** (0)	-0.079 *** (0)				
Ireland	AR0	0.0144 *** (0.0038)	-0.00365 (0.0038)				
Italy	AR2	0.00269 (0.00233)	-0.00641 ** (0.00233)	0.412 *** (0.07)	0.0924 *** (0.000679)		
Korea	AR2	0.0117 * (0.00458)	-0.0147 ** (0.00458)	0.272 *** (0.0661)	0.103 *** (0.00173)		
Latvia	AR0	0.0123 *** (0.00184)	-0.0405 *** (0.00184)				
Lithuania	AR0	0.0128 (0.0129)	-0.017 (0.0129)				
Luxembourg	AR0	0.0138 *** (0.0022)	-0.00249 (0.0022)				
Malaysia	AR0	0.0166 *** (0.000944)	-0.0376 *** (0.000944)				

Country.Name	spec	Intrcpt H.	Intrcpt L.	Lag 1	Lag 2	Lag 3	Lag 4
Mexico	AR0	0.0108 *** (0.000873)	-0.0102 *** (0.000873)				
Morocco	AR3	0.0168 (0.0133)	-0.0576 *** (0.0133)	-0.541 *** (0.11)	-0.0112 (0.0956)	0.259 *** (0.00339)	
New Zealand	AR2	0.0158 *** (0.00298)	-0.00384 (0.00298)	-0.32 *** (0.0689)	-0.289 *** (0.00182)		
Paraguay	AR1	0.0193 *** (0.00388)	-0.00982 * (0.00388)	-0.346 *** (0.0045)			
Philippines	AR0	0.012 *** (0.00163)	-0.011 *** (0.00163)				
Portugal	AR0	0.00854 *** (0.000921)	-0.00969 *** (0.000921)				
Romania	AR0	0.0125 *** (0.00286)	-0.0113 *** (0.00286)				
Russian Fed.	AR0	0.0177 (0.0152)	-0.00106 (0.0152)				
Singapore	AR0	0.0186 *** (0.00431)	-0.0156 *** (0.00431)				
Slovak Rep.	AR2	0.00768 *** (0.0011)	-0.0434 *** (0.0011)	0.0732 (0.074)	0.278 *** (0.00422)		
Slovenia	AR2	0.00531 *** (0.00106)	-0.0246 *** (0.00106)	0.24 ** (0.088)	0.175 *** (0.00558)		
South Africa	AR0	0.00984 *** (0.000934)	-0.00257 ** (0.000934)				
Spain	AR0	0.00881 *** (0.000522)	-0.00184 *** (0.000522)				
Sweden	AR0	0.00682 *** (0.000772)	-0.0151 *** (0.000772)				
Switzerland	AR0	0.00679 *** (0.000435)	-0.00611 *** (0.000435)				
Thailand	AR2	0.0137 *** (0.00163)	-0.0331 *** (0.00163)	-0.0958 (0.0738)	-0.0884 *** (0.00436)		
Turkey	AR0	0.0167 *** (0.00387)	-0.0238 *** (0.00387)				
Ukraine	AR4	0.00861 ** (0.0026)	-0.0569 *** (0.0026)	0.206 * (0.0936)	-0.0356 (0.119)	0.112 (0.111)	-0.0261 (0.00929)
United Kingdom	AR2	0.00513 *** (0.000715)	-0.00921 *** (0.000715)	0.164 * (0.0653)	0.117 *** (0.00128)		
United States	AR0	0.00846 *** (0.00152)	-0.00692 *** (0.00152)				
Venezuela	AR0	0.0157 *** (0.00195)	-0.0159 *** (0.00195)				

## H MSM growth regimes – by region and by commodity groups

(in %)	Mean $g_{Exp}$	Mean $g_{Rec}$	Std.Err.(rsdls)	P(Enter Rec)	P(Exit Rec)
Commodity exporters (13)					
avg	1.18	-1.60	0.951	4.63	28.1
std	0.243	1.98	0.412	3.35	14.9
max	1.60	-0.097	1.92	10.3	52.5
qt3	1.29	-0.82	1.05	7.46	34.5
med	1.20	-1.10	0.822	3.45	28.1
qt1	0.98	-1.59	0.691	2.33	15.4
min	0.78	-7.90	0.479	0.848	8.9
nb	13	13	13	13	13
Non Commodity Exporters (41)					
avg	1.12	-1.81	1.06	3.82	29.0
std	0.497	1.81	0.624	1.86	16.4
max	3.19	-0.0608	3.99	10.0	74.4
qt3	1.38	-0.497	1.21	4.36	37.3
med	1.02	-1.29	0.887	3.54	27.3
qt1	0.813	-2.38	0.719	2.63	17.1
min	0.544	-7.65	0.351	1.14	3.27
nb	41	41	41	41	41

**Table 8:** MSM estimations - Regime Analysis

avg - average, std - standard deviation , qt - quartile, med - median



(in %)	Mean $g_{Exp}$	Mean $g_{Rec}$	Std.Err.(rsdls)	P(Enter Rec)	P(Exit Rec)
Africa and the Middle East					
avg	1.32	-2.36	1.46	6.09	35.6
std	0.344	2.10	0.891	3.65	15.7
max	1.67	-0.257	2.44	10.3	53.1
qt3	1.48	-1.32	1.84	7.16	42.0
med	1.30	-2.38	1.25	4.02	30.8
qt1	1.14	-3.42	0.970	3.98	26.8
min	0.984	-4.46	0.691	3.95	22.8
nb	3	3	3	3	3
Asia					
avg	1.51	-3.01	1.14	2.51	34.9
std	0.294	2.34	0.288	1.17	10.9
max	1.87	-1.10	1.58	3.99	50.0
qt3	1.76	-1.58	1.26	3.46	40.1
med	1.50	-2.35	1.16	2.35	37.3
qt1	1.27	-3.28	1.04	1.73	30.7
min	1.16	-7.90	0.639	0.848	15.4
nb	7	7	7	7	7
Central and Eastern Europe					
avg	1.34	-2.79	1.29	2.91	24.7
std	0.604	2.59	0.879	1.04	22.3
max	3.19	-0.0884	3.99	4.42	74.4
qt3	1.28	-0.497	1.21	3.53	27.3
med	1.18	-1.85	0.972	3.23	19.3
qt1	1.02	-4.21	0.798	1.96	10.9
min	0.909	-7.65	0.680	1.14	3.27
nb	13	13	13	13	13
Latin and South America					
avg	1.16	-1.16	0.980	5.94	32.0
std	0.301	0.536	0.388	3.20	12.9
max	1.60	-0.432	1.68	10.0	52.5
qt3	1.38	-0.752	1.11	8.10	40.4
med	1.11	-0.971	0.845	6.75	29.8
qt1	0.976	-1.57	0.746	3.66	23.9
min	0.651	-1.98	0.479	1.19	11.5
nb	10	10	10	10	10
Western Europe					
avg	0.851	-0.974	0.804	4.09	27.0
std	0.287	0.713	0.357	1.76	15.3
max	1.44	-0.0608	1.92	8.45	52.7
qt3	0.881	-0.365	0.931	4.65	33.9
med	0.741	-0.969	0.720	3.54	22.9
qt1	0.640	-1.39	0.565	2.66	16.3
min	0.544	-2.41	0.351	2.42	8.60
nb	17	17	17	17	17
Western Countries					
avg	0.855	-0.609	0.774	3.61	26.4
std	0.0886	0.273	0.339	1.63	7.70
max	0.981	-0.239	1.28	5.56	31.8
qt3	0.880	-0.520	0.809	4.65	31.0
med	0.830	-0.653	0.618	3.33	29.4
qt1	0.805	-0.742	0.583	2.29	24.9
min	0.778	-0.891	0.579	2.19	15.1
nb	4	4	4	4	4

**Table 10:** MSM estimations - Regime Analysis

avg - average, std - standard deviation , qt - quartile, med - median

## I BC group-wise – Shapiro-Wilk normality test results

The table below presents for each group and variable (mean in the high regime, in the low regime, probability to enter a recession, probability to exit a recession) the results of the Shapiro-Wilk normality test.

*grp* indicates the group considered, *var* the variable for which the test is applied, *Y/N* summarizes whether the variable is normally distributed (Y) or not (N). *p.val* gives the p-value of the test and *W* the statistics associated.

	grp	var	Y/N	p.val	W
by country group					
1	AM	mean_h	N	0.00	0.84
2	AM	mean_l	Y	0.14	0.94
3	AM	p.enter	N	0.02	0.90
4	AM	p.exit	Y	0.20	0.94
5	EM	mean_h	Y	0.06	0.88
6	EM	mean_l	N	0.03	0.86
7	EM	p.enter	N	0.01	0.84
8	EM	p.exit	N	0.03	0.87
9	DM	mean_h	N	0.00	0.74
10	DM	mean_l	N	0.01	0.84
11	DM	p.enter	N	0.04	0.87
12	DM	p.exit	Y	0.52	0.95
by region					
1	AME	mean_h	Y	0.90	1.00
2	AME	mean_l	Y	0.99	1.00
3	AME	p.enter	N	0.02	0.76
4	AME	p.exit	Y	0.49	0.93
5	Asia	mean_h	Y	0.37	0.91
6	Asia	mean_l	N	0.03	0.79
7	Asia	p.enter	Y	0.68	0.94
8	Asia	p.exit	Y	0.79	0.96
9	CEE	mean_h	N	0.00	0.64
10	CEE	mean_l	Y	0.13	0.90
11	CEE	p.enter	Y	0.49	0.94
12	CEE	p.exit	N	0.01	0.82
13	LSA	mean_h	Y	0.70	0.95
14	LSA	mean_l	Y	0.31	0.91
15	LSA	p.enter	Y	0.43	0.93
16	LSA	p.exit	Y	0.87	0.97
17	WE	mean_h	N	0.01	0.84
18	WE	mean_l	Y	0.22	0.93
19	WE	p.enter	N	0.01	0.85
20	WE	p.exit	N	0.04	0.89
21	WE	mean_h	Y	0.38	0.89
22	WE	mean_l	Y	0.73	0.95
23	WE	p.enter	Y	0.33	0.88
24	WE	p.exit	Y	0.10	0.80
by commodity					
1	CMD	mean_h	Y	0.74	0.96
2	CMD	mean_l	N	0.00	0.59
3	CMD	p.enter	Y	0.07	0.88
4	CMD	p.exit	Y	0.21	0.91
5	No.CMD	mean_h	N	0.00	0.84
6	No.CMD	mean_l	N	0.00	0.83
7	No.CMD	p.enter	N	0.00	0.89
8	No.CMD	p.exit	Y	0.15	0.96

## J Group-wise BC regimes – Wilcoxon/Student test results

The table below presents for each group-pair () and variable the results of the Student's t test or Wilcoxon test to compare the average of both

*compar* indicates which groups are being compared, *var* the variable for which the test is applied (mean in the high regime, in the low regime, probability to enter a recession, probability to exit a recession). *test* indicates whether a Wilcoxon or a Student test is applied (depending on the results to the Shapiro-Wilk normality tests). *type* indicates whether the null that is being tested is one- or two-sided, and if one-sided whether the first group average is tested to be less/greater than the second group's average. *p.val* gives the p-value of the test and *W* the statistics associated.

	compar	var	test	type	Stat	p.value
1	AM-EM	mean_h	Wilcoxon	less	87.00	0.00
2	AM-DM	mean_h	Wilcoxon	less	94.00	0.01
3	EM-DM	mean_h	Wilcoxon	two.sided	99.00	0.59
4	AM-EM	mean_l	Wilcoxon	greater	237.00	0.05
5	AM-DM	mean_l	Wilcoxon	greater	277.00	0.00
6	EM-DM	mean_l	Wilcoxon	greater	143.00	0.11
7	AM-EM	p.enter	Wilcoxon	two.sided	203.00	0.52
8	AM-DM	p.enter	Wilcoxon	two.sided	182.00	0.97
9	EM-DM	p.enter	Wilcoxon	two.sided	105.00	0.77
10	AM-EM	p.exit	Wilcoxon	two.sided	195.00	0.68
11	AM-DM	p.exit	Student	less	-0.19	0.06
12	EM-DM	p.exit	Wilcoxon	less	75.00	0.06

## K – Theoretical considerations on the nature of growth processes and sovereign debt crises

This annex presents the theoretical model upon which Carre et al. (2019) builds to advocate for the need for discontinuities to capture the occurrence of financial crises.

Consider a two-period model of a small open economy, which can borrow on international financial markets. Said economy has the ability to default on its debt, but incurs a penalty when doing so. In the first period, the country is endowed with a given amount  $Q_1$ , while its endowment in the second period is stochastic and subject to potential shocks  $\tilde{Q}_2$ .

The country seeks to maximize an intertemporal utility function such as:

$$J = \max\{u(C_1) + \beta E(u(\tilde{C}_2))\}$$

subject to following budget constraints:

$$C_1 = Q_1 + D_1$$

$$\tilde{C}_2 = \tilde{Q}_2 - \tilde{R}_2$$

where  $C_i$  denotes consumption in period  $i$ ,  $D_1$  is the amount of debt borrowed in the first period and  $\tilde{R}_2$  is the amount actually repaid in period 2.

Defining  $r$  the world riskless rate of interest, in the deterministic case, competitive lenders would impose that  $R_2 = D_1(1 + r)$ .

If the country can default upon its debt at the cost of suffering a penalty amounting to a fraction of output  $\lambda\tilde{Q}_2$ , in the deterministic case, this would impose  $R_2 < \lambda Q_2$ . With the constraint binding, the country borrows a maximum amount of  $D_1 = \lambda Q_2 / (1 + r)$ .

Considering a simple stochastic case in which output in period 2 is uncertain between a high value  $Q_2^+$  with probability  $1 - p$  and a low value  $Q_2^-$  with probability  $p$ .

If  $R_2 < \lambda Q_2^-$ , then even in the bad state of nature, the country would not default upon a credit line given by  $D_1^s(1 + r) = R_2$  (superscript  $s$  stands for safe credit line).

Denote  $D_1^u$  an unsafe credit line upon which the country would default in the good state of nature, that is a credit line that would not lead to any repayment in the second period. We can derive in a similar manner that  $D_1^u(1 + r) = R_2(1 - p)$ . This would happen when  $\lambda Q_2^+ < R_2$ .

In the safe case, the country obtains as such a credit line worth at most  $\bar{D}^s = \lambda Q_2^- / (1 + r)$ . Similarly, in the unsafe case, the maximum amount for the credit line is given by  $\bar{D}^u =$

$\lambda Q_2^+(1-p)/(1+r)$ .

Define  $\gamma$  the extent of the recession in the bad case, that is  $Q_2^- = (1-\gamma)Q_2^+$ .

Saying that the safe case is always preferable is equivalent to  $\bar{D}^2 > \bar{D}^u$ . After brief rearrangement this is equivalent to  $\gamma < p$ .

As such small shocks with large vibration (low  $\gamma$  and high  $p$ ) do not generate any risk of default. On the other hand, large shocks with small risk do yield the risk of default. This is the Poisson case.

In the dynamic setting analyzed by Carre et al. (2019), this leads to the conclusion that it takes a discontinuous shock to the debt-to-gdp wealth ratio, driven by a Poisson process, to trigger a default. Shocks to GDP generated by a Brownian process do not trigger default. This simple model also allows to understand why neither the discount factor nor the functional form of the utility function really matter. All that matters is the upper limit to the debt ceilings that the country is allowed to reach.

## L Annex - Dating self-fulfilling debt crises

### L.1 Self-fulfilling dynamics and sovereign defaults.

As mentioned in section ??, financial crises have been seen by the theoretical literature as either related causally to a deterioration of economic conditions, or as the result of self-fulfilling mechanisms. In previous section, I have quantified how costly financial crises can be in terms of economic volatility. I have also identified that severe crises matter the most in explaining EMDE costlier recessions. A simple analysis of the data suggests that half of these episodes predates regime switches (causing it ?), while the other half follows a growth shock (being caused by it?). Finally, I postulate that around 7% of crises are of self-fulfilling nature. The next subsection aims at verifying the latter item. Following subsections explore the fundamental view of crises.

#### Identifying self-fulfilling events empirically

To infer econometrically the proportion of self-fulfilling events, I rely on Cohen and Villemot (2015).

In order to study sovereign defaults, they formulate a theoretical typology of events depending on the stock of debt. Below a critical threshold, no adverse shock to fundamentals can drive the country to default based on sole economic grounds. Above a critical threshold<sup>15</sup>, a country will rationally extend its level of debt up until default<sup>16</sup>.

In this framework, a crisis might occur because of the occurrence of another adverse exogenous shock or because of a self-fulfilling shock that endogenously reduces the country's repayment ability.

To bridge the gap between these theoretical considerations and econometric inferences, they focus as such on the law of motion for debt-to-gdp in 'normal times' versus during 'distress periods' that end up in a crisis. A self-fulfilling event is then identified as a crisis that would not have occurred should if debt-to-gdp had 'simply' been driven along the pre-crisis path. Their empirical framework relies on the estimation of a system of three simultaneous equations that link together said debt-to-gdp ratio, economic growth and the occurrence of a sovereign default. Using annual data on 97 countries over 1970-2004, they find that self-fulfilling events represent a small minority of all cases (between 6 and 12%).

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<sup>15</sup>This level for the debt-to-gdp ratio can be considered as the outcome of a succession of unfavorable exogenous shocks.

<sup>16</sup>The rationality of this phenomenon is driven by what is coined a 'Panglossian attitude' following Krugman (1999). Should an adverse shock be so costly that the country has no choice but to default, then existing debt would lose all value as the country reneges existing commitment to repay. As such, the country should have rationally worried more beforehand. It would have behaved as if the risk of an unfavorable shock could be ignored.

Next subsection details the econometric framework and associated assumptions. Using quarterly data, my database differs from theirs on several aspects. This calls for few methodological adjustments, which are presented afterwards.

### **Adapting the dataset**

Cohen and Villemot (2015)'s empirical approach relies on the identification of two types of episodes: 'normal times' and 'distress periods'. To identify distress periods, they use the three criterion for sovereign defaults identified in section ???. Normal times are then identified as the complement set of observations and each such episode is then divided into 5-year long sub-periods. At an annual frequency all data sources<sup>17</sup> are available continuously. It is therefore possible to date both beginning and end of distress periods.

At a quarterly frequency, I only have access to the beginning date of sovereign defaults. As such I need to posit an average length for distress episodes. I chose to set the length of an episode to 3 years (12 quarters), which is the minimum length for an episode chosen in their procedure<sup>18</sup>. For symmetry, I also divide 'normal times' in similar length episodes.

As their study concentrates on sovereign debt crises only, I initially follow this approach. I then extend default episodes with respect to associated currency and banking crises so as to capture the idea that sovereign crises are in a majority of cases involved in multiple crises episodes. The construction of their test relies on a crisis being triggered by a public debt-to-gdp ratio above or below a certain threshold. This idea is key to most of the literature on sovereign debt crisis<sup>19</sup>. As such their econometric test cannot be applied to other types of crises without adjustments. I partially tackle this problem for currency crises as quarterly time series for debt are derived from annual data using quarterly exchange rates changes<sup>20</sup>. To include banking crises, I then consider not only public but private debt as well.

Finally, I adapt their approach by introducing a dummy variable indicating if crises episodes are associated to a regime switch. Adding this information in the estimation process helps

I now present the specificities of the econometric model.

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<sup>17</sup>The data referred to includes data on arrears of payment, access to Paris Club rescheduling/restructuring plans and access to IMF financial assistance

<sup>18</sup>The rationale behind this assumption echoes both Cohen and Villemot (2015)'s treatment of the data and the shorter time series available at a quarterly frequency

<sup>19</sup>A key illustration of this is the debate on an optimal level for debt-to-gdp that has been at the center of the literature since the Great Financial Crises

<sup>20</sup>The procedure is described in annex ???.



## Econometric model and Results

### The system of equations:

Cohen and Villemot (2015)'s econometric approach relies on the estimation of a system of three simultaneous equations. Indexing variables by  $i$  for episode and  $t$  for time:

Equation 8 is an equation capturing the law of motion for debt-to-gdp. At quarter  $q$ , the stock of debt-to-gdp  $d_{i,q}$  is explained by the stock a year before  $d_{i,q-4}$ , by cumulated growth over the period  $g_{i,q}^c$ <sup>21</sup> and shocks meant to capture unpredicted valuation effects or unforeseen debt contingencies  $\epsilon_{i,q}^d \in N(0, \sigma_d^2)$ :

$$d_{i,q} = \eta^d * d_{i,q-4} + \eta^{d,g} * d_{i,q-4} * g_{i,q}^c + \epsilon_{i,q}^d \quad (8)$$

Equation 9 explains current growth cumulated over past year  $g_{i,q}^c$  by comparing it to past growth performances  $g_{i,q-4}$ , the occurrence of a crisis  $\delta_{i,q}$ <sup>22</sup> as well as a control for international convergence  $conv_{i,y-2}$  – measured here as the annual value for the log of PPP real GDP per Capita, two year before the episode. Shocks  $\epsilon_{i,q}^g \in N(0, \sigma_g^2)$  represent country's exogenous growth uncertainty:

$$g_{i,q}^c = \eta_1^g + \eta_2^g * g_{i,q-4} + \eta_3^g * conv_{i,y-2} + \eta^{g,\delta} * \delta_{i,q} + \epsilon_{i,q}^g \quad (9)$$

Equation 10 is a probit explaining the occurrence of a crisis  $\delta_{i,q}$  by current debt-to-gdp ratio  $d_{i,q}$ , previously mentioned controls (past situation, international convergence), as well as a measure of exchange rate overvaluation  $over.val_{i,y-2}$  and the US 10year-BAA spread  $sprd.us_{i,y-2}$ , both taken two years prior to episode start. The first addition is meant to capture the fact that debt and currency crises are often related (the *Twin Ds*), and the second proxies for the international financial environment.  $\epsilon_{i,q}^\delta \in N(0, 1)$  is a shock that represents the variability of the debt thresholds above which a country defaults.

$$\delta_{i,q} = \mathbb{1}_{\eta_1^\delta + \eta_2^\delta * conv_{i,y-2} + \eta_3^\delta * over.val_{i,y-2} + \eta_4^\delta * d_{i,q-4} + \eta_5^\delta * g_{i,q-4} + \eta_6^\delta * sprd.us_{i,y-2} + \eta^{\delta,d} * d_{i,q} + \epsilon_{i,q}^\delta > 0} \quad (10)$$

### Resolution

These three simultaneous equations exhibit a circular dependency illustrated through  $\eta^{d,g}$ ,  $\eta^{g,\delta}$  and  $\eta^{\delta,d}$ . The system is thus unidentified: for a given set of exogenous variables and a draw of shocks, two solution vectors are possible, a 'crisis' scenario  $(d^1, g^1, 1)$  and a 'no-crisis' one

<sup>21</sup>Growth enters debt-to-gdp ratio at the denominator. Introducing cumulated growth over the period is directly derived from a linearization of usual debt accumulation equation.

<sup>22</sup>This is derived with the idea that crises are associated with output losses/switches.

$(d^0, g^0, 0)$ . To resolve this issue, two elements are introduced.

First, a set of sign restrictions concerning the parameters governing circularity.

- $\forall i, q : \eta^{d,g} * d_{i,q-4} < 0$ . In other words debt-to-gdp is a decreasing function of growth. Rewritten as  $d^0 < d^1$  it implies that the debt-to-gdp ratio is always worse in a crisis situation, *ceteris paribus*<sup>23</sup>.
- $\forall i, q : \eta^{g,\delta} < 0$ . That is, growth is always lower in a crisis situation *ceteris paribus*:  $g^1 < g^0$ .
- $\forall i, q : \eta^{\delta,d} > 0$ . This implies that the probability of a debt crisis is an increasing function of the debt-to-gdp ratio.

Second, a binary stochastic variable is introduced when it is impossible to discriminate between the two equilibria: a *sunspot variable* unrelated to fundamentals. It is meant to capture agents' coordination around a given equilibrium when several options are possible. This variable is assumed to follow a Bernoulli of parameter  $p \in \{0.5, 1\}$ . In this article I consider, that if a country faces indeterminacy, the worst possible scenario is chosen by markets and a crisis is triggered<sup>24</sup>.

Based on these complements, episodes can as such be sorted into three classes. Denoting  $X^\delta$  and  $X^{\delta,d}$  exogenous variables introduced in equation 10 :

- If  $X_{i,q-1}^\delta \eta^\delta + d_{i,q}^0 * X_{i,q-1}^{\delta,d} * \eta^{\delta,d} + \epsilon_{i,q}^\delta > 0$ , then, according to the probit equation, even with the debt-to-gdp ratio of the 'no-crisis' scenario, a crisis is triggered. This case is denoted the *crisis equilibrium*, as for both scenarii, fundamentals set off the crisis.
- If  $X_{i,q-1}^\delta \eta^\delta + d_{i,q}^1 * X_{i,q-1}^{\delta,d} * \eta^{\delta,d} + \epsilon_{i,q}^\delta < 0$ , then, according to the probit equation, even with the debt-to-gdp ratio of the 'crisis' scenario, no crisis is triggered. This case is denoted the *no-crisis equilibrium*, as for both scenarii, fundamentals do not set off the crisis.
- If  $X_{i,q-1}^\delta \eta^\delta + d_{i,q}^1 * X_{i,q-1}^{\delta,d} * \eta^{\delta,d} + \epsilon_{i,q}^\delta > 0 > X_{i,q-1}^\delta \eta^\delta + d_{i,q}^0 * X_{i,q-1}^{\delta,d} * \eta^{\delta,d} + \epsilon_{i,q}^\delta$ , then both scenarii are possible and the sunspot determines the outcome. This is the so-called *self-fulfilling equilibrium*.

The model is then estimated maximizing likelihood using the full information set.

<sup>23</sup>See the annex of Cohen and Villemot (2015) for mathematical derivation

<sup>24</sup>This implies that  $p = 1$ . Note that the estimation of  $p$  is often inaccurate. Should  $p$  have been set to 0.5, estimates regarding the probability for a crisis to be self-fulfilling would be halved. Results given are as such upper-bounds.

## Results

As explained in the previous section, financial crises that explain differences in volatility the most are severe multiple episodes crises. I thus present and discuss the results for the estimation of the test on multiple episodes crises. Table estimates for other specifications are available in annex ??.

As can be seen in table 12, most coefficients are of expected sign and moderate accuracy. The debt dynamics equation exhibits high inertia with a coefficient on past debt to gdp close to 1. The interaction of past debt-to-gdp with current cumulated growth has a strong and significant effect.

Growth dynamics has some serial auto-correlation. The convergence effect of poor countries is robust. Finally, a crisis lowers growth by around 5%.

If in the debt crisis equation, all estimates are not significant, they have expected signs. Notably a higher debt-to-gdp ratio increases the probability of a crisis.

Overall I find that between 9.5 and 11.7% of crises are self-fulfilling. A result that confirms previous section remarks.

### An episode-wise approach to self-fulfilling events

Given previous results and my interest in specific types of crises, I now give the probability for each crisis-episode to be of self-fulfilling nature. The probability is inferred from the point estimates of some parameters (related to circularity and the level of the debt-to-gdp ratio) and the value for associated coefficients.

Under previous specification, several crises stem out with higher than average inferred self-fulfilling probabilities.

- Greece 2012.q4 default first. It has a very high probability of ‘self-fulfilling-ness’: 45.2% in (16) and 39.6% in (12). The Greek default of 2012 has been at the center of academic and institutional research. The involvement of the troika (IMF, European Commission, ECB) and the discussion on access to safe credit lines to cope with pressure on the financial markets as well as drastic economic costs for the population. An episode easily matched with a recession in the sens of MSM. As programs and negotiations moved forward starting in 2012-2013, the economic situation deteriorated, the banking system collapsed, the central bank lost track, the country losing competitiveness could not see its currency and yet economic prospects were so bad that capital start flowing out the country. It is as such very interesting that the default captures with a very high probability a risk of being partly of self-fulfilling nature.
- Bolivia 2004.q4. As the country underwent a vast process of liberalization through cap-

	(1)	(2)	(3)
<b>Debt/GDP ratio dynamics</b>			
$\beta_{X1}$ : Pub. Debt/GDP (q-8)	1.043*** (0.014)	1.062*** (0.015)	1.058*** (0.015)
$\beta_{X2}$ : Pub. Debt/GDP (q-8) * Cumul.Growth (q)	-0.844*** (0.123)	-1.026*** (0.127)	-0.982*** (0.125)
$\sigma_u$	0.085*** (0.004)	0.080*** (0.004)	0.079*** (0.004)
<b>Growth dynamics</b>			
$\beta_{Y1}$ : $1_{MSM-regimeswitch}$ (q-4;q)			-0.020 (0.011)
$\beta_{Y1}$ : Log per capita PPP real GDP (y-2)	-0.027*** (0.006)	-0.023*** (0.006)	-0.024*** (0.006)
$\beta_{Y1}$ : Real GDP Growth (q-8)	0.618** (0.196)	0.902*** (0.254)	0.958*** (0.250)
$\beta_{Y1}$ : Constant	0.343*** (0.056)	0.309*** (0.061)	0.322*** (0.060)
$\beta_{Y2}$ : $1_{Crisis}$ (q)	-0.052** (0.017)	-0.053** (0.017)	-0.048** (0.017)
$\sigma_v$	0.068*** (0.003)	0.063*** (0.003)	0.062*** (0.003)
<b>Debt crisis determinants</b>			
$\beta_{Z1}$ : Pub. Debt/GDP (q-8)	-3.840* (1.897)	-4.149 (2.193)	-3.709 (2.113)
$\beta_{Z1}$ : $1_{MSM-regimeswitch}$ (q-4;q)		0.817** (0.315)	
$\beta_{Z1}$ : Log per capita PPP real GDP (y-2)	-0.314 (0.274)	-0.690 (0.357)	-0.470 (0.325)
$\beta_{Z1}$ : USD GDP / PPP GDP (y-2)	-1.150 (0.750)	-0.514 (0.902)	-1.091 (0.887)
$\beta_{Z1}$ : Spread US (y-2)	-0.670** (0.228)	-0.561* (0.239)	-0.547* (0.227)
$\beta_{Z1}$ : Real GDP Growth (q-8)	-4.288 (6.265)	-9.236 (9.107)	-5.215 (8.403)
$\beta_{Z1}$ : Constant	3.790 (2.395)	6.590* (3.064)	5.161 (2.810)
$\beta_{Z2}$ : Pub. Debt/GDP (q)	3.543 (1.874)	3.761 (2.100)	3.194 (2.058)
p: Sunspot Bernouilli parameter	1.000	1.000	1.000
<b>Self-fulfilling probability</b>	0.095	0.117	0.095
<b>Self-enforcing probability</b>			
Number of observations	254	202	202
Log-likelihood	532.001	451.675	449.752
AIC	-1034.002	-871.350	-867.504

Table 12: Self-fulfilling estimates on Multiple Crises Episodes

italization of numerous public sector firms and financial liberalization regarding foreign investment, social unrest lead to the demission of president Sanchez de Lozada in October 2003. The sudden stop that the country experienced at that period is of 15.3-14.3% respectively self-fulfilling. Note that so far no control has been introduced for political crises or other similar related crises (fiscal, etc)

- Serbia, 2009.q1. In January 2009, a request for Stand-By Arrangement is addressed by the Serbian government to the IMF. The economic situation deteriorated through failed privatization, through a fall in incoming capitals and through trade losses into debated policies, social unrest and an external intervention approved by the IMF understood policy recommendations would be started.
- Ecuador 1999.q1. A multiple crises episode that resulted in 1999 in a banking crisis and a sovereign default. It started in a period of high financial stress given the international situation (EMDE's 1998 financial crises period). High public debt and low state revenues proved low insurance on financial markets. Unrest and a small default of a bank lead to panics and bank runs (a key self-fulfilling banking crisis). Moreover the Ecuadorian crisis is characterized by a sharp depreciation of the Sure that lead to a dollarization in 2000.q1. Probabilities are of 8.3 and 6.8%.
- Argentina 2001 default. Argentinean default is a famous case study in the history of financial crises. Argentina has been shocked with financial crises multiple times in past fifty years. Beginning 2001, the peso is devalued from 1 peso per USD to 1.4 peso per USD. End 2001, pressure on the currency and worries about a potential devaluation and/or deposit freeze lead to panics, unrest and bank runs. December 23<sup>rd</sup> of December 2001, president Rodriguez Saà defaults upon USD 93bn of Argentinean sovereign debt. The IMF stopped lending money to Argentina which lost access to international financial markets.
- Russia 1998.q3. Russian financial crises is characterized by a sudden devaluation and a default on public debt. This crisis is a key example of those crises out of panics spilled from one emerging market to another at the eve of any economic perturbation.
- (Thailand 2010.q4, political unrest; Costa Rica 2009.q4 credit crunch; Turkey 1995.q1, multiple crisis episode)

These results advocate strongly in favor of previously presented theoretical assumptions for the typology of crises.

Indeed most likely self-fulfilling events are often financial crises triggered during good periods. Quite notably, most of the episodes relate to times of either political unrest, financial turmoil in similar economies, panic spikes etc (see annex ?? for more detail). These results with recent findings (Herrera et al., 2020).

## M Data sources – financial crises datation

This annex presents the source for the data used in chapter ?? when dating financial crises. Several different types of sources are aggregated:

- (1) Quarterly time series for different macroeconomic and financial variables
- (2) Databases of crises that often entail (i) either time series of dummy variables indicating the occurrence of an event (ii) or tables/subsamples of events with dates and/or narrative elements
- (3) Archives from the IMF. These documents are between 35 and 90 pages long. They were accessed from <https://www.elibrary.imf.org> or <https://archivscatalog.imf.org>

Time series:

rates : "FIMM\_PA" IFS IMF

Monetary policy-related interest rates : percent per annum : "FPOLM\_PA" : IFS : IMF

reserves excluding gold: "RAXG\_USD" IFS IMF

## N Annex – Narrative methodology, currency crises

Present annex details the key theoretical factors and determinants behind currency crises.

**Agents and transactions**  $\cup$ : The exchange rate matters for all transactions<sup>25</sup> involving agents valorising the utility of said transaction in different currencies. That makes for a lot of transactions and as many different types of agents as possible. Here, I describe the main possibilities for key agents to be affected by the external nominal anchor.

- $\cup$  Households care (indirectly) about the exchange rate as it impacts the price of the imports aimed for consumption (durable and non-durable goods and services). Their perceived income can also be affected by the exchange rate, for example, if they work across borders. Depending on (i) the liberalization and development of financial markets and (ii) the distribution of wealth in the economy, the external nominal anchor might enter into consideration for some household's investment/savings decisions and affect their earnings/dues on foreign assets/liabilities.
- $\cup$  Firms and non-financial corporations care about the exchange rate if their balance sheet is exposed to risks of currency mismatch. This could be the result of (i) an important share of earnings coming from export receipts, (ii) a high dependency upon imported inputs. A firm's production, investment and pricing decisions might depend upon expected profits and thus be conditional on agent's expectations of future exchange rates. Exchange rate fluctuations can also affect firms ability to export based on their productivity<sup>26</sup>. Large or multinational firms may also care about the value/stability of the exchange rates in their direct investment decisions and/or want to insure against currency risk by diversifying their portfolio using swaps or derivative. Exchange rate flexibility has important effects on corporate debt currency denominations. Volatility often discourages currency mismatches.
- $\cup$  Banks and financial institutions are also exposed to balance sheet risks due to currency mismatch. More importantly, banks and financial institutions are key actors of forex markets. They are responsible for an important share of these transactions as, beyond their own, they often act as an intermediary for private agents. Financial institutions also enter forex markets to manage their portfolio of assets and/or speculate (e.g. carry trade<sup>27</sup>). This can lead to various cross-border capital flows and episodes of speculative attacks – in which the value of a currency might be 'stress tested'. Exchange rate fluctuations also relate to large capital flows. In the case of a sudden loss of confidence, they can be associated to massive capital flights.
- $\cup$  The government – sovereign authority – depends upon the exchange rate in different ways. Because of the particular nature of a country's income diversification, export earnings

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<sup>25</sup>A reader interested in a **more** detailed approach can search the latest IMF's Balance of Payments manual. As of the date of writing this: IMF (2009).

<sup>26</sup>Berman et al. (2012)

<sup>27</sup>See speculative mechanisms related to interest rate parities.

can prove to be a fruitful source of revenue for a government, e.g. natural resources etc. Nevertheless, should these receipts fall, the sovereign might see its policy space constrained by a rising debt service ratio. This might be a source of pressure for the exchange rate. The notion of *original sin*<sup>28</sup> has always been a key element when discussing sovereign's access to domestic/foreign currency borrowing.

- ⊕ The central bank, as the monetary authority, is the primary agent whose existence is related to the external nominal anchor. Her mandate stipulates her stance on the determination of the exchange rate and whether she should intervene on markets or not. Note that in some cases, authority over the exchange rate can be transferred to a currency board. Intervention can take many forms: print money, sell/buy foreign reserves, change interest rates. The central bank can also try to prevent fluctuations by imposing capital flow measures or macroprudential policies limiting currency exposure. Note that exchange rate fluctuations also pass-through to inflation and might create inflationary/depreciatory pressures on consumer/producer price indices<sup>29</sup>.

**The factors behind forex markets** ⊗: To properly define currency crises, it is important to pay attention to fundamental/structural determinants of forex markets.

- ⊗ As previously mentioned the *de jure* exchange rate regime is perhaps the first determinant of the foreign exchange market. In practice though, central banks often vary broadly in the exchange arrangements. *De facto* exchange rate regimes are thus a spectrum, see Ilzetzi et al. (2019) for a historical overview. The more constraining is the exchange arrangement (a fixed exchange rate/peg, a currency board, dollarization etc) bind the central banks to care about the exchange rate. Should she face another shock, the situation on the forex market might well determine her remaining policy space given the exchange arrangement.
- ⊗ The more an economy opens/globalizes her trade and financial activity<sup>30</sup>, the more she becomes reliant on forex markets. Hence a key friction that might be of interest for exchange rate fluctuations relates to existing barriers to trade and financial flows. More broadly, given exchange rate regimes, globalization can constrain monetary policy space following discussions on the Mundell trilemma, Rey (2018) Obstfeld (2019).
- ⊗ Global imbalances can be a key element to follow as they might suggest future expected external adjustment through valuation effects and potential app-/dep-eciatory pressures, Gourinchas and Rey (2007), (2014). (Adler et al., 2020) very recently discuss the impact of dominant currencies and trade invoicing patterns on the possibilities for flexible

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<sup>28</sup>See Eichengreen and Hausmann (1999), Hausmann and Panizza (2003) on the *original sin*. See also for emerging markets Broner et al. (2013) and Reinhart et al. (2003)

<sup>29</sup>See Geerolf (2020) for a discussion, by exchange rate regime, of CB's Philips Curve introducing real exchange rate growth and unemployment.

<sup>30</sup>See Martin and Rey (2006) for broader considerations on financial crashes and globalization in emerging markets.



exchange rates to enable external adjustment in emerging markets. They identify exchange rate movements as a source for negative balance sheet effect in emerging markets by compressing importing firms' balance sheets.

- ⊗ The lack of trade diversification can also be a very important factor in building up vulnerabilities on the exchange rates. If an economy relies too much on a specific set of goods and services<sup>31</sup>, this might presage a higher dependency on external factors and a higher pass-through of exchange rate fluctuations to the real economy. Exporters could also be more vulnerable to external shocks such as bad harvests or natural disasters and might thus be a source of vulnerability on the external front.
- ⊗ The development and liberalization of financial markets can also greatly affect exchange rates-related developments. Often liberalization periods in markets that are not enough developed can lead to increases in investors' risk aversion. This could expose the economy to speculative attacks or a constraining environment. Depending on the market's depth, number of participants, and the participation rate of foreign agents, developments on financial markets can spillover to forex markets and the exchange rate.
- ⊗ Agents facing balance sheet currency mismatch can be exposed to exchange rate fluctuations if their portfolio is short in foreign currency.
- ⊗ If a small open economy is developing, she might be subject to real appreciationary pressures to compensate for changes in relative labor productivity gains (e.g. Balassa Samuelson, see Samuelson (1994)). These dynamics might affect long-run values of exchange rates.

**Changes in policy** √: Because a crisis entails the evacuation of accumulated pressures, she is characterized by the revision by one or more agents of their optimal policy functions. I now describe the main policy adjustments that matter for the forex markets:

- √ Expectations realignments: because pressures on the currency often emanate from conflicting views on what today's price should be, new information or a clearer signal on an agent's intentions might help resolve part of the conflict. A key example would be an independent central bank's clear communication.
- √ When there is too much pressure on the exchange rate, if flexible, the latter adjusts. If not, it is possible for the central bank, to devalue the exchange rate to allow for a partial adjustment and a regain in external competitiveness.
- √ Is she wishes to fight off app-/dep-ressionary pressures the central bank can build up/down her stock of foreign reserves or gold. She can also enter swap agreements with other central banks.
- √ By influencing the key policy rates, the central bank affects the interests perceived on

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<sup>31</sup>Poorly diversified countries that rely a lot upon Tourism are a key example of services lead specialization, see e.g. Cyprus and Greece.

- domestic currency assets and might thus affect existing developments on forex markets. The key theoretical framework to think of these episodes is that of interest rate parities.
- ⚡ By imposing import tariffs, export subsidies or various capital flow measures, a country's authorities can regulate cross border flows of the domestic currency and thus protect the economy from damaging capital outflows. These measures might nevertheless discourage foreign investors and entail missed opportunities and a less efficient resource allocation. The policies are heavily debated in the changing multilateral world system but are found, in emerging markets and developing economies to have long-lasting effects, hence representing sources of frictions on forex markets.
  - ⚡ As drastic a policy change can be, changes in exchange rate regimes are often the only option left to policy-makers to exit the current crisis equilibria into a new safe zone.
  - ⚡ Finally asset purchases programs – unconventional monetary policies can also prove an interesting measure to follow regarding forex market dysfunctions. Open Market Outright transactions on government securities are a recent trend for small open advanced economies (post-2010) and a COVID-19 innovation for many Emerging Markets' Central Banks in Local Currency Bond Markets. Their effect has not yet been completely studied. The second type of asset purchases programs include lending operations/credit facilities which can alleviate liquidity pressures on private agents. Overall these policies can spillover to forex markets.

## O Financial crises in expansion: the outliers

### O.1 The outliers:

#### Sovereign crises:

Overall 5 (out of 35) sovereign crises are dated in expansions, 1 EM (Costa Rica), 3 DM (Bolivia, Thailand and Turkey) and 1 AM (Greece).

⚡ (EM.sov.exp): **Costa Rica, 2009q4**. The country weathered well the global financial crisis thanks to "a supportive fiscal stance" that managed to sustain growth. Nevertheless constraints on the government budget constraint lead to requesting external resources at the IMF end 2009 (Stand-By Arrangement) (Staff Report for the 2011 Article IV Consultation for Costa Rica).

⚡ (DM.sov.exp1): **Bolivia, 2004q4**.

*Following serious civil unrest in February and a sizable withdrawal of U.S. dollar deposits from the banking system, the Bolivian authorities refocused their efforts on putting in place a program to stabilize the economy, in support of which they request a Stand-By Arrangement (SBA) from the Fund. The authorities intend to continue advancing in their preparation of a medium-term economic program, for which they soon plan to seek support from the PRGF IMF (March 24, 2003), **Bolivia: Request for Stand-By Arrangement** Despite difficult social and political conditions, the authorities have been able to maintain a sound macroeconomic framework in 2004, including significant fiscal adjustment. IMF (December 16, 2004), **Bolivia: Stand-By Arrangement – Request for Extension***

⚡ (DM.sov.exp2): **Thailand, 2010q4**.

⚡ (DM.sov.exp3): **Turkey, 1995q1**.

⚡ (AM.sov.exp): **Greece, 2004q3**. Revisions of data standard with Eurostat lead to revelations of fiscal data inconsistencies. This uncovered an ongoing dynamics of "spending overruns and revenue shortfalls" which suddenly pushed the observed deficit to important levels and revealed a complete lack of policy space. Ensuing lack of confidence darkened the country's perspective and a recession followed. The fact that this episode is recorded during an expansion stems from the too costly 2008 and following recessions which prevents the model estimate to date a recession. This is thus an outlier from the perspective of the estimation.

**Banking crises:**

Overall 9 (out of 53) banking crises occur during expansions, 4 in EM (Costa Rica, Croatia, Latvia and Lithuania), 3 in DM (Bolivia, Paraguay and Turkey) and 1 in AM (United States).

✎ (EM.bkg.exp1): **Costa Rica, 1994q3.**

✎ (EM.bkg.exp2): **Croatia, 1998q1.**

✎ (EM.bkg.exp3): **Latvia, 1995q1.**

✎ (EM.bkg.exp4): **Lithuania, 1995q4.**

✎ (EM.bkg.exp5): **Slovak Rep. 1997q4** occurs 1y and a quarter before. Narrative quotes on the banking and on the currency crisis do not display any causal link. 1st is a bank mismanagement, due to liberalization process, second is a contagion and trust issue during the End 90's emerging crises.

✎ (EM.cur.exp1) : **Turkey, 1984q1.** *In 1983, however, the current account deficit widened again to an estimated US\$2.2 billion or 4.3 percent of GNP. Export receipts virtually stagnated while import payments increased by 4.4 percent; at the same time the net invisibles surplus fell from US\$1.8 billion to US\$1.3 billion, largely due to a decline in workers' remittances. Although export volumes were some 13 percent higher than in 1982, average export prices were some 10 percent lower. The rise in imports was largely attributable to an expansion in domestic demand fuelled by relatively easy credit policies. The decline in workers' remittances is related to a shift from direct remittances to deposits at the Central Bank through the Dresdner scheme, to expectations that the lira would be depreciated in early 1984 as well as to the appreciation of the U.S. dollar, as most remittances are in European currencies. [...] The authorities recognize the importance of a flexible exchange rate policy in maintaining external competitiveness. Frequent small adjustments to the exchange rate, based on relative price movements in Turkey and abroad and on movements in other exchange rates, have been practiced since mid 1981. The official exchange rate is determined daily by the Central Bank on the basis of relative price movements and other exchange rates, but actual transactions take place at a rate which is set by the commercial banks and which is allowed to fluctuate within a band of + 6 percent 11 around the official exchange rate. A wider band of + 8 percent has been permitted for transaction in banknotes since early February. As a result of this new policy and the continued adjustment of the exchange rate the lira has depreciated by about 23 percent against the U.S. dollar between end-1983 and end-June 1984. In real effective terms, on an export-weighted basis, the lira had depreciated by about 8 percent to March; however, since then the continued nominal depreciation has been insufficient to offset the upsurge in domestic inflation.*

✎ (DM.sov.exp1): **Bolivia, 1994q4.**

⚡ (DM.sov.exp2): **Paraguay, 1995q2.**

⚡ (DM.sov.exp3): **Turkey, 1982q2.**

⚡ (AM.sov.exp): **United States, 1988q4.**

*As the discussions proceeded, signs of a slowdown in economic growth— which previously had been observed only in a limited number of indicators—became more pervasive. [...] The Congress is close to finalizing the Financial Institutions Reform, Recovery and Enforcement Act of 1989, which includes measures to restructure the saving and loan industry. The legislation provides for USD144 billion in expenditures over the next 11 years to complete the insolvency resolutions initiated prior to 1989, to resolve those savings and loans that continue to operate but are insolvent or likely to become insolvent during this period and to capitalize a new insurance fund for the thrift industry.* IMF (August 3, 1989) **US: Staff report for the 1989 article IV consultations**

## P Annex – Number of crises episodes by country group, business cycle phase, type of financial crises and complexity.

Table 13 presents the detailed information on crises episodes and business cycle location. I discuss crises occurring in expansion and address outliers.

**Table 13:** Crisis episodes – by multiplicity, country group and BC localisation

Type of Episode	EM, 15c.			DM, 15c.			AM, 24c.		
	exp.	rec.	tot.	exp.	rec.	tot.	exp.	rec.	tot.
<b>crs.epsds in total</b>	9	25	<b>34</b>	12	26	<b>38</b>	22	47	<b>69</b>
<b>Single</b>	<b>8</b>	<b>12</b>	<b>20</b>	<b>10</b>	<b>9</b>	<b>19</b>	<b>22</b>	<b>36</b>	<b>58</b>
Single – sov	0	0	<b>0</b>	2	3	<b>5</b>	1	1	<b>2</b>
Single – cur	4	11	<b>15</b>	6	5	<b>11</b>	20	23	<b>43</b>
Single – bkg	4	1	<b>5</b>	2	1	<b>3</b>	1	12	<b>13</b>
<b>Double</b>	<b>1</b>	<b>8</b>	<b>9</b>	<b>2</b>	<b>9</b>	<b>11</b>	<b>0</b>	<b>10</b>	<b>10</b>
Double – sov.cur	0	5	<b>5</b>	1	4	<b>5</b>	0	2	<b>2</b>
Double – sov.bkg	0	0	<b>0</b>	0	0	<b>0</b>	0	3	<b>3</b>
Double – cur.bkg	1	3	<b>4</b>	1	5	<b>6</b>	0	5	<b>5</b>
<b>Triple</b>	<b>0</b>	<b>5</b>	<b>5</b>	<b>0</b>	<b>8</b>	<b>8</b>	<b>0</b>	<b>1</b>	<b>1</b>

This table details the number of crisis episodes by the number of financial crises that are associated with it. Episodes are counted:

- (a) by country group – **emerging**, **developing** and **advanced** markets
- (b) by regime – *exp* for expansions and *rec* for recessions
- (c) by multiplicity – **single**, **double**, or **triple** financial crisis episode

1. For all country groups, currency crises dominate single crisis episodes. This is particularly true for advanced markets. Given the particular nature of some currency crises I discussed earlier, I do not delve into a detailed analysis of this group for now.
2. In emerging markets, sovereign crisis never occur alone. A fourth of single crisis episodes are banking crises, hitting the countries mostly in expansion. For the Slovak Republic banking crisis of 1997q4, the recession starts 5 quarters after the event. The recession starts in 1999q1, two years after a currency unrelated in the narrations to the banking crisis. The Costa Rican banking crisis of 1994q3 is not followed by a recession. Indeed growth slows around zero for few quarters. The losses are too low for the Markov estimates to date a crisis. For the last two cases – Latvia 1995q2 and Lithuania 1995q4 – banking crises occur at the very beginning of the sample and I might not dispose of all necessary information to draw conclusion.
3. In developing markets, sovereign crises often occur alone. The two defaults occurring in expansion for developing markets are Thailand in 2010q4 and Bolivia in 2004q4. The

former default results from a purely political choice as the country experienced a political crises and violent social unrest and manifestations. For Bolivia, the country experienced in February 2003 severe social unrest and a run on banks' USD liabilities. The country requested/obtained external financing from the IMF in March. Authorities proceeded carefully with the program despite conflicting social and political conditions. In 2004q4, the authorities are forced to request for an extension of the deadline to respect the program's conditionality. The IMF agrees on December 23, 2004. Both of the defaults in expansion for developing countries are due to political developments.

4. In developing markets, two banking crises occur in expansion: Bolivia 1994q4 and Paraguay 1995q2. Bolivia experienced severe capital flights that pressured a weak prudential framework and could not prevent the failure of banking institutions. The country experienced losses but little decline in growth. Paraguay is a different story. The country had accumulated heightened vulnerabilities from ill-conceived financial development and liberalisation processes. In May 1995, 2 banking institutions failed to meet obligations. In the following month, important statistical mismanagements were revealed as unrecorded deposits were discovered. The country entered a long crisis that lasted until 1999. The Markov estimates dates a recession from 1998q3-1999q2 (i.e. the worst part). This banking crisis is thus associated with this episode of crisis (still a single type).
5. In advanced markets, the two single crisis episodes that signal in expansion are the Greek default in 2004q3 and the US banking crisis of 1988q4. The Greek default is, in reality, associated with a recession. Nevertheless given the depth of the 2010s' Greek crisis, the Markov estimates do not detect the recession. This is a missed signal<sup>32</sup>. The US banking crisis of 1988 is the *Savings and Loans* crisis. It resulted, inter alia, from a policy rate increase by the Federal reserve that constrained financial institutions and, combined with imprudent practices and frauds, lead to the failure of many savings and investment institutions. Policy measures were implemented and little counter effects were felt at the aggregate level on real gdp. The NBER does not date a recession that could be associated with the crisis directly. The following recession starts in 1990q3/q4 for the NBER/MSM.

Few double crises occur in expansion:

1. In emerging markets, the currency and banking double crisis episode is that of Croatia in 1998 (banking in q1, currency in q3). Because the quarterly real gdp time series starts in 1997q1 (q2 for the q-o-q growth rates), I do not dispose of enough historical background and growth rates pass the 0 threshold only in 1998q4 by a large amount. Markov estimates are inconclusive and I do not pursue this crisis.
2. In developing markets, the currency/sovereign and currency/banking double crisis episodes are associated with Turkey's history. I use the narrative quotes on currency crises to

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<sup>32</sup>I chose not to decide myself the dates of decision as I am unsure how I could ensure external validity of my dates.

start my research on their links to economic activity. The twin currency+sovereign crises occur in the same quarter in 1978q1 as "The Turkish authorities recognize the urgent need to reverse the external policies of the recent past, which have brought the Turkish economy to a point where the balance of payments is now an overriding constraint."<sup>33</sup>. A recession ensues that starts according to Markov estimates in 1979q2, 5 quarters after the crises dates. In practice, 1978q4 to 1979q2 also display small negative quarter-over-quarter growth rates (circa -0.1% per quarter). Their magnitude is too small to trigger a recession in a MSM sense right away. The crises are indeed associated with the ensuing recession, which already has a currency crisis in 1980q1, highlighting the Turkish extreme propensity to system overloads. I associate the two crises to the ensuing recession, as crises occurring before the recession. The episode moves from single currency crisis to a double crisis episode<sup>34</sup>. The twin currency+banking crises is not fundamentally a double crisis episodes but rather two financial crises that occurred in the same global context as the manifestation of turkish poor policy framework and institutions. The banking crisis in June 1982, illustrated by "the collapse of the Kastelli brokerage firm" is sad to have "added to the monetary difficulties as this necessitated support to several banks and made it impossible for the Central Bank to force them to make up their shortfalls in reserve requirements."<sup>35</sup>. The currency crisis results from long accumulated balance of payment imbalances that forced the country to widen the bands of its managed exchange rate by 8% in February 1984. "As a result of this new policy and the continued adjustment of the exchange rate the lira has depreciated by about 23 percent against the U.S. dollar between end-1983 and end-June 1984"<sup>36</sup>. Overall, these crises are different manifestations and additional glitches to the Overall, weak system. There are little spheres<sup>37</sup> of the Turkish economy that are not cautiously described over all the periods I consider<sup>38</sup>.

3. There is at first only one occurrence of a sovereign and banking double crisis episode, it is in recession. The episode is Cyprus' recession in 2012q1-2013q2 and the struggle that ensued from the Global financial Crises and the European sovereign debt crises.

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<sup>33</sup>IMF (1978), Turkey: 1978 article IV staff report ; IMF (1978), Turkey: Request for Stand-By-Arrangement

<sup>34</sup>I do not adapt figure 3 as these crises fall outside the line but they confirm DM's pattern of experiencing crises before recession start!

<sup>35</sup>IMF (1983) Turkey: 1983 Article IV staff report

<sup>36</sup>IMF (1984) Turkey: Recent Economic Development

<sup>37</sup>monetary, sovereign, financial, real, social

<sup>38</sup>Looking at the true roots of Turkish crises deserves a proper historical case study. I leave that for future work. Chapter 5 discusses the case of Argentina as a starter



## **Q Annex – Double dips and transitive expansions**

episode iD				recession.bfr								
typo	country	code	is.weaker	beg	end	durt	sov.bfr	sov.drg	cur.bfr	cur.drg	bkg.bfr	bkg.drg
dbl.dp	Argentina	ARG	0	2013q4	2014q3	4	0	1	0	1	0	0
dbl.dp	South Africa	ZAF	0	2015q2	2017q1	8	0	0	0	0	0	0
trstv	Argentina	ARG	0	2011q4	2012q2	3	0	0	0	0	0	0
trstv	Argentina	ARG	0	2015q3	2016q3	5	0	0	0	1	0	0
trstv	Brazil	BRA	0	1998q2	1999q1	4	0	1	0	1	0	0
trstv	Brazil	BRA	0	2001q2	2001q3	2	0	0	0	0	0	0
trstv	South Africa	ZAF	0	1974q4	1975q1	2	0	0	0	0	0	0
trstv	South Africa	ZAF	0	1982q1	1983q1	5	0	0	1	0	0	0
dbl.dp	Bolivia	BOL	0	1998q3	1999q2	4	0	0	0	0	1	0
dbl.dp	Paraguay	PRY	1	1997q4	1999q2	7	0	0	0	1	0	0
trstv	Morocco	MAR	0	1995q1	1995q2	2	0	0	0	0	0	0
trstv	Paraguay	PRY	0	2000q1	2002q4	12	0	1	0	1	0	0
trstv	Russia	RUS	0	2008q2	2010q1	8	0	0	0	1	0	1
trstv	Turkey	TUR	0	1998q3	1999q1	3	0	0	0	0	0	0
trstv	Venezuela	VEN	1	1998q1	1999q2	6	0	0	0	0	0	0
dbl.dp	Austria	AUT	0	1980q2	1982q4	11	0	0	0	0	0	0
dbl.dp	Greece	GRC	1	2008q4	2009q1	2	0	0	0	0	1	0
dbl.dp	Italy	ITA	0	1990q3	1991q2	4	0	0	0	0	0	0
dbl.dp	New Zealand	NZL	0	1985q2	1986q1	4	0	0	1	0	0	0
dbl.dp	New Zealand	NZL	0	2008q1	2009q2	6	0	0	0	0	0	0
dbl.dp	United States	USA	0	1980q2	1980q3	2	0	0	0	0	0	0
trstv	Austria	AUT	0	2008q2	2010q1	8	0	0	0	0	0	1
trstv	Denmark	DNK	0	1977q4	1978q1	2	0	0	0	0	0	0
trstv	Ireland	IRL	0	1982q3	1983q2	4	0	0	0	0	0	0
trstv	Italy	ITA	0	1974q3	1975q1	3	1	0	0	0	0	0
trstv	Italy	ITA	1	2007q1	2009q1	9	0	0	0	0	0	1
trstv	Luxembourg	LUX	1	1974q3	1975q3	5	0	0	0	0	0	0
trstv	Luxembourg	LUX	0	1977q1	1977q2	2	0	0	0	0	0	0
trstv	Luxembourg	LUX	0	2007q4	2009q2	7	0	0	0	0	0	1
trstv	New Zealand	NZL	1	1986q4	1987q2	3	0	0	0	0	0	0
trstv	Portugal	PRT	1	2008q2	2009q1	4	0	0	0	0	0	1
trstv	Switzerland	CHE	0	1996q2	1996q3	2	0	0	0	0	0	0
trstv	Switzerland	CHE	0	1998q3	1998q4	2	0	0	0	0	0	0

episode iD				expansion									
typo	country	code	is.weaker	beg	end	durt	sov.bfr	sov.afr	cur.bfr	cur.afr	bkg.bfr	bkg.afr	
dbl.dp	Argentina	ARG	0	2014q4	2015q2	3	0	0	0	0	0	0	
dbl.dp	South Africa	ZAF	0	2017q2	2017q4	3	0	0	0	0	0	0	
trstv	Argentina	ARG	0	2012q3	2013q3	5	0	0	0	0	0	0	
trstv	Argentina	ARG	0	2016q4	2018q1	6	0	0	0	0	0	0	
trstv	Brazil	BRA	0	1999q2	2001q1	8	0	0	0	0	0	0	
trstv	Brazil	BRA	0	2001q4	2002q4	5	0	0	0	1	0	0	
trstv	South Africa	ZAF	0	1975q2	1976q3	6	0	0	1	0	0	0	
trstv	South Africa	ZAF	0	1983q2	1984q2	5	0	0	0	0	0	0	
dbl.dp	Bolivia	BOL	0	1999q3	2000q2	4	0	0	0	0	0	0	
dbl.dp	Paraguay	PRY	1	1999q3	1999q4	2	0	0	0	0	0	0	
trstv	Morocco	MAR	0	1995q3	1996q4	6	0	1	0	0	0	0	
trstv	Paraguay	PRY	0	2003q1	2004q3	7	0	0	0	0	0	0	
trstv	Russia	RUS	0	2010q2	2011q4	7	0	0	0	0	0	0	
trstv	Turkey	TUR	0	1999q2	2000q3	6	0	0	0	0	0	0	
trstv	Venezuela	VEN	1	1999q3	2001q2	8	0	0	0	0	0	0	
dbl.dp	Austria	AUT	0	1983q1	1983q4	4	0	0	0	0	0	0	
dbl.dp	Greece	GRC	1	2009q2	2009q4	3	0	0	0	0	0	0	
dbl.dp	Italy	ITA	0	1991q3	1992q2	4	0	0	0	0	0	0	
dbl.dp	New Zealand	NZL	0	1986q2	1986q3	2	0	0	0	0	0	0	
dbl.dp	New Zealand	NZL	0	2009q3	2010q2	4	0	0	0	0	0	0	
dbl.dp	United States	USA	0	1980q4	1981q1	2	0	0	0	0	0	0	
trstv	Austria	AUT	0	2010q2	2012q1	8	0	0	0	0	0	0	
trstv	Denmark	DNK	0	1978q2	1980q1	8	0	0	0	1	0	0	
trstv	Ireland	IRL	0	1983q3	1985q2	8	0	0	0	0	0	0	
trstv	Italy	ITA	0	1975q2	1976q4	7	0	0	0	1	0	0	
trstv	Italy	ITA	1	2009q2	2011q1	8	0	0	0	0	0	0	
trstv	Luxembourg	LUX	1	1975q4	1976q4	5	0	0	0	0	0	0	
trstv	Luxembourg	LUX	0	1977q3	1979q1	7	0	0	0	0	0	0	
trstv	Luxembourg	LUX	0	2009q3	2011q1	7	0	0	0	0	0	0	
trstv	New Zealand	NZL	1	1987q3	1989q2	8	0	0	0	1	0	0	
trstv	Portugal	PRT	1	2009q2	2010q3	6	0	0	0	0	0	0	
trstv	Switzerland	CHE	0	1996q4	1998q2	7	0	0	0	0	0	0	
trstv	Switzerland	CHE	0	1999q1	2000q4	8	0	0	0	0	0	0	

episode iD				recession afr									
typo	country	code	is.weaker	beg	end	durt	sov.drg	sov.afr	cur.drg	cur.afr	bkg.drg	bkg.afr	
dbl.dp	Argentina	ARG	0	2015q3	2016q3	5	0	0	1	0	0	0	
dbl.dp	South Africa	ZAF	0	2018q1	2019q4	8	0	0	0	0	0	0	
trstv	Argentina	ARG	0	2013q4	2014q3	4	1	0	1	0	0	0	
trstv	Argentina	ARG	0	2018q2	2019q4	7	1	0	1	0	0	0	
trstv	Brazil	BRA	0	2001q2	2001q3	2	0	0	0	0	0	0	
trstv	Brazil	BRA	0	2003q1	2003q2	2	0	0	0	0	0	0	
trstv	South Africa	ZAF	0	1976q4	1977q3	4	0	0	0	0	0	0	
trstv	South Africa	ZAF	0	1984q3	1986q2	8	1	0	1	0	0	0	
dbl.dp	Bolivia	BOL	0	2000q3	2000q4	2	0	0	0	0	0	0	
dbl.dp	Paraguay	PRY	1	2000q1	2002q4	12	1	0	1	0	0	0	
trstv	Morocco	MAR	0	1997q1	1997q2	2	0	0	0	0	0	0	
trstv	Paraguay	PRY	0	2004q4	2005q1	2	0	0	0	0	0	0	
trstv	Russia	RUS	0	2012q1	2019q4	32	0	0	1	0	0	0	
trstv	Turkey	TUR	0	2000q4	2001q4	5	1	0	1	0	1	0	
trstv	Venezuela	VEN	1	2001q3	2003q1	7	0	0	0	0	0	0	
dbl.dp	Austria	AUT	0	1984q1	1984q2	2	0	0	0	0	0	0	
dbl.dp	Greece	GRC	1	2010q1	2013q1	13	1	0	0	0	0	0	
dbl.dp	Italy	ITA	0	1992q3	1992q4	2	0	0	1	0	0	0	
dbl.dp	New Zealand	NZL	0	1986q4	1987q2	3	0	0	0	0	0	0	
dbl.dp	New Zealand	NZL	0	2010q3	2010q4	2	0	0	0	0	0	0	
dbl.dp	United States	USA	0	1981q2	1982q3	6	0	0	0	0	0	0	
trstv	Austria	AUT	0	2012q2	2014q2	9	0	0	0	0	0	0	
trstv	Denmark	DNK	0	1980q2	1980q3	2	0	0	0	0	0	0	
trstv	Ireland	IRL	0	1985q3	1986q2	4	0	0	1	0	0	0	
trstv	Italy	ITA	0	1977q1	1977q3	3	0	0	0	0	0	0	
trstv	Italy	ITA	1	2011q2	2013q1	8	0	0	0	0	0	0	
trstv	Luxembourg	LUX	1	1977q1	1977q2	2	0	0	0	0	0	0	
trstv	Luxembourg	LUX	0	1979q2	1982q4	15	0	0	0	0	0	0	
trstv	Luxembourg	LUX	0	2011q2	2012q3	6	0	0	0	0	0	0	
trstv	New Zealand	NZL	1	1989q3	1992q3	13	0	0	0	0	0	0	
trstv	Portugal	PRT	1	2010q4	2012q4	9	1	0	0	0	0	0	
trstv	Switzerland	CHE	0	1998q3	1998q4	2	0	0	0	0	0	0	
trstv	Switzerland	CHE	0	2001q1	2003q2	10	0	0	0	0	0	0	

## R Annex – Expansions and Financial Crises, insights from the BC database

### R.1 By country group

	Expansions without FC			Expansions with FC		
	Duration	Amplitude	Slope	Duration	Amplitude	Slope
All Countries						
avg	24.53	26.94	1.19	44.34	46.78	1.09
std	17.41	23.67	0.80	21.54	28.07	0.37
nb	198.00	198.00	198.00	41.00	41.00	41.00
Emerging Markets (15c.)						
avg	23.22	26.87	1.21	38.33	52.11	1.34
std	16.38	20.87	0.60	16.97	26.35	0.28
max	82.00	85.56	2.97	66.00	88.14	1.66
qt3	36.00	38.76	1.52	48.00	76.44	1.54
med	21.00	21.09	0.99	39.00	53.80	1.38
qt1	9.25	8.07	0.82	22.00	33.55	1.22
min	3.00	2.27	0.42	15.00	15.91	0.84
nb	46.00	46.00	46.00	9.00	9.00	9.00
Developing Markets (15c.)						
avg	20.61	28.68	1.56	48.60	57.63	1.25
std	14.93	24.61	1.10	28.33	32.16	0.33
max	70.00	121.91	5.50	87.00	105.47	1.83
qt3	33.00	44.82	1.79	77.75	76.58	1.47
med	19.50	23.07	1.26	37.00	52.85	1.26
qt1	7.00	9.48	0.97	30.00	30.24	0.97
min	2.00	0.87	0.29	14.00	18.89	0.74
nb	44.00	44.00	44.00	10.00	10.00	10.00
Advanced Markets (24c.)						
avg	26.68	26.25	1.03	44.86	39.67	0.91
std	18.55	24.57	0.68	20.14	25.91	0.34
max	114.00	151.83	5.93	86.00	131.05	1.58
qt3	39.25	32.15	1.14	56.75	48.10	1.07
med	21.00	19.73	0.91	47.00	31.69	0.86
qt1	11.75	9.48	0.66	29.50	22.71	0.72
min	2.00	1.41	0.16	13.00	15.50	0.40
nb	108.00	108.00	108.00	22.00	22.00	22.00

**Table 14:** Expansions and Financial Crises - MSM estimations - Results

## R.2 By region

	Expansions without FC			Expansions with FC		
	Duration	Amplitude	Slope	Duration	Amplitude	Slope
Africa and the Middle East (3c.)						
avg	23.62	17.65	1.46	32.37	26.25	1.24
std	21.31	17.18	0.82	13.69	9.54	0.36
nb	17.00	17.00	17.00	4.00	4.00	4.00
Asia (7c.)						
avg	55.39	33.73	1.57	75.76	62.00	1.21
std	35.17	14.80	0.55	34.16	25.02	0.19
nb	22.00	22.00	22.00	4.00	4.00	4.00
Central and Eastern Europe (13c.)						
avg	38.00	30.32	1.55	51.69	33.40	1.56
std	26.12	16.98	1.26	25.17	15.73	0.22
nb	28.00	28.00	28.00	5.00	5.00	5.00
Latin and South America (10c.)						
avg	19.09	16.41	1.21	59.05	51.83	1.16
std	15.10	11.26	0.62	29.96	26.08	0.31
nb	37.00	37.00	37.00	6.00	6.00	6.00
Western Europe (17c.)						
avg	19.76	24.35	0.86	40.67	46.00	0.91
std	14.55	16.34	0.39	28.39	20.53	0.37
nb	75.00	75.00	75.00	18.00	18.00	18.00
Western Countries (4c.)						
avg	24.26	28.00	1.20	35.22	39.75	0.95
std	19.92	25.83	1.19	9.94	20.24	0.16
Commodity dependent (13c.)						
avg	20.33	17.31	1.16	58.90	52.85	1.10
std	16.39	11.38	0.54	31.20	24.70	0.26
nb	42.00	42.00	42.00	13.00	13.00	13.00
Non commodity dependent (41)c.)						
avg	28.71	26.47	1.20	41.16	40.39	1.08
std	25.02	18.25	0.86	25.11	19.11	0.42
nb	156.00	156.00	156.00	28.00	28.00	28.00

Table 15: Expansions and Financial Crises - MSM estimations - Results

## S MSM BC phases – by region and by commodity groups

	Expansions w/o FC			Expansions w FC		
	Amplitude	Duration	Slope	Amplitude	Duration	Slope
Africa and the Middle East (3c.)						
avg	23.19	17.75	1.43	31.97	24.20	1.37
std	21.94	17.74	0.84	11.89	9.44	0.43
max	73.90	70.00	4.20	47.06	38.00	1.90
qt3	30.09	22.75	1.62	39.35	30.00	1.57
med	14.08	11.00	0.01	30.38	19.00	0.02
qt1	8.57	5.75	0.96	27.17	18.00	1.04
min	2.27	3.00	0.66	15.91	16.00	0.84
nb	16.00	16.00	16.00	5.00	5.00	5.00
Asia (7c.)						
avg	55.39	33.73	1.57	75.76	62.00	1.21
std	35.17	14.80	0.55	34.16	25.02	0.19
max	151.83	66.00	2.65	105.47	87.00	1.38
qt3	78.21	42.50	1.98	104.61	81.75	1.32
med	51.90	39.00	0.02	79.06	61.00	0.01
qt1	26.48	23.00	1.23	50.21	41.25	1.14
min	6.60	7.00	0.72	39.43	39.00	0.94
nb	22.00	22.00	22.00	4.00	4.00	4.00
Central and Eastern Europe (13c.)						
avg	37.85	30.03	1.55	56.23	36.25	1.56
std	25.67	16.74	1.24	26.60	16.60	0.26
max	121.91	82.00	5.50	88.14	53.00	1.83
qt3	55.09	40.00	1.91	66.01	47.00	1.71
med	33.55	32.00	0.01	56.83	38.50	0.02
qt1	20.49	20.00	0.82	47.05	27.75	1.46
min	5.49	3.00	0.39	23.11	15.00	1.22
nb	29.00	29.00	29.00	4.00	4.00	4.00
Latin and South America (10c.)						
avg	17.92	15.06	1.26	52.62	47.25	1.13
std	15.01	10.61	0.67	28.14	24.16	0.27
max	68.37	39.00	2.97	83.67	82.00	1.59
qt3	26.73	22.25	1.54	76.51	67.25	1.29
med	15.53	12.00	0.01	57.65	45.50	0.01
qt1	5.38	6.75	0.83	26.38	28.50	0.93
min	0.87	2.00	0.29	18.89	14.00	0.74
nb	36.00	36.00	36.00	8.00	8.00	8.00
Western Europe (17c.)						
avg	17.99	22.33	0.85	39.49	45.26	0.90
std	13.88	15.32	0.40	26.18	20.41	0.33
max	60.50	62.00	2.24	131.05	86.00	1.58
qt3	22.17	30.00	1.06	47.64	57.50	1.03
med	16.06	19.00	0.01	33.08	48.00	0.01

	Expansions w/o FC			Expansions w FC		
	Amplitude	Duration	Slope	Amplitude	Duration	Slope
qt1	7.66	9.00	0.56	21.92	34.00	0.72
min	1.41	3.00	0.16	10.65	10.00	0.40
nb	73.00	73.00	73.00	23.00	23.00	23.00
Western Countries (4c.)						
avg	24.44	28.28	1.22	32.39	36.40	0.94
std	20.48	26.55	1.22	10.69	19.06	0.14
max	88.88	114.00	5.93	49.91	70.00	1.09
qt3	24.69	38.25	1.05	32.37	32.00	1.01
med	21.10	19.50	0.01	30.45	29.00	0.01
qt1	15.00	16.25	0.78	28.14	28.00	0.92
min	3.37	2.00	0.54	21.06	23.00	0.71
nb	18.00	18.00	18.00	5.00	5.00	5.00
Commodity Exporters (13c.)						
avg	19.68	16.50	1.17	55.49	50.27	1.09
std	16.49	10.83	0.55	30.33	24.13	0.25
max	68.37	42.00	2.97	105.47	87.00	1.58
qt3	25.36	22.00	1.42	76.54	70.50	1.28
med	17.23	15.00	1.04	49.91	48.00	1.08
qt1	5.55	7.75	0.84	27.95	29.50	0.92
min	2.27	3.00	0.34	15.91	17.00	0.71
nb	40.00	40.00	40.00	15.00	15.00	15.00
Non-Commodity Exporters (41)c.)						
avg	27.91	25.44	1.20	39.61	40.03	1.06
std	25.31	18.08	0.87	23.90	19.38	0.41
max	151.83	114.00	5.93	131.05	86.00	1.90
qt3	36.51	37.75	1.45	48.19	54.50	1.37
med	20.60	21.50	0.96	32.72	39.50	0.96
qt1	9.54	10.00	0.71	22.73	24.25	0.79
min	0.87	2.00	0.16	10.65	10.00	0.40
nb	154.00	154.00	154.00	34.00	34.00	34.00

**Table 16:** Expansion episodes without and with at least one financial crisis - Characteristics region- and commodity-wise.

	Recessions w/o FC				Recessions w FC			
	Amplitude	Duration	Slope	Recovery	Amplitude	Duration	Slope	Recovery
Africa and the Middle East (3c.)								
avg	-4.50	5.38	-1.83	4.66	-6.88	4.55	-2.17	6.92
std	5.11	4.31	2.66	6.50	5.08	1.75	2.40	3.49
max	0.27	14.00	0.03	18.62	0.30	8.00	0.06	12.16
qt3	-1.03	8.00	-0.25	4.39	-3.25	5.00	-0.60	9.64
med	-3.02	3.50	-0.01	2.98	-5.49	5.00	-0.01	5.76
qt1	-6.04	2.00	-2.28	2.01	-12.32	3.50	-2.84	4.55
min	-14.67	2.00	-7.33	-1.77	-13.50	2.00	-6.75	1.72
nb	8.00	8.00	8.00	7.00	11.00	11.00	11.00	11.00



	Recessions w/o FC				Recessions w FC			
	Amplitude	Duration	Slope	Recovery	Amplitude	Duration	Slope	Recovery
Asia (7c.)								
avg	-6.23	2.75	-2.40	10.79	-8.24	5.09	-2.08	6.66
std	1.23	0.89	0.62	3.91	5.84	2.02	2.22	3.39
max	-4.97	4.00	-1.66	15.75	-1.34	9.00	-0.19	12.05
qt3	-5.28	3.25	-1.93	14.75	-3.32	6.50	-0.61	8.18
med	-5.70	2.50	-0.02	10.39	-7.54	5.00	-0.02	6.96
qt1	-7.22	2.00	-2.69	7.16	-13.07	4.00	-2.15	4.78
min	-8.16	2.00	-3.53	6.36	-17.14	2.00	-7.90	1.49
nb	8.00	8.00	8.00	8.00	11.00	11.00	11.00	11.00
Central and Eastern Europe (13c.)								
avg	-9.58	9.20	-1.39	7.30	-11.23	10.14	-2.59	3.54
std	9.30	7.63	1.56	7.06	9.99	8.90	2.92	4.45
max	-0.66	25.00	-0.09	26.69	8.92	32.00	0.28	10.91
qt3	-2.82	9.50	-0.46	6.76	-5.76	14.00	-0.71	4.65
med	-5.00	6.00	-0.01	5.54	-9.77	7.00	-0.02	3.75
qt1	-16.67	4.25	-2.03	4.07	-17.30	3.25	-3.75	0.97
min	-26.09	3.00	-5.22	2.14	-29.02	2.00	-10.61	-3.87
nb	10.00	10.00	10.00	10.00	14.00	14.00	14.00	13.00
Latin and South America (10c.)								
avg	-5.98	4.35	-1.18	7.02	-7.08	5.56	-1.53	5.32
std	8.26	2.11	1.23	7.38	5.30	3.79	1.29	2.16
max	0.31	10.00	0.10	30.67	0.59	16.00	0.15	8.65
qt3	-1.55	6.00	-0.49	6.78	-3.98	5.75	-0.79	7.25
med	-2.69	4.00	-0.01	4.07	-7.00	4.50	-0.01	4.82
qt1	-6.56	3.00	-1.59	3.23	-8.28	3.25	-1.70	3.63
min	-35.87	2.00	-5.12	1.69	-22.68	2.00	-5.47	1.62
nb	20.00	20.00	20.00	16.00	18.00	18.00	18.00	18.00
Western Europe (17c.)								
avg	-1.82	5.43	-0.46	3.12	-5.60	7.03	-0.98	2.81
std	3.03	5.00	0.63	1.69	5.05	5.59	0.69	1.98
max	2.43	30.00	0.72	7.26	1.78	24.00	0.11	7.93
qt3	-0.20	6.00	-0.06	4.31	-2.77	9.00	-0.51	4.21
med	-1.20	3.00	-0.00	3.13	-4.58	5.00	-0.01	2.70
qt1	-2.36	2.00	-0.84	1.60	-7.10	3.00	-1.25	1.26
min	-14.13	2.00	-2.02	0.10	-26.58	2.00	-3.14	-1.49
nb	51.00	51.00	51.00	50.00	34.00	34.00	34.00	34.00
Western Countries (4c.)								
avg	-2.47	3.85	-0.75	3.83	-4.45	9.00	-0.81	4.82
std	1.50	1.72	0.51	2.16	1.46	7.80	0.54	1.79
max	0.15	7.00	0.04	8.00	-2.63	23.00	-0.22	6.86
qt3	-1.45	5.00	-0.36	5.58	-3.20	11.25	-0.35	6.23
med	-2.20	4.00	-0.01	3.37	-4.79	6.00	-0.01	5.03
qt1	-3.46	2.00	-1.10	2.07	-5.53	4.50	-1.22	3.23
min	-5.15	2.00	-1.72	0.86	-6.03	2.00	-1.51	2.76
nb	13.00	13.00	13.00	13.00	6.00	6.00	6.00	6.00

	Recessions w/o FC				Recessions w FC			
	Amplitude	Duration	Slope	Recovery	Amplitude	Duration	Slope	Recovery
Commodity Exporters (13c.)								
avg	-5.46	6.29	-1.04	5.90	-6.69	6.28	-1.30	4.49
std	8.34	6.23	1.26	6.99	5.94	4.03	1.59	1.90
max	1.78	30.00	0.10	30.67	0.59	18.00	0.15	8.65
qt3	-0.65	7.00	-0.16	5.15	-2.47	7.00	-0.61	5.75
med	-3.46	4.00	-0.67	4.04	-5.49	5.00	-0.79	4.30
qt1	-6.30	3.00	-1.52	3.07	-8.44	4.00	-1.51	3.56
min	-35.87	2.00	-5.12	0.86	-22.68	2.00	-7.90	1.49
nb	21.00	21.00	21.00	18.00	25.00	25.00	25.00	25.00
Non Commodity Exporters (41c.)								
avg	-3.50	4.93	-0.93	4.70	-7.26	7.01	-1.69	4.47
std	4.77	4.09	1.23	4.27	6.35	6.17	1.87	3.56
max	2.43	25.00	0.72	26.69	8.92	32.00	0.28	12.16
qt3	-0.66	6.00	-0.16	5.56	-3.87	8.00	-0.60	6.97
med	-2.19	4.00	-0.55	3.76	-5.98	5.00	-1.16	4.14
qt1	-4.97	2.00	-1.42	2.29	-9.44	3.00	-1.96	2.05
min	-26.09	2.00	-7.33	-1.77	-29.02	2.00	-10.61	-3.87
nb	89.00	89.00	89.00	86.00	69.00	69.00	69.00	68.00

**Table 17:** Business Cycle characteristics by phase - MSM estimations - Results

## T Annex – BC volatility decomposition along the taxonomy: currency & multiplicity

Present annex details the volatility decompositions for country groups based upon **currency**, i.e. the exposure to currency crises, and **multiplicity**, i.e. the fact that crises multiply upon another.

Table 18 presents the variance decomposition along currency (exposure to currency crises). Overall, recessions without currency crises are a major contributor to business cycle volatility almost 40% in emerging and developing markets against 62% in advanced markets. Single currency crisis episodes represent 17% of business cycle volatility for emerging and advanced markets. Given their low occurrence in developing markets, their contribution is 5 times lower. When currency crises combine with other crises, the contribution to business cycle volatility differs inbetween advanced and less advanced markets. For the former, the contribution is half that of single currency crisis episodes(8.5%). This is in part driven by a relatively lower share of currency-multiple crises in advanced markets. In emerging and developing markets, the figure is 3.5/5.5 times bigger (10.7/47.1% respectively). Crises including at least a currency crisis are the first contributors to developing markets' volatility and the second for emerging markets. Overall, currency crises are associated with 50.9/48.8/26.2% of developing/emerging/advanced markets' business cycle volatility. Currency market vulnerabilities are a key determinant of differences in volatility worldwide.

**Table 18:** Variance decomposition of output growth based on *currency*

Group	bc.vlt	$\sigma_{bc}^2$	$\sigma_{E \cap NoCur}^2$	$\sigma_{e \cap Cur}^2$	$\sigma_{R \cap NoCur}^2$	$\sigma_{R \cap 1Cur}^2$	$\sigma_{R \cap +Cur}^2$
DM	1.22	1.49	0.16	0.01	0.57	0.05	0.70
(%)		(100)	11.0	0.4	38.1	3.4	47.1
EM	0.91	0.82	0.10	0.01	0.32	0.14	0.25
(%)		(100)	12.2	1.1	39.0	17.0	30.7
AM	0.58	0.34	0.04	0.00	0.21	0.06	0.03
(%)		(100)	12.0	0.6	61.8	17.1	8.5
Relative to AM		Relative contribution to $\sigma_{bc}^2$ vs AM					
DM/AM	2.10	4.38	0.92	0.71	0.92	0.20	5.5
EM/AM	1.57	2.41	1.01	1.89	0.63	0.99	3.6

Business cycle volatility  $\sigma_{bc}^2$  is decomposed as the sum of five components reflecting characteristics from a given regime (0) expansion & no currency crisis  $\sigma_{E \cap NoCur}^2$  ; (1) expansion & no currency crisis  $\sigma_{e \cap Cur}^2$  ; (2) recession & no currency crisis  $\sigma_{R \cap NoCur}^2$  ; (3) recession & only currency crisis  $\sigma_{E \cap 1Cur}^2$  ; (4) recession & currency crisis & others  $\sigma_{E \cap +Cur}^2$ .

For each country group, the first line gives the values of the different components and the second line give the share of bc volatility each episode type identifies. The darker the color, the more frequent the event: less than 5%, 15%, 25% and above 25

The bottom part of the graph gives the relative (EM or DM vs AM) contributions to bc volatility (columns 4:8). Columns 2/3 give the relative volatility/variance.

### Multiplicity:

I now procede to analyzing how **multiplicity** helps understanding differences in volatility. Table 19 presents the variance decomposition based upon multiplicity (focusing only on components related to business cycle volatility). Table 20 presents the contribution of frequency and intensity by type of episode. Overall, multiplicity affects country groups decomposition very differently. Opposing simple/single crises to double/triple episodes, the latter represent 48.8/31.2/12.9% of aggregate BC volatility in developing/emerging/advanced markets. In developing markets, the major contributor to business cycle volatility is triple crisis episodes (32%), simple recessions follow (25%) and double/single episodes are not far behind (17/16%). In emerging and advanced markets, as mul-

**Table 19:** Variance decomposition of output growth based on multiplicity

Group	bc.vlt	$\sigma_{bc}^2$	$\sigma_E^2$	$\sigma_{R \cap NoCrs}^2$	$\sigma_{R \cap 1Crs}^2$	$\sigma_{R \cap 2Crs}^2$	$\sigma_{R \cap 3Crs}^2$
DM	1.23	1.51	0.16	0.37	0.24	0.25	0.49
(%)		(100)	10.9	24.6	15.7	16.5	32.3
EM	0.91	0.82	0.11	0.29	0.17	0.12	0.13
(%)		(100)	13.2	34.6	21.1	14.8	16.4
AM	0.59	0.35	0.04	0.15	0.10	0.04	0.01
(%)		(100)	12.1	44.5	30.4	10.6	2.3
Relative to AM		Relative contribution to $\sigma_g^2$ vs AM					
DM/AM	2.07	4.31	0.90	0.55	0.52	1.40	14.0
EM/AM	1.53	2.34	1.09	0.78	0.69	1.56	7.13

Business cycle volatility  $\sigma_{bc}^2$  is decomposed as the sum of five components reflecting characteristics from a given regime (0) no crisis  $\sigma_E^2$ ; (1) 'simple' economic crisis  $\sigma_{R \cap NoCrs}^2$ ; (2) economic and one financial crisis  $\sigma_{R \cap 1Crs}^2$ ; (3) economic and two financial crises  $\sigma_{R \cap 2Crs}^2$ ; (4) economic and three financial crises  $\sigma_{R \cap 3Crs}^2$ .

For each country group, the first line gives the values of the different components and the second line give the share of bc volatility each episode type identifies. The darker the color, the more frequent the event: less than 5%, 15%, 25% and above 25

The bottom part of the graph gives the relative (EM or DM vs AM) contributions to bc volatility (columns 4:8). Columns 2/3 give the relative volatility/variance.

tiplicity increases, the contribution to volatility falls. Emerging markets display a marked higher contribution of triple crisis episodes. In a nutshell, as markets develop, the contribution of multiple crises falls importantly (divided by 2 between DM and EM and by 10 between EM and AM). The contribution of simpler episodes falls as well. Mechanically, the contribution of single crisis episodes and simple economic crises increase. The trend is most striking for simple recessions, which are the first contributor to business cycle volatility in advanced markets.

**Table 20:** Frequency vs intensity: contributions to business cycle volatility by multiplicity

reg Group	Expansion			Rec $\cap$ NoCrs		
	$\sigma_{reg}^2$	frq	int	$\sigma_{reg}^2$	frq	int
DM	0.16	88.8%	0.18	0.37	4.1%	9.0
EM	0.11	86.7%	0.13	0.29	6.2%	4.6
AM	0.04	87.8%	0.05	0.15	7.1%	2.1
relative to AM :						
DM/AM	4.00	1.01	3.96	2.47	0.58	4.27
EM/AM	2.66	0.99	2.69	1.90	0.88	2.17

**Simple recessions** highlight differences in contributions between DM/EM/AM because they are more frequent and less intense in advanced markets. As markets develop, simple economic crises represent a greater share of economic volatility: from 24.6% for developing markets to 34.6 and 44.5% in emerging and advanced markets. Deviations associated with pure economic recession entail 2.2/4.3 times more intense fluctuations in emerging/developing markets when opposed to advanced markets. Nevertheless, these events are 12/42% less likely to occur for the former groups. For **single financial crisis episodes**, we observe a similar pattern, across groups, in lower magnitude: as markets develop, single crises represent a higher share of volatility (15.7, 21.1 and 30.4%). Differences in the contribution of single crises to volatility between emerging and advanced markets stems mostly from the 2 times more intense fluctuations. In developing markets, fluctuations are 4 times more

<i>reg</i> Group	<i>Rec. ∩ 1Crs</i>			<i>Rec. ∩ 2Crs</i>			<i>Rec. ∩ 3Crs</i>		
	$\sigma_{reg}^2$	frq	int	$\sigma_{reg}^2$	frq	int	$\sigma_{reg}^2$	frq	int
DM	0.24	2.2%	10.8	0.25	2.7%	9.08	0.49	2.2%	22.2
EM	0.17	3.4%	5.10	0.12	2.3%	5.38	0.13	1.4%	9.50
AM	0.10	3.9%	2.60	0.04	1.1%	3.27	0.01	0.1%	7.17
relative to AM :									
DM/AM	2.32	0.56	4.16	6.95	2.51	2.77	62.1	20.0	3.10
EM/AM	1.70	0.86	1.97	3.41	2.07	1.64	17.2	13.0	1.32

$\sigma_{reg}^2$  denotes the variance due to deviations from average growth in regime *reg*. It is computed as the product of a measure of the frequency of the deviations ( $frq_{reg}$  the ergodic probability of regime *reg*) and the intensity of the deviations ( $int_{reg}$  is the square of the difference between growth in regime *reg* and average growth).

intense than in advanced ones but the episodes are twice as rare. **Double crises** mark the shift between developing markets on one hand and emerging and advanced markets in the other. For the latter, the contribution of double episodes shrinks with an additional crisis (14.8 and 10.6%). In developing markets, double crisis episodes contribute roughly the same amount (16.5%) to volatility. For emerging/developing markets double crises are 2.1/2.5 times more frequent than in advanced markets. They entail 1.6/2.8 times bigger fluctuations. Whereas simple and single crises were less frequent and 2/4 times more intense when comparing EM/DM to AM, double crises are more frequent but relatively less costlier. **Triple crises** mark the shift between advanced markets and the other two groups. In the former they are too rare to carry significant importance. In developing markets they make for a third of BC volatility and in emerging markets for a sixth.

Obviously, both frequency and intensity contribute far more in emerging and developing markets to a higher volatility. Comparing the two groups together, provides confirmation that developing markets suffer from multiple crises both because they are more frequent and more intense. In developing markets, triple crises are 1.6 times more frequent, but more importantly they entail 2.3 more intense fluctuations when compared to emerging markets (Overall, the contribution is 3.6 times more important).

Before summarizing the results, it is important to note that a non-negligible fraction of aggregate volatility remains unexplained by the model and should deserve future attention.

## Results

### ON CURRENCY:

- $\kappa$  Currency crises are associated with half of business cycle volatility in emerging and developing markets, whereas in advanced economies they represent just a fourth of the aggregate.
- $\kappa$  In developing markets, currency crises by themselves do not generate a lot of volatility. Nevertheless they are very often associated with other crises and a huge share of BC volatility.
- $\kappa$  In emerging and advanced markets, single currency crisis episodes contribute the same amount to BC volatility, nevertheless, when crises cumulate, the contribution to volatility increases.
- $\kappa$  **In developing markets, currency crises are a necessary but non sufficient source of economic volatility. In emerging markets they are necessary and sufficient, whereas in advanced markets they are non-necessary but sufficient.**

### ON MULTIPLICITY:

- $\chi$  **As markets develop, multiplicity matters less for BC volatility.** Multiple crises are associated

with one half of business cycle volatility in developing markets, one third in emerging markets and one eighth in advanced markets.

- χ As crises multiply, they become relatively less costlier in emerging markets than in advanced markets. In developing markets, whatever the multiplicity, crises are at least 3 times more intense than in advanced markets.
- χ **In developing markets, economic and financial crises combine to generate excessive volatility. In emerging markets, simple economic crises are already an important source of losses and volatility. Multiple financial crises demultiply intensity to generate important macroeconomic volatility. In advanced markets, financial crises by themselves are not a key supplementary factor of volatility.**

## U Annex – (Un)conditional probabilities: formulas

I compute conditional and unconditional probabilities of observing a financial crisis in quarter  $q$  (event  $F_q = 1/0$ ) and a regime switch leading to a recession starting quarter  $q$  (event  $R_q = 1/0$ ).  $\#$  denotes the cardinal of the set of events considered. : (1) the probability to observe a financial crisis at date  $q$  is the total number of financial crises (all cases considered) over all available observations ; (2) the probability of observing a financial crisis conditional on the country having faced an economic crisis is given by the share of financial crises occurring in recession ; (3) the probability to face a recession is given by the number of transition to recession over all observations in expansion and (4) the conditional probability of entering into recession after a financial crisis is given by the share of recessions that are preceded by a financial crisis in the year before:

$$P(F_q = 1) = \frac{\#\{\text{Financial crises}\}}{\#\{\text{Observations}\}} \quad (11)$$

$$P(F_q = 1 | \exists s \in \{q-1, \dots\} s.t. R_s = 1) = \frac{\#\{\text{Financial crises inside recession}^*\}}{\#\{\text{Financial crises}\}} \quad (12)$$

$$P(R_q = 1) = \frac{\#\{\text{Regime switches leading to a recession}\}}{\#\{\text{Quarters of observation in expansion}\}} \quad (13)$$

$$P(R_q = 1 | \exists s \in \{q-1, q-4\} s.t. F_s = 1) = \frac{\#\{\text{Regime switches preceded by a financial crisis}\}}{\#\{\text{Regime switches}\}} \quad (14)$$

## **V Annex – Article IV and Recent Economic Development: summary**

This annex presents the tables of contents of Article IV consultations and Recent Economic Development staff reports to provide an overview of the topics covered in the documents.

### **V.1 Article IV consultation staff reports**

I provide examples for article IV in 1973 for Italy, 1995 for Paraguay and 2014 for India.

#### **Italy – Article IV staff report – 1973 consultations:**

1. Background
2. Report of the discussions
  - (a) Domestic economic development
  - (b) Fiscal policy
  - (c) Monetary policy
  - (d) The balance of payments and the exchange market
    - i. The balance of payments outturn in 1972 and the early part of 1973
    - ii. Exchange market developments in 1973
    - iii. The balance of payments outlook
3. Staff appraisal
4. Recommended decision

#### **Paraguay – Article IV staff report – 1995 consultations:**

1. Introduction
2. Recent developments
  - (a) Macroeconomic performance
    - i. Developments through 1994
    - ii. Developments during 1995
  - (b) Structural reform
3. Summary of discussions
  - (a) Indexation mechanisms
  - (b) Fiscal policy
  - (c) Monetary policy and financial sector reform
  - (d) External sector policies
  - (e) Medium term projections
  - (f) Statistical issues
4. Staff appraisal



**India – Article IV staff report – 2014 consultations:**

1. Context
2. Outlook and risks
3. Policy priorities
  - (a) Monetary policy
  - (b) Addressing external vulnerabilities
  - (c) Fiscal policy
  - (d) Financial and corporate sector issues
  - (e) Structural policies to boost growth
4. Staff appraisal

**V.2 Recent economic developments**

Recent Economic Development are the background material that shapes the staff's view of a country before the discussions with the national authorities. They are more detailed than the article IV staff reports. In general these documents were produced/available until the end 90's. I provide example of the table of contents for Korea in 1975 and Russia in 1999.

**Paraguay – Recent Economic Developments – 1975:**

1. Basic data
2. Internal economic developments
  - (a) Introduction
  - (b) Demand conditions
  - (c) Production
  - (d) Employment situation, wages and productivity
  - (e) Prices
  - (f) Monetary and credit policies
    - i. Principal developments in 1974
    - ii. Interest and credit policies
    - iii. Developments in the money and capital markets in 1974
  - (g) Government finance
    - i. Structure of the public sector
    - ii. Central government operations
    - iii. Revenue performance
    - iv. Trends in expenditure
    - v. Extrabudgetary transactions
3. External developments

- (a) Balance of payments developments in 1974
  - i. Exports
  - ii. Imports
  - iii. Services and transfers
  - iv. Capital movements
  - v. International reserves
- (b) External debt
- (c) Exchange and trade system
  - i. Exchange rate system
  - ii. Import system

### **Russian Federation – Recent Economic Developments – 1999:**

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  - (c) Rising pressures and policy responses, October 1997 – July 1998
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- 6. External sector developments
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  - (d) Trade policy, regional and CIS trade relations, and WTO accession
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    - i. Introduction
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## W Narrative elements on financial crises episodes

### Finland - 1981

**Crisis - type, dates & nature:** Single

1982q4 - Currency crisis

**BC turning points:** No MSM BC dates. Negative growth in 1980q2+80q4+81q1.

**Origin of the crisis:**

*Trigger/Shock.s:* External (2nd Oil Shock)

*Vulnerability.ies:*

**Event/chronology description:**

Following the break-up of the BWS, Finland has maintained a fixed exchange rate regime for the Markka against a basket of trade-partners currencies. The initial purpose is to stabilize foreign trade, upon which Finland relies heavily (forestry and later paper-related products). If the peg also contributes to overall price stability through import prices

**Key quotes:**

## Finland - 1991

**Crisis - type, dates & nature:** Complex

1991q3 - Banking Crisis

1992q3 - Currency Crisis

**MSM turning points:** 1990q2 (P) - 1992q4 (T)

**Origin of the crisis:**

*Shock.s:* Fall of the Soviet Union, ToT shock, Bursting of an asset price bubble

*Vulnerability.ies:* Overvalued currency, Overexposed banking sector after deregulation and internationalization of credit markets.

**Event/chronology description:**

Since the break-up of the BWS, Finland has chosen a fixed exchange rate regime for the Markka. At the end of the 80's, the peg is also used to restrain inflation pressures. Contrarily to previous oil-shocks, the combined collapse of the Soviet Union, the associated trade-partnership and an increase in oil prices greatly affected Finland. As the real exchange rate appreciated, the decreasing terms-of-trade imposed on the country a loss of competitiveness and profitability. Meanwhile the Markka was seen by markets as overvalued and subject to speculative attacks, to which the CB responded with a policy of strong and high interest rates. Through 1990, hourly earnings in the manufacturing sector decelerated. An external devaluation, as in 1981, wasn't a possibility for a decrease in real wage costs. This forced an internal devaluation through political commitment to the peg and high interest rates. The latter were forced continuously higher as the German rate grew between 1988q1 and 1992q3 from 3.5 to 9.7%. If the Markka stood strong throughout 1990s, credibility eroded

Over the recession, private consumption and investment fell by, respectively, 10 and 50%. Export earnings reduced by 10% in 1991. Stock Markets collapsed by 75% over 1989-92. House prices by 50% impacting dramatically wealth.

A great source of concern that arose with an overvalued currency, current account deficit, debt accumulation etc. Central Government deficits rose steeply after 1991 (mention twin priv.pub Deficits).

Develop on fiscal policy and sovereign debt.

Deflationary policies (debt deflation) pertained certainly due to the deepness/costliness of the recession.

Another concern that arose was the associated financial account positive balance. The collapse of the stock market and the severity of the crisis take ground in the gradual adaptation of an initially closely regulated banking system to the underlying deregulation and liberalization process. The higher exposure of banks inherently (mention the link between the fall in asset prices, the macroeconomic and monetary environment and the financial system:)

(in this part, depict the banking sector evolution and the rise of vulnerabilities on that side).

Introduce the fragilities in the banking sector which followed the deregulation and liberalization process. Note the combined importance of how monetary/credit policy (bound by the forex regime) impacted banks behavior and made savings banks' positions change (lending share to the construction industry, real estate and business services showed the highest increase). Earlier very regulated sector, which change her clientele towards riskier smaller and medium-sized enterprises. Undiversified and concentrated portfolio were often associated with foreign currency loans, the share of which increased from, in 1986, 22 to 43% in 91 for commercial banks and ca 0 to 12% in 90 for saving banks. Foreign currency risk !

Unravel on the SkopBank story of higher surveillance since end 1989

Link back to the trouble on the peg and the gradual and yet contained loss of credibility over 1991. Early 1991 speculative attacks and sharp fall in reserves

Renewal of the basket of currency in the peg towards the ECU in June 1991q2

Brief gain of credibility that erodes quickly as the Markka depreciates within the band in August 1991. Given the combined international and macro fin environment, banking crisis, deep and costly recession and the policy framework, devaluation pressures prove too high and the Markka is devalued a first time by 12.7% in November 1991. September 8, 1992 the Markka is allowed to float, the peg falls and the currency is devaluated by another 14.7% vis-a-vis USD.

At a time of still high interest rates, the depreciation increased the value of foreign-currency denominated debt, burdening firms heavily. The difficulty to access external financing forced firms into bankruptcies, in some cases due to liquidity problems and the impossibility to . Nonperforming loans increased, accumulation of losses and repayment difficulties, decline in collateral value, losses in the financial system. Government intervention in 1991q3 on SkopBank. Plus other problems for saving banks and policy responses.

For the IMF (PIN 98/67) "*The recovery was underpinned by the 1992 floating of the markka, and gained momentum when domestic demand picked-up in 1994-95*".

**Key quotes:**

## Indonesia - 1997

### Crisis - type, dates & nature:

Complex

1997q3 - sovereign crisis (IMF program)

1997q4 - banking crisis

1997q4 - sovereign crisis

### BC turning points:

e) Strong until 1996, slowdown over 1997

r) Recession over 1998q1-q4

e) Slow recovery (1997 level recovered only in )

### Origin of the crisis

#### Shock.s:

- Contagion from the Thailand 1997 crisis,
- Poor political communication and coherence.

#### Vulnerability.ies:

- Widening current account deficits reflecting inflationary pressures and more importantly large capital inflows, **especially as short-term private debt.**
- High levels of cronyism and corruption, which impaired the conduct of existing/design of new regulation policies and rules.
- Poor quality of financial intermediation, resulting from the rapid deregulation that followed the 1988's 'Pakto' reforms.
- Poor governance in banks and corporations, combined with important interconnection between the main entities of the two categories. Often supported and driven by the CB.

## Narration

### Context

Until the beginning of 1997, the Indonesian economy was characterized by good economic results and apparently strong fundamentals. Growth averaged 8% annually, boosted notably by a strong investment behavior. Inflation remained contained vis-a-vis other developing economies, slightly higher than in the region. The budget had been in surplus for five years and the debt-to-gdp ratio had been falling thanks to privatization proceeds.

Four main vulnerabilities afflicted the Indonesian economic and financial system and proved essential in the crisis unfolding:

- the economy had been the recipient of large capital inflows, mostly in the form of short term private debt. The latter's amount was grossly underestimated, which prevented a good understanding of the country's exposure to

market sentiments.

- the rapid deregulation process that started in the late 80's gave rise to a fragile banking system. As prudential regulations had either been inadequate or rarely enforced, many banks were either poorly capitalized or suffering from governance problems.
- since the beginning of the 90's, interventionist policies creepingly increased, favoring the president's family and well-connected businessmen. Corruption and cronyism weakened greatly the efficiency and governance of key sectors of the economy.
- political uncertainty rose regarding the eventual succession of ageing president Suharto.

### **Triggers, unfolding and management**

The Indonesian 1997 crisis started in July 1997 as the crisis in neighboring Thailand contaminated the Indonesian Rupiah forex market. As the initial CB intervention failed to tame speculation, the country exited the fixed exchange rate regime in August. Despite further monetary policy interventions and government , the currency kept depreciating.

**Key quotes:**







## RÉSUMÉ

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Sur les 50 dernières années, les marchés en développement et émergents font état de chemins de croissance plus mouvementés que les économies avancées: leurs cycles d'activité sont deux fois plus volatiles et ils ont été exposés à deux fois plus de crises financières. Cette thèse étudie comment les deux phénomènes sont reliés. Pour répondre à cette question je développe plusieurs revues de littératures théorique et empirique. Je combine des études empiriques et narratives pour dater les crises économiques, de change, bancaires et souveraines entre 1970t1 et 2020t1 pour 54 économies en développement, émergentes et avancées. En particulier je fournis une datation économétrique compréhensive des cycles d'activités en utilisant des modèles à changement de régime Markovien. Je développe également une méthodologie narrative pour traiter les archives du FMI. Je fournis deux applications de mon approche narrative et développe un cadre d'analyse pour (i) dater des potentielles crises de change (et souveraines) et (ii) étudier les chocs et vulnérabilités à l'origine des épisodes de crises. Les différences de volatilité de la croissance entre pays ne sont pas expliqués par des récessions plus ou moins fréquentes mais par une volatilité intrinsèquement plus élevée dans ces régimes. Les crises financières contribuent deux fois plus à la volatilité totale dans les marchés les moins développés. Ces pays sont en effet extrêmement exposés à des crises multiples: durant des récessions, plusieurs marchés financiers rentrent en crises et les pertes économiques sont drastiques. Plus les marchés sont développés, plus la probabilité pour une crise de se multiplier est faible. Les crises de change sont très fréquentes, quelque soit le type de pays. Ce sont des évènements pivotaux qui jouent un rôle clef dans la volatilité des marchés moins avancés (environ 50 %). J'étudie l'histoire des crises Argentines pour questionner l'origine des crises complexes. J'identifie trois types de chocs et six vulnérabilités centrales qui renforcent les manques de crédibilité et précipitent debacles de confiances, effondrements économiques et crises financières.

## MOTS CLÉS

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Crises financières, Volatilité économique, Cycle économique, Modèles à changement de régime Markovien, Économie narrative, Histoire économique.

## ABSTRACT

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Over the last 50 years, developing and emerging markets have displayed more hectic growth patterns than advanced economies: their business cycle is twice as volatile, and they were exposed to twice as many financial crises. This dissertation studies how the two phenomena are related. I consider this question through several theoretical and empirical literature reviews and an empirical and narrative study of economic, currency, banking and sovereign crises between 1970q1 and 2020q1 for 54 countries worldwide. I notably provide a comprehensive econometric dating of business cycles using Markov-Switching Models. I develop a narrative methodology to treat IMF archives and apply it to (i) date candidate currency (and sovereign) crises and (ii) study the shocks and vulnerabilities at the origins of crises. Differences in growth volatility are not explained by a higher frequency of recessions but by higher intrinsic volatility during these phases. Financial crises contribute 2 times more to aggregate volatility in less advanced markets. These countries are indeed highly exposed to multiple crises episodes occurring during recessions and associated to drastic economic losses. The more markets are developed, the lower the probability for crises to spill-over through the economy and multiply. Currency crises are frequent and central events. They play a critical role in driving business cycle volatility in non-advanced markets (roughly 50%). I study the history of Argentina to question the origins of complex crises. I identify three types of shocks and six key vulnerabilities that fuel the credibility gap and precipitate trust debacles, economic collapse and financial crises.

## KEYWORDS

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Financial crises, Economic volatility, Business cycles, Markov switching models, Narrative economics, Economic history.