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# Sovereign debt crises and animal spirits: lessons from a narrative on 70 years of complex crises

Manuel Béтин

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**THÈSE DE DOCTORAT**  
**DE L'UNIVERSITÉ PSL**

Préparée à l'Ecole Normale Supérieure de Paris et l'Ecole  
d'Economie de Paris

**Sovereign Debt Crises and Animal Spirits :**  
***Lessons From a Narrative on 70 Years of Complex Crises***

Soutenue par

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*Agis sans faire; Travaille sans effort.  
Considèrent les petites choses comme si elles étaient grandes  
et les chose peu nombreuses comme abondantes.  
Affronte le difficile, tant qu'il est encore facile;  
Accomplis la grande oeuvre par une série de petites actions.  
Le maître ne court jamais après le grand;  
Ainsi atteint-il la grandeur.  
Quand il rencontre une difficulté.  
Il s'arrête et s'y consacre;  
Il ne s'accroche pas à son propre confort;  
Ainsi les problèmes ne sont pas un problème pour lui.*

---

LAO TSEU, TAO TE KING, N°63

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# Résumé

Les crises macroéconomiques se caractérisent généralement par des effets domino à grande échelle qui impliquent un large éventail de perturbations hétérogènes, mais simultanées qui interagissent dans des directions complexes, difficiles à mesurer et à analyser quantitativement.

Pour relever ce défi, cette thèse compile un corpus de textes d'environ 23 000 rapports de conjonctures pays du Fonds monétaire international (FMI) et mobilise des techniques de *Traitement du Langage Naturel* (NLP) pour produire une base de données sur la perception du risque de crises. Cette base de données couvre 20 types différents de crises économiques, financières et non économiques pour un échantillon de 181 pays sur la période 1950-2019. Les résultats de ces données suggèrent une augmentation substantielle de la multiplicité des chocs lors des crises macroéconomiques depuis le début des années 1980 et un changement radical vers des crises plus psychologiques qui amplifient fortement les chocs initiaux, favorisent la contagion et synchronisent les cycles économiques entre pays. Ces faits stylisés sont la contrepartie empirique des prédictions théoriques montrant que les changements importants et soudains dans les anticipations sont de puissants mécanismes d'amplification des crises et peuvent être la source d'événements auto-réalisateurs. Le premier chapitre est ainsi consacré à l'explication de la méthode de recueil des données et à la présentation d'un premier ensemble de faits stylisés.

Le deuxième chapitre présente une étude empirique sur une longue période de

l'effet et des conséquences de la combinaison de mouvements de paniques, d'incertitude et de perte de confiance (nommé tout au long de la thèse, *changements de régime des anticipations*) sur la sévérité des crises souveraines. Plus précisément, je décris la nature et l'évolution des changements de régime des anticipations pour 181 pays au cours de la période 1960-2016 et j'étudie leurs effets d'amplification sur les crises souveraines et les récessions économiques.

Je distingue ensuite, dans le troisième chapitre, la 1<sup>st</sup> de la 2<sup>nd</sup> *Génération de crises souveraines*, ces dernières étant définies comme des épisodes combinant des crises de dette souveraine et des changements de régime d'anticipation. La distinction fondée sur l'existence ou l'absence de ce type de choc psychologique agrégé parmi les investisseurs étrangers est justifiée par sa capacité à discriminer entre deux types de crises souveraines qui impliquent d'importante différence à la fois dans leurs causes et leurs conséquences.

En effet, la comparaison de leurs coûts respectifs, montre que la deuxième génération est plus étroitement associée aux chocs mondiaux, à des récessions plus profondes, à des crises bancaires et financières plus sévères et à une plus grande instabilité institutionnelle.

Alors que les crises de dettes souveraines traditionnelles (1<sup>iere</sup> génération) ont tendance à se produire dans les pays à faible revenu avec une dette élevée et des institutions peu développées. Au contraire, les crises souveraines contemporaines (2<sup>nd</sup> Génération) tendent à se produire plus souvent dans des économies à revenu intermédiaire, économiquement et financièrement intégrées, avec des niveaux d'endettement modérés, mais sujettes à une perte de confiance soudaine.

L'occurrence périodique de ces crises contribue au phénomène de *trappe à revenu intermédiaire* dans les économies dont le marché des obligations souveraines est particulièrement profond et déréglementé, et dont la crédibilité dans les politiques macroéconomiques et la solidité du système bancaire est faible, ce qui rend ces pays

incapables de mettre en œuvre les interventions capables de désamorcer de violents renversements d'anticipations.

Ces résultats suggèrent que l'ancrage des anticipations en période de crises est un déterminant majeur de la sévérité des crises souveraines et qu'un cadre politique crédible capable de dompter les fièvres pessimistes doit être au centre des politiques de gestion des dettes souveraines lorsque l'État fait face à des crises de secondes générations. À l'inverse, lorsque l'État est confronté à des crises de première génération, un désendettement graduel et une restructuration ordonnée réduit les risques de surcharge d'endettement et les conséquences d'un défaut incontrôlé, souvent associé par une combinaison de performance économique fragile et de chocs exogènes sévères.

Dans la dernière section de ce travail, Je reprends la perspective générale sur les crises présentée tout au long de cette thèse pour discuter le choc de la COVID-19 à la lumière de ce cadre conceptuel. Je soutiens que les crises de dettes souveraines à la suite de l'épidémie de 2020 ont plutôt pris la forme de crises souveraines de première génération, en contraste de la tendance qui a mené à la prééminence de la seconde génération de crises souveraine dans les deux premières décennies du *XXI<sup>ème</sup>* siècle.

# Conseils de lecture

Un lecteur novice en économie peut se restreindre à l'introduction et à la conclusion générale (pour le novice zélé, il poussera aussi jusqu'à la section 1.3 qui présente des faits stylisés sur les crises, l'étude de cas du Mexique dans la section 2.2.3 et la perspective sur la COVID dans la section 3.3 (qu'il devra se dépêcher de lire avant que tout ce qui y est dit soit contredit par les faits) pour saisir les enjeux que j'ai cherché à mettre en lumière et les questions auxquelles cette thèse répond (modestement).

Un lecteur intéressé par la méthode de construction des données peut se concentrer sur le premier chapitre et éventuellement la section 2.2.1 du deuxième chapitre (l'annexe B est dédiée aux courageux qui voudraient mettre les mains dans le code<sup>1</sup> et l'annexe A pour les suspicieux qui voudraient connaître l'arrière-cuisine).

Un lecteur plus au fait des questions économétriques trouvera matière à lire (et à froncer les sourcils) dans le chapitre 2.

Un lecteur intéressé par la littérature sur les crises devra se référer à la section 2.1, mais trouvera aussi plusieurs références tout au long du texte (qu'il devra péniblement parcourir malheureusement).

Un lecteur curieux de la définition que je donne d'une crise psychologique en macroéconomie pourra se référer à la section 2.1.2 et 2.1.3 (pour la littérature) et la

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<sup>1</sup>En bas de page, pour le courageux des courageux, je mentionne les ressources en ligne liées à au téléchargement de la base de données <https://dataverse.harvard.edu/dataverse/complexcrises> ainsi qu'au code de réplication disponible [https://complexcrisesdb.github.io/CCDr/articles/CCDr\\_introduction.html](https://complexcrisesdb.github.io/CCDr/articles/CCDr_introduction.html)

section 2.2.1 qui présente mon principal indicateur (séduit ou suspicieux, il poussera peut-être y compris dans les méandres de l'annexe C).

Le lecteur expert des questions de dettes, incollable sur les dates des événements historiques trouvera matière à pinailler à la lecture de l'annexe F ou il trouvera un tableau infini précisant les dates associés à la typologie de crises du chapitre 3.

Pour le lecteur qui aurait parcouru tout cet ouvrage, je le félicite pour sa détermination, m'excuse pour les erreurs qui si trouvent, le remercie pour son temps et espère qu'il a apprécié cette lecture comme j'ai apprécié son écriture<sup>2</sup>.

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<sup>2</sup>Je me vois aussi dans l'obligation de m'excuser pour le lecteur purement francophone sous le nez duquel j'agite mon petit chiffon de savoir et le réoriente vers un texte en anglais qu'il ne peut pas comprendre... malheureusement les règles sont les règles et l'ambition d'être lu sur tous les continents est tellement grande qu'on en néglige l'accès aux membres de son propre village...

# Summary

Macroeconomic crises are sudden and severe events, usually characterized by a domino effect, that involve a wide and heterogeneous array of simultaneous disruptions that interact in complex ways. This complexity makes the record and analysis of such events particularly difficult and often incomplete.

To tackle this challenge, I have compiled a corpus of International Monetary Fund country reports for the period 1950-2019 and used *Natural Language Processing* (NLP) techniques to produce a new database of macroeconomic crises perceptions. This database covers 20 different economic, financial and non-economic events for a sample of 181 countries. Evidence based on these data suggests a substantial rise in the number of simultaneous shocks since the early 1980s and a drastic shift toward more psychologically driven events that strongly amplify initial shocks, foster contagion and synchronize business cycles across countries. These stylized facts complement the theoretical predictions that posit the role of shifts in expectations in the triggering and amplification of crises. Chapter 1 is devoted to explaining the data collections and presenting this first set of evidence.

The second chapter is devoted to provide an empirical investigation over a long period on the effects and consequences of the combination of panics, uncertainty and loss of confidence (called throughout the paper Expectation Regime Shifts) on the severity of sovereign crises. First, I describe the nature and evolution of expectation regime shifts for 181 countries during the period 1960-2016 and investigate the

psychological amplification effect on sovereign crises and economic recessions.

In the third chapter, I proceed by distinguishing 1<sup>st</sup> from 2<sup>nd</sup> *Generation Sovereign Crises*. The latter being defined as episodes that combine sovereign debt crises and expectation regime shifts. The distinction between the existence or absence of such aggregate psychological shock among foreign investors is justified by its capacity to discriminate between two types of sovereign crises with important difference in both their cause and consequence.

Indeed, second generation crises are found to be more closely associated with global shocks, have larger output costs, are simultaneous to more severe companion crises (banking and financial) and show larger institutional instability.

Regarding the characteristics of countries vulnerable to sovereign crisis, 1<sup>st</sup> *Generation Sovereign* crises tend to occur in low income countries with relatively high public debt, past history of default (serial defaulter syndrome) and weak institutions. On the contrary, 2<sup>nd</sup> *Generation Sovereign Crises* occur more often in economically and financially integrated middle income economies with moderate public debt levels but subject to a sudden loss of confidence in a context of intense financial deregulation and volatile foreign investors' confidence.

The periodic occurrence of these sudden and severe crises in a number of developing countries is likely to contribute to the middle-income trap phenomenon in economies with deep and deregulated sovereign bond markets that lack policy and financial credibility capable of limiting refinancing pressures and self-fulfilling solvency crisis.

These results suggest that the anchoring of expectations and the building of an economic and financial system resilient to sudden changes in expectations are a principal determinant of the severity of sovereign crises when confronted with crisis of second generation. In contrast, when confronted to crisis of first generation, a timely deleveraging and ordered restructuring reduce the risks of debt overhang and

the consequences of uncontrolled default usually caused by a combination of weak economic performances and exogenous shocks.

In the last section of this work, I wrap up the general picture of crises presented throughout this thesis to discuss the COVID-19 shock in light of this framework and argue that sovereign debt crises in the aftermath of the 2020 epidemic crisis have mostly taken the form of first generation of sovereign crisis in contrast to the trend that led to the preeminence of second generation of sovereign crisis that dominate the first two decades of the *XXI<sup>st</sup>* century.



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# General Introduction

In this work, I undertake a historical and empirical investigation on the occurrence of sovereign debt crises through the lens of the IMF bilateral surveillance. In the traditional view about sovereign crises, the distress occur in economically weak economies and is caused by fundamental shocks that lead to an output collapse and a discontinuity in public spending and revenue that drive public debt to insolvent levels, hamper economic development and sometimes lead the sovereign to default. A large literature following the seminal contribution of [Eaton and Gersovitz \(1981\)](#) has analyzed the mechanisms at play and describe the existence of solvency crises when a series of negative output shocks force the country to optimally decide to default ([Arelano \(2008\)](#), [Aguiar and Gopinath \(2006\)](#), [Chatterjee and Eyigungor \(2012\)](#)). Empirically, the literature has usually emphasized the crucial role of high and rising public debts, fragile balance of payments structures, past history of default and weak institutional frameworks ([Reinhart and Rogoff, 2009](#)).

As a complement to this traditional interpretation and to explain a number of episodes arising in the 1990s, alternative explanations have highlighted the role of *animal spirits* among sovereign investors as a driver of self-fulfilling crises. In this literature initiated by [Calvo \(1988\)](#), [Obstfeld \(1988\)](#), and [Cole and Kehoe \(1996\)](#) among others, the core mechanism takes the form of coordination failures that generate self-fulfilling dynamics in bond markets, potentially driving solvent countries into liquidity pressures and eventually default. Historically, this second type of crisis constitutes

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a particular risk for countries with deep and deregulated bond markets, integrated and open financial markets with short and foreign denominated debt (Calvo (2005), Martin and Rey (2006), Kose et al. (2006)). In the face of a sudden loss of confidence a wide spread and rapid capital flight creates high short term refinancing costs and the impossibility to roll over the public debt as observed in different European (Jeanne (1997), Jeanne and Masson (2000), Martin and Rey (2006), De Grauwe and Ji (2016), Bruneau et al. (2012), Tamborini (2015)), Latin American (Cole and Kehoe (1996), Cole and Kehoe (2000), Bratsiotis and Robinson (2004)) and Asian countries (Stiglitz (1999), Krugman (1999)).

The consensus agrees that sovereign crises often involves a mix of solvency (long term capacity to equate public revenues with public spending) and liquidity risks (short term capacity to rollover existing debt). While distinct conceptually, those two risks usually occur in combination and feedback on each other, making their empirical identification challenging.

This work is an attempt to identify, understand and evaluate over a long period the episodes of sovereign crises and to complement the existing solvency and liquidity typology by drawing a distinction between episodes of crises associated with adverse expectation regime shifts from those where crisis are not accompanied by such psychological disruption.

The evidence presented in this thesis shows that the rising severity of sovereign crises (loss of output, multiplicity of crises and sovereign debt pressure) is explained by the consolidation of the amplification effect of *expectation regime shifts* defined as the combination of *confidence collapse* among foreign investors, increased *risk aversion* of economic agents and *uncertainty traps* among investors, consumers and workers.

The use of a novel measure of *animal spirits* behaviors that echo to Keynes (1936), allows a systemic perspective on sovereign crises that connects the literature on self-

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fulfilling crises (Calvo (1988), Cole and Kehoe (1996), Aguiar et al. (2016)), multiplicity of crises (*Twin* (Kaminsky and Reinhart (1999), Na et al. (2018)), *Triple* and *Systemic* crises (Laeven and Valencia (2013), Brunnermeier and Oehmke (2013)), global crises (Kose et al. (2020)) and contagion events (Arellano et al. (2017), Bacchetta and van Wincoop (2016), Kumar and Persaud (2002)).

In many fields, crises are recognized as highly psychological events. They are periods of limited information, high uncertainty and usually call for a reaction to mitigate the effect of the initial shock, limit its propagation and pave the way for a rapid and solid recovery.

In macroeconomic contexts, the nature of expectations about ongoing events plays a crucial role in how crises unfold. Taking the two extreme cases, expectations can be modeled to be either positive (optimistic state of mind that generates confidence and certainty about the future *expansion of markets* and drives economic agents to seek opportunities) or negative (pessimistic state of mind that generates a loss of confidence, the reassessment of risks and a general uncertainty about a potential contraction of markets that drives agents to flee to safety).

At the macroeconomic level, those individual expectations aggregate and form the *aggregate belief* about the shock (intensity, duration and scope) and its consequences for the future. The herd nature of human behavior and the interconnected economic and information networks underlying economic activity explain in part why *aggregate expectations* are so volatile and fast moving. They are prone to sudden and non-linear regime switches, where a dominant optimistic belief can turn almost instantaneously into gloomy and persistent pessimism. The centrality of expectations in economic decisions led me to explore the potential amplification effect that those sudden shifts can generate on sovereign debt crises.

Throughout the three chapters of this work, I will try to convince the reader that the understanding of *expectation regime shifts* is essential for the understanding of

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sovereign crises. More specifically, I argue that *expectation regime shifts* can be empirically identified and measured (1), that they can act as a powerful amplification mechanism of crises (2), that when combined with sovereign crises they are particularly destructive (3) and that this type of highly psychologically driven events have been rising since early 1990s but may not be the dominant concern in the aftermath of the COVID-19 (4).

The evidence that contemporaneous crises are largely psychological and associated with multiple companion crises raise the following questions that I try to address throughout this work. Have expectations shifts become more volatile than before? What is the nature of adverse expectations? Is the transmission from expectations to real economic effects more rapid and intense than before? In a globalized economic and informational system, are all shocks susceptible of triggering negative expectation spirals with real economic consequences?

The thesis is structured as following. Chapter 1 presents a novel database on the perception of macroeconomic crises by the bilateral surveillance of the International Monetary Fund (IMF). Chapter 2 defines expectation regime shifts and estimate their amplification effect on economic recessions and sovereign crises. Chapter 3 identifies, defines and evaluates the relative costs of 1<sup>st</sup> and 2<sup>nd</sup> generation sovereign crises and conclude on a discussion on the nature of the COVID-19 crisis in the light of this framework.

Chapter 1 is based on the paper *The Complex Crises Database: 70 years of macroeconomic crises*, a joint work with Umberto Collodel. It presents a novel database on the perception of macroeconomic crises by exploiting popular *Natural Language Processing* (NLP) techniques (Gentzkow et al., 2019) to transform qualitative text information into quantitative data suitable for empirical and statistical analysis. Specifically, we compile a corpus of 23,000 IMF country reports (bilateral surveillance) from 1960 to 2019 and construct a lexicon of crises to classify 20 categories of crises.

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The contribution of this first chapter is three-fold. First, it provides a large country and period coverage on the perception of crises along many dimensions. It complements existing data on crises by providing continuous indices capturing the intensity of perceived crises: well-documented ones, such as sovereign or banking crises or less well-documented, like balance of payment, natural disaster or epidemics crises. This dataset, the *Complex Crises Database* (CCD) is available online in open source.

Second, we provide a toolbox programmed in R (the *CCDr* package) to extend, update and exploit the rich qualitative information of the surveillance activity of the fund. Third, the compilation of the corpus into an exploitable format allows the use of modern and advance ML techniques capable of dealing with the high dimensionality of the qualitative information of those reports and open the way to construct powerful predictive models. This work can be seen as an attempt to structure a rich set of qualitative information that connects *big data* methods and approaches with the historical analysis of macroeconomic crises.

Chapter 2 formally exploits the [Complex Crises Database \(CCD\)](#) presented in the first chapter to provide an understanding of the origin of the severity of sovereign crises in the last 70 years. This chapter is largely motivated by the fact that two of the worst economic crises in the last hundred years have occurred in the last twenty years. Indeed, recent macroeconomic crises seem to be increasingly severe and synchronized ([Kose et al. \(2020\)](#)) and affect both the economic and institutional systems. In this context, I provide empirical evidence on the conjecture that this increasing severity is rooted in powerful psychological amplification mechanisms, rooted in globalized and interconnected trade, financial and informational networks ([Bacchetta and van Wincoop \(2016\)](#), [Angeletos and Lian \(2020\)](#)).

In section 2.1, I review the literature on *fundamental* and *non-fundamental* drivers of crises and review the different strategies used to identify the non-fundamental drivers of crises. Section 2.2 is devoted to the presentation of the identification and

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description of the measure of negative *expectation regime shifts* as perceived by the IMF bilateral surveillance. I quantify their occurrence, describe their nature and source, show the main evolutions and emphasize the singularity of the contemporaneous period.

In section 2.3, I estimate the amplification effects of crises by identifying the system of simultaneous equations linking recessions (Y), sovereign crises (S) and expectation regime shifts (E). Using exogenous shocks as instruments in a 2SLS procedure, I show that the second order effect of expectation regime shifts ( $E \rightarrow Y$  and  $E \rightarrow S$ ) has crowded out the direct effect of recessions on sovereign crises ( $Y \rightarrow S$ ) and sovereigns on recessions ( $S \rightarrow Y$ ).

Controlling for a large set of indicators reflecting conventional and unconventional monetary and fiscal policy, I show that the self-fulfilling sovereign channel ( $E \rightarrow S$ ) is effectively cancelled out through the use of timely policies. On the contrary, the estimated effect of negative expectations on recessions ( $E \rightarrow Y$ ) and recessions on expectations ( $Y \rightarrow E$ ) is unchanged even after controlling for macroeconomic policy, suggesting that current macroeconomic policy has failed to effectively fight back this effect. Narrowing down the channels at play, I show that expectations' regime shifts that combine speculative distress and uncertainty about inflation and commodity prices generate the more severe doom loops.

In chapter 3, I classify sovereign crises into 1<sup>st</sup> and 2<sup>nd</sup> generation sovereign crises and show that while first generation crises were largely dominant during the period 1980-2006, the last decade was affected by a shift, with 2<sup>nd</sup> generation crises becoming more prevalent. I justify the relevance of this distinction in Section 3.1 by showing that the 2<sup>nd</sup> generation stands out in at least four dimensions. 1) They entail higher output costs: 2<sup>nd</sup> generation are associated with an average deviation of 3 percentage point from pre-crisis levels, larger than first generation crises. 2) They feature higher co-occurrences with companion crises, and in particular banking crises. 3) They spill

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over into political and social disruptions in the years before and after the crises. 4) They originate largely from external and global shocks.

Section 3.2 is devoted to the understanding of the source of vulnerabilities that makes countries likely to experience such crises. In light of the results found in section 3.1 and 3.2 I start by defining credible countries as countries displaying a particularly low probability of *banking and policy-related sovereign crises*. Then I compare the profile of countries vulnerable to 1<sup>st</sup> and 2<sup>nd</sup> generation crises and show that the first type of crises usually occurs in low income countries with high public debt levels and weak institutional frameworks. In contrast, 2<sup>nd</sup> generation crises are more likely in middle-income countries, which are highly integrated into international financial systems and that lack the credibility to anchor expectations in the face of coordination failure. In this second category of crises, isolating high public debt level and rising debt dynamics do not prove to be a central determinant of crises outbursts.

In Section 3.3, I extend the [Complex Crises Database \(CCD\)](#) to include the COVID-19 crisis. After describing the size and scope of the epidemic shock as described in the bilateral surveillance of the fund, I provide an analysis on the nature of expectation shocks during the period 2020-2021 and show that contrary to the *Great Financial Crises* (GFC) the epidemic shock has failed to negatively and persistently affects expectations or lead to coordination failure. In particular, until the end of 2021 the COVID-19 crisis has largely taken the form of a first generation sovereign crisis where high debt levels and depressed economic outcomes have not yet prompted sovereign panics and distress.

The contribution of this thesis is both methodological and conceptual. First, it provides a powerful method for the empirical analysis of crises. In particular, it undertakes a comprehensive mapping of IMF archive documents (link to 200,000 documents with proper metadata) that could enable narrative related works on previously unstructured material on the IMF activity. The present work, provides an extraction

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of close to 30,000 country reports (bilateral surveillance) converted to a usable format using OCR technology and made available in open-source to promote macroeconomic text mining literature. It provides a comprehensive lexicon of economic crises classifying around 1000 words into 20 categories of crises and extended the lexicon to include details about reform agendas and macroeconomic policy stance. The lexicon and codes are also available in open-source via the R package *CCRr* to provide an easy and efficient toolbox to extend and update the initial database.

In terms of direct contributions to the literature on sovereign crises, I undertake a large scale empirical work that complement the rich theoretical literature on *Keynesian - animal spirit* type of crises. In particular, it measures and evaluates crises driven by large psychological shifts and bridges the gap between different aspects of the literature that have concentrated on the solvency/liquidity nexus, open economy concerns and multiplicity of crises. By highlighting the central role of negative expectation regime shifts, I aim at unearthing the underlying common roots of several of these paradigms and provide meaningful evidence that the psychological amplification can be a major determinant of the severity of sovereign crises.

This thesis is a contribution to both the methodological and conceptual ambitions presented in this introduction. Among the extensions and further work that can be pursued, I can cite several avenues.

1) Extent and maintain the [Complex Crises Database \(CCD\)](#): several extensions of the database could be considered: additional events and types of crises, reform agenda or economic policy decisions. In the current vintage 20 indices are available but several additional indexes have complemented the database and in particular 3 indices concerning financial reforms and deregulation, 10 indices covering conventional monetary and fiscal policies as well as non-conventional policies such as the use of forward guidance or unconventional monetary policy.

2) Update and optimize the *CCDr* package: further cleaning of the code and im-



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provement of the code efficiency.

3) Work on crises' prediction models and early warning model using machine learning *Text to Data* models such as *fastext* to predict the occurrence of crises based on the full content of IMF reports and the supervised labelling of events made in this paper.

4) Further understanding of the determinants that protect countries from *expectation regime shifts*, and how to better describe how those expectations aggregate and evolve. Better understand the reasons that explain why some countries gain enough credibility to sustain protracted panics and successfully anchor expectations.

5) Document and understand the process of economic reforms that have contributed to the increase of the likelihood of *expectation regime shifts*.

6) Provide empirical evidence on the fiscal stance adopted during sovereign crises and understand the particular constraints related to the 2<sup>nd</sup> generation crises.

7) Implement and publish a *Crises Tracker* by coding an application that would perform a real-time screening of economic reports published by the major surveillance institutions.

# Introduction Générale

Dans ce travail, j'entreprends une enquête historique et empirique sur l'occurrence des crises de dette souveraine d'après la perspective de surveillance bilatérale du Fond Monétaire International (FMI). Dans la vision traditionnelle des crises souveraines, la détresse souveraine prend la forme de chocs fondamentaux qui se matérialisent en termes d'effondrement de la production et de discontinuités des dépenses et des revenus publics qui portent la dette de l'État à des niveaux insoutenables, entravent le développement économique et conduisent le gouvernement à faire défaut sur sa dette. Une abondante littérature dans la lignée des travaux pionniers de [Eaton and Gersovitz \(1981\)](#) a détaillé les mécanismes en jeu et décrit l'existence de crises de solvabilité, lorsqu'une série de chocs négatifs sur la production force le gouvernement à décider de manière optimale de faire défaut ([Arellano, 2008](#); [Aguiar and Gopinath, 2006](#); [Chatterjee and Eyigungor, 2012](#)). De manière empirique, la littérature à la plupart du temps mis en avant le rôle crucial joué par une dette publique élevée, une structure de balance des paiements fragile, un historique de défaut et un cadre institutionnel fragile ([Reinhart and Rogoff, 2009](#)).

En complément de cette interprétation traditionnelle et en réaction à un certain nombre d'épisodes dans les années 1990, des explications alternatives ont mis en évidence le rôle central des *esprits animaux* parmi les investisseurs souverains comme moteur de crises auto-réalisatrices. Dans cette littérature initiée par [Calvo \(1988\)](#), [Obstfeld \(1988\)](#) or encore [Cole and Kehoe \(1996\)](#), le mécanisme central prend

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la forme d'échecs de coordination qui génèrent une dynamique autoréalisatrice sur les marchés financiers pouvant conduire un pays solvable à une pression de liquidité et finalement à un défaut. Historiquement, ce deuxième type de crise constitue un risque particulier pour les pays dont les marchés obligataires sont profonds et déréglementés, dont les marchés financiers sont intégrés et ouverts et dont la dette est principalement de court terme et libellée en devises étrangères (Calvo, 2005; Martin and Rey, 2006; Kose et al., 2006). Face à une perte de confiance soudaine, la fuite importante et rapide des capitaux engendre des coûts de refinancement excessifs à court terme et rend impossible pour le gouvernement de refinancer sa dette publique. Ce genre de phénomène a été observé dans différents pays, européens (Jeanne (1997), Jeanne and Masson (2000), Martin and Rey (2006), De Grauwe and Ji (2016), Bruneau et al. (2012), Tamborini (2015)), d'Amérique latine (Cole and Kehoe (1996), Cole and Kehoe (2000), Bratsiotis and Robinson (2004)) et asiatiques (Stiglitz (1999), Krugman (1999)).

Le consensus général s'accorde sur le fait que l'origine des crises souveraines mélange des problèmes de *solvabilité* (capacité à long terme d'égaliser les recettes et les dépenses publiques) et de *liquidité* (capacité à court terme de refinancer la dette existante). Bien que distincts sur le plan conceptuel, ces deux mécanismes se combinent et s'influencent mutuellement, ce qui rend leur identification empirique difficile.

Ce travail est une tentative pour identifier, comprendre et évaluer sur une longue période les épisodes de crises souveraines pour ainsi compléter la typologie existante qui distingue *solvabilité* et *liquidité* en établissant une distinction entre les épisodes de crises associés à des changements de régime d'anticipations défavorables et ceux où aucune défaillance de coordination ne se produit.

L'approche consiste à montrer que la gravité des crises souveraines (perte de production, multiplicité des crises et pression sur le refinancement de la dette) s'explique

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par la consolidation du mécanisme d'amplification généré par ces *changement de régime des anticipations*, ici défini comme un effondrement de la confiance parmi les investisseurs étrangers, une augmentation de l'aversion au risque par les agents économiques et la consolidation de trappes à incertitudes parmi les investisseurs, les consommateurs et les travailleurs.

L'utilisation d'un indicateur d'*esprits animaux* en écho à Keynes (1936) permet d'adopter une perspective systémique sur les crises souveraines qui s'inspire de la littérature sur les crises autoréalisatrices (Calvo, 1988; Cole and Kehoe, 1996; Aguiar et al., 2016), sur celle de la multiplicité des crises (*Jumelles* (Kaminsky and Reinhart, 1999; Na et al., 2018), *Triples, systémiques* (Laeven and Valencia, 2013; Brunnermeier and Oehmke, 2013), globales, (Kose et al., 2020) et les épisodes de contagion entre pays (Arellano et al., 2017; Bacchetta and van Wincoop, 2016; Kumar and Persaud, 2002).

Dans de nombreux domaines, les crises économiques sont reconnues comme des événements hautement psychologiques. Elles constituent des périodes où l'information est limitée, où règne une grande incertitude et elles appellent généralement une réaction pour atténuer l'effet du choc initial, limiter sa propagation et ouvrir la voie à une reprise rapide et solide.

Dans un contexte macroéconomique, la nature des anticipations concernant les événements en cours joue un rôle crucial dans le déroulement des crises. Si l'on prend les deux cas extrêmes au niveau individuel, les anticipations peuvent être modélisées pour être soit *positives* (état d'esprit optimiste qui génère confiance et certitude quant à l'*expansion des marchés* future et pousse les agents économiques à rechercher des opportunités), soit *négatives* (état d'esprit pessimiste qui génère une perte de confiance, la réévaluation des risques et une incertitude générale quant à une *contraction potentielle des marchés* qui pousse les agents à limiter les pertes). Un raffinement de ce modèle inclut évidemment tout gradient de positivité et des

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passages de l'un à l'autre de manière discontinue.

Au niveau macroéconomique, ces attentes individuelles s'agrègent et forment ce qu'on appelle les *croyance agrégée* sur le choc (intensité, durée et ampleur) et ses conséquences dans le futur. La nature grégaire du comportement humain explique en partie pourquoi les *anticipations agrégées* sont par nature si volatile et rapide. Elles sont sujettes à des changements de régime soudains et non linéaires, où une croyance optimiste dominante peut se transformer presque instantanément en un pessimisme sombre et persistant. Le rôle central des anticipations dans les prises de décisions économiques a conduit mon intérêt pour l'exploration des effets d'amplification que ces variations soudaines peuvent générer. Le rôle central des anticipations dans les prises de décisions économiques m'a conduit à l'exploration du potentiel rôle amplificateur que ces retournements brutaux peuvent générer lors des crises de dette souveraines.

Dans les trois chapitres de cet ouvrage, j'essaierai de convaincre le lecteur que les *changements de régime des anticipations* peuvent être identifiés et mesurés empiriquement (1), qu'ils peuvent agir comme un puissant mécanisme d'amplification des crises (2), que lorsqu'ils sont associés à des crises souveraines, ils sont particulièrement destructeurs (3) et que ce type d'événements hautement psychologiques est en augmentation depuis le début des années 1990, mais ne semblerait pas constituer le risque principal dans le sillage de la COVID-19(4).

Le constat que les crises contemporaines sont largement psychologiques et associés à de multiples crises simultanées soulève les questions suivantes auxquelles je tente de répondre tout au long de ce travail. Les anticipations sont-elles plus volatiles qu'auparavant ? Quelle est la nature d'anticipations défavorables ? La transmission des anticipations à des conséquences économiques réelles est-elle plus directe et plus intense qu'auparavant ? Dans un système économique et informationnel mondialisé, tous les chocs sont-ils susceptibles de déclencher des spirales d'anticipations

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négatives ayant des conséquences économiques réelles ?

Cette thèse est structurée de la façon suivante. Le Chapitre 1 présente une nouvelle base de donnée sur la perception des crises macroéconomiques par le Fond Monétaire International (FMI). Le Chapitre 2 définit formellement les changements de régimes d'anticipations et estime leurs effets d'amplification sur les récessions économiques et les crises souveraines. Chapitre 3 identifie, définit, et évalue les coûts relatifs des crises de 1<sup>er</sup> et 2<sup>eme</sup> génération et conclue sur une discussion sur la nature de la crise de la Covid-19 à la lumière de ce cadre conceptuel.

Le chapitre 1 correspond à l'article *The Complex Crises Database : 70 years of macroeconomic crises* qui est un travail conjoint avec Umberto Collodel. Il présente une nouvelle base de données sur la perception des crises macroéconomiques en exploitant les techniques populaires du *Traitement du Langage Naturel* (NLP) (Gentzkow et al., 2019) pour transformer des informations textuelles, qualitatives, en données quantitatives adaptées à l'analyse empirique et statistique. Plus précisément, nous compilons un corpus de 23 000 rapports de conjoncture pays du FMI de 1960 à 2016 et construisons un lexique d'expressions liées aux crises classées dans les 20 catégories d'intérêt.

La contribution de ce premier chapitre est au moins triple. Tout d'abord, il fournit une large couverture par pays et par période sur la perception des crises parmi un grand nombre de dimensions. Il complète les données existantes sur les crises en fournissant des indices continus capturant l'intensité des crises perçues : bien documentées comme les crises souveraines ou bancaires ou moins documentées comme les crises de la balance des paiements, les catastrophes naturelles ou les épidémies. Cet ensemble de données, le *Complex Crises Database* (CCD) est disponible en ligne en *open source*.

Deuxièmement, nous fournissons une boîte à outils programmée avec le logiciel *R* (*package CCDr*) pour étendre, mettre à jour et exploiter la riche information

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qualitative produite par le Fond Monétaire International. Troisièmement, la compilation du corpus dans un format exploitable permet l'utilisation de techniques *Machine Learning* modernes et avancées capables de traiter la haute dimensionnalité de l'information qualitative de ces rapports et d'ouvrir la voie à de puissants modèles prédictifs. Ce travail peut être considéré comme une modeste tentative de structurer un riche ensemble d'informations qualitatives qui relie les méthodes et approches *big data* à l'analyse historique des crises macroéconomiques.

Le chapitre 2 exploite la base de données *Complex Crises Database* (CCD) présentée dans le premier chapitre pour comprendre l'origine de la sévérité des crises souveraines lors des 70 dernières années. Ce chapitre est largement motivé par le fait que deux des pires crises économiques sur les cent dernières années se sont produites au cours des vingt dernières années. Les crises macroéconomiques simultanées semblent être de plus en plus sévères et synchronisés (Kose et al., 2020) et ont un impact à la fois sur les systèmes économiques et institutionnels. Dans ce contexte, la question était de savoir si cette sévérité croissante pouvait être la conséquence d'un mécanisme d'amplification psychologique plus répandu dans un contexte de réseaux financiers et informationnels globalisés et interconnectés (Bacchetta and van Wincoop, 2016; Angeletos and Lian, 2020).

Dans la section 2.1, je passe en revue la littérature sur les facteurs de crises fondamentales et non fondamentales et je détaille les différentes stratégies utilisées pour identifier les facteurs de crise non fondamentaux. Dans la section 2.2.1 est consacrée à la présentation de l'identification et de la description de la mesure des *changements de régime des anticipations* négatifs. Je quantifie leur occurrence, décris leur nature et leur source, montre leur évolution principale et souligne la singularité de la période contemporaine.

Dans la section 2.3, je propose une quantification du rôle respectif des effets directs et indirects des crises en identifiant le système d'équations simultanées reliant

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la récession, les crises souveraines et les changements de régime d'anticipation. En utilisant des chocs exogènes comme instruments dans une procédure 2SLS, je montre que l'effet de second ordre des anticipations évince l'effet direct des récessions sur les crises souveraines ( $Y \rightarrow S$ ) et des crises souveraines sur les récessions ( $S \rightarrow Y$ ). En contrôlant pour un large ensemble d'indicateurs reflétant les politiques monétaires et fiscales conventionnelles et non conventionnelles, je montre que le canal souverain autoréalisateur est effectivement contrebalancé par la mise en place de politiques économiques adéquates. Au contraire, les effets estimés des anticipations négatives sur les récessions ( $Y \rightarrow S$ ) et des récessions sur les anticipations ( $S \rightarrow Y$ ) restent inchangés même après avoir contrôlé pour la politique macroéconomique, ce qui suggère que les instruments actuels n'aient pas réussi à lutter efficacement contre l'effet psychologique des récessions. En précisant mon analyse, je montre que les anticipations négatives qui combinent des détresses spéculatives et une incertitude forte sur l'inflation et le prix des commodités sont potentiellement les sources des spirales négatives les plus sévères.

Dans le chapitre 3, je classe les crises souveraines en deux catégories et montre que si la première génération a été largement dominante au cours de la période 1980-2006, la dernière décennie a connu une évolution vers une prévalence accrue de 2<sup>nd</sup> génération. Je justifie la pertinence de cette distinction dans la section 3.1 en montrant que la 2<sup>nd</sup> génération se distingue dans, au moins, 4 dimensions. (1) Ils entraînent des coûts de production plus élevés : La 2<sup>nd</sup> génération est associée à un écart moyen de 3 point de pourcentage par rapport au niveau de croissance d'avant crise, plus important que les crises de première génération. (2) Ils se caractérisent par une plus grande cooccurrence avec d'autres crises et en particulier les crises bancaires. (3) Elles s'accompagnent de perturbations politiques et sociales en amont et en aval de la crise. (4) Elles proviennent en grande partie de chocs externes et mondiaux.

La section 3.2 est consacrée à la compréhension des sources de vulnérabilité qui



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rendent les pays susceptibles de subir de telles crises. À la lumière des résultats trouvés dans les sections 2.2.1 et 2.3, je commence par définir les pays crédibles comme des pays affichant une probabilité particulièrement faible de crises souveraines liées à des paniques bancaires et une perte de confiance dans les politiques économiques. Ensuite, je compare le profil des pays vulnérables aux crises de 1<sup>st</sup> et 2<sup>nd</sup> génération et montre que le premier type de crises se produit généralement dans les pays à faible revenu avec des niveaux d'endettement élevés et un cadre institutionnel faible. En revanche, les crises de 2<sup>nd</sup> génération sont plus probables dans les pays à revenu intermédiaire fortement intégrés aux systèmes financiers internationaux et qui manquent de crédibilité pour ancrer les attentes face aux risques d'échec de la coordination. Dans cette deuxième catégorie de crises, le niveau d'endettement isolé et la dynamique de la dette ne s'avèrent pas être des déterminants centraux du déclenchement des crises.

Dans la section 3.3, j'élargis la base de données *Complex Crises Database* pour inclure la crise de la Covid-19. Après avoir décrit la taille et la portée du choc épidémique, je fournis une analyse précise de la nature des chocs d'anticipations qui ont eu lieu au cours de la période 2020-2021 et je montre que, contrairement à *La Grande Crise Financière* de 2008, le choc épidémique n'a pas généré de comportement moutonnier dirigé par un changement brutal d'anticipations. En particulier, à la fin de l'année 2021, la COVID-19 a plus largement pris la forme de crises souveraines de première génération où les niveaux d'endettement élevés et les résultats économiques déprimés n'ont pas encore provoqué de paniques souveraines.

La contribution de cette thèse est à la fois méthodologique et conceptuelle. Tout d'abord, elle apporte à la littérature sur les crises souveraines une méthode puissante d'analyse empirique. En particulier, elle rend disponible et nettoie les archives du FMI (lien vers 200.000 documents avec des métadonnées appropriées) ce qui pourrait permettre de travailler sur des documents non conventionnels concernant

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l'activité du FMI. Il fournit une extraction de près de 30 000 rapports de conjoncture pays convertis en format utilisable à l'aide de la technologie OCR et mis à disposition en open-source pour promouvoir la littérature sur l'exploration de notes de conjonctures. Il fournit un lexique complet sur les crises économiques classant environ 1000 mots dans 20 catégories de crises. Une extension déjà réalisée de la base de donnée a par ailleurs étendu le lexique pour inclure des détails sur les programmes de réforme et les positions de politique macroéconomique. Le lexique et les codes sont également disponibles en open-source via le package R CCRr afin de fournir une boîte à outils facile et efficace pour étendre et mettre à jour la base de données initiale.

En termes de contributions directes à la littérature sur les crises souveraines, j'entreprends un travail empirique à grande échelle qui complète la riche littérature théorique sur les crises keynésiennes d'esprits animaux. En particulier, il permet de mesurer et d'évaluer les crises provoquées par de grandes dérives psychologiques et de combler le fossé entre les différents aspects de la littérature qui se sont concentrés sur le lien entre solvabilité et liquidité, les problèmes d'économie ouverte et la multiplicité des crises. En soulignant le rôle central des changements de régime des anticipations, je vise à mettre en évidence les racines communes de plusieurs de ces diagnostics et à fournir des preuves significatives que l'amplification psychologique peut être un déterminant majeur de la sévérité des crises souveraines.

Cette thèse est une contribution préliminaire aux ambitions méthodologiques et conceptuelles présentées dans cette introduction. Parmi les extensions et les travaux à venir, je peux citer plusieurs pistes.

(1) S'occuper de l'extension et de la maintenance de la base de donnée *CCD* : plusieurs extensions de la base de données pourraient être envisagées : événements et crises supplémentaires, agenda des réformes, décisions politiques. Jusqu'à présent, 20 indices dans le premier millésime, 3 indices pour les réformes, 10 indices pour l'orientation politique.

(2) Mettre à jour et optimiser le package CCDr : nettoyage supplémentaire du code et amélioration de l'efficacité du code, extension pour inclure la version non supervisée. Améliorer la vignette pour inclure un exemple d'étude d'événement.

(3) Travailler sur les modèles de prédiction des crises : utiliser des modèles d'apprentissage automatique *text to data* tels que *fasttext* pour prédire l'occurrence des crises sur la base du contenu complet des rapports du FMI et de l'étiquetage supervisé existant des événements.

(4) Mieux comprendre ce qui protège les pays des changements de régime attendus et comment mieux décrire leur formation ? Mieux comprendre pourquoi certains pays sont crédibles et ne génèrent pas de paniques prolongées.

(5) Documenter et comprendre les réformes économiques qui ont augmenté la probabilité de changements de régime d'anticipation.

(6) Orientation fiscale optimale pendant les crises complexes : Montrer que les pays impliqués dans les crises de 2<sup>nd</sup> générations sont plus contraints et doivent s'appuyer sur des politiques non conventionnelles pour faire face à la composante psychologique des crises.

(7) Mettre en œuvre et publier un *Crises Tracker* en codant une application qui effectuerait un filtrage en temps réel des rapports économiques publiés par les principales institutions de surveillance.

# Chapter 1

## **The Complex Crises Database: 70 years of Economic Crises Through the Lens of The IMF**

*As research methods advance, and as more social media data accumulate, textual analysis will be a stronger field in economics in coming years. It may allow us to move beyond 1930s-style models of feedback, the "multiple rounds of expenditure", and get closer to all the kinds of feedback that really drive economic events.*

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SHILLER (2019)

### **Introduction**

Macroeconomic crises originate in different areas of the economic system, propagate through various channels and ultimately, disrupt different sectors of economic activity. A peripheral and localized shock, e.g., the collapse of the housing market at the onset of the Global Financial Crisis (GFC), can start a domino effect that extends

far beyond the initial disruption and breeds into highly complex outcomes.

While in the last decades the empirical literature on crisis has been growing substantially, it has devoted particular attention to a limited subset of crises: mainly, financial, banking crises, sovereign debt default and currency crashes (e.g., [Rey \(2015\)](#), [Laeven and Valencia \(2013\)](#), [Reinhart and Rogoff \(2009\)](#)). Although these crises are central and critical components of macroeconomic dynamics, it would be deceptive to isolate them from non-economic and less conventional events that have a critical role in the unfolding of events. These events, such as epidemics, political uncertainty, violent conflicts or migration crises might act as causes, consequences and amplification mechanisms, whose occurrence determines the speed, intensity, and duration of economic and financial downturns. Reconstructing the complex narratives of periods of high macroeconomic volatility in a quantitative and coherent framework is a difficult challenge that can both enrich the historical understanding of crises and provide empirical support to highlight specific mechanisms in theoretical frameworks.

In this paper, exploiting the recent technological advances in terms of computational power, image recognition and text mining techniques, and the bilateral surveillance of the International Monetary Fund (IMF) produced in the last 70 years for its member countries, we provide new and rich material for the analysis of macroeconomic crises.

First, we provide accessibility to a raw text database of roughly 23,000 documents (country reports and program related) covering the whole IMF membership throughout the period 1950-2019.

Second, we manually compile an IMF crisis-specific dictionary and propose a simple term-frequency approach to capture and quantify Fund discussions about a wide variety of economic and non-economic crisis events for each country and year. The large time span (70 years) and country coverage (181 countries) as well as

the scope of crises covered within a comparable framework complement and extend standard datasets of macroeconomic crises and provide useful material for a deeper understanding of the complexity at play during these highly chaotic events.

In terms of stylized facts, we provide evidence that the complexity of crises, measured as the intensity of the correlations between the different crises indices, has increased massively starting from the first wave of financial globalization, with a move from a sparse network with mostly real and domestic crises in the Bretton Woods era into a highly dense one, financially dominated, in the recent decade. Furthermore, we highlight another important empirical regularity: recent macroeconomic crises are dominated by strong contagion effects with an important psychological component that synchronize the occurrence of macroeconomic crises across countries and create severe global crises.

The paper is structured as follows. Section 1.1 summarizes the relevant literature on text mining and details the construction of the corpus, the dictionary, and the method used to compute the 20 crisis indicators. Section 1.2 presents a general overview of the dataset. It discusses the conceptual difference with other data-sets, compare with existing benchmarks and provide a number of events studies. Section 1.3 shows evidence of the rising crises' complexity by describing the crises co-occurrence, the increasing centrality of expectation regime shifts in the system and the dominant role of global shocks in the disruption of macroeconomic outlook.

## **1.1 From Qualitative Judgement To Quantitative Measures**

The record of events and the capacity of researchers to mobilize precise, comparable and accurate information is a challenge for empirical research. This challenge is all the more important during periods of crises where a cascade of events, often

unexpected, mix chaotic outcomes.

In the context of the digitalization of information and the increase in production of textual information, Natural Language Processing (NLP) and text analysis have gained great popularity in the recent period in academia. These techniques have permitted to transform large quantities of text into numerical data, extracting valuable insights and avoiding labor-intensive reading and manual coding. [Gentzkow et al. \(2019\)](#) provide an introduction to the use of text as an input for economic research and summarize the approach in three major steps:

- Represent the text  $D$  as numerical array  $C$  (count of tokens with preliminary cleaning to reduce the dimensionality of the data)
- Map  $C$  to predict values  $\bar{V}$  of unknown outcomes  $V$  (in the vast majority of setting the ultimate goal is prediction rather than causal inference the interpretation of the mapping between  $\hat{V}$  and  $V$  is usually not of interest as far as prediction is accurate. In my case, the mapping matter and determines the extent of credibility that can be given to the results (the discussion on the corpus and the lexicon reflect this necessity).
- Use  $\bar{V}$  in subsequent descriptive or causal analysis

In the social sciences, this type of empirical approach has been used to analyze a wide spectrum of subjects, ranging from the political slant of media to drivers of consumer decision-making.<sup>1</sup>

In macroeconomics, it has proved a useful tool to capture the perceptions of economic agents, as well as a good complement to the traditional economic and financial data. A first strand of literature harnesses sentiment-analysis i.e., the interpretation and classification of emotions (positive, negative, and neutral) to enhance the

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<sup>1</sup>See [Gentzkow et al. \(2019\)](#) for a comprehensive review.

forecasting of economic fluctuations and upcoming crises as well as providing an additional understanding of the swings in assets prices.

[Fratzscher and Reynaud \(2011\)](#) assess the degree of favorableness in the Public Information Notices (PINs) issued after Executive Board discussions of IMF *Article IV Consultations* with member countries. The sentiment classification depends on the authors' interpretation of IMF information and results in a quantitative score that goes from -2 to +2. For a set of 36 emerging market economies over the period 2001-2007, they find that the degree of favorableness significantly influences sovereign spreads. [García \(2013\)](#) constructs a sentiment index from the financial columns of *The New York Times*. The author uses a dictionary approach to classify positive and negative words in each article. He finds that news content helps predict stock returns to the daily frequency, especially during recessions.

Exploiting a similar dictionary approach, [Fraiberger \(2016\)](#) constructs a sentiment index over the period 1987 -2013 across 12 countries: to do so, he analyzes a corpus of economic news articles produced by *Reuters*. He finds that information from news articles are not incorporated into Consensus forecasts.

[Huang et al. \(2019a\)](#) build monthly sentiment indices for 20 countries from 1980 to 2019 using *Financial Times* news articles. Instead of a predefined dictionary, they use a *word2vec* algorithm ([Mikolov et al., 2013](#)), an unsupervised technique focusing on the distribution of words, to map them into a high-dimensional space and then count the occurrence of precise semantic clusters across the articles. Following this initial clustering, they classify each group according to its general sentiment (fear, risk, hedging, and crisis). They find that their sentiment indices spike ahead of financial crises and conclude that these new indices could complement traditional forecasting methods with early real time data. [Fayad et al. \(2020a\)](#), working on a corpus of IMF *Article IV Consultations* including all member countries in the period 2000-2018, develop a sentiment index measuring the reception of policy advice at



the time of the consultations: they find that, although authorities of member countries largely agree with Fund advice, there is sizeable heterogeneity connected with different country-specific economic and political characteristics.

Uncertainty and risk measures are the second avenue of research. These studies, rather than relying on the emotional intent of words, exploit solely their presence or frequency within a document. In their seminal work, [Baker et al. \(2016\)](#) create an economic policy uncertainty (EPU) index for the United States from 1985 onwards, counting the number of articles in the 10 leading US newspapers with words related to the economy, uncertainty, and policymaking. They then extend the same methodology to include all G10 economies.

[Ahir et al. \(2018\)](#) use the same approach with quarterly *Economist Intelligence Unit* (EIU) country reports: they produce an uncertainty index for 143 individual countries on a quarterly basis from 1996 onwards. Recently, a modified version of this index, the World Pandemic Uncertainty index, has been published to improve the understanding of the economic consequences of epidemics.<sup>2</sup> [Ghirelli et al. \(2019\)](#) refine this methodology for the Spanish case extending both the newspaper coverage and enriching the set of keywords to search for.

[Engle et al. \(2020\)](#) construct a climate change news index relying on a corpus from *The Wall Street Journal* (WSJ) covering the time span 1980-2017. The authors convert WSJ term counts into “term frequency–inverse document frequency” and compare the resulting scores to a corpus of authoritative texts on the subject of climate change: they use this new measure and a portfolio approach to build climate change hedge portfolios.<sup>3</sup>

Finally, different authors rely on a simple reading methodology for the identification of financial crisis episodes. [Romer and Romer \(2017\)](#) create a new semiannual

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<sup>2</sup><https://blogs.imf.org/2020/04/04/global-uncertainty-related-to-coronavirus-at-record-high/>

<sup>3</sup>Another notable mention goes to [Choi and Varian \(2012\)](#) and [Scott and Varian \(2014\)](#) that use *Google Trends* data and a term-frequency approach to now cast economic activity.

measure of financial distress in a sample of 24 advanced economies from 1967 to 2007. This measure is based on the manual coding of the *OECD Economic Outlook*: after reading all the documents, the authors classify the degree of financial distress for a certain country/half-year on a scale from 0 to 15. They then use this new series to explore the behavior of economic activity following financial crises. [Vannier \(2020\)](#) develops a conceptual framework to guide the choice of key elements entailed in such a methodology and applies it to date the start of currency crises: he proposes a narrative taxonomy of currency crises for 54 countries based on 315 IMF publications – mainly article IV consultations — covering the time span 1970-2020.<sup>4</sup>

Compared to the previous literature, our contribution is twofold. First, we significantly improve accessibility to IMF documents for economists and social scientists alike: we provide a raw text database of roughly 23,000 documents – country reports and program related – covering the whole IMF membership throughout the period 1950-2019. Previously, [Mihalyi and Mate \(2019\)](#) introduced a text dataset of country reports published by the IMF between 2004 and 2018 for 201 countries. We build on their work and extend the sample of documents backwards, exploiting Optical Character Recognition (OCR) and autocorrection techniques to overcome the accuracy hurdle that hindered previous work.<sup>5</sup>

Second, we manually compile an IMF crisis-specific dictionary and propose a simple term-frequency approach to capture and quantify Fund discussions about a wide variety of economic and non-economic crisis events for each country and year. This algorithmic approach allows us to process in a computationally feasible way the large volume of data available and, ultimately, to capture the entire complexity of events associated with episodes of macroeconomic volatility.

In the remainder of the section we present the source, country and time coverage

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<sup>4</sup>Manual coding has also been used for other purposes e.g., [Hernandez \(2020\)](#) characterizes the policy discourse in IMF–Argentine *Article IV Consultations* using manual coding of events.

<sup>5</sup>“We choose 2004 as our starting year because...from earlier periods...the majority are scanned PDF which make text recognition difficult and imprecise”([Mihalyi and Mate, 2019](#)).

of the corpus, explaining in detail the data acquisition and processing part, describe the construction of the lexicon and illustrate the empirical method used to extract crisis discussion indices from IMF texts.

### **1.1.1 The Corpus of IMF Documents**

The IMF is an international organization created in July 1944 at the Bretton Woods conference. Its primary mandate is to preserve the stability of the international monetary system. Although the institution is mostly known for its role of financial assistance for countries experiencing balance of payments difficulties, its mandate ranges from the provision of technical assistance, to the production of regular outlook for each member countries (bilateral surveillance) and the monitoring of global economic activity (multilateral surveillance). This paper, relies on the analysis of the bilateral surveillance activity of the Fund and concentrate on drawing a quantitative synthesis of country-specific crisis measures.

The Fund regularly monitors and evaluates the situation of economic and financial systems in order to identify contingent sources of risk. Surveillance is carried out 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 publications such as the Global Financial Stability Report, Fiscal Monitor, External Sector Report, Regional Economic Outlook or (iii) at a country level in the Article IV and other country reports e.g., the Recent Economic Developments series. Moreover, surveillance is often also a key condition associated with the Fund financing programs. Hence, program-related documents such as requests for assistance or program reviews also contain important surveillance elements.

To produce credible and comprehensive information about the economic outlook of its members, the Fund relies on an evolving conceptual framework for assessing country risks ([Ahuja et al., 2017](#)) and large teams of economic experts that

work in close relationship with national authorities and main economic actors, collecting and analyzing a wide variety of quantitative and qualitative information. This research culminates in the production of regular and formal economic reports which provide background information for political, economic and financial decisions.

The privileged relationship of the Fund with national authorities of close to all countries in the world, the close interactions of its staff with leading scholars and policymakers as well as the rigorous editorial process ensure an evident comparative advantage compared to other textual sources such as newspapers and tweets. Fund documents exhibit a number of desirable characteristics.

First, they are long and detailed: they depict meticulously the real time outlook of the economic situation. While newspapers might neglect some elements in favor of others or not correctly grasp the situation at hand, this risk is minimized by the Fund.

Second, they are extremely cautious: each word is discussed, weighed and negotiated and follows a strict protocol of revision and publishing. This revision system, commonly supervised by the Strategy, Policy, and Review (SPR) department leads to a situation of homogeneous linguistic i.e., a high likelihood that linguistic findings based on one document apply to another (Kilgarriff, 2001). Homogeneous wording is the kingpin of our lexicon approach: it allows us to compile consistently a dictionary of expressions the Fund uses to refer to different occurrences of the same type of events. The heterogeneous wording that characterizes other textual sources would render this methodology non-viable.

The use of a single source with controversial suspicion of ideological bias can be a concern for the capacity of the corpus to be representative of the reality of the underlying economic developments. The central question that underpins the validity of the analysis is whether the IMF provide a bias vision of the reality.

A first strand of literature discuss the IMF activity and how reality has pushed the

adaptation of IMF perspective and prescriptions<sup>6</sup>. In particular, the IMF as rather “followed” the evolution of the type of crises and adjusted its surveillance activity by adjusting the scope of its analysis to a more complex and non-linear reality (Reinhart and Trebesch (2016), Güven (2012)).

It is important to remind that the paper relies on the bilateral surveillance of the fund. on this aspect, the literature on the IMF is rich but not always consensual and highly heterogeneous in the methodological approaches, research objectives and conclusions of results. The findings on the stability or evolution of IMF prescriptions largely depends on the policy area considered (capital account opening, fiscal austerity/stimulus, privatizations, ...) and whether the IMF is considered as a homogeneous actor driven by its principals (member states and mainly the United States) or the agency of IMF staff (opportunistic bureaucrats) (De Vries, 1986; Momi, 2005; Chwieroth, 2008, 2013; Woods, 2006; Moretti and Pestre, 2015; Seabrooke and Nilsson, 2015). While non-negligible evolution are documented by many authors, (Güven, 2012; Ban and Gallagher, 2015; Chwieroth, 2008, 2013; Moretti and Pestre, 2015) they did not amend the neoliberal doctrine that has been overall more stable than the policy advice (Hernandez, 2020; Kaya and Reay, 2019; Holmgren, 2021) that shifts gradually from the Washington consensus to the post Washington consensus (Ban and Gallagher, 2015; Kaya and Reay, 2019) and has followed rather than driven the evolution of crises (Reinhart and Trebesch, 2016; Moretti and Pestre, 2015; Ban and Gallagher, 2015).

In complement to the evolution of doctrine and conceptual framework, the use of bilateral surveillance to monitor the description of the economic outlook can be impacted by the evolution of the vocabulary and theories used for the construction of the reports. The question is whether the structure (type of experts) and vocabulary has evolved across time and generates measurement error that could invalidate the

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<sup>6</sup>i.e., crises shape the models used to describe the reality

NLP extraction.

Overall, the literature document and wide extension of the size of reports, a general change of tone, concepts, and writing method ([Kaya and Reay \(2019\)](#), [Moretti and Pestre \(2015\)](#)), a more acute neoliberal bias oriented on pro market and financial related issue particularly since early 1970 due both from type of recruitment but also internal learning among staff ([Momani, 2005](#); [Chwieroth, 2008, 2013](#); [Seabrooke and Nilsson, 2015](#)) and the evolution in the relative power among member countries ([Woods, 2006](#)).

While there is an effective shift of concepts included and tone of reports, there is overall a large stability of doctrine in most areas in particular since the early 1980s (even if policy advice on specific topics have evolved). The trend of surveillance was not so much a change of doctrine but a gradual inclusion of additional focused driven by the inclusion of a more complex and financial related reality.

For the last 70 years, The IMF as played an important role in the resolution of crises and as adjusted its knowledge and practice to the changing reality ([Reinhart and Trebesch, 2016](#); [Güven, 2012](#); [Ban and Gallagher, 2015](#)). As an endogenous actor, the activity of the fund may have shape the nature and intensity of crises, as well as the description of the crises. It is crucial to recall that the data used in the analysis only rely on the *bilateral surveillance activity* and not the multilateral surveillance or the lending practice of the IMF ([Lombardi and woods, 2008](#)).

The literature seems to suggest that the bilateral surveillance is unlikely to truly influence economic actors and rather provide useful and quality information but with limited policy impact ([Lombardi and woods, 2008](#)). Furthermore, while the role of surveillance in amplifying conditionality cannot be excluded, ([Lombardi and woods, 2008](#); [Fratzcher and Reynaud, 2011](#)) find that the surveillance activity may be more favorable for countries with an IMF program.

Overall, the bilateral surveillance is a rather consensual document ([Lombardi and](#)

woods, 2008) jointly produced by the staff and national authorities that generate generally consensus, (Fayad et al., 2020b; Lombardi and woods, 2008) even if this consensus may hide a very narrow range of effective negotiation from national authorities (Holmgren, 2021). While the effect of the IMF lending practice (amount to lend, duration and lending conditions) can be important on economic performance and perception from market participants, it is much less evidence for its bilateral surveillance activity that does not prove a major determinant of policy decision and source of information for markets.

The literature review suggests that the surveillance activity of the IMF have largely evolved since its creation but has mainly remained neoliberal, dominated by economists with an important Anglo-Saxon dominance that is closely associated with academic research and has been shaped by the changing nature of crises.

While a structural break surely occurred since early 1980s due to the structural changes in IMF policies and rising financial concerns, the bilateral surveillance appear as a useful material to measure the description of the economic outlook from an economist neoclassical perspective (Reinhart and Trebesch, 2016; Fratzscher and Reynaud, 2011; Kaya and Reay, 2019; Ban and Gallagher, 2015). All the more that the intention is to test standard theoretical predictions that are likely to have important impact on IMF staff models (De Vries, 1986; Lombardi and woods, 2008; Chwiero, 2008; Seabrooke and Nilsson, 2015).

In this respect, the linguistic evolution of reports toward more abstract and less specific description provided by economist influenced by standard economic research (Moretti and Pestre, 2015; Lombardi and woods, 2008) are rather an asset for the use of a dictionary based approach. Furthermore, the hypothesis of a risk that the IMF overestimate the crises to push particular reforms seem invalidated by the defensive surveillance hypothesis highlighted by Fratzscher and Reynaud (2011).

To concretely provide an example of the type of economic description produced by the IMF bilateral surveillance I provide an example of *Recent Economic Developments* on March 28, 1995, during the executive board meeting<sup>7</sup>. Keywords of interest highlight the story that is indeed to be extracted from the report and in parentheses the category of crises reflected (ERS=expectations, S=sovereign default, C=Currency crisis, Y= recession, bop=balance of payment, I=inflation). The narrative captured by the term frequencies of these keywords reflects an intense expectation regime shifts in the context of sovereign and currency crises, a recession and fundamental imbalances regarding external accounts and inflation dynamics. see Appendix A.1.5 for the full transcript.

*The Mexican economy continued to be affected by uncertainty (ERS) and volatility in the financial and foreign exchange markets at the beginning of 1995. While this situation resulted from a combination of factors, a central determinant was the persistence of market doubts (ERS) as to the adequacy of the amounts, timing, terms, and the real availability of the external financing (S) to support Mexico's program of adjustment. Under a situation of uncertainty (ERS) concerning the availability of resources to meet external payments, market speculation (ERS) emerged on Mexico's need to resort to exchange controls. In this context, as serious difficulties were found to rollover (S) the external obligations coming due, the exchange rate depreciated (C) substantially and interest rates rose to levels well above those assumed in the AUSEE.*

*The adverse evolution of financial and exchange market conditions was reflected in inflation and economic activity. The monthly rate of growth of the consumer price index rose from 0.9 percent in December 1994, to 3.8 percent and 4.2 percent in January and February 1995, respectively. In the first 15 days of March, consumer prices increased 3.1 percent. Simultaneously, the upturn in GDP growth observed in 1994 (to 3.5 percent in real terms) was reverted since the end of the year. Preliminary estimates from a monthly industrial survey show decreases in manufacturing output (Y) of 0.5 percent in January-February 1995 with respect to the same period of the previous year, after having recorded a real rate of growth of 3.6 percent in 1994. As a result, employment in this sector is estimated to have decreased by 2.9 percent in January at an annual rate.*

The first step of the compilation of the corpus is the scraping of the IMF archives to download documents for each of the IMF member countries. The initial scraping provides around 250,000 references produced between 1947 and 2016. In addition to the references of documents available in the archives, we also scrape the current

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<sup>7</sup>Statement by Mr. Guzman on Mexico Executive Board Meeting 95/30 March 29, 1995



IMF website to obtain references for the documents published after 2016.<sup>8</sup> The reference provides rich metadata: mainly, the title of the document, the day of publication and the link to the attached document in PDF format. We perform a semantic analysis on the title to retain only the relevant types of documents, i.e., documents related to individual country surveillance.<sup>9</sup> This leaves 39,000 references, for which we download the associated PDF. Sometimes, however, metadata exhibit inconsistencies: thus, from this original sample, we further remove a number of misclassified documents.<sup>10</sup><sup>11</sup> This further cleaning leaves us with a final corpus of 23,465 documents covering the time span 1950-2019.

To read and convert these documents into text suitable for statistical analysis, we have to overcome a substantial accuracy hurdle: most of the early reports feature wandering baselines (horizontal lines on which the letters “sit”) and ink splodges, resulting in a highly imprecise text recognition with standard libraries available in modern statistical software programs (Figure 1.1b). At the same time, more advanced image recognition technologies i.e., OCR require a much longer computational time to process the enormous amount of information available. In order to obtain the maximum accuracy while making the task computationally feasible, we decide to harness the power of cloud services: in particular, we choose to use Google Cloud’s Vision API (see Figure 1.1a).<sup>12</sup>

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<sup>8</sup>Respectively, <https://archivescatalog.imf.org> and <https://www.elibrary.imf.org>.

<sup>9</sup>We consider these as country reports and program-related documents. See section A.1.1 in the Appendix for more details on the procedure.

<sup>10</sup>Titles may contain reference to Article IV or programs and be of different nature e.g., a Working Paper on the evaluation of program outcome. In turn, these documents are problematic since they discuss specific topics and confuse information about different countries.

<sup>11</sup>Technically, to automate the process and not revise one-by-one the documents, we compile a list of keywords that commonly appear on the first page of these misclassified documents and exclude the document from the term-frequency calculation (see section 1.1.3) if we detect one of them on the first page. A full list of these keywords is available in Table A.1.

<sup>12</sup>For the details, see section A.1.3.

Figure 1.1: Converting Documents to Text Data

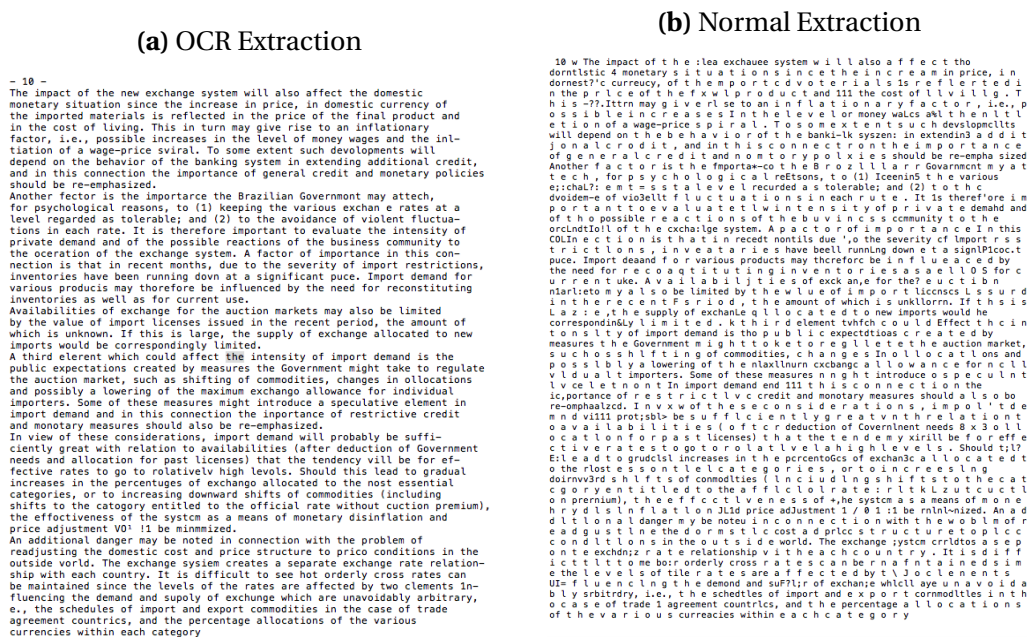


Figure 1.2 shows the composition of the final corpus, dividing between country reports and program-related documents. Country reports comprise two thirds of the total: the most common documents are Article IVs, followed by Recent Economic Developments. While the former are the last step of the *Article IV consultation* and are published with the prior agreement of country authorities, the latter are internal documents that provide background for the whole process and prepare in advance their analysis (Vannier, 2020).

While *Article IVs consultations* should be conducted annually, in practice the final publication often has biennial frequency, especially in earlier years. In addition, countries that are in disagreement with Fund analysis may refuse the release of Ar-

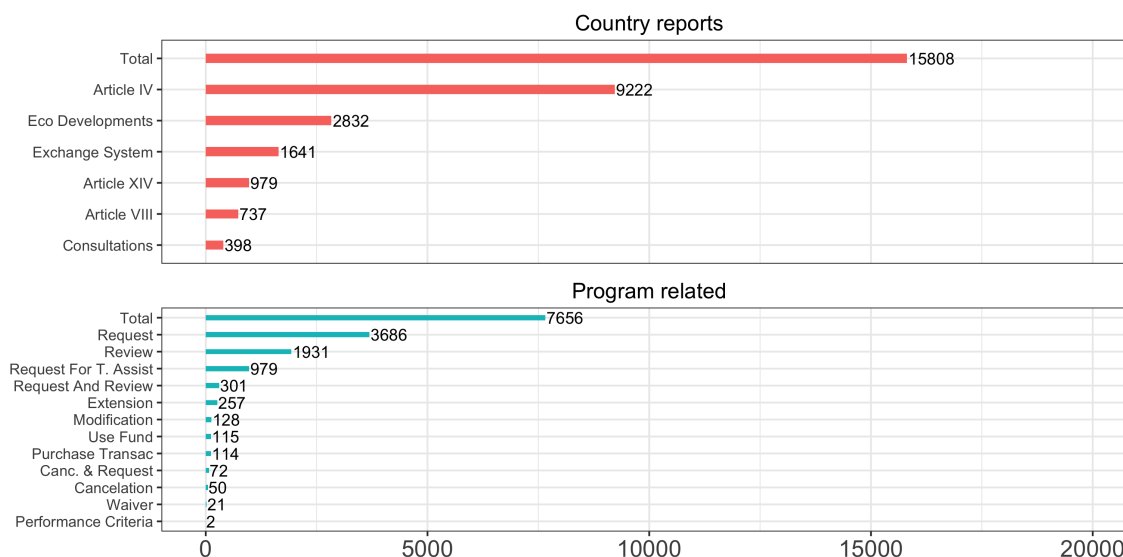
ticle IVs. Hence, including Recent Economic Developments in the corpus is fundamental to compensate the otherwise inevitable loss of information. Article XIV and Article VIII documents appraise the motivation behind the introduction and maintenance of exchange rate restrictions, and thus are particularly useful to capture episodes of currency volatility.

Lastly, simple Consultations are a “archaic” version of Article IVs, mostly present in the 50s and 60s and replaced afterwards. Program-related documents are, instead, mainly composed by Requests and Reviews, with other minor documents, e.g., Modifications, Waivers etc., completing the picture. In Appendix [A.1](#), we present an overview of the different types of documents: their purpose, whether they are currently issued by the Fund and whether their production is or was regular (Table [A.2](#)). Furthermore, we also show the evolution in the number of individual country reports and program-related documents over time (Figure [A.1](#)).<sup>13</sup>

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<sup>13</sup>We find a strong correspondence between the description of the documents and their evolution over time. For instance, Article VIII and Article XIV documents that are published for countries maintaining exchange restrictions, disappear at the turn of the 21st century (Figure [A.1a](#)).

**Figure 1.2: Size of the Corpus**



**Source:** *Complex Crises Database (CCD)*

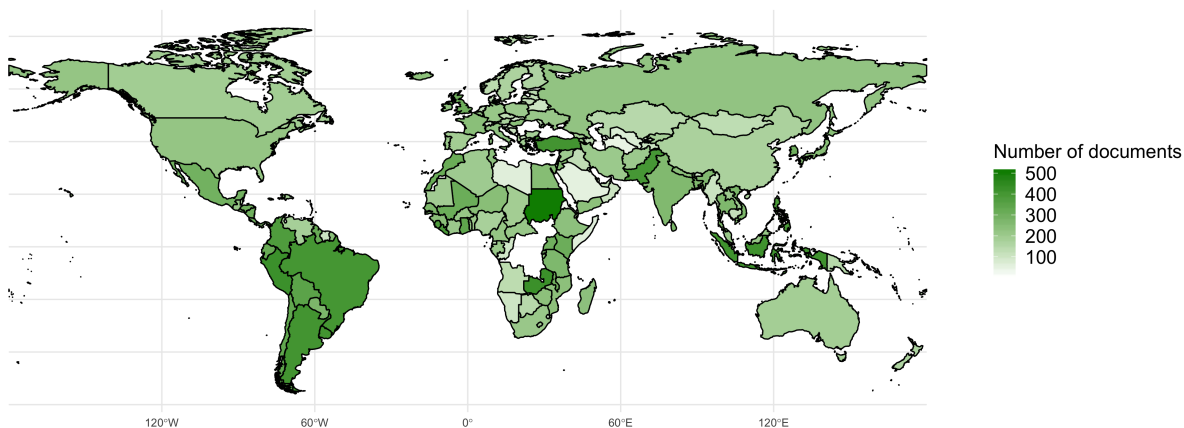
The documents in the corpus exhibit an extensive coverage, covering almost every country in the world (Figure 1.3).<sup>14</sup> While Latin American countries have been widely covered by the Fund, developments in some countries of Africa and Central Asia are less documented. Rather than a shortcoming, however, this geographical distribution of the corpus reflects deep historical reasons: most nations in Africa were colonized by European states in the early modern era and gained independence relatively late compared to Latin American countries.<sup>15</sup> Similarly, different Central Asian nations gained independence only after the fall of the Soviet Union in 1992.<sup>16</sup> North-American and European countries reveal, instead, a uniform pattern.

<sup>14</sup>Except for non-IMF members, 11 in total: Cuba, East Timor, North Korea, Liechtenstein, Monaco, Taiwan, and Vatican City.

<sup>15</sup>Many countries in the early 1960s, but some after 1970 e.g., Guinea-Bissau from Portugal in 1973 and even afterwards e.g., Zimbabwe from Britain in 1980.

<sup>16</sup>Obviously, this is only part of the explanation: the other part is that large Latin American countries requested a high number of programs compared with other geographical groups.

**Figure 1.3: Country Coverage**



**Source:** *Complex Crises Database (CCD)*

Reports on high income countries appear, on average, more than a decade earlier in the sample compared to lower income groups (Table 1.1): this result is coherent with advanced economies being the earliest clients of the Fund.<sup>17</sup> In Appendix A.1, we report the detailed number of documents by country and the year of the first document was published (Table A.3).<sup>18</sup>

To the best of our knowledge, in this work we provide accessibility and consider the broadest corpus of relevant IMF documents both in time, country coverage and type of report. This rich material allows us to adopt a holistic stance toward the analysis of crisis events and to ensure a general perspective for all income groups, thus re-balancing the crisis literature toward low-income countries. Furthermore, since it encompasses a long time horizon, it allows us to draw comparisons between the early Bretton Woods era and the most recent period: in this way, it corrects the usual

<sup>17</sup>“Advanced economies had been [the Fund] earliest and largest clients before the emerging market economies started to dominate its activity in the 1980s.” (?)

<sup>18</sup>From the table other patterns emerge: for example, small islands such as Antigua & Barbuda and Vanuatu are the least covered in the sample.

**Table 1.1:** Average Date of First IMF Reports By Income Group

Income Group	Avg. Start Year
High income	1959
Low income	1971
Upper middle income	1974

**Source:** *Complex Crises Database* (CCD)

**Note:** Avg. Start Year is the average publication year of the first document in the final corpus of IMF reports.

focus bias on financially dominated crises for the post 1980 decades.

As pointed out by [Hassan et al. \(2019\)](#), NLP approaches do not come without caveats and limits. First, that this type of method come structurally with significant measurement error intrinsic to the NLP methods (errors in the documents of the corpus, misclassifications, ...), second that the corpus can suffer from important biases and third that the narrative source of this data provide complementary measures with results not always strictly comparable to results found using more traditional data.

Among the caveat on the corpus, unrelated to the potential bias of the IMF surveillance activity itself, is the validity of the metadata retrieved from the IMF archives. During the process of selection of documents used for the analysis, a number of misclassifications in the IMF archives have been detected and corrected (see annex) but a number of others may persist. Among the contributions of this paper is to extend the country and time coverage used in other studies. The strategy to extend the corpus was to rely on the IMF archives, for which homogeneous and comprehensive mapping of the specific bilateral surveillance reports is normally provided. An important work was devoted to identified and validate that the reports selected were matching the type of report, the name of the country and the period provided in the metadata. While a number of coding rules and verification processes were done,

there are potentially a number of errors that persists. In particular, a number of missing documents due to a non-explicit title of documents or a misclassification from the IMF archives themselves (error in the country or period or in the type of documents). Due to the large number of documents per year used and aggregate, the noise of such errors should have minor effect and are intended to be corrected in further vintages.

### 1.1.2 The Lexicon of Crises

A proper lexicon is a dictionary of words, based on prior knowledge, that provides a list of synonyms or near-synonyms describing the occurrence of an event. The rising interest for unsupervised and more complex text mining techniques is largely motivated by the necessity to by-pass the construction of a lexicon, a long and cumbersome process. Moreover, a large number of corpora displays little information on its actual content that is highly heterogeneous, making prior knowledge largely irrelevant. In this respect, the format of IMF documents, the use of broad and abstract concepts (Moretti and Pestre, 2015) and the homogeneous language of the corpus largely eased the identification of the patterns and recurrent expressions commonly used by Fund staff.

In practice, the lexicon has been constructed by a first identification of each category according to prior knowledge on the dates and locations of the major disruptions to the macroeconomic outlook<sup>19</sup>. A careful reading of these well-known events formed the building stone of the vocabulary identification for each category and the first iteration in the process. Following this, preliminary term frequencies (see section 1.1.3 below) provided indices for each country and document that, in turn, served as a guideline toward finding the most relevant documents.

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<sup>19</sup>Wikipedia provided a complementary source of initial information, in particular for non-economic events e.g., [https://en.wikipedia.org/wiki/List\\_of\\_natural\\_disasters\\_by\\_death\\_toll](https://en.wikipedia.org/wiki/List_of_natural_disasters_by_death_toll)

In this second step, we both control the veracity of the identification and add or correct the words and expression to include in the lexicon. This two-step process was repeated as long as evident marginal improvements were noticeable. In order to have a comprehensive and accurate lexicon, capturing extensively the occurrence of specific events, but also limiting potential Type 1 and Type 2 errors, we establish and follow a number of coding rules.

The main guidelines are the following. First, we refrain from adopting a predetermined length for n-grams: no fixed number of words was defined. The lexicon includes both single words e.g., *epidemic*, *flood* or *rainfall* and longer expressions such as *large real depreciation* or *slowdown of economic activity*. We limit words with multiple meanings including the associated adjective in the expression, for example *trade war* indicates instances of trade conflicts, while *civil war* indicates armed battles. The couple noun+adjective was constructed using expert knowledge combined with manual reading of the documents. Regular expressions and anchors have been extensively applied to capture plural forms and avoid other matching errors.

The final dictionary counts almost 700 expressions organized in 20 categories. Table 1.2 provides an extract of the vocabulary included in the lexicon.<sup>20</sup> The heterogeneity in the number of expressions for each category is large, ranging from 64 words for contagion to 7 for migration crises. Nevertheless, this difference reflects some structural characteristics of the corpus itself: namely, the diversity of expressions increases with the degree of economic relevance of the category. Economists easily find a number of synonyms for well-established economic phenomena, but less so for more unconventional events that are, hence, characterized by redundancies. Moreover, some categories contain by construction shorter terms that can refer to a multiplicity of complicated expressions.

For example, *Paris club* is directly associated with debt rescheduling and, thus,

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<sup>20</sup>Table A.4 reports the full vocabulary.



useful to capture a variety of phrases. No generic expression of the sort exists for regional crises, forcing us to include the different variations (*regional crisis, crisis in the region, crisis in neighboring countries* etc.), therefore increasing the number of expressions in the category. The political crises group is also particularly large. We ascribe this to the diplomatic tone necessarily adopted by Fund staff: numerous euphemisms are often used to substitute harsher terms, requiring a careful tracking of the different variants of an expression (e.g., *political atmosphere, political instability, political turmoil, political uncertainty*, etc.).

**Table 1.2:** Summary of the CCD Lexicon

Category	Total number	Examples
Contagion	64	regional crisis, crisis in the region, spillovers from the global crisis, systemic crisis ...
Political	60	political turmoil, internal security situation, political atmosphere, political crisis ...
Expectations	60	crisis risks, market reversal, economic sentiment remains poor, market sentiment has collapsed ...
BoP	54	Shortage of foreign exchange, bop crisis, balance of payment crisis, capital account crisis ...
Epidemics	42	epidemic, epidemia, pandemic, pandemic ...
Sovereign	41	rescheduled debt, external payments crisis, difficulties in servicing its external debt, difficult time in rolling over
Commodity	40	oil crisis, rice crisis, crop crisis, crop failure ...
Banking	38	bank resolution, bank crisis, Banking sector restructuring, restructuring of nonperforming loans ...
Housing	35	home prices have been declining, drops in real estate prices, house price trends, home-price overvaluation ...
Sev. Recession	34	severe economic crisis, very difficult economic circumstances, Severe recession, severe crisis ...
Wars	28	war damage, insurgency crisis, security crisis, civil conflict ...
World	28	world-wide recession, global economic crisis, global crisis, world recession ...
Soft recession	28	slowdown in the economic activity, slowdown in economic growth, slowdown of output ...
Inflation	26	inflation pressure, inflationary pressure, high. {0,10}inflation, high rate of inflation ...
Trade	26	trade war, trade policy tension, trade tension, trade conflict ...
Financial	20	financial stability crisis, international monetary crisis, crisis in financial market, financial risks ...
Currency	15	exchange rate crisis, large real depreciation, foreign exchange crisis, severe disruption of exchange markets ...
Nat. disaster	14	flood, drought, rainfall, torrential rains ...
Social	13	social risk, social strain, social.*turmoil, social disruption ...
Migration	7	refugee, migrant, inward migration, population inflow ...

**Note:** Authors' own elaboration.

In the selection of the categories, we gave particular attention to cover both economic and non-economic crises, domestic and non-domestic, in the real and the financial sector. Although the macroeconomic literature has devoted much less attention to the specific role of political crises, epidemics, violent conflicts, social tensions or migration outcomes, we deem these events of great importance in the general

macroeconomic dynamics.<sup>21</sup> The categories include real domestic perturbations such as economic slowdowns and recessions, but also financial market related disruptions e.g., financial crises, currency crises and banking crises. Nonetheless, identifying the nature of the crisis is not always clear-cut. Since the keyword approach made further refinements difficult, we had to accept this ambiguity for a number of crises: for example, the category contagion refers to instances of both trade and/or financial contagion.<sup>22</sup> Similarly, a number of authors in the sovereign crisis literature have isolated precisely the domestic instances of default from external ones ((Reinhart and Rogoff, 2009; Bordo et al., 2001)) but this distinction is difficult to implement with the keyword approach employed in this paper.

The present lexicon includes different nuances of intensity within the same category. For instance, the Contagion category includes different shades of external crisis: either contagion from a crisis in other countries (*“crisis spillovers”*, *“crisis in the region”*, etc.), slowdown of activity in partners (*“regional situation turned adverse”*, *“adverse exogenous events”*, etc.) or regionally located crisis (*“Mexican crisis”*, *“Crisis in Argentina”*, *“2002 crisis”*, *“Asian crisis”*, etc.).<sup>23</sup>

The only categories for which a clear separation between expressions referring to moderate intensity events and large collapses was necessary are those related to output dynamics. The first category, Soft Recession, refers to the “peak to trough” moment in the business cycle and denotes the regime shifting from expansion to recession (*“slowdown in economic activity”*, *“economic decline”*, *“slowdown of output”*, etc.), a sluggish recovery (*“low rate of economic growth”*, *“activity remains weak”*, *“sluggish recovery”*, etc.) or a moderate contraction (*“contraction of output”*, *“decline*

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<sup>21</sup>The Covid-19 crisis showed how little prepared are traditional macroeconomic models to deal with such events and fostered a new literature seeking to integrate epidemiologic and macroeconomic models (???).

<sup>22</sup>See Fratzscher (2003) for a review.

<sup>23</sup>World-wide crises have their dedicated category to capture contagion and shocks not regionally located, but concerning major economies (*“World-wide recession”*, *“international crisis”*, *“turbulence in international markets”*, *“worsening international environment”*, *“ongoing global downturn”*, etc)

*in economic activity*”, “*output is estimated to have contracted*”, etc.). In contrast, the category Severe recession includes instances of effective output collapses i.e., deep troughs of the business cycle (“*severe economic crisis*”, “*sharp decline in output*”, “*deep recession*”, “*very difficult economic circumstances*”).

Non-fundamental drivers of economic activity and crises have been largely documented in the macroeconomic literature: business confidence, panics, euphoria or adverse expectations are well-known drivers of economic activity (e.g., [Akerloff and Shiller \(2009\)](#)). To capture these non-fundamental drivers, we include a specific category, Expectations, that includes the perception of general risk (“*crisis risk*”, “*potential risk*”, “*upward risk*”, etc) the shift in expectations from economic agents (“*market confidence*”, “*general uncertainty*”, “*uncertainty among market participants*”, etc), clear non-fundamental crises (“*self-fulfilling crisis*”, “*speculative attacks*”) and call for forward guidance (“*signals to market*”, “*bolster confidence*”, “*restore market confidence*”, etc)<sup>24</sup>.

The lexicon is highly dependent on the corpus to which it is applied. In the present case, omissions of some categories may not denote the absence of an event, but rather an irrelevance for macroeconomic stability with respect to the main stream economic models: not all non-conventional crises produce potential or realized consequences for economic activity. They may thus not enter as a risk in the outlook produced by Fund staff.<sup>25</sup> The lexicon for these categories produces an interesting subsample of the more economically relevant occurrences, with a cross-country comparability that is often missing in such areas.

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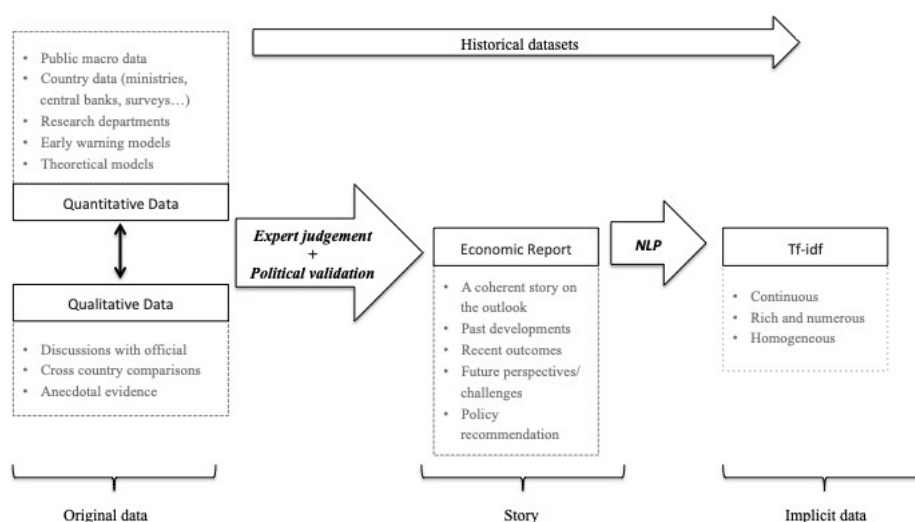
<sup>24</sup>The Analysis of Expectations is at the core of [Chapter 2](#) and [Chapter 3](#). More details about the meaning and relation with theory can be found in [Section 2.2.1](#)

<sup>25</sup>Non-conventional in the sense of macroeconomic theory.

### 1.1.3 The Extraction Method

The calculations of the indices used throughout the paper follows a term-frequency approach. After compiling the lexicon for each category, we count the number of times each document contains keywords belonging to a single category and divide by the total number of characters in the text:  $tf_{ij} = \frac{N_{ij}}{N_i}$ . In practice, this process of term matching depends on the pre-processing method chosen: in particular, the unit of tokenization can be different.<sup>26</sup> We decide to tokenize the documents by sentence to not impose any predetermined length on the keywords we will search for.

**Figure 1.4:** Sketch of the Data Generating Process



**Note:** The diagram shows the whole process of text analysis in a stylized way. IMF reports are a combination of quantitative and qualitative data concerning different events that are properly ranked in terms of importance and then transformed into words. The purpose of the NLP method is to extract from the story these initial data.

The choice of the dictionary based approach rather than more unsupervised text analysis techniques (Hassan et al., 2019) stems from the nature of our corpus and the research question addressed in this paper.

<sup>26</sup>A token is an instance of a sequence of characters in some particular document that are grouped together as a useful semantic unit for processing.

[Gentzkow et al. \(2019\)](#) argue that the choice of method and the validity of the exercise require a careful choice in the method and research strategy. No unconditionally preferred method exists, but there is rather an array of approaches that may fit or not the research objective and corpus at disposal. After surveying the different statistical methods and discussing several applications, they defend the use of a dictionary based approach they provide four main reason to choose a dictionary base method :

- Dictionary-based methods are most appropriate in cases where prior information is strong and reliable, and where information in the data is correspondingly weak.
- They are appropriate where the outcomes  $V$  are not observed, so there is no training data to use to fit a supervised model, and where the mapping of interest does not match the factor structure of unsupervised methods such as topic models<sup>27</sup>. For instance similar to my approach, in [Baker et al. \(2016\)](#), there is no ground truth data on the actual level of policy uncertainty reflected in particular articles, and fitting a topic model would be unlikely to endogenously pick out policy uncertainty as a topic.
- They are appropriate when some training data does exist (as in the pattern based sequence-classification used in [Hassan et al. \(2019\)](#)), but this training data is sufficiently small or noisy that the researcher believes a prior-driven specification of  $f(\cdot)$  is likely to be more reliable<sup>28</sup>.
- Pattern based approach require the collection of specific documents for each index of interest what suppose ex-ante the knowledge of the categories of in-

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<sup>27</sup>for corpora of many unlabeled documents (or when the labels do not tell the whole story that one wishes to investigate), topic modeling is the obvious approach. Word embeddings are also becoming an option for such questions.

<sup>28</sup>Text regression is generally a good choice for predicting a single attribute, especially when one has a large amount of labeled training data available.

terest (the possible crises covered by the IMF) and suppose that a linguistic homogeneity across time of this reference documents. We believe tracking the change in the use of words and include them in a dictionary is more efficient than finding a reference document that could map this evolution. Furthermore, the set of 20 crises indices covered in the first chapter was made “endogenously” as the reading of documents provide some example of crises. The careful building of the lexicon non-only enriched the initial set of crises of interest, but also contribute to a rapid and flexible way of including new categories.

In the case of this database, the objective of mapping a large set of events, often rare, largely documented from many other sources and without evident training data has driven the choice of the dictionary based approach. As mention in the paper this dictionary based approach is simple, flexible and a conservative initial approach. “While we are optimistic about the value of more sophisticated statistical methods, we also expect the dictionary approach to remain the optimal choice in many settings” (Gentzkow et al., 2019).

In particular, it provides a useful labelling exercise for unsupervised approaches and dimensionality reduction as presented in the chapter 2 where a deeper linguistic analysis is performed on the *Expectation Regime Shift* indicator.

The implicit process of data construction is summarized in Figure 1.4 that lays out the different components and the sequence leading to the organization of the original data into economic reports and ultimately, the transformation into quantitative indices. The data presented in this paper is more numerous than those of standard data-sets not only in the scope of crises covered, but also in the quality and number of sources underlying the expert judgement: the Fund has real-time access to a vast amount of information and resources that comprises both quantitative and qualitative data, public and private. These sources are compiled, analyzed and summarized

by “experts” explicitly in charge of rendering the bilateral surveillance of the member countries.

The narrative character is the main characteristic of these new data. While it grants us a clear advantage with respect to the country and time coverage as well as the richness of information available, it may raise doubts about the correspondence between Fund discussions and reality because of potential editorial biases and methodological shortcomings.

The first concern stems from the stability of the methodology and the constancy of the concept of crisis over time. For instance, a banking crisis identified in 1970 might not be the same as one detected in 2012. This critic is, however, not specific to narrative data, but applies also to the national accounts, financial records and accounting rules; any work that covers a long time span will be subject to these statistical discrepancies across time, and it is not clear whether in this respect a non-narrative methodology would be superior. If anything, the interesting feature of a text-based indicator is that it is much more resilient to structural breaks <sup>29</sup>.

A second issue is raised by the role of member countries in the drafting of Fund documents: as long as they have some input in the preparation, a worsening economic outlook may not be revealed to avoid self-fulfilling spells. This, in turn, would introduce a discrepancy between the real and the text outlook. Nevertheless, we do not believe this to be an alarming concern: major economic and non-economic events are discussed thoroughly in these documents.<sup>30</sup> Although suspicions of systematic biases in Fund activity may not be necessarily unfounded (e.g., [Hernandez \(2020\)](#); [Dreher et al. \(2009\)](#); [Barro and Lee \(2005\)](#)), we believe them to be limited to the choice and design of intervention in member countries through programs rather than in the surveillance of countries.

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<sup>29</sup>For instance, the IMF staff knows how to interpret differently a current account deficit depending on the exchange-rate regime and capital mobility regime.

<sup>30</sup>See [Romer and Romer \(2017\)](#) for the same point on the *OECD Economic Outlook*.

Last but not least, text analysis and large scale data transformation may lead to important noise and potential Type 1 and Type 2 errors, hence undermining the validity of the data.<sup>31</sup> In this specific case, the errors derive from the complexity of language and semantics that may not be perfectly captured through a predefined lexicon.

Yet, given the length of the documents, the degree of detail and the emphasis on risky outcomes, the erroneous assessment from misleading sentences is unlikely to change dramatically the information conveyed by our indices. While a false positive will definitely produce a non-zero term-frequency, it is unlikely that in the same document these errors are repeated often enough to blur reality: by the same token, in the case of adverse outcomes, several sentences will be devoted to its description and assessment, setting a minimum threshold for the term frequency (for example removing the 25 percent lower occurrence) can in any case provide an ex-post correction.

To formally validate indicators constructed using NLP techniques, [Gentzkow et al. \(2019\)](#) proposed to main methods: When the goal is prediction, the primary tool for validation is checking out-of-sample predictive performance on data held out from the main estimation.

When the goal is to go beyond prediction and use the values  $\bar{V}$  in some subsequent descriptive or causal analysis, manual audits can be the more appropriate validation method. It consists at cross-checking some subset of the fitted values against the coding a human would produce by hand. In a setting where we have sufficient prior information to justify this assumption, we typically also have enough prior information to evaluate whether the resulting classification looks accurate. In the case of the paper the dictionary was constructed by a back and forth between external sources to locate specific reports, coding of the specific vocabulary, running of the

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<sup>31</sup>detecting discussions relative to a category where there is none and the other way around.



index, validation and so-on and so-forth.

More precisely, to provide evidence that the corpus used for the NLP approach and lexicon is valid, I follow the strategy of [Baker et al. \(2016\)](#): Show the correlations of the indicators with existing benchmarks and discussion conceptually the differences, discuss potential bias in the corpus, undertake manual supervision by reading documents and undertaking an audit process, show event studies and discuss evidence of market adoption. I perform those validity checks in the following section.

In addition to the dictionary approach, other methods have been tested. For instance a pattern based method was tried for banking, sovereign and expectations regime shifts using the following handbook of macroeconomics as reference source: [Hamilton \(2016\)](#) (*Chapter 3 – Macroeconomic Regimes and Regime Shifts*), [Gertler et al. \(2016\)](#) (*Chapter 16 – Wholesale Banking and Bank Runs in Macroeconomic Modeling of Financial Crises*), [Bordo and Meissner \(2016\)](#) (*Chapter 7: Fiscal and Financial Crises*). This approach did not provide convincing results when comparing with benchmark, and proved less powerful and flexible than the dictionary approach.

Among the reasons for the poor identification using such method for banking and sovereign crises is the difficulty to have robust reference documents that capture not only banks/sovereigns developments but specifically banking/sovereign crises. Finding such documents proved difficult and the attempts fails to discriminate between positive and negative occurrence. An alternative possibility was to identify intensity of discussion for a specific topic in a first step and in a second step identify the general sentiment using a sentiment analysis. However, due to the variety of topics considered in the reports, the likelihood of the sentiment specifically apply to bank related question is low and create a higher risk of classification errors.

A number of studies used pre-existing dictionaries, in particular for sentiment analysis in [Loughran and McDonald \(2011\)](#) or in [Hassan et al. \(2019\)](#) for synonyms for uncertainty. In our case we consider that the building of the dictionary is one

of the contribution of the paper as no pre-existing dictionary was found satisfactory enough for the research objective to correctly identify macroeconomic crises. Given the homogeneity of the corpus and the specific economic knowledge of the IMF staff, the inclusion of generic terms for uncertainty as done in [Hassan et al. \(2019\)](#) was considered to provide more false positive without particular benefits. The choice of including a string of words with associated adjectives was deemed more appropriate to capture the events of interest.

While dictionary based approaches are traditionally considered as more labor-intensive than unsupervised method, it is not always the case. As explained in [Gentzkow et al. \(2019\)](#) all methods, and especially unsupervised, require a prior reduction of dimensionality, often refers as cleaning (removing stop words, punctuation, removing some documents, ...). To reduce the noise and the word that convey relatively little meaning on their own.

Due to the high homogeneity of our corpus, this first cleaning of the document would need a very comprehensive preparation to yield convincing results given the research objective. While the dictionary approach looks for something specific in the text (ex-ante knowledge), robust unsupervised techniques require removing what is unnecessary ex-ante. Unsupervised approaches such as topic modelling were initially tried but did not yield convincing results due to the limits of such methods for example in the arbitrary choice of topics defined for the algorithm and the difficult interpretability of results for descriptive evidence. However, the combination of supervised and unsupervised methods as done in [Chapter 2](#) prove that different methods are not necessarily exclusive and can be used sequentially to refine the indicators or extend the research question.

The general strategy to narrow down the analysis adopted in this thesis is similar to [Baker et al. \(2016\)](#) and [Hassan et al. \(2019\)](#) and combine several methods. First, identifying a broad concept and then refine its meaning by imposing linguistic re-

strictions. For example, I start to identify a broad concept of adverse expectations using the dictionary approach and then use a more unsupervised approach using a “bag-of-words” method to count the more frequent words in the paragraphs of the reports that identified expectations regime shifts in the first step. By conditioning the index on specific words (“risk”, “uncertainty”, “speculation”, “distress”, etc ...) I narrow down the identification of the different concepts of expectations regime shifts. In a third step, the construction of a relevant corpus of text-based descriptions of specific expectation regime shifts can be used to train regressions models that can be used to identify additional events on the existing corpus or on other sources of information.

## 1.2 *The Complex Crises Database (CCD)*

The empirical literature on macroeconomic crises is vast and characterized by a wide variety of identification methods (mainly, non-parametric, parametric and qualitative), data sources, country and time coverage, frequency and features of the resulting data (binary or continuous measures) as well as focuses (e.g., from real activity drops to exchange rate crashes) (see for instance [Bordo and Meissner \(2016\)](#)).

In this section, We first shortly review the literature on macroeconomic crises, discuss the definitions and main features of the benchmark data-sets for sovereign default and economic recession. Second, we discuss the conceptual differences and compare the different indices <sup>3233</sup>.

In the second part of the section, we provide a number of event studies, show the distribution of different shocks and provide evidence for the rise of the co-occurrence and the co-movements across countries. Among the main contribution of this thesis

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<sup>32</sup>For a comprehensive literature review on macroeconomic crises databases, see [Vannier \(2020\)](#).

<sup>33</sup>Even though, for feasibility reasons, we constrain the comparison to some key indices, most arguments we put forward apply to all categories.

is the identification of the non-fundamental component of crises. Given the specific focus of Chapter 2, the extended presentation and discussion on the definition and measure of the expectation regime shift variable, that capture the reversal of expectations from international investors is presented in a second step in Chapter 2, Section 2.2.

Identifying economic crises, defined as a drop in domestic output, benefit from the compiling of long GDP series for most countries and several proxies for periods prior to the compilation of standardized national accounts (e.g., [Feenstra et al. \(2015\)](#)). In addition, specific work on the dating procedure in the spirit of [Harding and Pagan \(2002\)](#) or [Kose et al. \(2020\)](#) have provided convincing dating of individual and global economic downturns.

For financial crises the literature combined long, qualitative, narrative studies ([Kindleberger \(1975\)](#), [Diaz-Alejandro \(1985\)](#)) with more rigorous, quantitative investigations. Among the latter, [Reinhart and Rogoff \(2009\)](#) stand out as the most comprehensive source of information on the timing of financial crises: for 68 countries, mostly advanced economies and major emerging markets, going back to the nineteenth century, the authors date sovereign defaults, inflation spikes, exchange rate crashes, stock market bursts and banking crises. Similarly, [Laeven and Valencia \(2013\)](#) expand the country coverage to 160 countries focusing on a shorter time period (1970-2017) and identifying, specifically, episodes of systemic banking crises. Finally, [Beers and Mavalwala \(2017\)](#) report a continuous measure of sovereign crises: for all countries that underwent a default in the period 1960-2016, the authors provide an estimation of the amount of outstanding debt in default.

Given the variety of sources and methods, [Bordo and Meissner \(2016\)](#) provide a comparison of different dating procedure and highlight the relatively high disagreement among authors. In addition, most of these data have living vintages and both extend forward to new periods and possibly revise historical records. For instance,

[International Monetary Fund \(2010\)](#) build on [Reinhart and Rogoff \(2009\)](#) and provide a larger coverage for public debt and sovereign debt related data. This effort of data collection on global crisis are aggregated and available for download [here](#)<sup>34</sup>. This work can be seen as a complementary approach that extends the record of global crises to a larger set of events and includes a qualitative perspective that may not be reflected in balance sheets and debt records.

The current vintage of the Complex Crises Database contains 20 variables, one for each category of the lexicon, where each variable corresponds to the term-frequency computed as detailed in section 1.1.3. Table 1.3 provides a classification of the indices across different dimensions.

**Table 1.3:** Classifications of Categories of Crises

	Variable	Type	Nature
1	Banking crisis	Economic	Financial
2	Financial crisis	Economic	Financial
3	Inflation crisis	Economic	Real
4	Trade crisis	Economic	Real
5	World crisis	Economic	Real and financial
6	Contagion crisis	Economic	Real and financial
7	Expectation crisis	Economic	Financial
8	Housing crisis	Economic	Real
9	B.o.P. crisis	Economic	Financial
10	Currency crisis	Economic	Financial
11	Eco. recession	Economic	Real
12	Eco. slowdown	Economic	Real
13	Sovereign crisis	Economic	Financial
14	Violence crisis	Non economic	Real
15	Nat. disaster	Non economic	Real
16	Commodity crisis	Non economic	Real
17	Political crisis	Non economic	Real
18	Social crisis	Non economic	Real
19	Epidemic crisis	Non economic	Real
20	Migration crisis	Non economic	Real

**Note:** Authors' own elaboration. see Annex A.2 for details on the dictionary

Since the frequency of reports' publication is uneven, with several documents per

<sup>34</sup><https://www.hbs.edu/behavioral-finance-and-financial-stability/data/Pages/global.aspx>

year in most cases, to harmonize across countries and period we aggregate the term-frequencies at the yearly frequency.<sup>35</sup> This aggregation brings the final dataset to 7,788 yearly observations distributed across 181 countries over the period 1950-2019. The current vintage of the database, both the raw text files and the term-frequencies, can be downloaded from our [Harvard Dataverse Repository](https://dataverse.harvard.edu/dataverse/complexcrises)<sup>36</sup>.

### 1.2.1 Comparison with Benchmarks

Before comparing our indices to the benchmarks, it is important to discuss the conceptual differences and explain why different approaches may lead to different outcomes, and how discrepancies in the dating can reflect complementarity rather than disagreement. See [Romer and Romer \(2017\)](#) or [Bordo and Meissner \(2016\)](#) for similar arguments..

First, a fundamental difference between our term-frequencies and the benchmark originates in their distinct nature. While we aim at capturing crises discussions by the Fund, the literature has usually tried to pinpoint their exact timing. The paramount example is that of policy reactions: if policymakers intervene effectively in a country experiencing debt distress, ultimately avoiding any missing payment or rescheduling, the country/date would not appear in standard sovereign crisis's data sets. Nevertheless, the debt problem, most probably, has received considerable attention by Fund staff and is thoroughly discussed in their reports.

For example, the euro-area sovereign crisis, while generating acute pressure on the debt of several countries (Greece, Spain, Italy, Portugal), did not materialize in widespread defaults (excepted for Greece). Other similar cases are the Tequila crisis in Mexico (1994-1995), when the IMF's and Fed's external assistance compensated

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<sup>35</sup>This aggregation ensures a homogeneous frequency and is more suitable for quantitative analysis: however, it comes at a cost of a big information loss. The use of complementary information will be explored in further versions of the data-set.

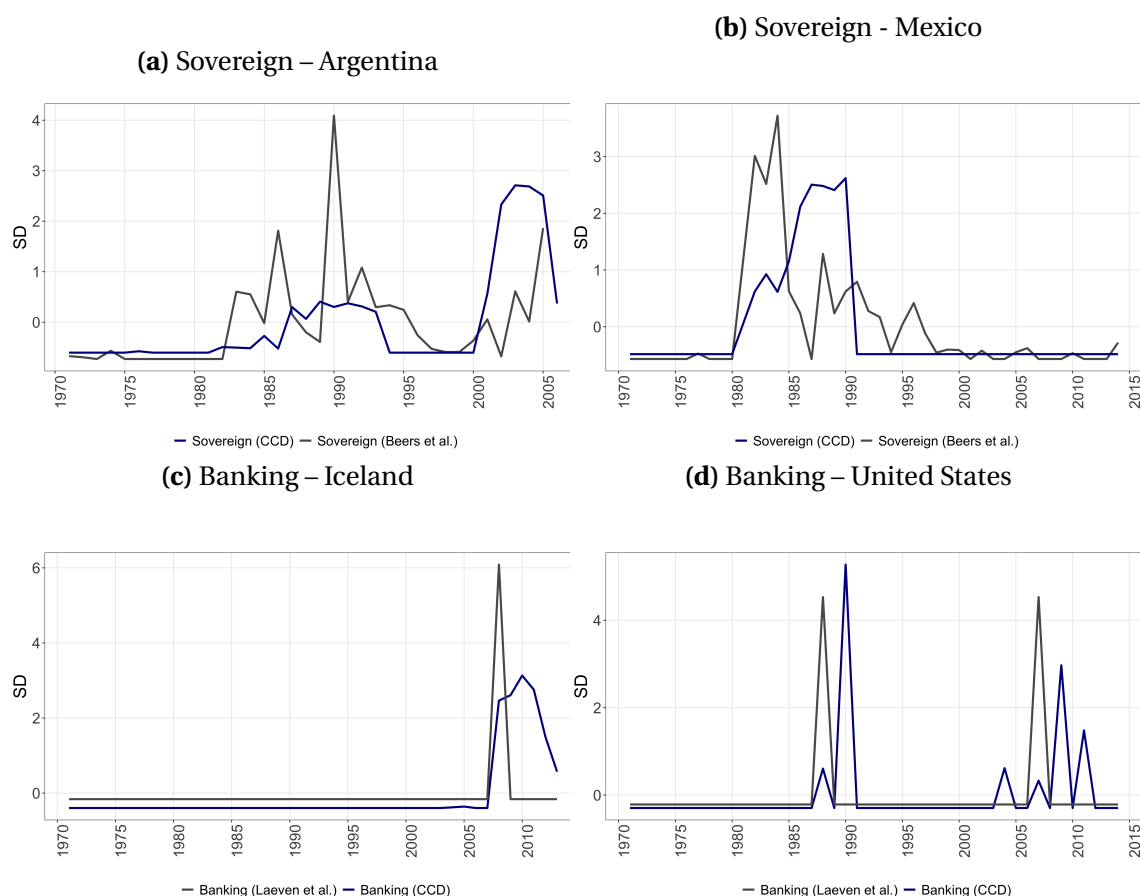
<sup>36</sup><https://dataverse.harvard.edu/dataverse/complexcrises>

the rollover pressure experienced by the country, and Italy during the collapse of the European Exchange Rate Mechanism, when the speculative attack that put pressure on the value of the Lira was fueled by high levels of public debt and rising interest rates. The same argument applies also to crises that have been often foretold, but have never materialized, e.g., the United States balance of payments crisis. [Mitchener and Trebesch \(2021\)](#) discusses, at length, this so-called sovereign crisis without default.

Furthermore, even if the comparison database does not try to pinpoint the exact timing of a crisis, but conveys another type of information, there still might be differences in the nature of the measure: for example, while both our sovereign term-frequency and the [Beers and Mavalwalla \(2017\)](#) index are continuous measures of default intensity, they lend themselves to different interpretations: the former will tend to peak earlier than the latter, with the most acute moment of discussion likely to be anterior to the default itself (legal procedure and agreement).

Second, one must be cautious about the underlying features of the data. Most of the crises databases employ a binary measure rather than a continuous one to indicate the first year of occurrence of a crisis: in addition, the authors usually decide a time window after the first signal is issued to avoid capturing multiple instances of the same episode. For instance, [Reinhart and Rogoff \(2008\)](#) define currency crises as years of exchange rate devaluations higher than 15%. After the first year, signals are filtered over a 3-year window, with all positive signals muted. [Laeven and Valencia \(2013\)](#) use a similar methodology (30% depreciation threshold) with a 5-year window. It follows that a mechanical comparison of our term-frequencies with databases identifying the start of a crisis would result in unsatisfactory, low correlation values.

**Figure 1.5: Banking and Sovereign Crises: Comparison with Benchmarks**



**Source:** *Complex Crises Database* (CCD), [Beers and Mavalwalla \(2017\)](#), [Laeven and Valencia \(2013\)](#)  
**Note:** In the first two panels, the dark gray line represents the normalized amount of debt in default or restructuring from [Beers and Mavalwalla \(2017\)](#), the light gray line is the sovereign term-frequency. In the second panel, the dark gray line represents a dummy variable for the first year of banking crisis from [Laeven and Valencia \(2013\)](#), the light gray line shows the banking term-frequency.

Figure 1.5 illustrates the points mentioned above. The first panel of the figure compares our sovereign term-frequency to [Beers and Mavalwalla \(2017\)](#) for Argentina and Mexico. For Argentina, in the early 1980s, concerns about default rose, sharply starting from 1982, with local peaks in 1983, 1986 and 1990. Nevertheless, the default becomes effective only from 1987 on-wards: the Argentinean case exemplifies a slow-moving default, anticipated years before its occurrence.

For Mexico, in 1982, the outlook is very different, with the term-frequency and



the amount in default peaking up simultaneously with little anticipation: while the term-frequency spikes in the first years of the default, capturing widespread fund discussion, the actual amount, however, reaches its maximum only 4 to 5 years later<sup>37</sup>.

The second panel, instead, compares the banking term-frequency to the banking crises start dates from [Laeven and Valencia \(2013\)](#) for Iceland and the United States. In both countries, banking crisis are sudden and unexpected, but their resolution is more gradual. Simple correlation would yield low correspondence irrespective of the validity of the two approaches.

While perfect matching of our index and the benchmark is neither possible nor relevant, a certain degree of correspondence is nonetheless necessary to validate our approach. Table 1.4 shows the confusion matrix between the [Beers and Mavalwalla \(2017\)](#) and the sovereign term-frequency for different income groups.<sup>38</sup>

**Table 1.4:** Sovereign Crises and Actual Default - Confusion Matrix

Crisis	Default	All	High income	Middle income	Low income	Obs
0	0	34.88%	65.73%	24.88%	11.62%	2324
0	1	11.26%	1.28%	15.12%	16.98%	750
1	0	17.63%	27.16%	16.53%	4.86%	1175
1	1	36.23%	5.83%	43.47%	66.53%	2414

**Source:** *Complex Crises Database* (CCD), [Beers and Mavalwalla \(2017\)](#)

**Note:** Default is defined as 1 if the amount of debt in default from [Beers and Mavalwalla \(2017\)](#) is strictly positive. Crisis is equal to 1 if the sovereign term-frequency is strictly positive.

Pooling across all countries, 71% of the country/years observations display a correspondence between the two measures (row 1 and 4, column 3): the result is homogeneous across income groups, although slightly higher for low income countries (78%). Among high income countries, two third of the sample correspond to normal

<sup>37</sup>In addition, as mentioned earlier, while for the Tequila crisis in 1995 our term-frequency reaches almost one standard deviation, the [Beers and Mavalwalla \(2017\)](#) measure remains flat.

<sup>38</sup>We convert both indices to binary measures before the comparison to obviate their different meaning.

times, defined as periods with neither discussion nor default on debt. The lion's share of the mismatch come from the occurrence of default discussion without an effective default (18%): as explained earlier, this result mostly stems from the nature of our term-frequency that also captures latent episodes of default<sup>39</sup>.

To better understand what our term-frequencies capture and how it relates to several measures of recessions and default, we run different regressions on the sovereign default and economic recessions benchmarks. Table 1.5 presents the result for our measure of economic recession.

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<sup>39</sup>The confusion matrix by decade (not reported) suggests that the overall matching is stable around 65 to 75 percent. The post GFC period displays the higher mismatch, in particular due to a higher number of crises that are not identified as events of default. While we cannot rule out a change of perspective on sovereign crisis from the IMF expert judgement, the fact this result is coherent with [Mitchener and Trebesch \(2021\)](#) that shows the increasing occurrence of sovereign crises without default

**Table 1.5:** Correlation of Severe Recession and Output Fluctuations

<i>Dependent variable:</i>							
	g	g	g<0	g<0	Phase B	Large B	Phase B2
Y	-0.19 (0.20)	-0.31** (0.14)					
Y>0			0.07*** (0.02)	0.13*** (0.02)	-0.01 (0.02)	0.02* (0.01)	0.03 (0.02)
Constant	3.97*** (0.45)			0.06*** (0.01)			
Country FE	No	Yes	Yes	No	Yes	Yes	Yes
Time FE	No	Yes	Yes	No	Yes	Yes	Yes
Controls	No	Yes	Yes	No	Yes	Yes	Yes
Robust se	Yes	Yes	Yes	Yes	Yes	Yes	Yes
F	0.97	3.13***	9.17***	50.15***	3.01***	2.47***	3.61***
Observations	2,061	2,060	2,061	2,061	2,098	2,021	2,098

**Source:** *Complex Crises Database (CCD), OECD Analytical Database*

**Note:** Y is the severe recession term-frequency. G corresponds to real GDP growth rate. Y>0 and g<0 are dummies equal to 1 when the respective condition is satisfied. Phase B, Large B and Phase B2 are dummies indicating the cyclical component of real GDP obtained following [Harding and Pagan \(2002\)](#). Phase B is equal to 1 for all the years in between the peak and the trough of the cycle. Large B indicates the downturn phases with the largest amplitude. Phase B2 refers to the second half of the downturn. GDP data are from the Analytical Database of the OECD.

\*\*\*: significant at 1% level, \*\*: significant at 5% level, \*: significant at 10% level.

First, we regress the normalized severe recession term-frequency (Y) on the growth rate of real GDP (g) (column 1 and 2). The results show that the term-frequency is significantly negatively correlated with the growth rate of real GDP after controlling for the other term-frequencies, country and time fixed effects (column 2). For robustness, we regress the term-frequency on a dummy variable equal to 1 when the real GDP growth rate falls below -1%: across both specifications (column 3 and 4), the correlation is positive and significant. Lastly, to show that our measure captures effectively the occurrence of particularly severe economic recessions rather than slow-downs, we observe the correlation between our term-frequency and different dum-

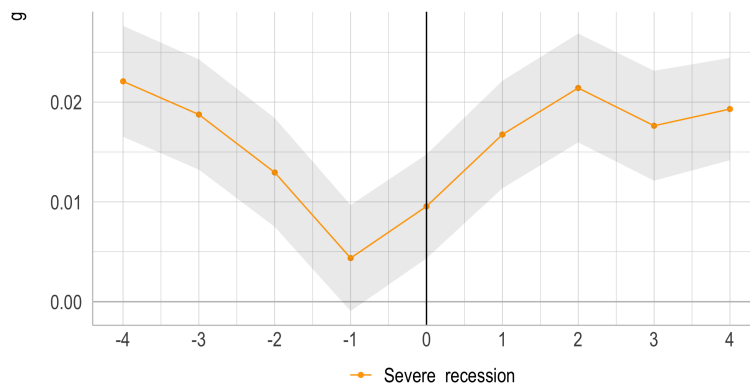
mies indicating the state of the business cycle: Phase B, equal to 1 for all the years in between the peak and the trough of the cycle, Large B, indicating the downturn phases with the largest amplitude and Phase B2, referring solely to the second half of the downturn. The term-frequency does not significantly correlate with the peak to trough, but only with the most severe slumps in economic activity (column 5, 6 and 7).<sup>40</sup> Over the sample of countries and time periods where both output measures and the severe recession term-frequency are available, we observe that the narrative indicator significantly matches the economic outcome. Moreover, we confirm that the latter captures the difference between slowdowns and particularly dire recessions.

To enhance the understanding of the timing of our narrative indicator, we also regress the different output measures on the lags and leads of the severe recession term-frequency (Figure 1.6). We find that output measures are significantly correlated and with the expected sign contemporaneously and for the following one to two years, without any evidence of anticipated warning. This results highlights the real time and backward looking nature of our term-frequencies.

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<sup>40</sup>Similar specifications for the soft recession term-frequency, instead, captures the slowdown of economic activity. While the index is correlated with the both the GDP growth rate and the recession dummy, it is no longer associated with large downturns (Phase B) but only with the second part of the downturn (Phase B2).

**Figure 1.6:** Evolution of The Deviation From Trend Real GDP Growth Around Severe Recessions



**Source:** *Complex Crises Database (CCD), OECD Analytical Database*

**Note:** The figure displays the estimate real growth growth rate of GDP around the index of severe recessions.

We perform a similar validation for the sovereign term-frequency with respect to the benchmark measure of sovereign default. Table 1.6 shows the results for the different specifications. We first regress the term-frequency (S) on the amount of debt in default (D.Default) [unit] (column 1 and 2): we find that a one standard deviation increase in the term-frequency is unconditionally associated to an increase of 225.39 [unit] of debt in default (column 1), with the result robust to different controls (column 2). Similarly, we show the correlation between a dummy for a strictly positive term-frequency ( $S > 0$ ) and the probability of default ( $D.Default > 0$ ): a one standard deviation increase in the term-frequency of crises increases the probability of default by 7%.

**Table 1.6:** Sovereign Crisis and Correlation with Benchmark

	<i>Dependent variable:</i>				
	D.Default	D.Default	D.Default>0	D.Default>0	D.Default>0
S	222.72*** (46.29)	167.77*** (39.23)			0.07*** (0.01)
S>0			0.44*** (0.02)	0.11*** (0.02)	
Constant	362.11*** (73.79)		0.22*** (0.02)		
Country FE	No	Yes	No	Yes	Yes
Time FE	No	Yes	No	Yes	Yes
Robust se	Yes	Yes	Yes	Yes	Yes
F	23.15***	1.85*	388.9***	16.63***	16.79***
Observations	6,680	6,678	6,677	6,677	6,678

**Source:** *Complex Crises Database (CCD)*, [Beers and Mavalwalla \(2017\)](#)

**Note:** S is the sovereign term-frequency. D.Default is the amount of debt in default or rescheduling from [Beers and Mavalwalla \(2017\)](#).

S>0 and D.Default>0 are dummies equal to 1 when the respective variable is strictly positive.

\*\*\*: significant at 1% level, \*\*: significant at 5% level, \*: significant at 10% level

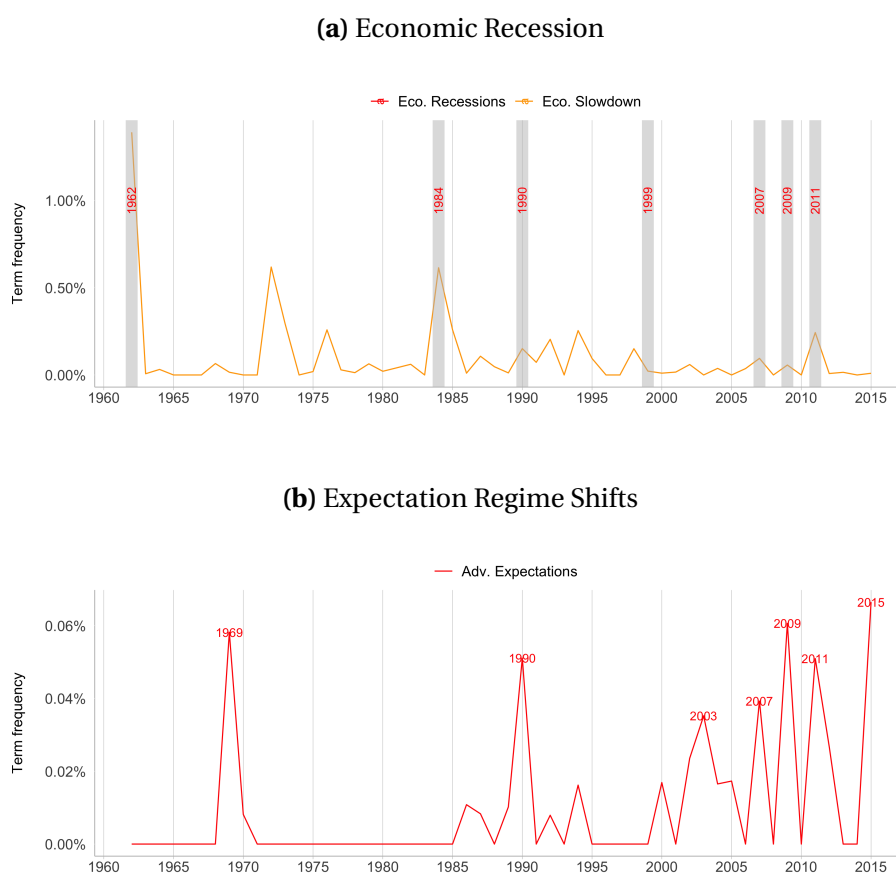
All in all, although comparison with other crisis's database is complicated by differences in the nature and features of our term-frequencies and that perfect matching between the two is neither possible nor relevant. As documented by [Bordo and Meissner \(2016\)](#), the comparison of standard benchmark of crises display wide disagreement across databases, with an agreement of roughly 0.41 on the dating of sovereign crises. In this respect, our measure is largely inline with other indicators and complement those benchmark in a spirit closer to [Romer and Romer \(2017\)](#).

As a conclusion, our indices for economic recession and sovereign narrative indicators are correlated with their respective benchmark and that they constitute a real-time and backward looking (one year lag) economic assessments of the country's outlook rather than a forward-looking measure.

To provide a concrete example of how the indicators capture the crisis outlook,

I discuss an event study focused on recession and expectations regime shifts for the United States for the period 1960-2016. Figure 2.4 Panel B shows the evolution of the adverse expectation measure that reflects the shift in macroeconomic expectations. The index displays a number of important spikes, in particular in 1969, 1990, 2003, 2007, 2009, 2011 and 2015 (see annex D for more details).

**Figure 1.7: A Picture of Macroeconomic Risk in the United States**



Source: [Complex Crises Database](#) (CCD).

For three events, I provide an example of transcript that shows how the IMF describe the events:

- The Great Financial Crisis (*“on the other hand, others claim that the increasing global financial integration has potentially raised the economy’s vulnerability to abrupt reversals in market confidence related to those subprime external*

## Chapter 1: The Complex Crises Database: 70 years of Macroeconomic Crises

### Section 1.2

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*shocks and spillover effects.” [...] “an additional challenge is the emerging crisis of confidence affecting the government-sponsored enterprises (gse) and the run on the deposits of a major regional mortgage company” [...] “we agree that financial conditions and downside risks to growth can justify the recent sharp decrease in fed funds and the relevance of maintaining negative real interest rates.” [...] “at the same time, directors acknowledged that the downside risks to growth still remain large, adding to the complexity of monetary policy management at this juncture.” [...] “however, whereas the latest data indicates that the downside risks to growth have not intensified, the upside risks to inflation due to higher energy and food prices compounded by the weakness of the U.S. dollar are more likely.” [...] “it is questionable whether the extreme version of this business model, which satisfied demand for high risk loans from nonviable borrowers at the top of the housing market, should have a future.” [...] “yet as was noted in the staffs recent presentation of the global financial stability report (gfsr) update to the board, an inevitable tension exists between measures that support market functioning and bolster confidence amid a crisis, and the longer-term objective of ensuring that incentives are aligned, and moral hazard is avoided.” [...] “the downside risks underscore the need for vigilance and maintaining policy tools to deal with financial strains.” [...] “the sharp loss in jobs around the time of the financial crisis resulted because the seizure of credit markets caused a sharp drop in economic activity, and because the panic that took hold of financial markets likely spread to employers in other sectors, causing them to react more than normally to a contraction in demand for their goods and services by shedding workers (krueger, 2010).”*

- the 1987 fast crash (“at times, a tendency for self-fulfilling expectations of further appreciation also may have been a factor” [...] “the issues of points raised by the staff regarding the effectiveness of the gramm-rudman-hollings act and medium-term fiscal estimates have serious policy implications, including undermining confidence in the exchange and financial markets.” [...] “in particular, if market confidence in the U.S. economy erodes, the basis for sustainable growth of the world economy would be seriously undermined.” [...] “furthermore, monetary easing would increase the volatility of the market’s perceptions of the course of the U.S. economy, and might lead to a crisis in market confidence of the size that the United States experienced in October 1987.”),
- the 1999-2000 dot.com bubble, (“against this background, while the outlook is still broadly favorable, the downside risks have intensified.”[...])
- but also non-financial, such as the geopolitical tensions around 09/11 (“the downturn was triggered in part by the collapse of the IT boom and stock prices in March 2000, but was further exacerbated by the September 11th terrorist attacks, which contributed to a further plunge in confidence and job losses.” [...] “the federal fiscal position has weakened considerably since last year owing to the effects of the economic slowdown, the June 2001 tax cuts, increased security and defense-related outlays following the terrorist attacks, and the March 2002 stimulus package.”, the war in Iraq and Afghanistan, the World.com and Enron scandal in 2001-200 3, or the prospect of uncertain geopolitical tensions around 2015 (“it is important that potential risks in these areas are addressed, given the concerns in the present conjuncture about the build-up of systemic risks in non-banks.” [...] “it is important that potential risks in these areas are addressed, given the concerns in the present conjuncture about the build-up of systemic risks in non-banks.” [...] “directors noted that, while the outlook remains broadly favorable, there are important downside risks and uncertainties, in particular slower potential growth, a strengthening of the U.S. dollar further away from levels justified by medium-term fundamentals, and sustained investor risk aversion following the outcome of the referendum in the United Kingdom.” [...] “there is a strong commitment to continue to strengthen efforts to monitor potential risks and emerging threats to financial stability.” [...]).



The major uncertainty peaks captured since 1990 are in line with results in (Baker et al., 2016) who find a similar evolution of uncertainty for the United States. Based on their of risk sentiments (Nowzohour and Stracca, 2020) show the behavior of four uncertainty and confidence indices over the period 2006-2016 and find little intra country correlation of those measures (across 1980-2016 period). While each of these measures is specific, we see that our index aggregates the four dimensions and captures the main peaks of all indices with 2007-2009 matching the peak in the VIX, 2011-2012 rather the policy uncertainty index and 2014-2015 geopolitical risk. Section 2.2 and Annex C D, H and provide additional evidence for the validity of the indicators.

### 1.2.2 Non-Economic Events Do Matter

Among the main contribution of the database is to provide an extended, comprehensive and comparable set of narrative indicators also for non-economic crises. While detailed data covering specific non-economic events have been already made available (e.g., National Consortium for the Study of Terrorism and Responses to Terrorism (START), EM-DAT (n.d.)), they often incorporate different countries and time periods, hence lacking comparability. Moreover, rather than a proxy for the intensity of the event *per se*, differently from the aforementioned, our indicators signal the relevance of the event for the economic outlook of the country under scrutiny<sup>41</sup>.

For instance, in IMF (2003), the IMF classify large disasters according to the combination of different criteria: the event either affects at least half a percent of a country's population, or causes damages to the capital stock, housing, human lives, etc. of at least half a per-cent of national GDP, or results in more than one fatality for every 10,000 people.

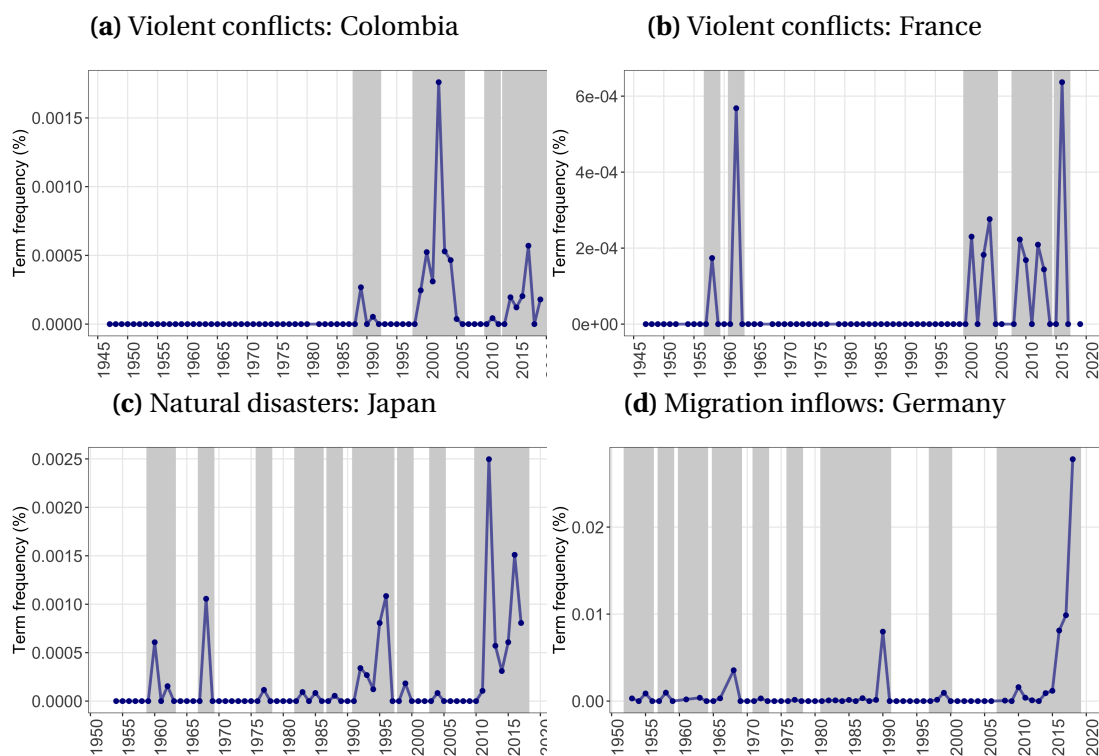
Figure 1.8 provides an example of the term-frequency for the Violence category in

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<sup>41</sup>In the present case, omissions of some categories may not denote the absence of an event, but rather an irrelevance for macroeconomic stability: not all non-conventional crises produce potential or realized consequences for economic activity. Thus, they may not enter in Fund staff discussions.

France and Colombian, for natural disasters in Japan and Migration inflows in Germany.

**Figure 1.8:** Examples of Time Series For Non-Economic Indicators



**Source:** *Complex Crises Database (CCD)*

**Note:** The blue line corresponds to the violence term-frequency for, respectively, Colombia and France. Shaded gray areas are years of strictly positive term-frequency.

Although the conflict between the Colombian government and the Revolutionary Armed Forces of Colombia (FARC) as well as other guerilla forces started in 1960, it intensified in the mid-1990s as a consequence of the higher wealth accumulated by terrorist groups through drug-related activities. The indicator peaks again in 2017 when the peace referendum between the government and FARC rebels failed as the “No” gained the majority (Figure 1.8a).

For France, the indicator peaks at the end 1950s-early 1960s, in correspondence of the Algerian war, and then shows a turbulent behavior throughout the  $XXI^{th}$  century

when the country experienced a series of violent terrorist attacks: it peaks again in 2016 after the November 2015 *Bataclan* attack (Figure 1.8b) <sup>42</sup>.

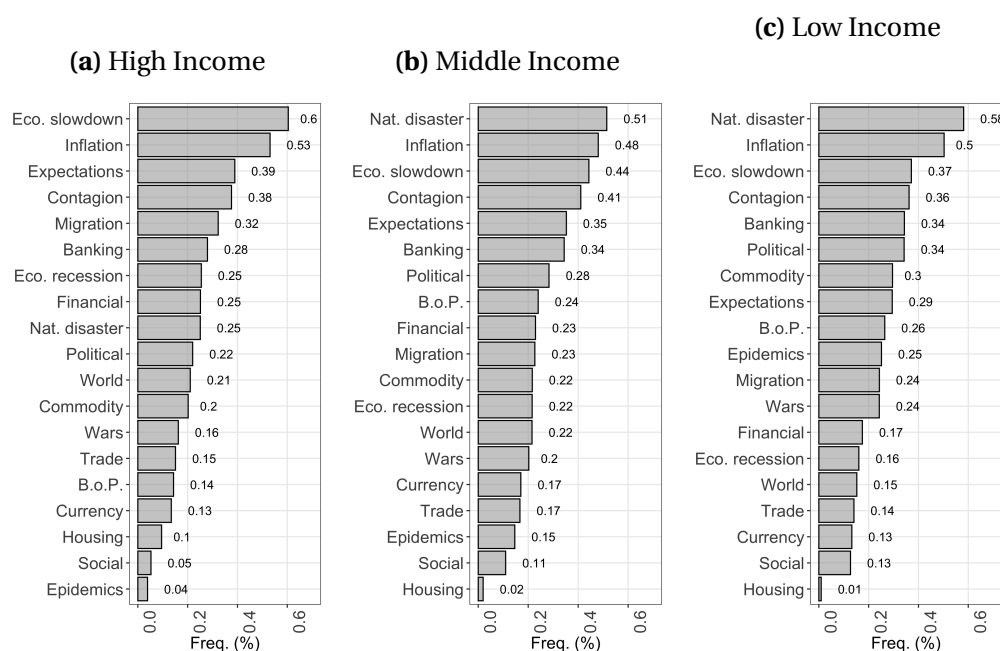
While a strict focus on non-economic crises is rarely part of the macroeconomic academic debate, that usually emphasizes purely financial outcomes, Fund staff discusses frequently these topics in their reports and especially so for precise income groups (Figure 1.9).

For high income countries, migration issues appear in more than one fourth of total annual observations (32%), followed by natural disasters (25%) and political crises (22%). For middle and low income countries, natural disasters are discussed habitually: more than half of total annual observations (51% and 58% respectively), becoming the second most widely considered issue. Similarly, political instability occupies a greater role in lower income groups (28% and 34%). Further, epidemics and violence issues also fill up a substantial part of the analysis in low income countries (roughly 25%).

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<sup>42</sup>For an event study of the natural disaster indicator, see Appendix.

**Figure 1.9:** Descriptive Statistics: Probability of Occurrence of Crises



**Source:** *Complex Crises Database (CCD)*

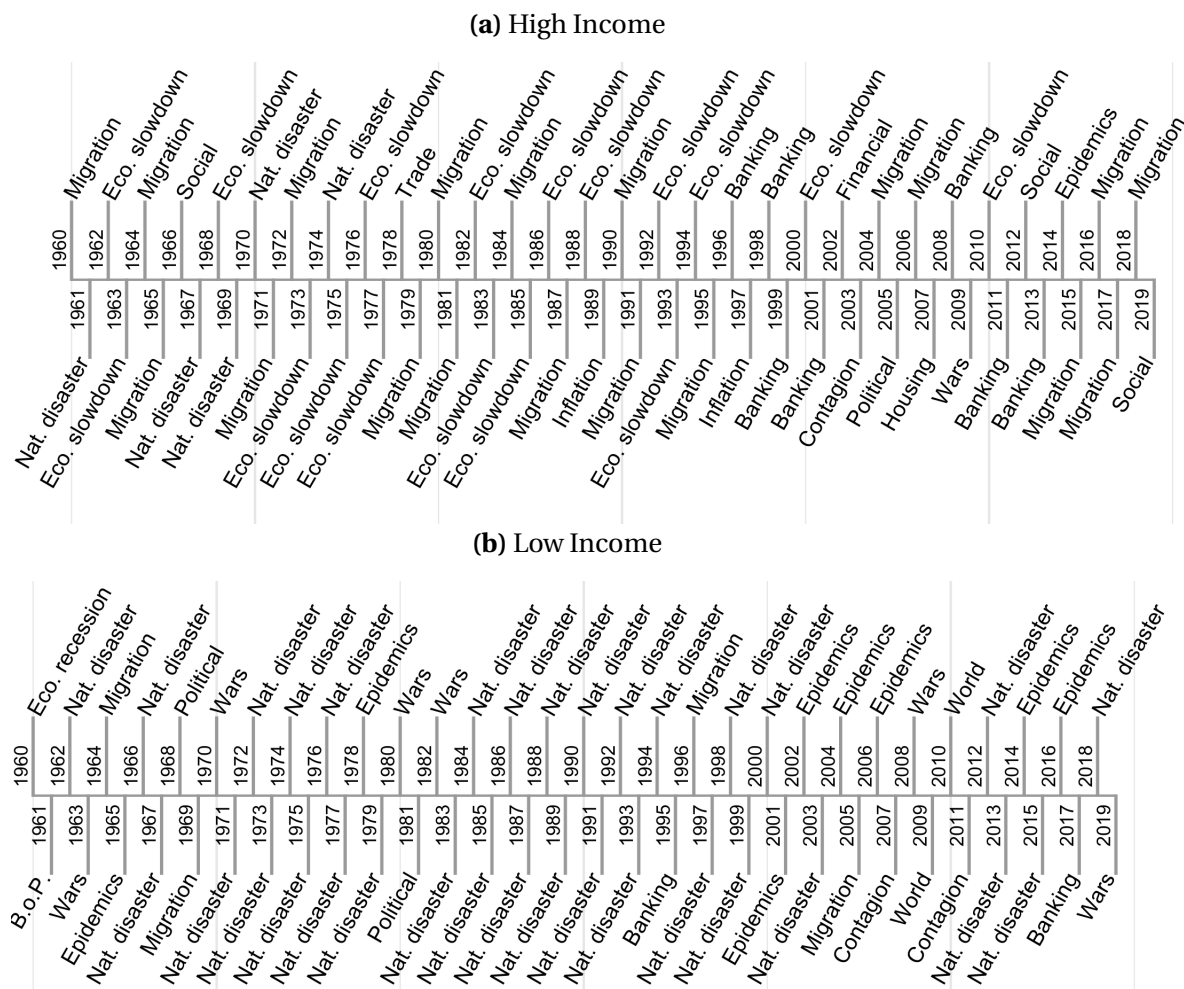
**Note:** The bars denote the unconditional frequencies of the occurrence of crises discussions. Formally, it is the proportion of periods with strictly positive term-frequency. Dark-gray bars represent non-economic categories.

One might argue that, however, breadth does not coincide with depth of topic discussion: Fund staff might still discuss some categories in a shallow way, but do so in every report. If this is the case, non-economic events may be less critical for the economic outlook of a country than we are trying to argue.

In Figure 1.10 we compute the mean of the 20 term-frequencies for each year of the sample, pooling across different countries, and then report the category corresponding to the highest value: the pattern that emerges contrasts for different income groups. While for high income countries non-economic events are rarely the most discussed category, outmatched by financial outcomes and output slowdowns (Figure 1.10a), for low income countries, non-economic events and specifically nat-

ural disasters are largely covered in Fund bilateral surveillance (Figure 1.10b)<sup>43</sup>.

**Figure 1.10:** Yearly Priority of IMF Crises Surveillance



**Source:** *Complex Crises Database (CCD)*

**Note:** The figures displays, for each year, the category with the 2<sup>nd</sup> highest unconditional mean between the 20 crisis in the dataset. The sovereign crises index is excluded because is systematically rank first every year due to the specific focus on debt IMF supervision.

In short, although non-economic events are not always documented in a com-

<sup>43</sup>Another interesting pattern is that for high income countries, when non-economic events are the year priority, the relevant category is migration crises: for instance, migration concerns were at the forefront of the economic discourse following the fall of the Berlin Wall and the uncertainty regarding the stability of the URSS entering the 1990s.

prehensive manner in empirical macroeconomic literature, they can be pivotal to comprehend the economic outlook of a country and, in particular, of middle and low-income groups. The richness of this database and the potential for rapid and flexible extension constitute an element of novelty in the empirical crisis's literature that allows to precisely date and characterized events common label as exogenous shock.<sup>44</sup>

## **1.3 Some Stylized Facts on 70 years of Macroeconomic Crises**

### **1.3.1 A Rising Complexity: Animal Spirits and Spillovers**

The new material presented so far allows us to adopt a broad perspective on the perception of macroeconomic crises by the bilateral surveillance of the International Monetary Fund. In top of the identification of the dates of the events and the intensity of each occurrence, the variety of topics covered in this database allows the exploration of novel stylized facts regarding the multiplicity of crisis, the co-movement and contagion of those crises across countries and the rising psychological component.

Figure 1.11 presents the evolution of the “crisis system”, constructed considering each category in the database as a node in the network and the contemporaneous correlations across term-frequencies as their edges<sup>45</sup>.

The resulting pattern provides prima facie evidence on the rising complexity of the system: links between term-frequencies have both become more frequent and

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<sup>44</sup>Other types of non-economic events might be of utter importance in the future, e.g., cyberattacks. In light of this, it is essential to have a framework that is easily expandable.

<sup>45</sup>The division in time bins is based on previous knowledge and corresponds to well-known events: the Bretton Woods system, the first wave of financial globalization, the second wave of financial globalization, the run-up to the GFC and the recent post-GFC period.

thicker, increasing approximately 6-fold. During the earliest period (1950-1976), the network is relatively sparse and mainly organized around real crises, natural disasters and inflation crises (Figure 1.11a).

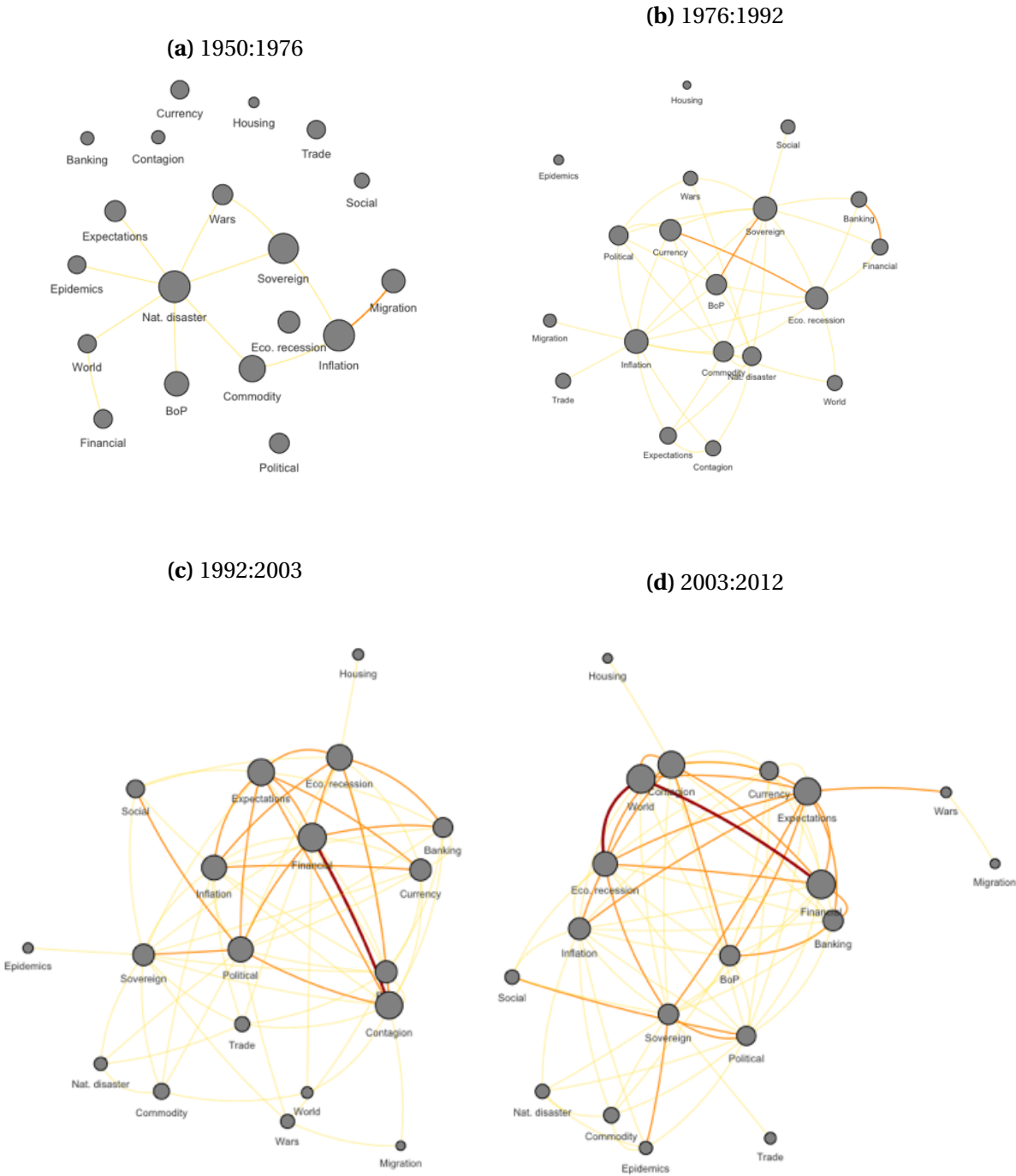
Figure 1.11b portrays the initial stretch after the collapse of the Bretton Woods system: numerous novel connections appear and several subnetworks emerge. While the subnetwork around natural disaster persists as well as the one around inflation, a new cluster around sovereign crises appears. Among the others, we note the strong interconnection of sovereign and balance of payment crises, currency crashes and deep economic recessions and banking and financial turmoil.

The early 1980s clearly stand out as a period of structural change from a shallow system to a deeper network where financially related elements gradually take over<sup>46</sup>. This trend consolidates at the end of the century: this decade is characterized by the persistence of a cluster around sovereign crises, the move to the periphery of the natural disaster node and the clear emergence of a financial *clique* composed by contagion, financial turmoil, banking crises and expectations. Finally, starting from the 21st century, all nodes become connected to the network, with the *click* between the financial components of the systems consolidating while real shocks move further away to the periphery.

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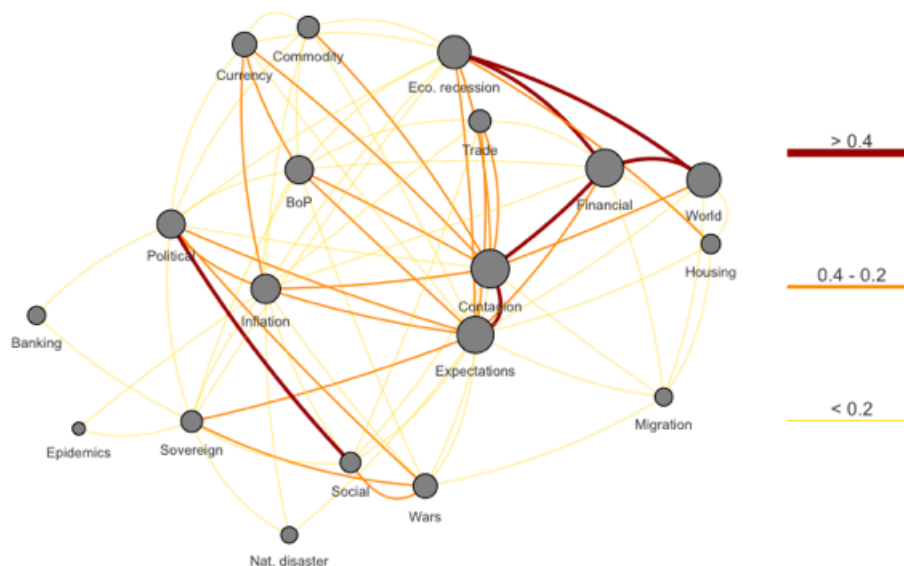
<sup>46</sup>See [Diaz-Alejandro \(1985\)](#) for a detailed chronicle of the first wave of financial globalization and deregulation.

Figure 1.11: An Evolving Network of Crises





(e) 2012:2019



**Source:** *Complex Crises Database* (CCD)

**Note:** Adjacency matrix built from pairwise correlations between term-frequencies: minimum correlation to display edge equal to 0.1. Size of nodes proportional to their eigencentality. Legend indicates correlations between categories. Visualization of the network through the ForceAtlas2 algorithm (Jacomy et al., 2014).

Table 1.7 summarizes the previous visual observation calculating the average shortest path by time period.<sup>47</sup> We find a roughly 3-fold reduction in the shortest path that holds for all income groups: we confirm that the overall evolution of the system concerns all income groups and underline the profound and lasting structural shift toward a more dense and financially dominated system. Similarly to the international financial network (Haldane, 2009), the “crises system” displays increasingly the features of a “small world” where particular disturbances spread quickly across

<sup>47</sup>The average shortest path of a network indicates how far, on average, are all pairs of nodes based on the geodesic distance (i.e., the shortest path): thus, a lower shortest path indicates that perturbations transmit more rapidly across the network

the whole system.

**Table 1.7:** Densification of the Network of Crisis: Average Shortest Path Across Crises

Income Group	Min. Corr	1950:1976	1976:1992	1992:2003	2003:2013	2013:2019
High	0.2	17.78	16.15	13.49	13.35	5.48
Low	0.2	-	17.37	13.28	7.27	5.54
Upper-middle	0.2	18.39	13.43	9.8	11.18	4.02

**Source:** *Complex Crises Database (CCD)*

**Note:** Average shortest path is the mean shortest distance (number of links) between any single pair of nodes. Adjacency matrix built from pairwise correlations between term-frequencies. Minimum correlation indicates that pairwise correlations lower than the respective value are set equal to 0 when building the adjacency matrix. If two nodes are not connected, their shortest distance is set equal to the number of nodes in the network. Algorithm does not converge for Low Income countries in the period 1950-1976 and is replaced by missing value.

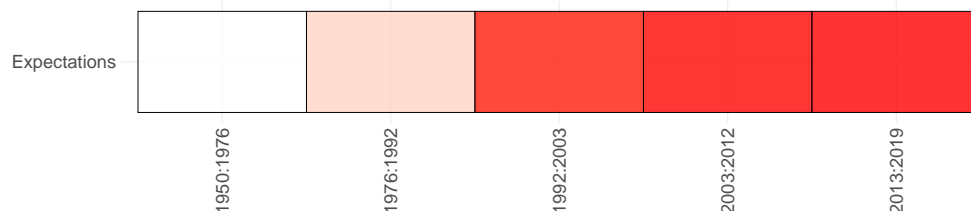
Lastly, we focus on a specific category, expectations, and track its behavior over time within the system. This category is of particular interest given that it is the only one characterized by a non-fundamental attribute. Moreover, while the role of manias and panics has been deemed central for the unraveling of macroeconomic crises by different strands of the narrative literature (e.g., [Kindleberger \(1975\)](#), [Akerloff and Shiller \(2009\)](#)), its actual contribution has been difficult to quantify given the intrinsic challenge in measuring this channel and comparing it to the fundamental one.

Figure 1.12 shows the evolution of the eigenvector centrality for the expectation's category over the different time periods: while expectations are mostly peripheral until the early 1990s, they gain an increasingly prominent role in the last 30 years, thus confirming their present key role as complexing element<sup>48</sup>.

Chapter 2 provide more details about the definition, description and role of expectation regime shifts in the amplification effect of sovereign crises and its relation to which standard non-fundamental measures of risks and uncertainty.

<sup>48</sup>The basic idea of eigenvector centrality is that a node importance is not only determined by the fact that the node is directly connected to many other nodes, but also by whether it is connected to well-connected nodes. For a more thorough explanation, see [Jackson \(2010\)](#).

**Figure 1.12:** The Centrality of Expectation Regime Shifts in the network of Crises



**Source:** *Complex Crises Database* (CCD)

**Note:** The eigencentrality of a node is the associated  $i_{th}$  element of the eigenvector with the largest eigenvalue for the given adjacency matrix. It indicates the importance of a node based on the number of connections it has with other “important” (well connected) nodes. Scales of red indicate the eigenvector centrality during a precise time period, where a brighter red indicates higher eigencentrality. The adjacency matrix is built from the correlation matrix of all categories within the period under consideration.

### 1.3.2 Contagion, Co-movements and Global Shocks

The country and time coverage as well as the nature of the underlying corpus provide useful material to analyze the general co-movement and common global crises across countries in the spirit of [Kose et al. \(2020\)](#). The occurrence of global downturns or large scale financial disruptions are particularly well documented in the bilateral surveillance of the funds and reflects the mandate of stability of the international monetary system.

Two approaches are possible to measure the external dimension and the occurrence of events implying several countries. First, it is possible to compute the number of countries experiencing specific crises. Clusters around specific periods largely identify instances of common shocks that similarly hit specific sectors of several countries in the same year. Figure 1.13 shows the number of countries with at least an occurrence of keywords related to severe recessions, epidemics, sovereign crises or

commodity crisis.

The second approach is to capture the mentions, in the reports, of external events. To do so we rely on two main indexes: Contagion and World Recession (Figure 1.14 that points at the moments when events, recognized as external, global or originating in neighboring countries, hit specifically the country).

Those indexes can be seen as the country specific effect of global or external events on the outlook of the country. Well documented global events are rare and the construction of proper global indexes is difficult and often require not only quantitative measures but also qualitative judgement.

The results provided by our global indexes and the flavor of the approach proved to be similar to [Kose et al. \(2020\)](#) that empirically investigate the episodes of global recession in the post WWII area and find four major events: 1975, 1982, 1991, and 2009 (2020 escape the scope of the paper but definitely would be included). In each of these episodes, there was a contraction in annual real per capita global GDP and broad-based weakness in other key indicators of global economic activity. Among other characteristics, these episodes were highly synchronized internationally, involving severe economic and financial disruptions in many countries around the world<sup>49</sup>.

The dating approach and overall methodology follows in [Kose et al. \(2020\)](#) is largely in line with the method used through this paper. Among the key similarities, the finding that it is misleading to employ a simple growth threshold (such as below 2.5 percent annual growth in global GDP) to identify global recessions, the evidence that judgmental method are necessary to complement purely quantitative measure.

Namely, broadening the scope of the analysis beyond the GDP and including several indicators of global activity—real GDP per capita, industrial production, trade, capital flows, oil consumption, and employment. When looking at quarterly data,

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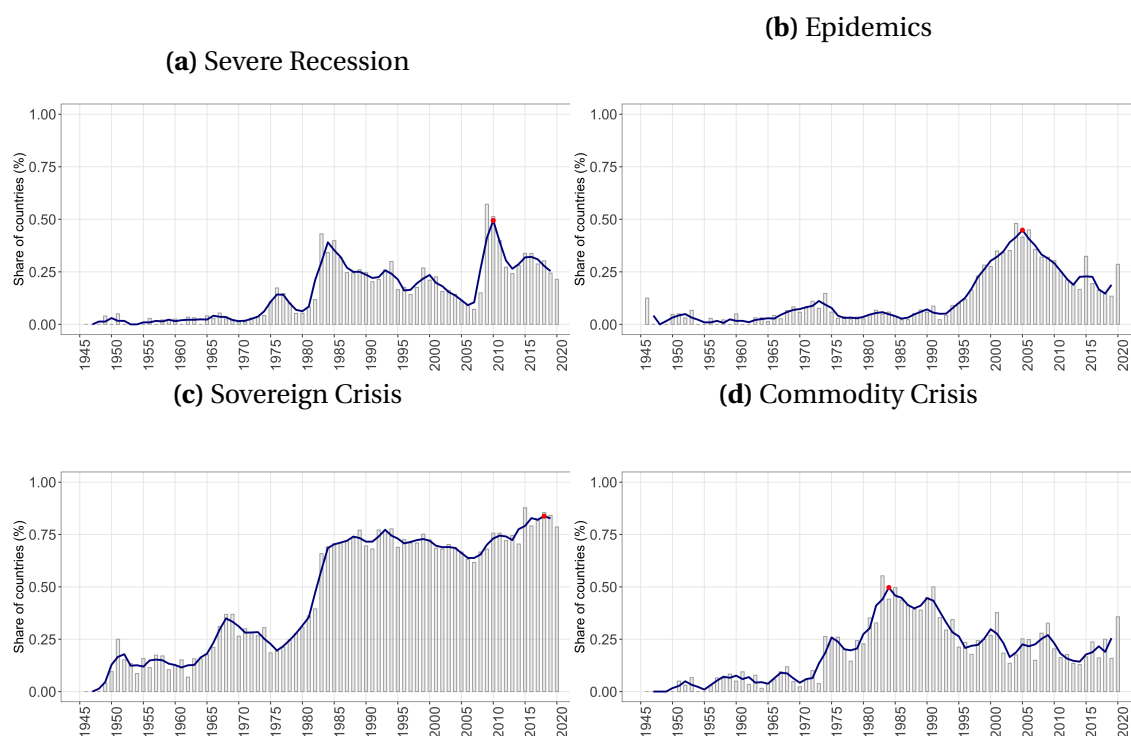
<sup>49</sup>dates corresponds to the peaks of countries with positive index for severe recessions (see Chapter 1). The index for world outcomes also peaks up for many countries (except for 1991).

four additional short-lived global contraction episodes emerge: 1970:4 (-0.7 percent), 1980:2 (- 4.8 percent), 1981:2 (-0.3 percent), 1998:1 (-0.2 percent), and 2001:3 (-0.5 percent). Fourteen of these contractions lasted for only a quarter without translating into global recessions. However, some of these short-lived global contractions were associated with recessions in major economies that took place ahead of global recessions (1982) or coincided with global downturns (1998 and 2001).

Although the four global recessions coincided with recessions in the United States, not every U.S. recession was associated with a global recession. In fact, the United States experienced six additional recessions during 1950-2019, including recessions in 1958 and 2001 that coincided with global downturns. But it grew strongly during the 1998 global downturn and, to a lesser extent, during the 2012 global downturn. In addition to the four global recessions, the global economy experienced low growth in 1958, 1998, 2001, and 2012: in these four years, the global economy registered its lowest growth rates of the past seven decades, except for the years of global recession and the two years before and after each of them.

More largely documented is the evidence that crises occur in waves, with important contagion and cascading across countries and across regions. The occurrence of global recessions (Figure 1.13 panel a) seems more and more common in the twenty-first century (Kose et al., 2020) but occurred in several occasions in the second half of the  $XX^{th}$  century.

**Figure 1.13: Global Shocks and Waves of Crisis Across Countries**



**Source:** *Complex Crises Database* (CCD).

**Note:** The figure displays the share of countries in the sample displaying strictly positive term frequencies for a selection of crises indices.

Non-conventional and non-economic crises are far from rare and isolated. Natural disaster for instance are common in history and are largely documented in qualitative studies <sup>50</sup>. The Recent focus on epidemics crises has shown that those events can happen in every country and while standard quantitative measured were not capable of tracking the past occurrence of such events the qualitative assessments provided by the IMF did indeed cover the occurrence of those events in particular among low income countries for which statistical agencies and official reports are scarce.

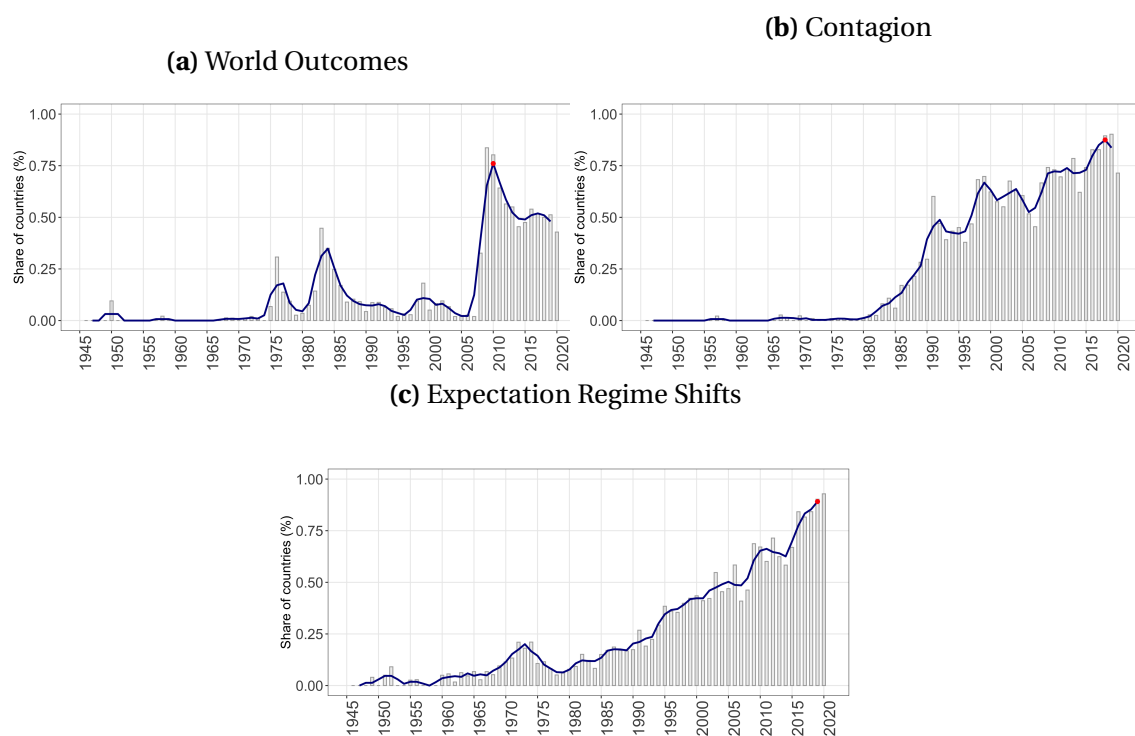
In addition, while some events have seemingly low importance, in terms of probability or duration they can nonetheless be at the center of major systemic events. The housing crisis in 2007 for instance played a key role in the GFC and was nonethe-

<sup>50</sup>Refer to Chapter 3 Section 3.3 for a discussion on the COVID19

less a type of crises well documented in more qualitative or specific studies. Among the contribution of this paper is to provide empirical measures that can help to better assess the historical probabilities of important but past or neglected events for which the *This time is different* syndrome (Reinhart and Rogoff, 2009) can be particular important.

In times of very connected and interdependent economic systems, a proper assessment of risks in peripheral countries become necessary. The COVID-19 epidemic shows that properly assessing the risks and understanding the channels of diffusion across countries is a key challenge for the stability of economic, financial and political systems. An approach based on the assessment of risk only for the developed economies with good quality data for financially related event is not possible anymore and overestimate the prevalence of Knightian uncertainty in domains where specific risks were indeed qualitative addressed. In terms of risk assessment and economic stability objectives, a necessary shift is to put the complexity of the connections of countries and sectors at the center of the risk analysis.

**Figure 1.14:** Waves of Global Shocks and Contagion Across Countries

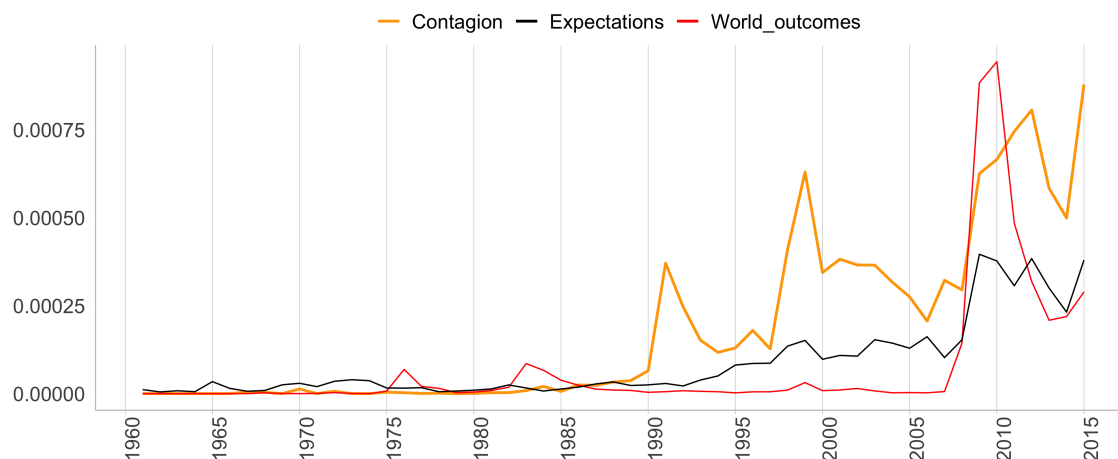


**Source:** *Complex Crises Database* (CCD).

**Note:** The figure displays the share of countries in the sample, displaying strictly positive term frequencies for world scaled crises and contagion from neighboring countries.



**Figure 1.15:** Intensity of Global Shocks, Contagion, and Expectations Regime Shifts



**Source:** *Complex Crises Database* (CCD).

**Note:** The figure displays the average term frequency of the index for world-scaled crises and contagion from neighboring countries.

## Conclusion

In this paper, we provide a text-based dataset computed on 23,000 country reports covering the whole IMF membership throughout the period 1950-2016, building on and improving significantly over the closest paper in the field ([Mihalyi and Mate, 2019](#)).

The novelty of this dataset is to capture and quantify the bilateral surveillance of the IMF on the multiplicity of adverse economic and non-economic events, quantitative and qualitative, that interact during crises. We manually compile an IMF crisis-specific dictionary and propose a simple term-frequency approach to create continuous indices of crisis perception.

The large time span (70 years) and country coverage (181 countries) of the resulting database as well as the scope of crises covered within a comparable framework

complement and extend standard datasets of macroeconomic crises and provide useful material for a deeper understanding of macroeconomic volatility episodes as described by the International Monetary Fund. The data-set that includes the 20 indicators of crises documented in this chapter plus a number of extensions in topic coverage and time span is available in open source ([Complex Crises Database \(CCD\)](#)<sup>51</sup>), in addition to the cleaned and structured raw reports available on the same platform. Furthermore, the codes and toolbox used to extend the dataset is also available and accessible via the R package [CCDr](#)<sup>52</sup>.

Exploiting this data, we assess the quality of the data with respect to the literature and exploit its richness to investigate the simultaneity of crises. We start by comparing some key economic indicators (severe recession and sovereign) to standard benchmarks found in the literature and discuss conceptual differences.

This exercise confirms that the *term-frequencies* constitute an accurate real-time and backward looking economic assessment of the countries' outlook. In addition, we show that, while non-economic events tend to be under documented in historical macroeconomic perspectives, they occupy a substantial amount of discussion in Fund reports for all income groups and especially so for lower income groups.

Finally, exploiting the vast amount of data at our disposal, we propose a general overview on the co-occurrence of crises. We study its evolution within the last 70 years and find that it has risen considerably: in particular, the system underwent a clear structural break starting from the early 1980s, shaping from a simple network dominated by real crises in the Bretton Woods era to a highly complex, financially dominated one, in the recent post-GFC period. Furthermore, we highlight the rise in centrality of the non-fundamental expectations channel and the large rising importance of contagion and measures of global shocks.

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<sup>51</sup><https://dataverse.harvard.edu/dataverse/complexcrises;jsessionid=f8c9f1328701e0c392fb21dd9700>

<sup>52</sup><https://github.com/ComplexCrisesDb/CCDr> and <https://complexcrisesdb.github.io/CCDr/>

*C'est en partie quand les outils nous défont qu'on apprend à mieux s'en servir, et ce déficit se produit souvent du simple fait que les outils ne sont pas adaptés à une fin précise. Peut être ne sont ils pas assez bons, ou est il difficile d'imaginer comment s'en servir. Le défi est d'autant plus grand que nous sommes obligés d'employer ces outils pour réparer des erreurs ou les effacer. Dans la création comme dans la réparation [...] l'incomplétude même de l'outil nous à appris quelque chose. [...] Les outils simples posent souvent ce problème, la possibilité de les employer de multiple manières ne fait qu'augmenter la difficulté d'en déterminer le meilleur usage dans une application particulière.*

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RICHARD SENNETT, *Ce que sait la main*

## Chapter 2

# Macroeconomic Crises and Expectations Regime Shifts

*If you are distressed by anything external, the pain is not due to the thing itself, but to your estimate of it; and this you have the power to revoke at any moment.*

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MARCUS AURELIUS, MEDITATIONS

### Introduction

In a context of globally connected networks of a financial, technological or informational nature, crises do not only impact the economic system through fundamental productivity or labor shocks. They also impact production through their psychological effect that drives extreme decision-making, generates herd behaviors and eventually global *manias and panics*.

This destructive effect of panics was an important component of the Great Financial Crisis (GFC) with complex financial markets spreading uncertainty and panic from the US mortgage market through the world-wide banking network triggering

fire sales, a credit crunch and a global financial, banking and economic crisis.

In the face of such psychological crisis, conventional policy response designed to tackle fundamental supply or demand disruption proved insufficient. Forward guidance, unconventional monetary policy and unconditional (national or supranational) support to distress entities were the main instruments used to tame the panic against weak governments and bank, restore confidence among financial investors, and fade away the uncertainty that dragged down the economic recovery.

Later on, as a legacy of the GFC, the euro-area sovereign crises further highlighted the central role of uncertainty, risk aversion and economic sentiment in the collapse of economic activity, repayment capacity of sovereigns and solidity of European institutions. It was indeed not so much lending arrangements provided by the Troika to European countries in distress that ended the economic and sovereign pressure but rather the “*Whatever it takes*” of the head of the European Central Bank (ECB) Mario Draghi that successfully anchored expectations and changed the adverse perspective of a euro area collapse.

Those example provide evidence that the severity of the modern sovereign crises is largely due to the complex interaction of agents opinions and prospects about the future that generates self-fulfilling dynamics, that are particularly contagious and synchronized. This “uncertainty virus”, a negative sentiment about current and future economic prospects further amplify the effect of the fundamental economic hurdles that push the economy into recession, foster a wait and see attitude that delays the recovery, and prevents timely and determined policy reactions.

In this chapter, I empirically investigate the amplification effect of expectation regime shifts on the severity of macroeconomic crises. Using the *Complex Crises Database (CCD)*, a large database on crises sentiments covering 180 countries for the period 1960-2016 (Chapter 1) and a 2SLS estimation procedure, I estimate the system of simultaneous equation relating economic recession, sovereign crises and

expectations regime shifts.

Controlling for a large set of confounding factors (transmission channels and macroeconomic policy stance) and using several exogenous shocks as instruments, the estimations suggests that the usual empirical link between sovereign default and economic recessions is mainly driven by the *second order* effect of the non-fundamental shock, when expectation regime switches occur. In a second step, I refine the measure of expectation regime shifts and found that the more severe doom-loops occur when expectations regime shifts combine sudden speculative distress and uncertainty about inflation and price of commodities.

The chapter is structured as following. In section 2.1, I review the literature on the fundamental and non-fundamental drivers of crises, as well as the empirical literature on market sentiment and risk. In section 2.2, I describe my novel measure of Expectation Regime Shifts (ERS) by provide a comprehensive overview about its nature, source, and evolution of over the period 1960-2016. In section 2.3, I estimate the amplification effect of expectation regime shifts on recessions and sovereign crises and narrow down the relative importance of specific transmission channels.

## 2.1 Literature Review

### 2.1.1 Definition of Non-Fundamental Crises

Two traditional ways of understanding crises stand out in economic literature. The fundamental business cycle view asserts that crises arise from fundamental causes that are part of the business cycle. Fluctuations emerge from the direct effect of crises on productions (capital, labor, and technology) or the existence of market rigidity and frictions that prevent a smooth adjustment that amplify fluctuations.

The *risk centric view* asserts that crises result from panics, where agents suddenly modify their perspectives on future economic outcomes, overshooting a ra-

tional risks assessment. This change of perspective is what [Kindleberger \(1975\)](#) call the moment of distress. The period between *mania* and *panics*: “a sharp turning point triggered by events that in a more neutral environment would not warrant a large response”.

The Cambridge Business English dictionary defines expectations as "what you believe or hope will happen in the future". They correspond to the forecasts of the future values of economically relevant variables. They closely correspond to what [Nowzohour and Stracca \(2020\)](#) define as economic sentiment and captures “economic agents’ views about future economic developments that may drive the economy through their effect on agents’ decisions today.

Those views reflect the joint dynamic of rational arguments and individuals’ states of mind that generate a degree of economic confidence. This confidence is the subjective feeling of certainty or strong belief in positive future economic developments. This is the product, on the one hand, of the *risk assessment* and, on the other, of the *risk sentiment*.

The latter corresponds to the change of perspective of the future following a rational evaluation of how current events will impact future fundamentals. The former corresponds to the state of mind of individuals and determines the willingness of agents to engage in uncertain (risky) decisions. The uncertainty attached to those decisions can take two forms ([Nowzohour and Stracca \(2020\)](#), [Rossi et al. \(2016\)](#)): *type I uncertainty* corresponds to the increase in the range of possible outcomes of future economic developments; *type II uncertainty* (Knightian) corresponds to the lack of knowledge of the probability distribution from which future economic developments are drawn<sup>1</sup>.

Decision-making can be thought of as a combination of a rational evaluation of incoming information (private or public), a model of how other people react to this

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<sup>1</sup>“Type II uncertainty may be thought of as either a source of uncertainty of its own or as an amplifier of type I uncertainty as in [Rossi et al. \(2016\)](#)”

information and a state of mind (Mood). The study of moods that drive decisions and spread across groups of individuals is at the core of social psychology and the literature on mob behavior.

A panic, for instance, is defined as a “*sudden sensation of fear, which is so strong as to dominate or prevent reason and logical thinking, replacing it with overwhelming feelings of anxiety and frantic agitation consistent with an animalist fight-or-flight reaction. Panic may occur singularly in individuals or manifest suddenly in large groups as mass panic*”. In an economic context, it is precisely those mass panics that [Keynes \(1936\)](#) defines as Animal Spirits:

*"Even apart from the instability due to speculation, there is the instability due to the characteristic of human nature that a large proportion of our positive activities depend on spontaneous optimism rather than mathematical expectations, whether moral or hedonistic or economic. Most, probably, of our decisions to do something positive, the full consequences of which will be drawn out over many days to come, can only be taken as the result of animal spirits—a spontaneous urge to action rather than inaction, and not as the outcome of a weighted average of quantitative benefits multiplied by quantitative probabilities."*

The idea that non-fundamental drivers can largely drive economic outcomes, has a long history, but has gained importance in the macroeconomic literature of the last two decades and has taken different forms in both theoretical models and empirical studies.

### **2.1.2 Non-Fundamental Shocks in Macroeconomic Models**

The idea of the role of panic in economics has been included and modernized in the macroeconomic and finance literature as *herd behavior*, and refers to the behavior of individuals in a group acting collectively without centralized direction.

[Banerjee \(1992\)](#) and [Bikhchandani et al. \(1992\)](#) provided seminal contributions for the non-financial market context and [Golub and Sadler \(2017\)](#) gives a wide-ranging



survey on the recent literature, in particular in financial related contexts. The cornerstone of this literature is to consider humans as social by nature, influenced by peers and with the capacity to influence the behavior of others in ways where decisions and sentiments can overshoot an optimal, rational, predictable and reasonable decision.

Different strategies and assumptions have been adopted to include non-fundamental drivers into standard models. [Nowzohour and Stracca \(2020\)](#) provides the following classifications.

A first strand of the literature corresponds to *irrational animal spirits* advocates (dating back to [Keynes \(1936\)](#), but more recently [Akerloff and Shiller \(2009\)](#) and [De Grauwe and Ji \(2016\)](#)) that see the cause of macroeconomic fluctuations in purely psychological waves of optimism and pessimism unrelated to fundamentals. In this context, animal spirit optimism inevitably ends up in a bust when investors are caught by reality.

The second avenue corresponds to the *Self-fulfilling animal spirits* advocates (e.g., [Morris and Shin \(1998\)](#), [Morris and Shin \(2002\)](#), [Benhabib et al. \(2015\)](#), [Bacchetta and van Wincoop \(2016\)](#), [Angeletos and La'O \(2013\)](#), [Farmer \(2012\)](#), [Bacchetta and van Wincoop \(2016\)](#), [Benigno and Fornaro \(2018\)](#), [Acharya et al. \(2021\)](#)) that also see the root of macroeconomic fluctuations in purely psychological, sunspot-driven waves. Their particularity, is to consider an effective change in fundamentals, making the initial boom or bust in confidence rational, as expectations eventually materialize. As a result, the economy constantly oscillates between booms and busts. Among the reasons for the existence of such oscillations, [Shiller \(2017\)](#) argue that the origins of those fluctuations come from the viral nature of narratives and sudden changes in economic sentiments.

The third group, *news advocates* ([Beaudry and Portier \(2006\)](#), [Beaudry and Portier \(2014\)](#), [Barsky and Sims \(2012\)](#) and [Blanchard et al. \(2013\)](#)) posits an imperfect knowledge about future developments of the economy where agents only receive a signal

used as a proxy for the economy's future development. In this framework, the economy is subject to recurrent booms and occasional busts that depend on the realization of positive or negative signals. Among important studies on the role of information rigidity, we can cite [Carroll \(2003\)](#), [Coibion and Gorodnichenko \(2012\)](#), [Coibion and Gorodnichenko \(2015\)](#), and [Mankiw et al. \(2003\)](#).

This paper draws on the line of the self-fulfilling animal spirit category, where coordination failure can push countries with sound fundamentals into confirming negative beliefs. Among the mechanisms used to generate such effects, market rigidity have been practical instruments to create a link between demand and production.

[Farmer \(2012\)](#) provides a close economy model where wealth act as transmission mechanism of adverse expectations. A belief of a lower value of financial wealth leads to lower consumption, which leads to lower firm profits, which justifies the initial drop in wealth. Similarly, [Heathcote and Perri \(2012\)](#) also present a model exploiting the wealth channel. In their model, lower housing wealth makes it possible to have self-fulfilling beliefs of higher unemployment. More pessimistic prospects of job opportunities tomorrow and more binding credit constraint when collateral value is lower entail a reduction in consumption that lower output and consequently increase unemployment.

Another modelling strategy uses rigidity in the form of the timing of the decisions across agents and some degree of imperfect information. [Benhabib et al. \(2015\)](#) develop such a model where business cycles are affected by market sentiment in a rational expectation framework. Self-fulfilling rational equilibrium can emerge when production decisions need to be made in advance of knowing demand and agents receive imperfect information about aggregate demand.

A stagnation trap is another mechanism presented by [Benigno and Fornaro \(2018\)](#) with a Keynesian growth theory, where pessimistic expectations can lead to very persistent slumps characterized by high unemployment and weak growth.

Non-fundamental drivers of crises increase not only the severity of the fluctuation in a close economy, but they also constitute an important channel of contagion, with panic possibly jumping from one country to another. In this respect, the rising co-movements in the main macroeconomic aggregates in recent years highlight the vulnerability of modern economies to imported crises and global recessions (Kose et al., 2020).

Among the main channels of contagion, trade links, financial connections and changes in risk appetite are common mechanisms cited by Kumar and Persaud (2002). A model combining financial integration and expectations is presented by Perri and Quadrini (2018). They introduce a mechanism leading to self-fulfilling credit shocks. If the resale value of firms is expected to be low, credit will be tight. But tight credit makes it difficult for constrained firms to purchase assets from defaulting firms, which indeed makes the resale value low. While they have a two-country model with perfect business cycle co-movement, this is a result of perfect financial and goods market integration.

In contrast with Perri and Quadrini (2018) that posit perfect market integration across countries, Bacchetta and van Wincoop (2016) take stock of the evidence that goods and financial integration remains imperfect and includes the self-fulfilling feature of recession in a new Keynesian two country models with low level of economic integration and show that a business cycle panic is necessarily synchronized across the two countries as long as they have some minimum level of trade and financial integration.

The self-fulfilling mechanism is a result of a circular relationship between present and future macroeconomic conditions through profits and bankruptcies. This results in a self-fulfilling shock to expectations and not from an exogenous shock to fundamentals. Lower demand today leads to weaker profits, which increases bankruptcies and lowers future output. The key feature of this model is that the co-movement is

not a result of transmission, but rather of a coordinated panic.

Applying the model to the *Great Recession*, the authors argue that the crisis in U.S. financial markets plays the role of trigger event for the self-fulfilling shift in beliefs more than the linkage between financial markets and the real economy. Similarly, [Kaminsky \(2019\)](#) found little evidence of direct spillovers from the United States during the GFC, and argue that less tangible channels of contagion may have played a more important role in the global spread of the crisis.

### 2.1.3 Self-Fulfilling Models in Financial Markets

A number of researchers have posited that expectations and beliefs may have played a major role in the boom and burst dynamic of assets. [Adam et al. \(2017\)](#) argue that movements in investor optimism and pessimism are crucial ingredients of financial market fluctuations. Similarly, declining house prices are considered by [Adelino et al. \(2018\)](#) or [Kaplan et al. \(2020a\)](#) as core components of the GFC. The former provide evidence for the importance of household perceptions of house price risks on home-ownership choices, as well as the impact of updates of beliefs in housing cycles. The latter insists that the main drivers of movements in house prices and rents were a shift in beliefs and not a change in credit conditions around the Great Recession. The evidence of expectation driven crises has been a widely discussed literature, in particular on financial markets. Self-fulfilling exchange rate crashes ([Obstfeld, 1996](#); [Jeanne and Masson, 2000](#); [Kasa, 2004](#); [Morris and Shin, 1998](#)), banking crises ([Gordon, 1988](#); [Diamond and Dybvig, 1983](#); [Bryant, 1980](#); [Allen and Gale, 2007](#)) or sovereign default ([Calvo, 1988](#); [Cole and Kehoe, 2000](#); [Aguiar et al., 2016](#)) all feature crises that result from the nonlinear, self-referential feedback between beliefs and outcomes. This literature pioneered modern versions of an old literature on the role of financial market risk appetite in boom and burst cycles: ([Keynes \(1936\)](#), [Minsky \(1977\)](#), [Kindleberger \(1975\)](#), [Minsky \(1986\)](#)). In their long history of financial crises, [Allen and Gale \(2007\)](#)

detail the coexisting literature about risk-centric and fundamental view of banking crises. In particular, they cite [Friedman and Schwartz \(1963\)](#) and [Kindleberger \(1975\)](#) that argued that many banking crises resulted from unwarranted panics (mob psychology) and that most of the banks that were forced to close in such episodes were illiquid rather than insolvent. In more recent papers, they cite [Diamond and Dybvig \(1983\)](#) where bank runs are modeled as the result of self-fulfilling prophecies. Among the alternative view [Allen and Gale \(2007\)](#) cite [Mitchell \(1941\)](#) that argue that financial crises occur when depositors have reason to believe that economic fundamentals in the near future look poor. In that case, depositors, anticipating that future loan defaults will make it impossible for the bank to repay their deposits, withdraw their money now. The depositors in this case are anticipating insolvency rather than illiquidity.

The interplay between weak fundamentals, external shocks and potential coordination failures have also been widely used in the sovereign default literature. Quantitative models (DSGE) of sovereign default in the spirit of the seminal paper of [Eaton and Gersovitz \(1981\)](#) and later extended in numerous directions (see [Aguiar et al. \(2016\)](#) for a comprehensive discussion) first emphasize the role of unexpected negative output shocks as trigger of the decision to default. In this literature, the sovereign chooses optimally to default or not on its debt by comparing the benefits from defaulting (no interests and principal payments) with the costs (exclusion from financial market, direct output or reputation costs). In an extended DSGE framework, [\(Aguiar et al., 2016\)](#) introduce time-varying credit beliefs regarding the probability of default. The three state Markov process features a rollover crisis regime, a tranquil regime (low probability of run next period), and a vulnerable regime (high likelihood of run in the next period). Shifts in beliefs can generate sharp spikes in spreads in the absence of declines in fundamentals that push the country into default or forced it to reduce debt quickly. Most sovereign self-fulfilling crisis models featuring multiple

equilibria outcomes have featured either liquidity crises ([Cole and Kehoe \(1996\)](#), [Cole and Kehoe \(2000\)](#), [Rodrik and Velasco \(1999\)](#)) or inefficient auctions ([Calvo \(1988\)](#), [Corsetti and Dedola \(2016\)](#), [Farhi and Maggiori \(2018\)](#), [Conesa and Kehoe \(2017\)](#), [Broner et al. \(2014\)](#), [Kriwoluzky et al. \(2014\)](#), [Bocola and Dovis \(2015\)](#), [Lorenzoni and Werning \(2019\)](#)). In general, the mechanism is the following: when international creditors expect the sovereign to default they demand high spreads, which make repayment costly and raise the default frequency. On the other hand, when lenders do not expect default they demand low spreads which reduces repayments and the default frequency. [Aguiar et al. \(2016\)](#) synthesize this literature providing the main following regularities: crisis and in particular default are low probability events, crises are not tightly connected to poor fundamentals, spreads are highly volatile, rising spreads are associated with deleveraging by the sovereign, risk premia is an important component of sovereign spread.

The combinations of imperfect information, imperfect learning processes, heterogeneous agents, asynchronous decisions making, or labor and credit market rigidity are among the mechanisms commonly used in the theoretical literature to generate non-fundamental shocks susceptible of spreading across agents. [Allen and Gale \(2007\)](#) provide two possible origins for the shift in risk appetite. On the one hand, a shift in the degree of aversion to risk from economic agents. [Kahneman and Tversky \(1979\)](#) and [Tversky and Kahneman \(1974\)](#) for instance, argue that people rely on a limited number of heuristics to simplify complex probability judgements. Under the Availability Heuristics, individuals assess the probability of an event by the ease with which instances can be called to mind, rather than the actual probability distribution. The cyclical nature of risk appetite may reflect this decision-making process. The self-reinforcing nature of upswings and downturns, driven to a degree by investor' expectations, could reflect the fact that during upswings high levels of returns easily come to mind and the occurrence of a crisis is more distant. Conversely,

during downturn the probability of continued economic woes is accorded a disproportionately high weight in investors' minds, so that risk appetite falls, safe heavens seems all the safer and the downside risk associated with high yielding assets looms large in the mind of investors. This process continue up to the occurrence of an event that call those beliefs into question and engender uncertainty. Under representative heuristics, probabilities are evaluated by the degree to which an asset is perceived similar to another (see this interpretation for Asian crises in 1997 and LTCM collapse by [Kumar and Persaud \(2002\)](#)). The second possible origin for the shift in risk appetite can come from the shift in the proportion of different types of investors that have different risk appetites. For instance, in a risk averse environment, it may be that short term traders respond to a deteriorating environment by exiting riskier positions. [Kindleberger \(1975\)](#) provide a rationale for such behavior based on the distinction between "insiders" and "outsiders". At some points in the generation of the bubble, better informed "insiders", sell out at the top of the market to outsiders eager to get on the bandwagon. Less informed outsiders have more risk appetite than the insider they replace, what increases the aggregate level of risk appetite and the bubble grows. Imperfect information, bounded rationality or intrinsic heterogeneity of agents have each been highlighted in the theoretical literature as potential explanations for deviations to the optimal rational decisions<sup>2</sup>.

Overall, the common property of the event amplified by panics and shifts in expectation is the important non-linearity of both its causes and consequences. For instance, most models feature potential multiple equilibria and coordination failure and build on the existence of different regimes that corresponds to levels of fundamentals that determine the possible existence of dangerous precondition. The so-called safe-regime usually corresponds to countries with strong enough fundamen-

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<sup>2</sup>A number of observational studies have tried to understand how people's macroeconomic expectations are formed to empirically validate those channels ([Das et al. \(2020\)](#), [Goldfayn-Frank and Wohlfart \(2018\)](#), [Kuchler and Zafar \(2019\)](#), [Malmendier and Nagel \(2011\)](#), [Manski \(2018\)](#), [Mian et al. \(2015\)](#), [Tortorice \(2012\)](#)).

tals so that panics or self-fulfilling dynamics cannot occur. Only strong and violent fundamental shocks can generate fluctuations. At the intermediate regime, different equilibria are possible and the effect of non-fundamental drivers can kick in.

The empirical evidence documenting speculation episodes and sudden coordination of investors believes that kick-in non-linearly have also a long history on foreign stock exchange markets (Kindleberger, 1975). The crises that shook the European Monetary System (EMS) in 1992–3 were seen by Jeanne (1997) and Jeanne and Masson (2000) as the combination of self-fulfilling and fundamental drivers, with bifurcation mechanisms occurring for intermediate ranges of fundamentals. Testing such results in the case of the French franc, he finds that while the different episodes of crisis were associated with bad fundamentals, they were considerably amplified by self-fulfilling speculation. Cole and Kehoe (1996) and Bratsiotis and Robinson (2004) explores the self-fulfilling nature of the Mexican government's inability to roll over its debt during December 1994 and January 1995. Both paper show that the non-fundamental component was a significant driver of the crises. A few years later, the South Asia Tiger paradigm brutally ended up after the Tai devaluation in 1997 with an overnight shift in the perception of those economies marked an important non-fundamental contagion with large consequences driving to banking and sovereign pressures (Stiglitz (1999), Krugman (1999), Chowdhry and Goyal (2000)). Regarding the euro area sovereign crisis De Grauwe and Ji (2016) shows that a significant part of the surge in the spreads of the peripheral Eurozone countries during 2010–11 was disconnected from underlying increases in the debt to GDP ratios and fiscal space concerns, and was associated with negative self-fulfilling market sentiments that became very strong after 2010. Similarly, Bruneau et al. (2012) investigate the presence of self-fulfilling dynamics during the European sovereign crisis and suggest that both the fundamentals and “animal spirit” ignited the European sovereign crisis. Using Italian data and a model of sovereign borrowing featuring endogenous debt matu-



rity, risk-averse lenders, and self-fulfilling crises and [Cole and Kehoe \(2000\)](#), [Bocola and Dovis \(2015\)](#) shows that non-fundamental risk played a limited role during the 2008–2012 Italian crisis.

#### **2.1.4 Empirical Evidence on Expectation Regime Shifts**

In parallel to the theoretical developments, a complementary empirical literature has tried to capture the determinants of the shifts in market sentiment and to account for the sudden movements of panics (excessive pessimism) or manias (excessive optimism). Identify periods of panics involve two challenges. First, collect the relevant information and second, interpret the constructed indicator. This is all the more difficult that expectations are soft by nature, dealing with sentiments and opinions about the future. In this context, identify the causes, consequences and channels at play during expectations regime shifts is an open empirical question that the literature has tackled using five main strategies. 1) Use implied proxies to track the decisions involving trade-offs between today and tomorrow. This strategy has been largely used in financial market contexts using implied stock market volatility, forecast densities, forecast disagreement, economic data surprises or conditional variances of macroeconomic variables. Among the largely used indicators we found the sharp ratio, the value of Credit Default Swaps (CDS), the VIX or the Exchange Market Pressure (EMP) ([Eichengreen et al., 1996](#)). 2) Record and analyze people's opinion using surveys. For instance, track consumer or business confidence (PMI index). 3) Design survey experiments to study the expectation formation process and observed changes of outcomes when people have different mindsets. 4) Track individuals' information acquisition using web browsing information. This strategy has gained popularity in recent years and consists of tracking how people chose the information they received (the website they visit, the browsing behavior, ...) and observes the popularity of different searches. Google trends and other similar methods

have become largely popular, in particular regarding the capacity to obtain real time and high frequency measures (Choi and Varian, 2012). 5) Finally, extract information embedded in news articles and reports from experts. This last strategy is the one adopted in this paper and aims to exploit the sentiment and attitude inferred by informational authorities. It has been used in various directions, whether to purely track the occurrence of specific events, to capture the changes in sentiment, to distinguish differences across sources or to capture more soft/qualitative information, this literature has gained ground by exploiting the recently established technique of text analysis (Natural Language Processing) and benefited from increasing computing performance (see Gentzkow et al. (2019) for a general overview). The NLP literature range from simple 'manual' coding of events on economic reports in the spirit of Romer and Romer (2017) or on a corpus of newspapers similar to Bloom (2014); to more advanced unsupervised learning techniques to classify and predict different outcomes such as Huang et al. (2019b).

Among the papers that adopt a similar empirical strategy and for which we extend and complement the analysis, we can cite a number of works. Caldara and Iacoviello (2018) measure the risk of events such as wars, political tensions, and terrorist acts that affect the normal and peaceful course of international relations and, similarly to Baker et al. (2016), construct an index by counting the number of articles mentioning phrases related to geopolitical tensions in eleven international/Anglo-Saxon newspapers. In a more recent strand of the literature on the empirical evidence of the effect of risk and uncertainty on the macroeconomic fluctuations, (Bloom, 2009); Bloom et al. (2018) create an economic policy uncertainty (EPU) index for the United States from 1985 on-wards counting the number of articles in the 10 leading US newspapers with words related to the economy, uncertainty, and policymaking. Nowzohour and Stracca (2020) reviewed six existing measures of sentiment based on a monthly panel database covering 27 advanced countries from January 1985 to Octo-

ber 2016 including a composite survey-based index of consumer and business confidence, a newspaper-based index of Economic Policy Uncertainty from [Baker et al. \(2016\)](#), realized stock market volatility, realized stock market skewness as well as realized absolute negative stock returns. Their paper assess whether those different sentiment measures are correlated among each other and how they are (cross) correlated with economic activity. they find that the newspaper-based Equity Market Volatility (EMV) tracker moves with the VIX and with the realized volatility of returns on the S&P 500. Policy news is a major source of volatility with specific Trade Policy news, becoming a leading source after Donald Trump's election and especially after the intensification of U.S-China trade tensions. In addition, they find that the share of EMV articles with attention to government policy rises over time, reaching its peak in 2017-18. Finally, they show that their measures are typically highly positively correlated across countries, suggesting the existence of a global factor. Consumer confidence is reported to have the closest co-movement with economic and financial variables. Most of these correlations are found to be contemporaneous or forward-looking, consistent with the view that economic sentiment could indeed be a driver of activity.

[Fraiberger \(2016\)](#) counted the positive expressions in the full corpus of economic news articles produced by Reuters covering 12 countries over the period 1987-2013 to track fluctuations of GDP. [Bennani et al. \(2021\)](#) uses the qualitative content of the Regional Economic Outlook (REO) reports published by the International Monetary Fund (IMF). They exploit several measures of IMF sentiment based on the REO reports covering 16 countries in three regions from 2007 to 2018 and show the significant impact of sentiment on stock market returns. [Fayad et al. \(2020b\)](#) use unsupervised techniques to develop a sentiment index measuring member countries' reception of IMF policy advice at the time of Article IV Consultations and finds that develop the first sentiment index measuring member countries' reception of IMF pol-

icy advice at the time of Article IV Consultations and finds that while authorities of member countries largely agree with Fund advice, there is variation reflecting country size, external openness, policy orientation, assessed riskiness, and commodity export intensity. [Huang et al. \(2019b\)](#) construct sentiment indices for 20 countries from 1980 to 2019. Relying on computational text analysis, they capture specific language like “fear”, “risk”, “hedging”, “opinion” and “crisis”, as well as “positive” and “negative” sentiments, in news articles from the Financial Times. [Ghirelli et al. \(2019\)](#) investigate the sensitivity of the policy uncertainty (EPU) index from [Baker et al. \(2016\)](#) and find two key parameters: the number of keywords included and the newspaper coverage. [Ahir et al. \(2018\)](#) provide an index of uncertainty (the World Uncertainty Index (WUI)) for 143 individual countries on a quarterly basis from 1996 onward. It is constructed using the frequency of the word “uncertainty” in the quarterly Economist Intelligence Unit country reports. Globally, the Index spikes closely after the 9/11 attack, SARS outbreak, Gulf War II, euro debt crisis, El Niño, European border crisis, UK Brexit vote and the 2016 US election. Uncertainty spikes tend to be more synchronized within advanced economies and between economies with tighter trade and financial linkages.

Risk sentiment and expectations can take various forms and materialized in different channels that make the measurement of the global market sentiment an empirical challenge. Furthermore, not only is it difficult to measure, but a number of studies suggests that uncertainty and risk aversion in the early *XXI<sup>th</sup>* century stem from different sources than before the global financial crisis. [Rossi et al. \(2016\)](#) argue that financial-market-based risks seem to be less important than risks posed by shifts in economic policy and geopolitical tensions. In addition, they suggest that the nature of uncertainties has changed with more prevalent type II uncertainty. In short, ambiguity rather than risk has recently become an important driver of agents’ actions. A similar conclusion is drawn from [Kozlowski et al. \(2015\)](#), where the ma-

terialization of an event ex ante perceived as extremely unlikely (such as the global financial crisis) leads to a strong re-assessment of macro risks and, in particular, the probability of tail events.

This paper contributes to the empirical literature on the macroeconomic effect of economic sentiment on business cycles and sovereign crises. It exploits new data on risk sentiment and investigates the role of non-fundamental drivers in the occurrence of crises in detail. It follows the large literature on the risk view of fluctuations and provides new insight on the relative impact of direct costs and second order effects of crises. In particular, it combines self-fulfilling animal spirit mechanisms and both failure and recessions hypothesis, showing that major fundamental shocks have important impacts on risk aversion. Using a modern narrative approach and relying on Natural Language Processing techniques in the spirit of [Baker et al. \(2016\)](#), [Ahir et al. \(2018\)](#) and [Bennani et al. \(2021\)](#) the paper investigates the origin and effect of panics. In line with [Rossi et al. \(2016\)](#) and [Kozlowski et al. \(2015\)](#) I provide empirical evidence for the structural change in the type of uncertainty and economic sentiment after the Great Financial Crises. The next section presents the data and describe in length the measure of expectation regime shifts.

## 2.2 Data and Descriptive Statistics

This paper uses the indices of crisis sentiment from the [Complex Crises Database](#)<sup>3</sup> (CCD) in Chapter 1. The database provides a continuous measure of crisis sentiment at yearly frequency, extracted from the *International Monetary Fund* (IMF) country reports from 1960 to 2016 for 181 countries over 20 different crises dimensions, covering both economic and non-economic events. It also exploits an update of the data-set that includes measures that capture macroeconomic policy stance

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<sup>3</sup><https://dataverse.harvard.edu/dataverse/complexcrises;jsessionid=f8c9f1328701e0c392fb21dd9700>

and cover qualitative sentiments indices on both conventional and unconventional policy stance<sup>4</sup>.

The validity of the use of perception measures of crises based on the narratives extracted from IMF bilateral surveillance as measures of crises rely on 4 strong assumptions. a) The IMF properly observe the outlook (and has no influence on this outlook) and b) use an accurate implicit "*fundamental model*" of the economic system to explain the undergoing events. c) When the IMF fail to explain the outlook with the *implicit*<sup>5</sup> fundamental model, they "*augment*" this model with an *implicit* non-fundamental model. Finally, d) the additional variable of the "*augmented*" model (the residual explanation) match the psychological counterpart of theoretical models. In chapter 1 I discuss the validity of this set of assumptions and provide rationale to consider the variables used throughout this paper as valid indicators of crises perceptions<sup>6</sup>.

In the first chapter of the thesis, I provide a number of stylized fact. First, an increasing co-occurrence<sup>7</sup> of crises since the early 1980s, second, a shift from a relatively risk-free period before the 1980s to a gradual increase in the number and severity of economic downturns<sup>8</sup> and associated financial related crises, third the rising

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<sup>4</sup>The same dictionary based approach presented in chapter 1 is used to recover monetary and fiscal loosening and tightening, forward guidance, unconventional monetary policy, coordinated intervention and exchange rate intervention

<sup>5</sup>I use implicit because reports are mostly descriptive and very rarely make explicit references to theoretical models (the reference to self-fulfilling models seem to be an exception)

<sup>6</sup>See section 1.1 or Romer and Romer (2017) for a discussion on the use of perception measure to capture crisis events

<sup>7</sup>In chapter 1 the co-occurrence is measured as the degree of correlations between crises

<sup>8</sup>The identification of recession corresponds to the identification of the qualitative assessment about the severe degradation of the economic outlook (Annex 1.1.2) and follows the spirit of the NBER definition of recession: "A recession is a significant decline in economic activity spread across the economy, lasting more than a few months, normally visible in production, employment, real income, and other indicators. A recession begins when the economy reaches a peak of activity and ends when the economy reaches its trough. Between trough and peak, the economy is in an expansion. Because a recession is a broad contraction of the economy, not confined to one sector, the committee emphasizes economy-wide measures of economic activity. The committee believes that domestic production and employment are the primary conceptual measures of economic activity".

importance of global crises and cross-country contagion and fourth the rising psychological contagion effects of crises.

In this chapter, I focus on three main variables: economic recessions (Y), sovereign crises (S) and expectation regime shifts (E) to understand the doom loop observed during episodes of crises. Concretely, I take stock of the stylized facts found in chapter 1 and emphasize the role of psychological driven events in the deepening of the macroeconomic crisis regime during the period 1980-2016.

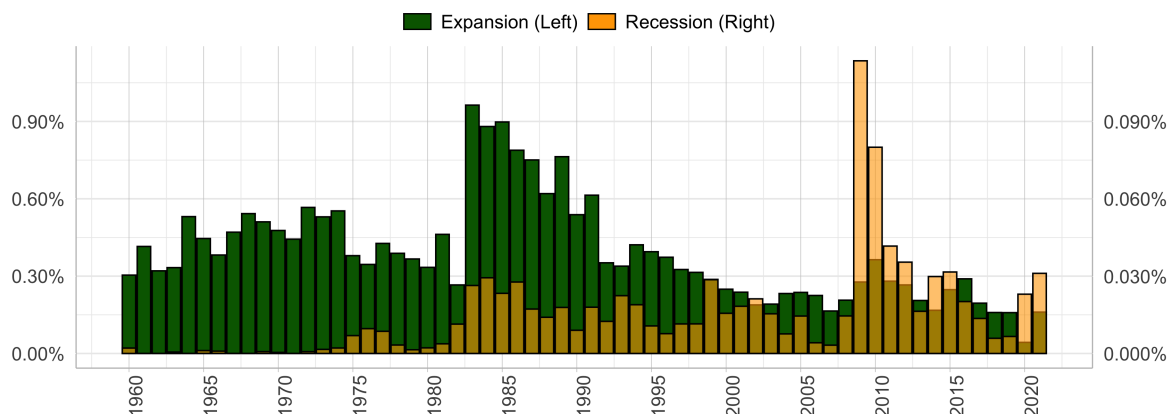
Figure 2.1 illustrate the higher crisis regime by displaying the *Word-frequency* of periods of expansion and periods of severe recession categories. Throughout the paper, *Word Frequency* refers to the ratio of the number of words related to the category of interest and the total number of words in the underlying report<sup>9</sup>. *The Word frequency* can be considered as an index that map the frequency of occurrence of the category of interest in the report to the intensity of the event, providing an informative continuous measure of events<sup>10</sup>. The figure confirms the transition from a fast growth regime to a crisis regime where instances of rapid economic growth decline relative to sharp and global crises that become more recurrent and severe.

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<sup>9</sup>See Section 1.1 for more details about the methodology

<sup>10</sup>In the NLP literature, word frequency is more commonly call *term frequency*

**Figure 2.1: From Expansions to Recessions: 1960-2021**



**Source:** *Complex Crises Database* (CCD)

**Note:** Expansion refers to the average Word-frequency associate with economic expansions. Recession refers to the average Word-frequency associated with severe economic recessions. For each variable, the 25% lower frequencies are set to 0 to limit false positives and exclude transition phases.

The review of the literature has shown that while central in the understanding of economic outcomes, expectations can encompass different definitions and concepts, sometimes complementary, sometimes exclusive. To, identify empirically Expectation Regime Shifts, provide a clear definition and isolate its different components, I proceed in sequential steps.

I start by a wide definition of Expectation Regime Shifts and identify general expressions denoting panics, uncertainty, loss of confidence and signs of coordination failure identified in the IMF bilateral surveillance reports (Annex A.4). This regime shifts correspond to the abrupt shift of perception of systemic agents regarding the *rules of the game in the market* and the anticipation action of other agents as described in the IMF country report<sup>11</sup>.

<sup>11</sup> *Positive expectations* can overall be summarized as the aggregate sentiment that market will expand and that other agents will engage in the markets to seek opportunities and maximize the gains. *Adverse expectations* that the market will contract and that other agents will withdraw from the market to minimize the losses. This expectation distress corresponds to the turning point triggered by events



Due to the nature of the IMF and its mandate of international stability, the expectation regime shifts conceptually captures more precisely the country specific effect of global expectation regime shifts (often denoted in the literature as foreign investor global risk aversion) and less so other more domestic related expectations that could still have important local effects (fears from insecurity or violence for instance). At that stage, it maps the aggregate negative expectations from both financial investors and economic agents in real sectors (investors in the productive sector as consumers) regarding the macroeconomic outlook of the country as a whole.

Measuring this psychological variable in a macroeconomic context is empirically challenging. First, because of the scarce availability of expectation measures <sup>12</sup> and, second, because of the difficulty to properly isolate changes in the level of risks from changes in uncertainty, aversion, and confidence.

In this chapter, I argue that a narrative approach based on the economic expert judgement of the agency in charge of the stability of the international economic system can provide a fruitful method to tackle these two challenges. Specifically, it allows for the building of a macroeconomic expectation measure that is based on the specific bilateral surveillance of the IMF staff and ensure a country specific measure that denote the aggregate state of mind of economic agents. The underlying reports are purposely designed to provide an assessment of the current state of the economy, describe the past and current developments in the main sectors, and identify the source and nature of current and expected risks (Lombardi and woods, 2008).

The second empirical challenge is to distinguish the nature, origin, and type of ex-

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that in a more neutral environment would not warrant a large response [Kindleberger \(1975\)](#)

<sup>12</sup>The VIX is usually the standard measures of foreign financial market uncertainty (“fear index”). It is computed on a real time basis since 1993 to capture the expected short-term market volatility and was constructed to provide an index upon which futures and options contracts on volatility could be written. In contrast to my measure of ERS, the VIX is forward-looking and captures the volatility that an investor expects to see. The level of the VIX is implied by the current price of options on the S&P500 index and represents expected future stock market volatility over the next 30 days calendar. ([Whaley, 2009](#))

pectation regime shifts. To correctly identify this measure, to match the indices with clearly identified parameters from theoretical models and to disentangle the different components of negative expectations, I performed a second step semi-supervised NLP approach that narrow down the meaning of the global index of Expectations Regime shift. A large part of this section is devoted to explore in details the general index, provide example of perceptions that I intend to capture and discuss the evolution in the type of risk, uncertainty, panics, or sentiments that is reflected by the IMF bilateral surveillance.

It is important to note that the entire chapter relies uniquely on the data constructed in the Complex Crises Database<sup>13</sup>. This choice is driven by several constraints.

First, to limit measurement errors inherent to such method (indices are more likely to be impacted by the same bias / errors, a year lag with respect to hard data due to publishing timing), obtain a balanced panel with large country coverage (including low income countries with not historical records).

There is no equivalent in the literature of Expectation Regime Shift variable that I could use, both in the nature of the measure and in the scope of countries and periods. Similarly, the type of sovereign crises that I want to analyze include more events than strict sovereign default, using a strict measure of sovereign default would remove high income countries with problems of rollovers that did not end in default.

In addition, only using market data, I would shrink data to post 1990 periods for high and middle income countries with developed foreign exchange financial market alone. Regarding recessions, the real GDP is not entirely available for all countries and periods from standard data-sets and are shown to have a year lag with the reports

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<sup>13</sup>The presentation of the method to compute the indices is presented in 1 Section 1.1, The discussion on the relation between the empirical measure and theory is done in Section 2.2.1, The comparison with benchmark data is done in Chapter 1 1.1 and in Chapter 3 where events of sovereign crisis are identified, categorized and compare to standard macroeconomic data

(see 1). Even nominal GDP is very volatile, in particular among low income countries with experiences of high inflation periods that blur the measure of recessions. Relying on an index of recession based on GDP data would need an arbitrary threshold (no equivalent of NBER recessions is available for all countries) and would not capture the real time perception of the severity of recession that I am interested in. Relying on the IMF statement at the time of crisis remove the need to assume an arbitrary cut-off number for recession and number of consecutive quarters of contraction.

The identification strategy relies strongly on the capacity to control for a large set of potential channels. No other source of extensive controls would ensure such balanced panel, less so for countries that are suspected to be the more vulnerable to the doom loop effect I try to document.

### 2.2.1 Novel Measures of Recessions, Expectation Regime Shifts and Sovereign Crises

Table 2.1 shows the probability of occurrence of the three main indicator: economic recessions (Y), sovereign crises (S) and expectation regime shifts (E).

**Table 2.1:** Probability of Crises For Different Calibrations of the Term Frequency

Crisis	$P[x > 0]$	$P[x > q(0.05)]$	$P[x > q(0.25)]$	$P[x > q(0.5)]$	$P[x > q(0.8)]$
Sovereign crises (S)	58%	53.9%	42%	27.4%	10.9%
Expectations (E)	30.9%	28.1%	21.2%	12.9%	4.5%
Severe recession (Y)	19.4%	17.2%	13.7%	8.8%	4.2%

**Source:** [Complex Crises Database \(CCD\)](#).

**Note:**  $P[x > 0]$  is computed as the proportion of periods with strictly positive term frequencies.  $P[x > q(0.05)]$  corresponds to the probability that the term frequency of the index is larger than the 5th percentile.

The probability of negative expectation regime shifts is 30% (34% in high income countries) and last on average two years (Table 2.2). Severe economic downturns oc-

cur with a probability of 19.42% (24% in high income) for an average duration of a year and a half<sup>14 15</sup>. Tensions on Sovereign debt repayment are much more frequent (58% across the whole sample and 36% in high income countries) and display heterogeneous duration. Two and half years in high income countries, but close to 7 years in low income countries.<sup>16</sup>

The Expectation regime shifts measure the qualitative perception of negative expectations and can be seen as the results of the information aggregations about several standard measured including the VIX, spreads, or non-price measures such a media coverage or policy communication. While methodologically very distinct, this measure can be related to estimation of the common factor in the spirit of [Miranda-Agrippino and Rey \(2020\)](#) where the first factor is usually associated to investor uncertainty and the price of risk as well as foreign factors ([Miranda-Agrippino and Rey \(2020\)](#) and [Aguiar et al. \(2016\)](#))<sup>17</sup>.

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<sup>14</sup>Duration in line with ([Bordo et al., 2001](#)) documenting recessions of about 2 to 3 years for the period 1880-2001

<sup>15</sup>The occurrence of economic slowdowns represents around 58% (not reported), in line with the relative symmetry of the business cycle found in the literature

<sup>16</sup>The results might be seen as contrasting with traditional figures reporting much lower default probabilities, several remarks are important. First, there exists a large heterogeneity across countries with a probability decreasing to 36% when considering only high income countries and 28% for the sub-sample of developed economies (AUS, AUT, BEL, CHE, DEU, DNK, ESP, FRA, GBR, GRC, HKG, HRV, HUN, IRL, ISL, ISR, ITA, JPN, KOR, NLD, NZL, PRT, SVK, USA). In particular, our sample includes many low-income countries which are less often included in the literature and that suffers from chronic refinancing issue with almost no access to bond markets. Second, this result hides a large heterogeneity across episodes with possible minor concerns for high-debt countries in the absence of acute pressure.

<sup>17</sup>It is useful to note that common factor models are usually estimated using IMF data covering a large country coverage and including variables ranging from world production, world trade; world financial conditions and world private liquidity indices, but also capital flows measures, exchange rates, commodity price index or volatility measures ([Miranda-Agrippino and Rey, 2020](#))

**Table 2.2:** Average Duration of Crises (in Years)

Crises	Income group	N. years
Expectations (E)	High	2
	Low	1.8
	Lower middle	2
	Upper middle	1.9
Severe recession (Y)	High	1.7
	Low	1.5
	Lower middle	1.5
	Upper middle	1.6
Sovereign Crises (S)	High	2.5
	Low	6.8
	Lower middle	5.4
	Upper middle	3.9

**Source:** [Complex Crises Database \(CCD\)](#), world Bank income group classification and author's calculations.

In this paper, I propose a definition that includes sovereign crises with default and without default. In contrast with the standard definition of sovereign crises that define sovereign crises as events involving (i) missed payments (a legal default) and/or (ii) a debt restructuring at terms that are worse than the original terms, implying creditor losses (“haircuts”) and/or coercion imposed by the sovereign ([Ams et al., 2019](#)), I include in our definition the events where government face high sovereign bond yields and debt rollover problems, but not necessarily missed payments or legal default ([Mitchener and Trebesch, 2021](#))<sup>18</sup>.

This broader definition covers well-known episodes that are not on the radar of the traditional definition such as most European countries during the euro area crises, Mexico (1994/95), Thailand (1997/98), Brazil (1999 and 2002), Turkey (1999-

<sup>18</sup>See [Sturzenegger \(2004\)](#) for an overview of sovereign debt crises analysis and [Buchheit et al. \(2019\)](#) for a discussion of sovereign debt restructuring processes.

2001) or Portugal (2011-2013). This choice is in line with [Pescatori and Sy \(2007\)](#) that argue that default events are no longer a reliable indicator of rollover pressures. [Mitchener and Trebesch \(2021\)](#) argue that sovereign crises without default have a long history, but represents more than 80% of the episodes in the modern area (1995-2018).

In contrast with [Pescatori and Sy \(2007\)](#), [Mitchener and Trebesch \(2021\)](#), [Aguar et al. \(2016\)](#)<sup>19</sup> or [Broner et al. \(2013\)](#) that identify debt crises as episodes with strong increases in bond yields (“spread crisis” or “spread spikes”) I rely on the narrative about debt rollover pressure as identified by the IMF. While this difference is minor for advanced economies or emerging countries with a liquid foreign debt market and robust statistical infrastructure over a long period, it includes a broader sovereign risk measure that covers all countries in particular middle and low income countries during the period<sup>20</sup>.

## 2.2.2 Identifying The Nature of Expectation Regime Shifts

To provide a proper definition of expectation regime shifts (E) index I performed a linguistic analysis by extracting additional information on the nature, source and origin of these events (Annex C).

Concretely, I sub-sampled the reports identified by a positive term frequency of the expectation variables (E) and extracted the whole paragraph associated to the identified key word. After a comprehensive cleaning (removing stop words and stemming) I tokenized the paragraphs, computed the term frequencies of each words and

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<sup>19</sup>Crisis is defined as a change in spreads that lie in the top 5 percent of the distribution of quarterly changes that corresponds to a jump of 158 basis-point jump in the spread. This definition impose that across the sample sovereign crises constitute 5% of the time.

<sup>20</sup>The larger periods of sovereign default in this paper reflects several reasons: high spread periods are more frequent that default, the sample of countries is less bias toward advanced economies, the frequency is annual. For instance the EBMI index usually used to measure the spread on sovereign debt of emerging economies only start in the early 1990 and later for many countries, for example Chile

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investigated the frequency of occurrence and linguistic relationships. The following transcripts provides some examples of description of Expectation Regime Shifts:

- MEX 1961-07-05: *"these objectives are: (1) to achieve an internal balance in 1961 and 1962 through appropriate financial policies that will enable Mexico to meet necessary expenditures, both for consumption and investment, public and private, (2) to strengthen confidence in the convertibility and stability of the Mexican peso both at home and abroad by establishing internal balance, thus checking speculative capital movements, arresting price increases, and stimulating savings, (3) to lay a foundation for further expansion in production and growth of the Mexican economy through increased savings that will not endanger the nation's balance of payments."*
- IDN 1969: *"during the past year, there were speculative attacks on the rupiah fed by rumors regarding the timely availability of foreign aid, the danger of food shortages, and generally the ability of the government to meet seasonal exchange requirements."*
- MEX 1995-12-06 review: *"the latest market instability seems to have been related to concerns about the prospect for an early recovery and the health of the banking system; fears (in advance of the budget announcement) of a relaxation of economic policy, and a general uncertainty about Mexico's short-term political and economic prospects." [...] "the positive market responses to two recent international bond offers also suggest a strengthening of market confidence, possibly related to a generally favorable response to the 1996 budget, and the announcement of additional government support for commercial banks facing difficulties."*
- MEX 2009-02-05 article IV: *"this reflected in part deleveraging by foreign investors, and generalized heightened risk aversion amongst market players" [...] "negative feedback effects between worsening credit quality, weakening bank capital, and a further growth slowdown, are key downside risks to the outlook." [...] "amidst a global confidence crisis, the authorities have so far managed to preserve market confidence in Mexico public finance." [...] "they believe that access to FCL resources could play a positive role to support their macroeconomic strategy and bolster confidence until external conditions improve, and complement financing from the fed (us\$30 billion swap line, expiring this October), as well as other multilateral (us\$5 billion in 2009 from the world bank and idb)" [...] "the objective of the flexible credit line (FCL) arrangement with Mexico, at the time of its approval, was to support the Mexican authorities overall*

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*macroeconomic strategy and bolster confidence until external conditions improve, by providing assurance that Mexico is in a very strong position to manage any potential risk and pressures in the event that the global situation were to deteriorate further."*

Table 2.3 Provides the probability of expectations regime shifts by type. The highest probability corresponds to nonlinear increases in the level of risk (36%). Brutal loss of confidence occur in 20% of time and extreme psychological disruption such as distress or panic in less than 3% <sup>21</sup>.

**Table 2.3:** Probability of Expectation Regime Shifts by Nature

Countries	E	risk	confidence	uncertainty	sentiment	distress	panic
All	30.9%	36.4%	20.6%	8.5%	1.9%	2.6%	2.99%
High Inc.	34.6%	37.5%	24.3%	8.8%	1.7%	0.7%	3%
Low Inc.	22.3%	30.7%	11.5%	5.5%	0.4%	6%	2%
Middle Inc.	31.2%	37.4%	21.1%	9.1%	2.5%	2.7%	3.3%

**Source:** Complex Crises Database (CCD) and author's calculations.

**Note:** Probability of occurrence of adverse expectation related words in IMF country reports. These frequencies only includes the occurrence in paragraphs previously identified as discussing the details about expectation regime shifts. For instance 8.45% of periods are identified as mentioning the occurrence of expectation regime shifts related to uncertainty.

Table C.2 shows the same exercise for a selection of related topics. Policy and government related outcomes (*debt* (4869<sup>22</sup>), *policy* (4340) and *fiscal* (3646)) as well as *financial* (3369) and *banking* (3250) issues are the most often associated expressions to shifts in expectations. On the contrary, supply shocks such as *oil* (1085) or *commodity* (310) seem far less associated to macroeconomic expectation regime shifts. *Global* related concerns (1929) are slightly more prevalent than *domestic* (1240) and have been gaining importance in recent periods.

<sup>21</sup>Table C.1 provides the number of occurrences of each of those words. The most common is *risk* (19,828 occurrences), *confidence* ranks second (7516 occurrences). Far less frequent, *stress* (442), *panic* (331) and *aversion* (237) refers to specific events and are only used for particularly acute and specific developments.

<sup>22</sup>Numbers in parentheses correspond to the number of occurrences found in the reports



To narrow down the linguistic relationships I looked at proximity of each word with those reflecting the source, origin, or nature of the concept under scrutiny. To do so, I counted the frequency of words in a range of 15 words before and after the targeted word. The 20 more frequent associated words are shown in Table C (in Annex) for a chosen set of relevant expectations related words. This linguistic analysis is useful to understand what are the causes and transmission channel of expectation regime shifts. Overall, they have been largely associated to financial related shocks, perspectives on output fluctuations (largely external) and concerns on the conduct of macroeconomic policy.

Similar to risk, the origin of both uncertainty and aversion are related to international developments. Aversion, from financial market and investors while uncertainty is subject to economic and financial outcomes as well as government fiscal policies and debt concerns. The drop in confidence reflects domestic concerns regarding financial spillovers and government policy decisions (specifically through debt, reforms, and external support) that may materialize in specific crises such as economic downturns, bank runs or debt distress<sup>23</sup>.

Table 2.4 shows the probability of expectations regime shifts associated to different source and origin. Policy related ERS occur in 18.75% (15.75% for fiscal policy and 9.31% for monetary policy) of the time. Financial related ERS are the second-highest source of concern, respectively 14.69 and 15.94% for banking and financial outcomes. Adverse sentiments about real shocks such as oil or commodity are much less frequent but account for 6.14% for oil related shocks and less than 2% for concerns about commodity dynamics<sup>24</sup>.

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<sup>23</sup>(Cimadomo et al., 2016) for details on how the conduct of credible fiscal plans and economic perspectives are important components of forecasts and sovereign spreads.

<sup>24</sup>The cross-country average hide large country specificities, for instance oil related ERS representing 44% in the United Arab Emirates or 30% in Angola

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**Table 2.4:** Probability of Expectation Regime Shifts by Type

Countries	policy	fiscal	monetary	banking	financial	economic	ex. rate	commodity
All	18.8%	15.7%	9.3%	10%	15.9%	13.7%	6.1%	2%
High Inc.	20.7%	19.1%	11.2%	20%	18.1%	15.5%	9.6%	1.3%
Low Inc.	12%	9.4%	5.3%	10%	9.6%	8.6%	5.7%	1.8%
Middle Inc.	19.5%	15.7%	9.4%	10%	16.5%	14.1%	9.5%	2.4%

**Source:** [Complex Crises Database \(CCD\)](#) and author's calculations.

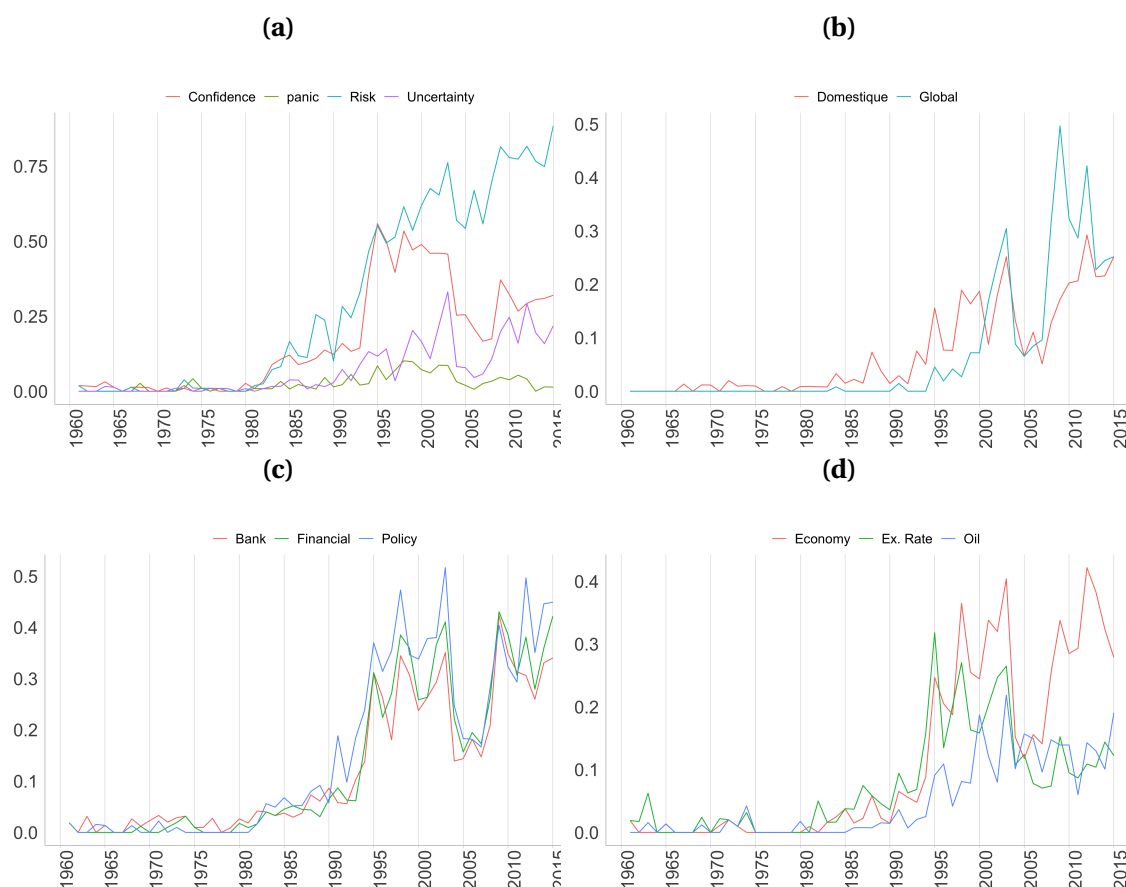
**Note:** Probability of occurrence of adverse expectation related words in IMF country reports. These frequencies only includes the occurrence in paragraphs previously identified as discussing the details about expectation regime shifts. For instance 18.75% of periods are identified as mentioning the occurrence of expectation regime shifts related to policy.

Figure 2.2 shows that the intensity and drivers of expectation regimes shifts are time dependent ([Rossi et al. \(2016\)](#), [Nowzohour and Stracca \(2020\)](#) and [Kozłowski et al. \(2015\)](#))<sup>25</sup>. The two largest spikes occur around 2001-2003 and during the GFC 2008-2010 for all the different components of expectations. However, a number of differences emerge.

<sup>25</sup>In Chapter 1 I detail the challenges and benefits of a lexicon approach to capture crises sentiment in the corpus of IMF documents. They emphasize the need for a stable and homogeneous linguistic to make sure that the index properly reflects the vocabulary used throughout the years. In particular, a careful design of the lexicon is necessary to ensure that expressions used in remote periods are captured by the indices.

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**Figure 2.2:** Evolution of the Nature, Source, and Origin of Expectation Regime Shifts



**Note:** The proportion of countries that display a strictly positive term frequency of words belonging to the same sentence in paragraphs identified as referring to expectation regime shifts. Sentences are defined as a proximity of + or - 15 words after cleaning of stop words. Words are stemmed to ensure proper counting.

First, the increase in the occurrence of *risk* is much larger than the increase in the occurrence of *confidence* during the GFC. While the *risk* reaches the level of the early 2000s, it remains below the levels of the second half of the 1990s for *confidence*.

Second, while the recovery to positive expectation and confidence was as sharp as the spike in 2001-2002 it stayed at particularly high levels for *risk* with a clear W-shaped pattern at levels never reached before. The GFC and the following euro area sovereign debt crises acted as a structural break in the degree of macroeconomic risk,

confirming the existence of a potential stagnation trap mechanism in the spirit of [Benigno and Fornaro \(2018\)](#). The level of confidence also failed to decrease quickly with a long period of slow recovery, that confirm the findings that low trust on recovery can be important in the aftermath of large recessions ([García \(2013\)](#), [Guiso \(2012\)](#)).

A third important observation concerns the occurrence of *uncertainty*. In contrast to *risk* or *confidence*, *uncertainty* does not react abruptly and seems to rather steadily increase after crisis outbreaks. Furthermore, the level of uncertainty also plateaued in a pattern similar to *risk*. This evidence shows that the GFC has also acted as a structural break for uncertainty measures inline with [Kozłowski et al. \(2015\)](#).

In this respect, the main lesson of the post 2008 period is the following. Adverse expectations usually originated in high levels of risk and persistent uncertainty, mostly related to the conduct of fiscal policy, financial markets, banking sector developments and concerns about global shocks. However, the volatile expectation outcomes observed in the 1990s suggests that adverse shifts in expectations is not specific to the  $XXI^{th}$  century and has a longer history in particular among middle income countries.

Figure 2.3 shows the difference between effective crises outcomes and specific expectation regime shifts. Figure 2.3a shows the evolution of the proportion of countries experiencing financial crises and financially related ERS<sup>26</sup>.

The first observation is that unsurprisingly expectations correlates with outcomes, however the relative importance vary in time. In particular, the proportion of negative expectation regime shifts about financial outcomes exceed the proportion of countries in effective crises trough-out the period 1990-2006 but is lower during the 1980s and during the GFC. During the period 1990-2006, a number of countries did not experience effective financial crises, but yet suffer negative expectation spillovers. On the contrary, during the GFC, the non-fundamental transmission of the financial

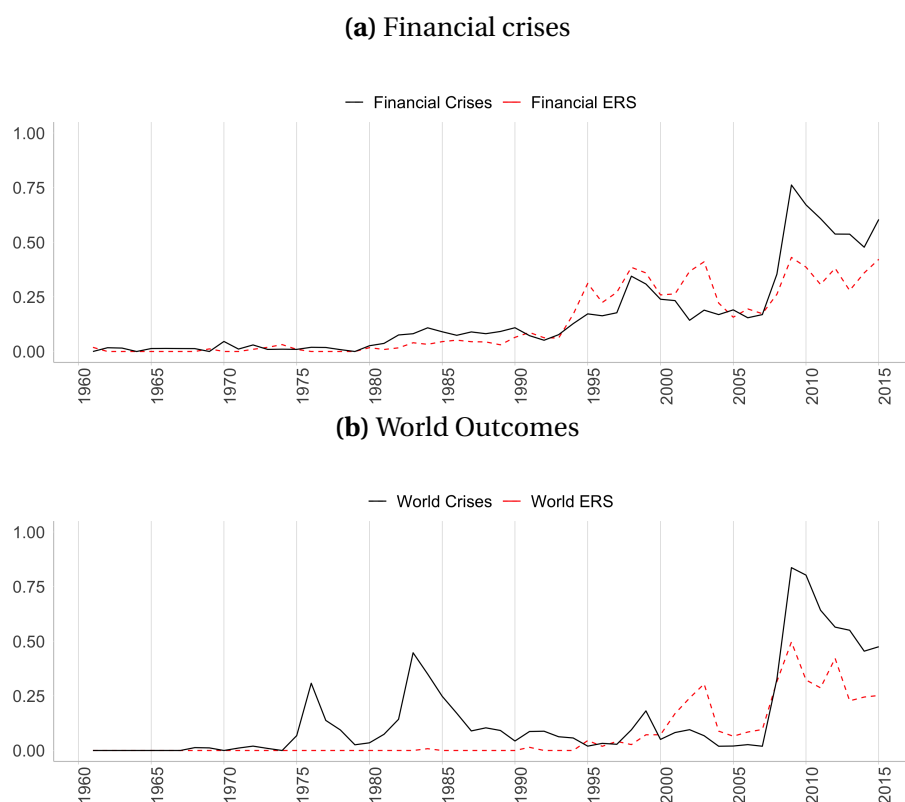
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<sup>26</sup>Financial ERS corresponds to reports mentioning Expectation regime shifts and which associated paragraphs contains the word financial

crises only concerned a sub-sample of countries experiencing financial tensions.

A similar evolution is observed in Figure 2.3b that plot the proportion of world related ERS and the occurrence of world scaled crises. The proportion of countries experiencing negative expectations about global outcomes only exceed the number of countries effectively experiencing fundamental spillovers in the period 2001-2003. The GFC see both crises and negative expectations about world scale crises peak-up, while the pre-1995 period display no negative sentiment about non-fundamental spillovers from international crises but do feature important fundamental impact around 1976 and 1982.

**Figure 2.3:** Times Series of Fundamental Versus Non-Fundamental Shocks: Global Shocks and Financial crises



**Source:** *Complex Crises Database* (CCD).

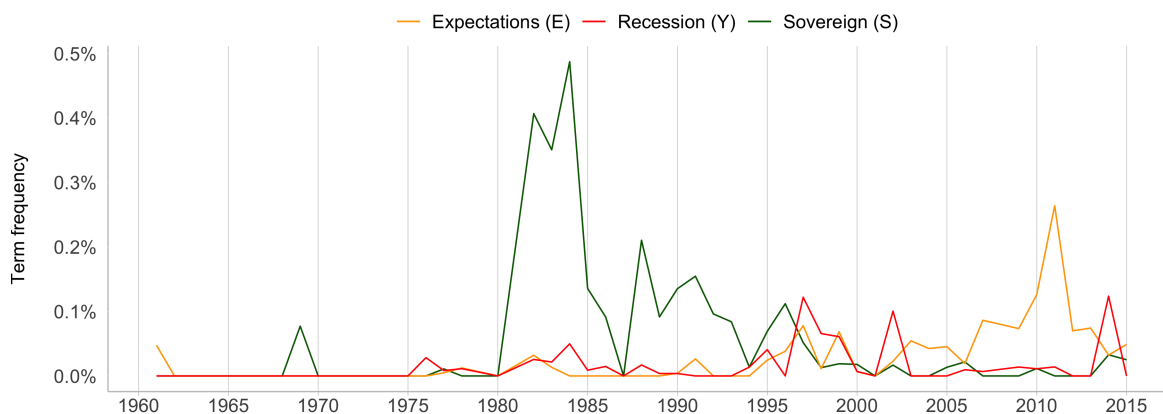
**Note:** The figure displays the share of countries experiencing a crisis (fundamental component in black) and specific (financial panel a) and world crisis panel b)) expectation regime shifts (non-fundamental component in red dotted).

### 2.2.3 A Case Study: Psychological Driven Sovereign Crises in Mexico

Figure 2.4 shows an example of the dynamic of recession, expectation regime shifts and sovereign default for Mexico, a country with a well-documented history of macroeconomic crises. The case of Mexico is an illustration of the joint dynamic between sovereign crises, economic recessions and expectation regime shift and consequently

provide an interesting case study to introduce this type of events.

**Figure 2.4:** From 1<sup>st</sup> to 2<sup>nd</sup> Generation of Crises in Mexico



**Source:** *Complex Crises Database* (CCD).

**Notes:** Term frequencies captures the proportion of crises related expressions with respect to the total number of words in the reports. Terms frequencies of each report are averaged over the year.

The Bretton Wood periods was a period of economic expansion and moderate fluctuations for the Mexican economy. The first episode of tensions occurred in August 1982 with the suspension of payments on the Mexican public debt and the financial assistance from the IMF and the United States (Sablick, 2017). This episode was not specific to Mexico and also concerned other countries such as Zaire and Peru that declared bankruptcy or Argentina and Brazil that also suspended their payments. While the reversal appeared sudden in 1982 it reflects a long period of foreign debt accumulation during the 1970s, fuelled by and accommodating US monetary policy and already emerging financial distress since 1978 (Kindleberger, 1975). Mexico actually displayed early signs of economic recessions in the late 1970s, with no major concerns of debt repayment and panic. The following transcript provided the Statement by Mr. Buira on Mexico Executive Board Meeting 82/99 on July 16, 1982, and reflects the view expressed in the bilateral surveillance at the time.

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"The causes of the imbalances were both domestic and external. On the external side, the different cyclical position of the Mexican economy, which had been growing at record rates, contrasted sharply with the stagnation or decline experienced by its main trading partners in the industrial world, as a result of their pursuit of restrictive financial policies in the fight against inflation. These policies, which led to the virtual stagnation of world trade in 1980 and 1981, to a progressive softening of the oil markets and to historically high rates of interest in real terms in international financial markets, were to have a serious adverse impact on the value and volume of Mexico's exports and on the level of debt service payments." [...] "On the domestic front, a too rapid expansion of domestic demand, associated with unprecedented levels of current and investment expenditure both public and private, was compounded by the increase in the public sector deficit which resulted from the decline in revenues from oil exports and from the insufficient adjustment of prices and tariffs of goods and services provided by the public sector." [...]

"The continuing deterioration of the external position and the recurrence of outflows of short-term capital led the Banco de Mexico, the central bank, to withdraw from the exchange rate market on February 17, 1982, to allow the peso to find an appropriate level"

The years 1982-1984 capture the worst tensions around public debt and see the coexistence of a recession and the first moderate signs of panic crises. Contrary to this early episode with unsustainable levels of debt combined with the reversal of the international economic environment and US monetary policy, the Tequila crisis (1994-1995) provides the clear characteristic of a complex endogenous crisis with strong feedback and interactions between output collapse, loss of confidence, political unrest (peasant conflicts and assassination of presidential candidate), an earthquake, an exchange rate crash, a rollover pressure on sovereign debt and a necessary external assistance (Sablick, 2017; Mishkin, 1999; Musacchio, 2012; Kindleberger, 1975). The following transcripts detail the perception of the IMF on the developments of the Tequila crisis (see Annex E.2).

MEX 1994-02-28 article IV: *"it is to be hoped that, after the elections, the new government*



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*will be in a position to quickly finalize negotiations on a fund-supported adjustment program, which could pave the way to much-needed debt relief." [...] "clearly, significant amounts of assistance and debt rescheduling will be needed." [...] "this is evident from the high level of the ratio of the fiscal deficit to GDP, the extremely high debt-service ratio and the associated large buildup of external arrears to 68 percent of GDP, the continuing large deficit-even with some improvement-in the external current account as well as in the overall external balance, and the uncertain trends in the level of the official reserves." [...]*

MEX 1995-02-01 request: *"this confidence crisis is closely related to worries that the impossibility of rolling over tesobonos and other dollar denominated obligations coming due may represent an important source of pressures on the exchange rate." [...] "moreover, there had been clear signs of the re-emergence of financial panic, which had threatened to spread beyond Mexico to other emerging markets in the western hemisphere and other regions." [...] "this risk of a new form of debt crisis is of a systemic nature because the whole financing of emerging countries would be endangered if this perception were to become a self-fulfilling prophecy." [...] "we commend the staff and the managing. Director for their quick and determined approach to help Mexico overcome its confidence crisis." [...]*

The transcript of the Statement by Mr. Guzman on Mexico Executive Board Meeting 96/75 on August 2, 1996, shows how the 1994-1995 episode stands out compare to the 1982 events.

"The evolution of the main macroeconomic aggregates during 1996, provides clear evidence of the merits of the strategy set in motion to overcome the worst economic crisis in Mexico since the Great Depression. After a real GDP fall of nearly 7% in 1995 a moderate recovery of economic activity has begun. Simultaneously, inflation has been cut down sharply and the improvement in confidence has allowed a 16.6 percentage point decline in yields on 28 day Cetes throughout the year to coincide with a modest nominal appreciation of the peso. On the other hand, while the banking system continues to face a difficult situation, the measures put in place have contained the magnitude of the problem and there are reasonable grounds for optimism. In the face of clear progress

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in the restoration of macroeconomic stability and a more favorable outlook, the conditions under which Mexico has obtained resources in international capital markets have improved. Thus, Mexico has been able to prepay substantial amounts of the emergency assistance received from the Fund and the US authorities only a year and a half after the crisis started."

The case of Mexico provides an example of the variety of possible type of crises, and in particular events with moderate sovereign debt pressure combined with volatile expectations contemporaneous with a deep recession. Retrospectively, the 1994-1995 crisis stands out as the archetype of a highly psychological sovereign crises with minor direct costs of the sovereign crisis (absence of default), but an important non-fundamental component fuelled by domestic and external developments that disrupted the entire economic and financial activity.

The particular nature and structural shift in this type of crises was indeed already largely understood by policymakers of the time. For instance, [Sabllick \(2017\)](#) recall a quote from the FED Chairman of the time Allan Greenspan: "We are obviously dealing with a highly psychological issue and a very significant amount of international financial volatility". This statement was confirmed by Robert Rubin, former United States Secretary of the Treasury during the Clinton administration ([Rubin and Weisberg, 2003](#)). Rubin points out that the tequila crisis was seen as at the time as the early version of the *Complex Crises* to come during the *XXI<sup>th</sup>* century<sup>27</sup>.

*"Mexico is a good example of a situation – often encountered by policymakers as well as by those in the private sector – in which all decisions had the potential for serious adverse consequences and the key was to find the least bad option. In this case, the danger of not acting were severe economic duress in Mexico, a contagious decline in emerging markets, and a setback to American growth and prosperity. The risk of acting was failure – potentially endangering repayment of billions of dollars of taxpayer money – or if we succeeded, moral hazard."*

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<sup>27</sup>A fact also noted by the IMF director Camdessus that saw the Tequila crisis as the "the first crisis of the 21st century."

Difficult bargaining between the American administration, the IMF, and the Mexican government finally ended in a successful rescue plan involving additional swap lines for the central bank of Mexico and an unprecedented lending arrangement<sup>28</sup>:

*"President Clinton authorized the \$20 billion loan from the ESF on Jan. 31, 1995. An additional \$17.8 billion from the IMF and \$10 billion from the Bank for International Settlements brought the total aid package up to nearly \$50 billion. With this assistance, Mexico was able to meet its demands and avoid default, but it did suffer a severe recession. Eventually, its economy recovered, and it repaid its loans in full and ahead of schedule."*  
Sablick (2017)

The success of this intervention allowed a quick recovery and a long period of stabilization of the Mexican economy that was finally ended by the third wave of large disruption that occurred in the aftermath of the GFC.

In contrast with the period 1980-2000, no major tensions on public debt or economic collapse were directly generated by the world recession and the banking crisis in advanced economies. However, this large external shock affected the Mexican economy strongly via the panic channel with large concerns about potential self-fulfilling crises forcing the IMF and the Mexican government to agree on a precautionary lending arrangement (Flexible credit line) in 2009, 2010, and 2011 with the objective of avoiding an investor panic and consequent capital flight.

This episode is symptomatic of the structural change in the nature of macroeconomic crises with sudden, sharp and global panics deeply affecting countries with sound macroeconomic fundamentals and forcing authorities to design coordinated international policy interventions, tackling both fundamental and non-fundamental drivers. The rise of forward guidance, unconventional monetary policy and coordi-

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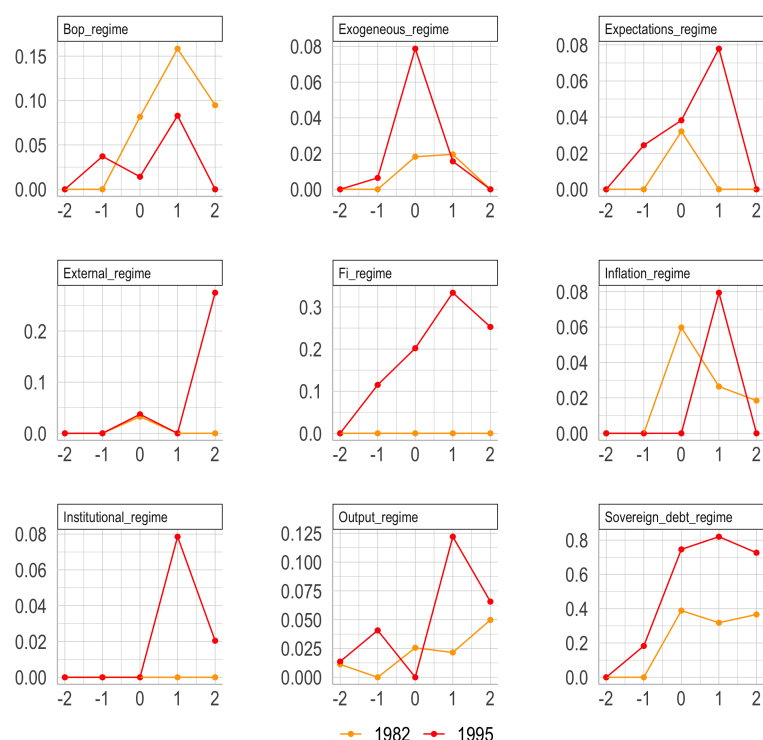
<sup>28</sup>see [Rubin and Weisberg \(2003\)](#) on the similarity to Colin Powell's doctrine of military intervention: "The Powell doctrine, which became well known during the Persian Gulf War says that the United States should intervene only when American interests are at stake and that intervention must be with an overwhelming level of force.[...] If investors believe that a government has sufficient resources to right itself and that reforms are in place to deal with the underlying problems, the outflow should stop."

nated policy interventions are additional symptoms of the complex management of modern macroeconomic crises.

To have an idea of how the narrative regarding the two episode of crisis in Mexico, I show how the main crisis indicators evolve around 1982 and 1994. Figure 2.5 provides the evolution of the indicators in a 4 years window around sovereign crises in Mexico in 1982 and 1994. Both crises feature systemic disruptions, however several differences can be notice. The 1982 crisis is associated to a more severe balance of payment and currency crises that culminate in 1983, an inflation peak up in 1982 and a temporary disruption in the Expectation regime and external shock in 1982. The sovereign crises emerge in 1982 and prolonged in the following two years. Across these indicators, no major differences can be noticed between the crisis in 1982 and the crisis in 1994. The major difference stands out with respect to the absence of financial and institutional crises in 1982. In addition to the size of the exogenous shocks and the amplitude of the recession and sovereign crises is much larger in 1994. While the external dimension is similar at the triggering of the crisis in 1982 and 1995 the consequence of the crises in South Asia in 1998 appears in the aftermath of the Tequila crisis.

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**Figure 2.5:** Crises Regimes Around Crises in Mexico: 1982 and 1995



**Source:** *Complex Crises Database* (CCD)

**Note:** The figure display the average term frequency for different crisis' regime in Mexico in the 4 years window around 1982 and 1995. Output regime measures the intensity of severe recession; Bop regime measure the occurrence of balance of payment and currency crisis; Financial regime include financial and banking crisis; Institutional regime includes social and political crisis, Exogenous regime includes Natural disasters, Epidemics, Commodity crises or violent conflicts; External regime includes world outcomes and contagion; Sovereign debt regime indicate the occurrence of tensions on public debt (it is not default but rather mentions of high and rising public debt); inflation refers respectively to inflation crisis.

The cases of Mexico and the United States (Section 1.1 Annex D) show that the diffusion of risk across economic agents and the abrupt shift of expectations can occur for a variety of reasons. In many occasions direct endogenous economic or financial outcomes are the roots of disruption, in other occasions exogenous non-economic reasons such as armed conflicts, terrorists attack, political instability or epidemic outbreaks trigger the snowballing adverse dynamic. The last 60 years were full of nu-

merous events with the power to reverse market expectations. The observed differences across episodes and countries reflect mainly the different economic structure and set of vulnerabilities that link volatile expectations and refinancing costs.

Regarding cross countries differences, we can note that while expectation regime shifts are associated with adverse financial outcomes and contagion at all level of development, it appears that lower income countries are particularly affected by risks and uncertainty steaming from non-economic origins. The high level of risk and uncertainty in the post GFC period can come as a surprise with respect to traditional risk and uncertainty measures, however, the evidence of structural change documented in this paper confirm the findings that the risk in the post GFC periods may have been underestimated.

The unprecedented used of unconventional monetary policy and the record high levels of private and public debt across all countries in the context of highly constrained fiscal and monetary conventional policies also constitute an important risk and uncertainty for financial and economic actors. In this context, government action and commitment have become an important focal point of expectation formation. The higher level of financial related risk aversion as well as the more careful attention to neglected sources of risk such as violence, epidemics, or sudden migration can be one explanation for the finding that the “*panic recovery*” following the GFC was very different from the early 2000s when risk disappeared as fast as it occurred.

### **2.3 The Amplification Effect of Expectation Regime Shifts**

In this Section I proceed with the estimation of the relationship between economic recession ( $Y_{it}$ ), adverse expectations ( $E_{it}$ ) and sovereign crises ( $S_{it}$ ) (Equation 2.1), provide details of the identification strategy and discuss the results. To facilitate the comparability of indices, I normalized all variables and ensure their stationary by

estimating the equation in first difference.

$$\begin{cases} \Delta Y_{it} = \beta_s^y \Delta S_{it} + \beta_e^y \Delta E_{it} + \beta_X^y \Delta X_{it} + \alpha_i^y + \delta_t^y + \epsilon_{it}^y \\ \Delta E_{it} = \beta_y^e \Delta Y_{it} + \beta_s^e \Delta S_{it} + \beta_X^e \Delta X_{it} + \alpha_i^e + \delta_t^e + \epsilon_{it}^e \\ \Delta S_{it} = \beta_y^s \Delta Y_{it} + \beta_e^s \Delta E_{it} + \beta_X^s \Delta X_{it} + \alpha_i^s + \delta_t^s + \epsilon_{it}^s \end{cases} \quad (2.1)$$

I concentrated on six parameters of interest that I estimate below.  $\beta_y^s$  and  $\beta_s^y$  respectively capture the direct effect of recessions on sovereign crises and the direct effect of sovereign crises on recessions, and are referred to as *Fundamental parameters*.  $\beta_e^y$  and  $\beta_e^s$  respectively capture the effect of adverse expectations on recessions and sovereign crises and are referred to as *Self-fulfilling parameters*.  $\beta_y^e$  and  $\beta_s^e$  respectively capture the contribution of recessions (Recession hypothesis) and sovereign crises (Failure hypothesis) on expectation regime shifts, that are coined *Panic parameters*.

The direct estimation of the system using simple OLS is not satisfactory due to the simultaneity and omitted variable bias. To correct for it, I consider the following strategy 1) limit risks of omitted variables bias by controlling for a large set of crises channels and unobservable, 2) tackle the simultaneity bias using exogenous shocks as instruments for each variable of interest, 3) identify the direct and indirect effects of sovereign crises by including in the traditional equation of the cost of sovereign default ( $S_{it}$ ) the measure of shift in expectations ( $E_{it}$ ).

The set of controls ( $X_{it}$ ) includes a range of financial market related crises: banking, currency, balance of payment, financial, labor market crises and housing crises, nominal shocks (inflation), and three institutional shocks: political, social and violent conflicts. All controls are taken from The [Complex Crises Database \(CCD\)](#) and extensions in the same spirit to capture policy related interventions (tightening or loosening monetary policy, stimulus or fiscal consolidation, forward guidance, unconventional monetary policy, financial stabilization policies and coordinated policy

measures) and specific reforms about financial deregulation and liberalization policies.

Outcome ( $Y_s$ )	Economic Channel ( $X_i$ ) controlled for	Exogenous Instrument ( $Z_j$ )
<ul style="list-style-type: none"> <li>- Sovereign Crisis</li> <li>- Expectation</li> <li>- Eco. Recession</li> </ul>	<ul style="list-style-type: none"> <li>- Banking crises</li> <li>- Financial turmoil</li> <li>- Balance of payment crisis</li> <li>- currency crash</li> <li>- Housing crisis</li> <li>- Political instability</li> <li>- Social instability</li> <li>- Violent conflicts and wars</li> <li>- Unemployment crises</li> <li>- Economic Expansion</li> </ul>	<ul style="list-style-type: none"> <li>- Expectations (via Number IMF Exec. Meetings)</li> <li>- World scale Crises</li> <li>- Crisis Contagion</li> <li>- Migration</li> <li>- Natural disaster</li> <li>- Epidemic</li> <li>- Trade</li> <li>- Commodity</li> </ul>

In order to account for potential time varying evolution of the measure and perception of the sentiment variable, I included time ( $\alpha_t$ ) and country fixed effects ( $\delta_i$ ). Finally, heteroscedasticity robust standard errors are calculated.

The estimation intent to provide a response to a particularly difficult empirical question for which no standard and completely convincing method has been found. Among the reasons we can cite the absence of valid and extensive (country and time) indicator of expectations regime shifts (mainly using statistical methods or market based data), the lack of exogenous instruments, limited capacity to correct for confounding factors, an identification largely relying on high frequency measure that limits the capacity to capture significant aggregate effects<sup>29</sup>, and a sample bias toward advanced economy with good quality financial market data where the dynamic of interests is rarer than for middle income countries.

The estimation should be seen as an intent to provide a test of the relative valid-

<sup>29</sup>“ a very well identified shocks (cf high frequency evidence) is that they are often small so that the statistical power to detect any effect is limited. Necessary trade off between perfect identified shock and detectable effect”, [Stock and Watson \(2018\)](#)



ity of two set of models: standard models with pure real and fundamental linkages and models with non-fundamental drivers. The effect of Expectation Regime Shift even if not perfectly identified suggests that models that do not include psychological feedback effects miss an important mechanism that explains the severity of severe sovereign and economic crises all the more in more recent periods.

The choice of the simultaneous equation estimation was driven by the willingness to estimate the contemporaneous doom loop between fundamentals, expectations and sovereign crises. The absence of time dimension is justified by the nature of the report that is akin to a smoothing over a range of 2 to 4 years before the report (see Chapter 1). It is one reason why I do not use any dynamic specification (vector auto regression and internal instruments) and concentrate on simultaneous relationship (that is coherent with the yearly frequency of dataset that make more difficult assumptions relying on the timing of the shock (ordering of variables). The use of a large set of controls is intended to isolate the sovereign-recession doom loop, but naturally the results do not minimize the existence of other doom loops, in particular with respect to banking and financial crises.

### **2.3.1 Theoretical Framework and Relation with Theory**

As presented in the literature review, the effect of psychological amplification effect of crises as a long history in the economic crisis literature. The main theoretical prediction usually take three forms: 1) Irrational animal spirits (Exogenous optimism/pessimism not related to fundamentals); 2) self-fulfilling animal spirits (fundamentals are impacted by sunspot expectations); 3) News advocates (boom and burst due to realization of negative signal about future economic developments). The paper draw on the Self-fulfilling animal spirit theories and tries to test the following prediction.

On one hand, the psychological component of sovereign crises take the form of

coordination failures among foreign investors due to sudden and large expectations shifts that prevent short term rollover by drying out available funds. First, the effect can kick-in only for intermediate range of fundamentals (vulnerable countries) and second, they can kick in for very or minor changes or no change in fundamentals (self-fulfilling dynamics). In this case, the Expectation regime shift create a possibility for self-fulfilling liquidity crises (spread jumps that prevent rolling over the debt in the spirit of [Aguiar et al. \(2016\)](#)).

On the other hand, noisy endogenous signals can create strategic complementary in absence of technology, preferences, or government policies shocks with effects on production. Self-confirming beliefs about aggregate outcomes can amplify fundamental shocks and/or create self-fulfilling shocks (Keynesian demand driven recession in the spirit of [Bacchetta and van Wincoop \(2016\)](#) and [Angeletos and Lian \(2020\)](#)). Different theories suggest potential sentiment driven business cycles in both rational expectations settings and neo-keynesian framework.

In this case, the non-fundamental dynamic is usually generated through information frictions and strategic complementarities. Most theories underscore that the type of expectations at play are confidence and uncertainty in investment and consumption decisions that generate demand driven business cycles. The circular link between expectation and output is also model through the effect on inflation and interest rate expectations. Consequently, the theory suggests the possible co-existence of non-fundamental driven shocks (self-fulfilling business cycle) or amplification effect of fundamental shocks. In the context of sovereign crisis, such Expectation regime shifts dynamic can create a possibility for self-fulfilling solvency crises where depressed output due to sluggish expectations creates a lower capacity to repay the debt and amplify the financing gap.

Identifying expectations dynamics is challenging both economically and econometrically. All the more that they take the form of self-fulfilling effects, where expect-

tations are assumed to be orthogonal to the state of fundamentals. The estimation in this chapter, mainly, tries to capture the amplification effect of expectation regime shifts rather than claiming a perfect identification of self-fulfilling effects. To better link the theory and the empirical estimation, I perform a three-step approach that allows to narrow down the precise expectation channels at play.

The first dictionary based NLP extraction of the term frequency of the category *Expectations* start by identifying broadly the instances of expectation regime shifts (see lexicon for the list of associated keywords and discussion on the construction of the indices). In a second step, Among the paragraphs identified as referring to expectation regime shifts I compute the distribution of words (Section 2.2, Annex C) and create dummies to classify the nature and source of expectation regime shifts (“uncertainty”, “confidence”, “banking”, “currency”, etc). In the last step, I re-estimate the system of equation for different definition of Expectation Regime Shift and compare their relative explanatory power.

Fundamentals can usually take three form in the literature (Acharya et al., 2021): *Technology, Preferences, or Government Policies*. In the context of the estimation what I call *fundamentals effect* is the *residual direct effect* of output collapse (equation 1)/ sovereign crises (equation 3) after controlling for “technology shocks” proxy by *trade shocks* (balance of payment), *financial shocks* (banking and financial), *political shocks* (political and social crises) and *monetary shocks* (inflation and currency). This specification that controls for confounding factors from companion crisis is intended to “clean” fundamentals from the effect of traditional channels.

Similarly, the specification that includes both crises and policy controls is intended to clean the fundamental effect from both technology and government policy shocks. The residual fundamentals are thus intended to capture the direct effect of recession on sovereign crises (a wealth effect on the denominator and an automatic stabilizer effect in the numerator in the debt ratio dynamic) and the output cost of

sovereign default (wealth effect on investment due to portfolio loss consecutive to the haircut from default). It should be explicit that I do not claimed that fundamentals plays no role and do not strictly estimate self-fulfilling mechanisms where psychological dynamics are orthogonal to fundamentals. Furthermore, the estimation features a large set of controls to shut down many standard direct channels such as banking crises, balance of payment, inflation or currency crises.

The paper build on the theoretical evidence that psychological amplification mechanisms are the norm in current models of sovereign default and output fluctuations. In this context, the psychological dimension of sovereign crises is twofold. One direct non-fundamental effect on sovereign crises itself (a non-fundamental numerator effect where fast moving expectations regime shifts coordinate expectations on the so-called bad equilibrium where refinancing dry out) and one indirect via the *confidence multiplier* that amplify fundamental shocks (a non-fundamental denominator effect)<sup>30</sup>. In a simple model where sovereign crises correspond to a non-linear jump in the debt to GDP ratio ( $\Delta d = \frac{\Delta D}{\Delta Y}$ ) that exceed some form of debt limit, then both the numerator D and the denominator Y can be amplified expectation dynamics (the debt to gdp ratio is then  $\Delta d = \frac{\Delta D(E)}{\Delta Y(E)}$ )<sup>31</sup>.

In Conclusion, my estimation test the hypothesis that non-fundamental effects are an important amplification mechanism of sovereign crises. Contrary to the theoretical literature on sovereign crisis that has mostly concentrated on self-fulfilling liquidity crises, I argue that non-fundamental effects can be twofold. One *non-fundamental numerator effect* that correspond to a coordination failure among foreign investors that dry out financing (non-fundamental liquidity effect) and one *non-fundamental denominator effect* where negative expectations impact output and generates a form of non-fundamental solvency mechanisms.

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<sup>30</sup>In this framework Self-fulfilling crisis are only a special (polar) case (particularly difficult to identify) where the sovereign crises is only driven by animal spirits in absence of fundamental shock

<sup>31</sup>Output is not assumed to be an exogenous shock as in standard quantitative models (Eaton and Gersovitz, 1981)

### 2.3.2 Identification Strategy

The use of a large database covering a wide array of crises and the rigorous identification of expectation regime shifts (Section 2.2) limit the risk of omitted variable bias and ensure a valid measurement of the main variable of interest. The main remaining challenge of estimation is the selection of proper instruments that match the requirements in terms of exogeneity and relevance. In addition, the simultaneity of the system require that is at least one exogenous variable exclusively affects each of the three simultaneous equations (rank condition).

The key condition for valid estimation of such systems using exogenous instruments are the two standard Instrumental variable assumption: exogeneity and validity assumption and the order condition that make sure that at least one instrument is uniquely associated to each equation. The order condition consequently ensure that the system is fully identified. Finding convincing and efficient instruments in macroeconomics is particularly challenging. In particular, due to the trade-off between perfectly identified instruments and the statistical power needed to find aggregate effect (Stock and Watson, 2018).

In this paper, I gathered potential instruments that have been used in the literature to identify specific channels, usually on a small subset of countries or focusing only on one country where such data is available. In light of the different strategies used in empirical macroeconomic, the identification used in this paper somehow mix both cross-sectional identification (all indices have both time and country specific dimensions), instrumental approach relying on quasi experimental shocks, narrative based indicators and the control for confounding factors.

In this respect, the use of a large set of control variables not only minimize the risks of omitted variable bias and measurement errors, but also contribute to the validity of the exclusion restriction. Following Stock and Watson (2018) “First, although an instrument might not satisfy Condition LP-IV, it might do so after including suit-

able control variables; that is, the instruments might satisfy the exogeneity conditions only after controlling for some observable factors. As discussed in Section 5, this is the case in the Gertler-Karadi (2015) application. [...] Second, even if Condition LP-IV is satisfied, including control variables could reduce the sampling variance of the IV estimator by reducing the variance of the error term.”

The system is identified if and only if the set of exogenous variable is not the same for each equation and if at least some instruments are unique to each equation. As explained by Stock and Watson (2017) the instruments might not satisfy condition LP-IV but might do so after including suitable control variables, this approach is used in Gertler-Karadi (2015). In this paper, the identification of each parameter rely on the fact that the instrument impact each variable uniquely conditional on controlling for other fundamental linkages. The exogenous assumption come from the type of shock considered in the first stage and the exclusion restriction from the controls of channels of transmissions. In addition, it is important to recall that the nature of expectation regime shift reflected general foreign investor expectation regime shifts rather than broader expectations of domestic actors (cf previous discussion on the mandate of IMF as international surveillance) and that sovereign crises include sovereign crises with and without default.

- $Z_1$ =**World Outcomes** and denote world scale global recession. It is presumably exogenous ( $E[Z_1, e^E] = E[Z_1, e^Y] = E[Z_1, e^S] = 0$ ) to most countries excepting the G20 and can affect Expectations through the effect on risk aversion of foreign lenders and recession through the direct economic effects on output due to fundamental contagion (banking, financial, bop, currency, inflation, political). However, I assume that there is no direct effect of global recession on sovereign risk other than through the expectation or recession channel after controlling for observable channels. In some sens we consider World outcome to capture an exogenous jump in the risk-free rate, what is akin to assume that

$$E[Z_1, S_{it}|X_{i,t}] = 0$$

- $Z_2$ =**Contagion** and denote contagion from crises in neighboring countries. Crises in neighboring countries is assumed to be exogenous conditions in the domestic economy, however by controlling for the state of specific fundamentals we reduce the likelihood that the crises in the neighboring country originate from a crisis in the domestic economy that spillover to the neighboring country and feedback to the economy. ( $E[Z_1, e^E] = E[Z_1, e^Y] = E[Z_1, e^Y] = 0$ )<sup>32</sup>.
- $Z_3$ =**Number of Executive board meetings**. The executive board meetings (EBM) summarize high level confidential discussions about the publication of the country surveillance documents and staff appraisals<sup>33</sup>. While the EBM are accessible ex-post from the archives, they are confidential events and there is little risk of reverse causality. The intuition behind these instruments is that the disagreement among IMF staff and the board, reflected by a higher number of meetings, only impact the expectations measure through the uncertainty and risk channel. Controlling for potential other reason for additional executive board meeting, reinforce the assumption that it is the degree of uncertainty that is capture via this instrument so that  $E[Z_3, S_{it}|X_{i,t}] = E[Z_3, Y_{it}|X_{i,t}] = 0$ .
- $Z_4$ = **Commodity** a similar instrument is used by Kilian (2008) that estimate the effect of exogenous oil shocks on economic growth. The exogenous assumption of commodity related shocks mainly come from the international determinants of commodity prices, (Schmitt-Grohé and Uribe, 2018) in particular when excluding oil exporters and G20 as I do in robustness checks.

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<sup>32</sup>Using an instrument common to all three equations even if not correcting the simultaneity issue it may still be required to deal with omitted variables, or measurement error (Wooldridge 0).

<sup>33</sup>Lombardi and Wood (2008) suggests that "Ultimately, the only influence the Board has over bilateral surveillance is to place different degrees of emphasis on the various issues raised in the staff appraisal and to voice that emphasis in a summing up, an initial draft of which is prepared by staff prior to the Board meetings."

- $Z_5 = \text{Natural disasters}$ . Natural disasters could constitute a major shock to public finances and debt sustainability because of their impact on output and the need for reconstruction and relief expenses (Melecky and Raddatz, 2011). The idea is to consider natural disaster as an instrument for exogenous increase in public debt, as such natural events are orthogonal to the business cycle and difficult to forecast. The local dimension of most natural disasters (earthquake, tsunami, floods, ...) events make the exclusion restriction that natural disaster as no effect on foreign investors' expectation other than through its effect on higher debt and alternative channels control by the vector  $X$  ( $E[Z_5, E_{it}|X_{i,t}] = 0$ ). The exclusion restriction with respect to recession is less convincing, as they usually entail large economic destruction. However, from the theoretical point of view, the impact of a disaster on economic activity is ambiguous. A disaster may destroy capital and other factors of production, reducing the amount of output that can be produced with a given amount of labor. However, it also makes people inter-temporally poorer, increasing the incentives to work through a standard wealth effect. The final response of output depends on which of these effects dominate. Assuming  $E[Z_5, Y_{it}|X_{i,t}] = 0$  basically supposed that the destruction of capital is compensated by higher incentive to work. In this respect, the yearly frequency of the report may help to ensure that the net output effect of natural disaster is lower than the short term effect that could be captured at higher frequencies.
- $Z_6 = \text{Epidemics}$
- $Z_7 = \text{Migration}$  The use of exogenous migration inflow to estimate the effect of migration in particular on employment has a large literature, among others Card (1990), Card (2001), Carrington and De Lima (1996), Friedberg (2001), Glitz (2012), Hunt (1992), East et al. (2018).



- $Z_8 = \text{Trade}$  Trade and diplomatic sanctions as been an important instrument in international political affairs and usually take the form of economic sanction to hurt economic growth and influence political agendas (([Splinter and Klomp, 2022](#)). "The basic idea behind economic sanctions is that it is expected that they create a major and sudden adverse economic shock. It assumes that when this shock is large enough, and the target country cannot anticipate or mitigate the costs, the target government is more willing to accept the demands of the sending country". While the primary intention is to generate an external direct exogenous cost to the economy (what ensure  $E[Z_8, e^Y] = 0$ ), the exclusion restriction is unlikely to hold unconditionally ( $E[Z_8, E_{it}] = 0$  and  $E[Z_8, S_{it}] = 0$ ) as economic sanctions hurt the economic performance of the target economy through various channels including hampering international trade ([Afe-sorgbor \(2019\)](#), [Kohl and Klein Reesink \(2019\)](#)), real exchange rate appreciations ([Wang et al., 2019](#)), foreign capital flight ([Hatipoglu and Peksen \(2018\)](#), [Besedeš et al. \(2017\)](#)), the limited access to certain technologies ([Hufbauer et al., 2009](#)), or political uncertainty. The vector of controls X ensure to capture for the set of channels and ensure that the exclusion restrictions on expectations ( $(E[Z_8, E_{it}|X_{it}] = 0)$  and sovereign crises ( $(E[Z_8, S_{it}|X_{it}] = 0)$  such that the residual direct channel of trade crisis on output take the form of limits on technology transfer.

**Table 2.5:** 2SLS: Selection of Instruments For The First Stage

	IV First Stage		
	d.E	d.Y	d.S
d.N.IMFstatements	0.002*** (0.001)	0.001 (0.001)	-0.0004 (0.001)
d.Epid.	0.01 (0.01)	-0.02 (0.02)	0.04*** (0.01)
d.Nat.	0.01 (0.01)	0.004 (0.01)	0.05*** (0.01)
d.Com.	-0.003 (0.004)	-0.004 (0.003)	0.02*** (0.003)
d.Cont.	0.17*** (0.01)	0.07*** (0.02)	0.06** (0.03)
d.Migr.	-0.01 (0.01)	0.01 (0.01)	0.03** (0.01)
d.Trad.	-0.0001 (0.01)	0.04*** (0.01)	0.05*** (0.02)
d.World	0.15*** (0.02)	0.21*** (0.03)	-0.04 (0.06)
Country FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
Robust se	Yes	Yes	Yes
Controls	Yes	Yes	Yes
Robust F	73.69***	10.52***	19.2***
Observations	6,432	6,432	6,432
R <sup>2</sup>	0.18	0.07	0.14
Adjusted R <sup>2</sup>	0.14	0.04	0.10

**Note:** \* p<0.1; \*\* p<0.05; \*\*\* p<0.01. E, Y and S respectively stands for the expectation index, recession and the sovereign crises. Controls includes 9 variables: armed conflicts, balance of payment crises, currency crises, banking crises, financial crises, housing crises, inflation crises, political crises and social crises. Regarding the tested instruments, Com. stands for commodity crises, Epid. to epidemics, Nat. to natural disasters, Cont. to contagion, Migr. to migration, Trad. to trade crises, N.IMF EBM to the Number of executive board meeting. All variables are from the *Complex Crises Database* (CCD) The operator d. correspond to the first difference of the normalized indices. Heteroscedastic robust standard errors are specified.

The selection of instruments and the validation of the relevance of the instruments is presented in Table 2.5 and Table 2.6. Specifically, I choose three instruments for recessions (Y): contagion, world outcomes and trade conflicts. Three instruments for expectation regime shifts (E): contagion, world outcomes and number of IMF board meetings and six instruments for sovereign crises (S): epidemics, natural disasters, commodity, contagion, migration and trade.

In order for the rank condition to hold, different instruments can enter the first stage for all variables, but at least one should be specific to each equation. Epidemics, natural disasters, commodity and migration are specific to the sovereign equation. Trade is uniquely associated with recession and the number of IMF board meetings to expectations.

Table 2.6 provides the Wald-test for the validity of instruments. The first row provide the p-value of the test, comparing a specification without the instruments to the specification with the respective selected instruments. The second row compares the specification with the selected instruments with specifications including all potential instruments.

**Table 2.6:** 2SLS:p-value of Wald-test

Specification	d.S	d.Y	d.E
Selected instruments	0	0	0
Additional instruments	0.32	0.21	0.69

**Note:** E, Y and S respectively stands for the expectation index, recession and sovereign crises. Selected instruments for recession (d.Y) are contagion, world outcomes and trade conflicts. Selected instruments for Expectation (d.E) are Number of IMF executive board meetings, contagion and world outcomes, Selected instruments for sovereign crises are epidemics, natural disasters, commodity, contagion, migration and trade crises.

### 2.3.3 Estimation Results

The literature on the relationship between sovereign crises and recessions is wide-ranging and has largely documented the important output costs associated with sovereign default (Cohen (1992), Tomz and Wright (2007), Reinhart and Rogoff (2009), Kuvshinov and Zimmermann (2019), Trebesch (2018), Panizza et al. (2009)).

Among the channels and rationales for a direct effect of sovereign crises on output, there are wealth effects due to the transfer of wealth from private creditors to the sovereign and the higher borrowing costs. Financial autarky that prevents domestic resident from borrowing from domestic or foreign investors (Dooley, 2000). Pressure on sovereign debt increases the risk premia of the country, spillover to private sector interest rates and hamper investment and output. Trade retaliation costs (Borensztein and Panizza, 2010). Pressure on bank balance sheets that hold an important part of sovereign debt and that may reduce their provision of liquidity to the economy. It can reduce the credibility of a bank rescue plan making a bailout package unsuccessful (Hoelscher and Quintyn, 2003) and question the availability of the central bank foreign reserves and the ability to defend the exchange rate, potentially generating a companion exchange rate crash and signs of monetary policy tightening that could put further pressure on domestic demand (De Paoli et al., 2006).

In turn, recessions are drivers of sovereign crises as they reduce state revenues and increase spending, which generates discontinuous jumps in the debt to GDP ratio and raises concerns about the capacity (willingness) of the country to stabilize the economy. Empirical evidence suggests that most sovereign defaults occur during recessions, with most sovereign crises during economic expansions, related to non-economic drivers (Tomz and Wright, 2007).

Table 2.7 provides the estimation results of the 2SLS estimation of the system of two equations relating sovereign default and economic recessions for different specifications. Column (4) corresponds to the instrumental variable specification showing

the positive relationship between sovereign default and economic recessions controlling for country and time fixed effects as well as for the potential channels of transmission investigated in the literature (banking, balance of payment, exchange rate, inflation, financial, political, social and housing).

One standard deviation increase in the index of sovereign crises increases the cost of recession by 0.29 standard deviation. This cost of default is three time lower than the unconditional cost of default estimated without the costs associated with the fragility of the financial intermediaries, trade retaliations, sudden loss of confidence in the domestic currency and political instability.

These results confirm the evidence that sovereign default rarely occurs in isolation, and that companion crises involve important additional costs. A large proportion of these output costs come from the spillover of companion crises. However, it also confirms that standard channels fail to exhaust the direct effect of sovereign crises on recessions. The downward bias of the OLS coefficients (column (2) and (3)) confirms the empirical regularity that sovereigns tend to default at the trough of the cycle when output is already depressed (Tomz and Wright, 2007). This regularity is also explained by standard quantitative models in the spirit of Eaton and Gersovitz (1981). During good times, the utility cost of default out-weights the utility benefit from not repaying the debt, what decrease the incentive to default.

Similarly, column (8) provides the mirror specification of the effect of recessions on sovereign default with a coefficient estimate of 0.18, significant at 5%. In line with the literature, I found that recessions are important drivers of sovereign crises.

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**Table 2.7:** Estimation Results: Simple System

	<i>Dependent variable:</i>							
	d.Y				d.S			
	OLS	OLS	IV	IV	OLS	OLS	IV	IV
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
d.S	0.14*** (0.02)	0.06** (0.03)	0.83*** (0.10)	0.38*** (0.13)				
d.Y					0.11*** (0.02)	0.05*** (0.02)	0.61*** (0.08)	0.26** (0.11)
Controls	No	Yes	No	Yes	No	Yes	No	Yes
Country FE	No	Yes	No	Yes	No	Yes	No	Yes
Time FE	No	Yes	No	Yes	No	Yes	No	Yes
Robust se	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6,495	6,494	6,495	6,494	6,495	6,494	6,495	6,494
R <sup>2</sup>	0.02	0.08	0.02	0.05	0.02	0.13	0.02	0.10
Adjusted R <sup>2</sup>	0.02	0.05	0.02	0.02	0.02	0.10	0.02	0.07

**Source:** *Complex Crises Database (CCD)*

**Note:** \*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$  Y and S respectively stands for the recession and the sovereign crises indices. Controls includes 9 variables: armed conflicts, balance of payment crises, currency crises, banking crises, financial crises, housing crises, inflation crises, political crises and social crises. Heteroscedastic robust standard errors are specified. All variables are from the *Complex Crises Database (CCD)*. The operator d. correspond to the first difference of the normalized indices. IV specifications corresponds to the second stage of the 2SLS procedure where instruments for d.Y are contagion, world outcomes and trade conflicts and instruments for d.S are epidemics, natural disasters, commodity crises, contagion, migration crises and trade crises.

Sovereign crises are painful episodes that generate important economic, political and social turmoil. Collapses of states have a large impact on the stability of societies, far beyond the pure economic consequences.

In particular, risk aversion and general economic sentiment is largely driven by the perception of the solidity of the sovereign and trust in public institutions. In this context, sovereign debt pressure have not only direct effects but also collateral damage via the effect of such episodes on expectations of economic agents. To further identify the direct and indirect effects of both recessions and sovereign crises, I estimate the system presented in equation 2.1. Table 2.8 shows the results of the

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estimation for the OLS and IV specifications.

**Table 2.8:** Estimation Results: Complex System

	<i>Dependent variable:</i>								
	d.Y			d.S			d.E		
	OLS	IV	IV	OLS	IV	IV	OLS	IV	IV
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
d.S	0.06** (0.03)	-0.05 (0.17)	0.16 (0.35)				0.02 (0.02)	0.39* (0.20)	-0.03 (0.42)
d.Y				0.09*** (0.02)	-0.54 (0.36)	-0.18 (0.26)	0.05*** (0.02)	1.01*** (0.23)	0.99*** (0.24)
d.E	0.09*** (0.03)	0.73*** (0.17)	0.75*** (0.19)	0.15*** (0.02)	0.67** (0.29)	-0.01 (0.23)			
Ctrlr crises	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ctrlr policy	No	No	Yes	No	No	Yes	No	No	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Robust se	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6,494	6,432	6,055	6,495	6,432	6,055	6,494	6,432	6,055
R <sup>2</sup>	0.09	0.04	0.04	0.03	0.02	0.28	0.15	0.03	0.04
Adjusted R <sup>2</sup>	0.05	0.001	0.002	0.03	-0.02	0.25	0.12	-0.01	-0.01

**Note:** \*p<0.1; \*\*p<0.05; \*\*\*p<0.01

Estimation results of equation 2.1. E, Y and S respectively stands for the expectation, recession and the sovereign crises indices. Controls includes 10 variables: armed conflicts, balance of payment crises, currency crises, banking crises, financial crises, housing crises, inflation crises, political crises, social crises and labor market crises. Controls for policy intervention includes 13 variables: tightening and loosening monetary policy, fiscal stimulus and consolidation, forward guidance, financial stabilization policies, unconventional monetary policy, coordinated policy intervention.

Heteroscedastic robust standard errors are specified. All variables are from the [Complex Crises Database](#) (CCD). The operator d. correspond to the first difference of the normalized indices. IV specifications corresponds to the second stage of the 2SLS procedure where instruments for d.Y are contagion, world outcomes and trade conflicts, instruments for d.S are epidemics, natural disasters, commodity crises, contagion, migration crises and trade conflicts and instruments for expectation are contagion, world outcomes and number of executive board meetings.

Column (2) and (5) in Table 2.8 mirror the specifications in column (4) and (8) in Table 2.7 and correspond to the separate estimate of the direct and indirect effect of crises.

The first observation is that the OLS specification tends to overestimate the effect of recessions on sovereign crises ( $\beta_y^s$ ) and the effect of sovereign crises on recessions

$(\beta_s^y)$ . Including controls for other crises and unobservables (country and year fixed effects) the positive relationship between sovereign crises and recessions ( $\beta_y^s$ ) estimated by OLS in Table 2.7 column (1) is divided by half in column (2).

The IV specification further corrects the positive bias and show that there is no significant direct effect of sovereign crises on recessions ( $\beta_s^y$ ) (column(2), Table 2.8) after controlling for the usual spillover costs. Similar conclusions can be drawn for the causal effect of recessions on default ( $\beta_y^s$ ). The IV specification (column 5, Table 2.8) shows no significant direct causality from recessions to sovereign crises. The lower tax collection, increasing spending needs and widening financing gaps are not the cause of the crisis itself.

Column (2) and (5) for the expectations variable (d.E) provide the estimated coefficients of the effect of expectation regime shifts on recessions ( $\beta_E^y$ ) and on sovereign crises ( $\beta_E^s$ ). In both cases, the results show that the simple OLS estimation underestimates the effect of expectation regime shifts on both recessions and sovereign crises.

Regarding the effect of expectation regime shifts on recessions ( $\beta_E^y$ ), the IV estimation shows a seven times larger (column (2) compared to column (1)) effect. The correction of the OLS bias is also at play for the effect on sovereign crises ( $\beta_E^s$ ), although of smaller magnitude (from 0.15 in the OLS specification column (4) to 0.67 in the IV with controls column (5)).

The output losses found in Table 2.7 column (4) actually originate in the increased risk aversion that emerges simultaneously with the sovereign crises, but not directly via the direct costs. The results demonstrate that controlling for a wide variety of economic and non-economic factors associated with recessions and crises episodes, identifying correctly the first and second order effects of periods of crises and dealing with the simultaneity bias of recessions, expectation regime shifts and sovereign crises, what drives the economic downturns is the indirect effect of expectation regime shifts ( $\beta_E^y$ ) rather than the isolated effect of sovereign default ( $\beta_s^y$ ).



The non-significant negative relationship between economic recessions and sovereign crises provide support for the idea that defaulting during “bad” times may not be optimal. Putting together those two results, we can conclude that what causes the sovereign crises is the loss of confidence of investors, suggesting that countries are forced to default by difficulties in the rollover of their debt entailed by shifts in the risk appetite of investors that increase borrowing costs.

These results are in line with the conclusions from [Aguiar et al. \(2016\)](#) who argue that defaults are not tightly connected with poor fundamentals, spreads are highly volatile and that risk premia are an important component of sovereign spreads. It also confirms the possibility of self-fulfilling crises with expectation regime shifts not necessarily directly linked to weak fundamentals in the spirit of [Calvo \(1988\)](#), [Cole and Kehoe \(1996\)](#) or [Cole and Kehoe \(2000\)](#) and converge with the findings of [\(Patella and Tancioni, 2021\)](#) that document regime-dependent drivers of risk for the Italian economy. Emphasizing that negative confidence shock “triggers demand-like macroeconomic disruptions, and sharp increases in sovereign spreads” while changes in fundamentals fail to directly explain episodes of sovereign risk surges. In this respect, it is useful to remind that the output cost associated to sovereign default in standard quantitative sovereign debt models is most of the time assumed and calibrated in order for the models to generate plausible levels of default ([Aguiar et al., 2016](#)).

Turning to the effect of sovereign crises on recession, [Table 2.8 Column \(2\)](#) provide a specification similar to [Table 2.7 Column \(8\)](#), augmented with the expectation variable (d.E). The size of the coefficient  $\beta_s^y$  is reduced from 0.29 ([Table 2.7 column 4](#)) to zero ([Table 2.8 column 2](#)). Controlling for fragile financial intermediaries, trade disruptions, exchange rate crises, financial crashes, inflation outburst, political instability social unrest and isolating the effect of expectation regime shifts, I found no direct effect of sovereign crises on severe recessions.

The recession self-fulfilling coefficient ( $\beta_E^y$ ) of 0.73 suggests that irrespective of the state of fundamentals, coordinated panics can have self-fulfilling dynamics and amplify economic fluctuations considerably. This result is inline with the theoretical prediction of [Farmer \(2012\)](#), [Bacchetta and van Wincoop \(2016\)](#) and [Benhabib et al. \(2015\)](#) that show the possibility of self-fulfilling recessions or [Benigno and Fornaro \(2018\)](#) on the possibility of stagnation traps.

The literature on non-fundamental drivers of banking, sovereign or currency crises is large, with well-known episodes of self-fulfilling defaults documented for the period prior to the GFC. On the contrary, the evidence of self-fulfilling recessions is a much more recent phenomenon with most theoretical developments and empirical evidence restricted to the post GFC period that is seen by many researchers as a structural break in the importance of risk sentiments. Section 2.2 support this idea of an important structural change in terms of risk and confidence levels in the post 2010 period. However, most trends and dynamics associated with expectation regime shifts pre-dated the GFC and were already largely at play at the end of the 1990s and only consolidated and accelerated in the more recent periods.

These results complement and enrich several findings of the literature. These results are in line with imperfect information frameworks ([Benhabib et al., 2015](#)) where crises are uncertain real time events and decisions are taken before knowing the correct realization of outcomes. This information structure and the self-fulfilling animal spirits outcomes documented in this paper validates the evidence of potential destructive expectations similar to [Bacchetta and van Wincoop \(2016\)](#), [Morris and Shin \(1998\)](#), [Das et al. \(2020\)](#) or [Angeletos and La'O \(2013\)](#) that documents the effects of shifts in expectations on economic activity without shifts in the underlying fundamentals.

In contrast to the literature emphasizing the existence of exogenous sunspots as coordination device, my results suggest that expectation regime shifts are not driven

by exogenous sunspots. They are rather dependent on fundamentals and crises, what gives credit to the *failure* and *recession* hypothesis of [Gordon \(1988\)](#). Combining those results with the descriptive analysis of section 2.2.1 I validate the existence of coordinated panics in the spirit of [Bacchetta and van Wincoop \(2016\)](#) and provide the empirical evidence of an important channel necessary to understand the large co-movement of crises found in [Kose et al. \(2020\)](#) and [Bacchetta and van Wincoop \(2016\)](#).

Table 2.8 column 3, 6 and 9 provide the estimation results for specifications that in addition to the crises variables controls for the macroeconomic policy reactions by extending the Complex Crises Database of Chapter 1.

Specifically, I include two variables capturing the general perception on conventional monetary policy (loosening and tightening), two variables on conventional fiscal policy (stimulus and consolidation), unconventional monetary policy, forward guidance, exchange rate intervention, financial stabilization policies and coordinated reactions. In addition, I include several variables that capture the main monetary policy instrument used: changes in the funds rates, monetary targets on monetary aggregates and open market operations.

Column 3 shows that the estimation of the effect of expectations on recessions is stable at 0.75 standard deviations. Similarly, the effect of recession on expectations is also stable (column 9). Regardless of the macroeconomic policy reactions, expectation regimes shifts and recessions are robustly associated, showing that the current instruments have no effect on the occurrence of self-fulfilling recession dynamics.

In contrast to the stability of the estimations of the link between recession and expectation regime shifts, the effect of expectations on sovereign crises (column 6) shows no significant association. The positive and significant coefficient in column 5 that correspond to self-fulfilling sovereign crises parameters vanishes when controlling for macroeconomic policy reaction. The coefficient estimates converge to zero,

suggesting that risk of self-fulfilling dynamics on sovereign bond markets can be successfully avoided through the use of adequate macroeconomic policy mix. Similarly, the contribution of sovereign crises to negative expectation regime shifts also vanishes (column 9) suggesting that correct policy reaction can successfully anchor expectations.

To narrow down the characteristics of destructive expectations, I go one step further in the characterization of the non-fundamental drivers of recession and sovereign crises and provide evidence for the specific causal channels linking adverse expectations and economic fluctuations.

Using the results from the linguistic analysis presented in Section 2.2, I test different channels of transmission of Expectation Regime Shift on recessions and sovereign crises. In particular, I test the empirical validity of four vulnerabilities that can lead to a higher likelihood of coordinated panics in (Bacchetta and van Wincoop, 2016): tight credit, zero lower bound, constrained counter-cyclical fiscal policy and increasing trade and financial integration.

In particular, I further investigate what is the type and source of expectation shocks that generate sovereign default and economic recessions. Specifically, I use a specification similar to the one presented in Equation 2.1 and construct 14 dummies associated with shifts in expectations that I interact one by one with the expectation variable.

$$\begin{cases} \Delta Y_{it} = \beta_s^y \cdot \Delta S_{it} + \beta_e^y \Delta E_{it} * 1_{\{w_{j,k} \in E\}} + \beta_X^y \cdot \Delta X_{it} + \alpha_i^y + \delta_t^y + \epsilon_{it}^y \\ \Delta E_{it} = \beta_y^e \cdot \Delta Y_{it} + \beta_s^e \cdot \Delta S_{it} + \beta_X^e \cdot \Delta X_{it} + \alpha_i^e + \delta_t^e + \epsilon_{it}^e \\ \Delta S_{it} = \beta_y^s \cdot \Delta Y_{it} + \beta_e^s \Delta E_{it} * 1_{\{w_{j,k} \in E\}} + \beta_X^s \cdot \Delta X_{it} + \alpha_i^s + \delta_t^s + \epsilon_{it}^s \end{cases} \quad (2.2)$$

**Table 2.9:** Estimation Results for Specific Expectations Variables

Type of ERS	Dependent	Non.Fundamental	Fundamental	ERS source
Inflation uncertainty	S	$\beta_E^S = 0.84$	$\beta_Y^S = 0.05^{***}$	$\beta_S^E = -0.01$
	Y	$\beta_E^Y = 9.27^*$	$\beta_S^Y = 0.3^*$	$\beta_Y^E = 0.05$
Policy distress	S	$\beta_E^S = 2.45^{***}$	$\beta_Y^S = 0.03^*$	$\beta_S^E = 0.09^{**}$
	Y	$\beta_E^Y = 4.01^{***}$	$\beta_S^Y = -0.14$	$\beta_Y^E = 0.1^{**}$
Speculative distress	S	$\beta_E^S = 8.38^*$	$\beta_Y^S = -0.04^{**}$	$\beta_S^E = 0.03^*$
	Y	$\beta_E^Y = -3.61$	$\beta_S^Y = 0.43^{***}$	$\beta_Y^E = -0.01$

Table 2.11 displays the estimation of the ERS coefficients  $\beta_E^S$  and  $\beta_E^Y$  when interacting the ERS variable with a dummy variable, capturing the occurrence of specific ERS. More precisely,  $1_{[w_{j,k}]}$  equals to 1 when expressions denote the type of j and the origin k are found in the paragraphs that describe the Expectation Regime Shifts. Table E.2 provide the estimated coefficients for 3 Expectation specifications: expectations regime shifts reflecting inflation uncertainty, policy distress and speculative distress. When expectation regime shifts take the form of policy distress, the psychological amplification effect has a simultaneous effect on sovereign crises ( $\beta_E^S = 2.45$ ) and recessions ( $\beta_E^Y = 4.01$ ). When expectation regime shifts take the form of inflation uncertainty, the psychological amplification effect on recession ( $\beta_E^S = 9.27$ ) is particularly large but close to zero for the effect on sovereign crisis. Conversely, When expectation regime shifts take the form of speculative distress, the psychological amplification effect on sovereign crisis is large ( $\beta_E^S = 8.38$ ) but the effect on recession is insignificant. In this case, the doom loom may be particularly strong as expectations fuel the sovereign crises that itself contributes to the deepening of the recession ( $\beta_S^Y = 0.43$ ) and the consolidation of the expectation panic ( $\beta_S^E$ ). Table 2.11 provide the estimated coefficient (when significant at least at the 5%)  $\beta_E^S$  and  $\beta_E^Y$  for a larger set of expectation measures.

Table 2.10 present the results of the effect of adverse expectation regime shifts for different components of expectations ( $\beta_E^S$  and  $\beta_E^Y$ ).

In particular, the risk, confidence, sentiment, and uncertainty channels hamper economic growth and are significant determinants of recessions (column 2). On the contrary, they do not appear as significant determinants of sovereign defaults (column 1). Panics and distress are extreme psychological shocks that push sovereigns into public debt rollover pressures, but have no direct effect on recessions. This suggests that sudden swings of panics can have sudden and abrupt effects on debt repayment, while steady states of pessimism and gloomy perspectives are rather more often associated with recessions and shallow recoveries.

Violent shifts of expectations do not cause direct recessions. It is the negative states of mind that spread through economic agents because of a poor level of confidence, heightened risk, higher uncertainty and degraded economic sentiment that deepen the recession and hamper the recovery.

**Table 2.10:** Estimation Results of the Self-fulfilling Parameter by Type of Expectations

		risk	confidence	uncertainty	distress
$\beta_E^S$	economy	0.43**	0.44	0.96*	2.3**
	inflation	1.2	-0.45	0.84	13.22
	financial	0.73**	0.36	0.79	2.53**
	speculation	3.86*	2.74*	2.27	8.38*
	policy	0.42**	0.28	0.67	2.45***
	exchange rate	0.94	0.35	-0.54	2.55
	commodity	-0.16	-2.61	-1.73	6.94**
$\beta_E^Y$	economy	1.05***	1.64***	3.01***	4.67***
	inflation	3.71**	1.78	9.27*	35.91
	financial	1.95***	2.04***	3.43***	2.67**
	speculation	-2.98	-0.92	-10.37	-3.61
	policy	0.94***	1.33***	2.82***	4.01***
	exchange	1.47**	1.01*	4.81**	4.5**
	commodity	3.15***	5.08***	7.94**	-8.37

**Note:** \*p<0.1; \*\*p<0.05; \*\*\*p<0.01

The table displays the coefficients  $\beta_E^S$  and  $\beta_E^Y$  of equation 2.1 in the second stage of the 2SLS procedure where instruments for d.Y are contagion, world outcomes and trade conflicts, instruments for d.S are epidemics, natural disasters, commodity crises, contagion, migration crises and trade crises and instruments for expectation are contagion, world outcomes and number of executive board meetings. Each value correspond to separate estimations where expectations are restricted to the joined occurrence of the specific topics. The table reads as follows: one standard deviation increase in the financial risk expectations variables is associated to an increase of sovereign risk by 0.73 standard deviations. Heteroscedastic robust standard errors are specified. Controls includes 9 variables: armed conflicts, balance of payment crises, currency crises, banking crises, financial crises, housing crises, inflation crises, political crises and social crises and country and time fixed effects.

To refine the understanding of the transmission channels of transmissions of adverse expectations, I interact the expectation variable with different sources of expectation shocks. Specifically, I test economic, exchange rate, banking, oil, financial, monetary, fiscal and policy expectation shocks. Two of these shocks are positively associated with sovereign debt distress: banking and monetary expectation shocks.

These results suggest that swings in the conduct of the monetary policy and concerns about the health of the financial sector can be powerful sources of concerns,

able to spread abrupt shift of expectations and reducing the capacity of the government to roll over the debt.

A similar exercise for recessions suggests that both economic and policy expectation shocks are associated with severe economic downturns. Adverse expectations concerning the state of the economy as a whole, or more specifically negative exchange rate or oil price expectations, are strongly associated with the occurrence of severe downturns. The relatively large coefficients associated with exchange rate and monetary policy expectations provide credit for the mechanism presented by, (De Paoli et al., 2006) where concerns about availability of central bank foreign reserves can cause doubt about the ability to defend the exchange rate and raise prospects of future tightening of monetary policy that would lower future output.

The evidence of the role of monetary policy expectations in non-fundamental recessions echo to the theoretical predictions that highlight the implications of the zero lower bound (ZLB) as suggested by (Brendon et al., 2020). More generally, uncertainty about the capacity of government policy to coordinate expectations positively can act as an important precondition for self-fulfilling recessions and is in line with Blanchard's (2014) assertion that economies close to the "*dark corners*" (close to ZLB and with constrained fiscal policy) may behave quite differently and more unpredictably than those in more conventional territory. The positive and significant effect of bank, economic, and oil expectations validate the mechanism generating self-fulfilling recessions in (Bacchetta and van Wincoop, 2016). In this paper, the link between current expectations and future output is obtained through profit and bankruptcies of debt constrained firms, unable to face specific fixed costs. In the model, the value of the fixed costs determines the number of firms that can go bankrupt if they fail to fully pay the fixed costs. In this context, oil price increases would back the idea of fixed costs faced by certain firms, concerns on banks could reflect a high level of firms with debt constraints and a negative perspective on economic outcomes could



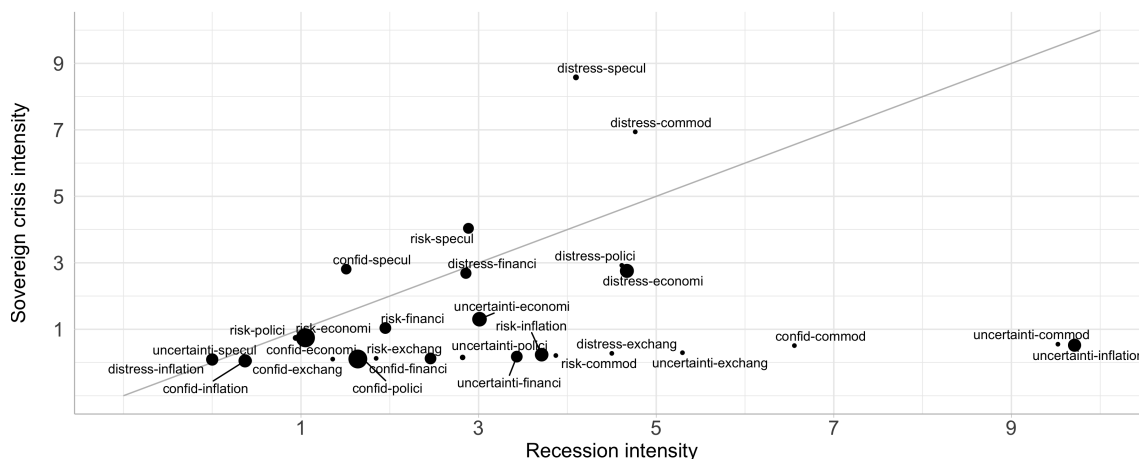
reflect the fear of lower profits, higher bankruptcies and lower future income, justifying the first period concerns and the self-fulfilling mechanism.

Crises that involve economic recessions, expectation regime shifts and sovereign default are episodes that potentially lead to a severe setback for economic development. Fundamental economic shocks are costly for the economy and can generate profound disruptions when they are amplified by the doom loop driven by expectation regime shifts. When the adverse shift is sudden, akin to panics, regarding the banking sectors or the conduct of the monetary policy, it put pressure on the rolling over of sovereign debt. When the adverse shift is persistent, mixing risks, uncertainty, and loss of confidence in future economic developments, financial stability and the conduct of economic policy, economic slowdowns are likely to slide into severe recessions.

In this respect, the potentially more severe and profound macroeconomic crises combine sudden and sharp panics as well as persistent gloomy sentiments that maintain the economy in a dual and retro-acting sovereign and economic crisis that can take decades to stabilize. The circular relationship between sovereign crises, recessions, and panics is the core of the complexity of macroeconomic crises. The feedback and non-linear relationship in the system can generate chaotic behavior, with effects amplifying seemingly minor or isolated events.

The rising psychological dimension of modern sovereign crises has important consequences for the risk assessment of these events and crises management policies.

**Figure 2.6:** Simulated Intensity of Crises for Specific Expectations Measures



**Note:** The figure displays the simulated intensity of Sovereign crises (y-axis), Recession (x-axis) and Expectation regime shift (size of bubbles). The simulation correspond to a one-standard deviation initial shock of the three variables in equation 2.1. For example, for an initial shock of one standard deviation in sovereign crises, recession, and expectations about speculative distress the final sovereign crises shock reach 8.5 standard deviations and the final recession shock 4.2 standard deviations.

## Conclusion

In this chapter, I presented a novel measure of negative *expectation regime shifts* define as the combination of *confidence collapse* among foreign investors, increased *risk aversion* of economic agents and *uncertainty traps* among investors, consumers, and workers. I quantify their occurrence, describe their nature and source, show the main evolution and emphasize the singularity of the post 2008 period. Using this measure as an indicator of non-fundamental amplification effects of crises, I quantify the respective role of direct and indirect effects of fundamental shocks by identifying the system of simultaneous equations linking recessions (Y), sovereign crises (S) and expectation regime shifts (E). Using exogenous shocks as instruments

in a 2SLS procedure, I show that the second order effect of expectation regime shifts ( $E \rightarrow Y$  and  $E \rightarrow S$ ) has crowded out the direct effect of recessions on sovereign crises ( $Y \rightarrow S$ ) and sovereigns on recessions ( $S \rightarrow Y$ ) after controlling for standard fundamental channels such as banking crises, exchange rate crashes, trade disruption or political instability.

Controlling for a large set of indicators reflecting conventional and unconventional monetary and fiscal policy, I show that the non-fundamental sovereign channel ( $E \rightarrow S$ ) is effectively cancelled out through the use of timely policies. On the contrary, the estimated effect of negative expectations on recessions ( $E \rightarrow Y$ ) and recessions on expectations ( $Y \rightarrow E$ ) is unchanged even after controlling for macroeconomic policy, suggesting that current macroeconomic policy has failed to effectively fight back this effect. Narrowing down the channels at play, I show that the doom loom between expectation regime shifts, recession and sovereign crises is particularly strong when the expectation regime shift combine speculative distress and financial related risks on sovereign debt repayment on one hand and uncertainty about inflation, commodities, and exchange rate on the other hand.

The contribution of this paper to the literature on macroeconomic crises is three-fold. First, it provides a novel measure of macroeconomic risks that captures the country specific expectation regime shifts of international investors and discusses extensively their origin, consequences, and relationship with crises. Volatile, contagious and diverse in nature, panics have been more recurrent and simultaneous across countries in the last 30 years. Second, negative shifts in economic sentiment are at the center of the severity and complexity of macroeconomic crises through their simultaneous relationship with sovereign crises and economic recessions. Using exogenous crises as instruments for the three variables of interest, the results suggest that economic crises and sovereign defaults are both largely amplified by regime switches in expectations and can generate severe doom loops.

## Chapter 3

### *First or Second Generation Sovereign*

### *Crises? Don't get me wrong*

*C'est dans cette même nuit, je crois, que j'ai compris que désir de connaître et puissance de connaître et de découvrir sont une seule et même chose.*

*Pour peu que nous lui fassions confiance et le suivons, c'est le désir qui nous mène jusqu'au coeur des choses que nous désirons connaître. Et c'est lui aussi qui nous fait trouver, sans même avoir à le chercher, la méthode la plus efficace pour connaître ces choses, et qui convient le mieux à notre personne."*

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ALEXANDRE GROTHENDIECK, RÉCOLTE ET SEMAILLES, I

### **Introduction**

The capacity of a country to borrow funds is a central attribute of the sovereignty of a government. It allows the states to link present and future generations via an intertemporal allocation of resources. Current productive activities generates resources that are mobilized over overlapping horizons to contribute to the continu-

ation and consolidation of the institutions that constitute the pillars of the functioning of the country. Sovereign debt is the cement that stick together the productive initiatives that allow the construction of prosperous countries.

In this context, understanding the causes and consequences of the sovereign debt crisis is understanding a central piece of the architecture of societies, all the more in a contemporaneous context where debt contracts play a ubiquitous role in economic systems.

Sovereign debt crisis are as old as the oldest modern states, and precise records of the incapacity to repay creditors have been comprehensively compiled for more than 200 years. Over such a long period, history shows that the consequences of a sovereign default has ranged from armed retaliation, trade sanctions, temporary exclusions from financial markets and sometimes forgiveness when debt was considered *odious*. On the creditor side, it has taken the form of pure and simple write-off of the entirety of their financial claims (and sometimes political and violent prosecutions), to minor adjustments to the maturity structure that only marginally affect the net present value of such claims.

Causes of sovereign crises have proved as diverse as their consequences. Wars and armed conflicts, successions of negative economic shocks taking the form of natural disasters or economic contagion, or endogenous disruptions on financial markets are among the standard identified reasons to explain why countries may be confronted with the incapacity to generate enough resources to meet their financial pledges.

In Chapter 1 I have provided evidence of the central role of sovereign crises in the *system of macroeconomic crisis* and have documented how sovereign debt problems have been increasingly related to financial and psychologically driven crises. I have also laid the empirical foundations for the investigation of sovereign debt crises in a larger context than the uniquely financially oriented focus that has been considered

in most of the literature. Nonetheless, the evolution of sovereign crises in the last forty years has correctly pointed sovereign debt problems as principally financially generated, with an important psychological dimension. This evolution has driven the research documented in Chapter 2 and fuel the conclusion that psychologically driven crises generate powerful doom loops. They amplify the recessions, heightened sovereign distresses and can spill over strongly to other crises and other countries.

In this chapter, I aim at complementing this analysis by providing a typology of sovereign crises that would help to discriminate in a simple manner the more severe events. This typology is intended to create a conceptual framework that would summarize the variety of causes and consequences that were presented in this introduction.

In this respect, I propose a distinction between 1<sup>st</sup> and 2<sup>nd</sup> generation sovereign crises based on the occurrence or not of expectation regime shifts (ERS), defined as the abrupt shift of perception of systemic agents regarding the rules of the game in the markets. In other words, I distinguish sovereign crises with respect to the occurrence or not of sudden panics, uncertainty spikes, or abrupt loss of confidence among real and financial investors with systemic importance.

In concrete terms, this typology drawn from the existence or not of expectation regime shift aims at discriminating between sovereign default consecutive to the conjunction of an accumulation of imbalances <sup>1</sup> and sudden fundamental shocks <sup>2</sup>, without coordination failures<sup>3</sup>, and sovereign defaults where the trigger is a coor-

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<sup>1</sup>Balance of payment mismatch for instance

<sup>2</sup>Risk free interest rate hikes, commodity crash, natural disasters

<sup>3</sup>Those events are closer to the developments explained by standard quantitative models of default where default is a optimal decision after a sequence of negative shocks when the value of repaying the debt is lower than the cost of default)

dination failure due to sudden loss of confidence and panic <sup>4 5</sup>.

The distinction is intended to map two distinct narratives that have been historically made by economic observers<sup>6</sup>. Two transcripts from the bilateral surveillance of Mexico provide examples of such different narratives and the conceptual difference that they entail:

Example of 1<sup>st</sup> **generation sovereign crisis** as describe by the IMF: Statement by Mr. Buira on Mexico Executive Board Meeting 82/99 July 16, 1982

*"The causes of the imbalances were both domestic and external. On the external side, the different cyclical position of the Mexican economy, which had been growing at record rates, contrasted sharply with the stagnation or decline experienced by its main trading partners in the industrial world, as a result of their pursuit of restrictive financial policies in the fight against inflation. These policies, which led to the virtual stagnation of world trade in 1980 and 1981, to a progressive softening of the oil markets and to historically high rates of interest in real terms in international financial markets, were to have a serious adverse impact on the value and volume of Mexico's exports and on the level of debt service payments." [...] "On the domestic front, a too rapid expansion of domestic demand, associated with unprecedented levels of current and investment expenditure both public and private, was compounded by the increase in the public sector deficit which resulted from the decline in revenues from oil exports and from the insufficient adjustment of prices and tariffs of goods and services provided by the public sector." [...] "External indebtedness is an area of major concern. Interest payments on public debt are current, and principal payments were suspended in late August. A process of debt restructuring is presently being carried out in realistic terms, taking into account the debt repayment obligations and balance of payments prospects for the years ahead. The Mexican public sector debt is to be restructured in the coming months and no later than March 23, 1983."*

Example of 2<sup>nd</sup> **generation sovereign crisis** as describe by the IMF: Statement by Mr. Guzman on Mexico Executive Board Meeting 95/30 March 29, 1995

<sup>4</sup>In the literature those events have usually been explained by including in the models non-fundamental mechanisms and led to theoretical models in the form of self-fulfilling models where short term foreign financing can dry out due to speculative capital flight. This type of crisis is indeed closely associated to the boom-burst cycle theories and show that modern crises have more and more taken the form of endogenous runs on bond markets.

<sup>5</sup>Contrary to strict self-fulfilling models where fundamentals play no role, the 2<sup>nd</sup> Generation Sovereign Crises do not claim to capture only event where the state of fundamentals play no role but rather include episodes mixing liquidity and solvency pressures triggered and/or amplified by psychological disruptions

<sup>6</sup>Due to the nature of the data used in this work, it is more prudent to restrict economic observers to the judgement of the IMF staff. see Chapter 1 for a discussion on the validity of the IMF expert judgement and on the potential bias or methodological assumptions underlying the data used to identify the events of interest.

## Chapter 3: *First or Second Generation Sovereign Crises? Don't get me wrong*

### Section 3.0

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"[...] Uncertainty and volatility in the financial and foreign exchange markets at the beginning of 1995. While this situation resulted from a combination of factors, a central determinant was the persistence of market doubts as to the adequacy of the amounts, timing, terms, and the real availability of the external financing to support Mexico's program of adjustment. Under a situation of uncertainty concerning the availability of resources to meet external payments, market speculation emerged on Mexico's need to resort to exchange controls. In this context, as serious difficulties were found to roll over the external obligations coming due, the exchange rate depreciated substantially and interest rates rose to levels well above those assumed in the AUSEE."

[...] "exogenous shocks, of internal or external origin, caused an initial breakdown of confidence and a sharp reversal of capital inflows. This led to a serious deterioration in the international reserve position which, in turn, tended to increase the uncertainty about the ability and the determination of the Government to maintain an exchange rate policy that looked increasingly unsustainable in light of the policy response to the destabilizing shocks."

Based on this typology I provide a number of stylized facts showing that 2<sup>nd</sup> generation that combine sovereign risk and adverse expectation regime shifts prove to be more costly in terms of output, more often associated to multiple other crises, driven by a large global component that synchronize events across countries and are more dangerous for institutional stability.

The evidence of two distinct classes of sovereign crises and the analysis of the determinants of their respective occurrence provide important implications for sovereign debt crisis management policies. While the promotion of economic prosperity<sup>7</sup> and the idea that economic development can shelter countries from the risk of sovereign crises is relevant in the case of 1<sup>st</sup> generation Sovereign Crises it may prove hazardous for middle income countries if the associated gains in GDP growth are obtained through rapid and extended economic and financial deregulation and the absence of solid and credible macroeconomic policy frameworks.

Reform programs that combine economic liberalization and pro-growth reforms without particular attention to the build up of a credible institutional framework are deemed to trade *simple* (1<sup>st</sup> generation) sovereign crises for *complex* psychological crises (2<sup>st</sup> generation) that are more exogenous, more costly in terms of output

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<sup>7</sup>This argument usually take the form of the idea that supply side reforms that foster potential growth will generate the resources (via tax collection) needed to repay the debt and reduce the debt to GDP ratio



losses, more dangerous for policy credibility and more synchronized across countries.

To conclude this work, I extend the [Complex Crises Database \(CCD\)](#) to 2021 to include the COVID-19 crisis. After describing the size and scope of the epidemic shock, I provide a precise analysis on the nature of expectation shocks during the period 2020-2021 and show that contrary to the *Great Financial Crises* (GFC) the COVID-19 shock has so far failed to negatively affect expectations strongly enough as to generate adverse coordination failures. Insofar, at the end of 2021 sovereign debt problems have rather taken the form of 1<sup>st</sup> generation sovereign crises where high debt levels and the legacy of the 2020 crisis have not yet prompted sovereign panics and financial crashes. The resurgence of a number of supply side disruptions in the real economic sectors in the aftermath of the COVID-19 and the relative resilience of financial markets to unforeseen and sudden events such as the COVID-19 epidemic or the Ukrainian conflict in a context of high levels of public debt point at the contemporaneous nature of a type of sovereign crises that could have been seen as testimony of the past.

This chapter is structured as following. In the first section, I show that the occurrence of 2<sup>nd</sup> Generation sovereign crises (SGS) have been rising, and I evaluate their costs with respect to first generations. In a second section, I investigated the determinants to the vulnerability of first and second generation crises. In the last section, I extend the analysis to 2021 and compare the COVID-19 crises with the Great Financial Crises (GFC) in light of the framework presented throughout the paper.

### 3.1 The Cost of Sovereign Crises: The Type of Distress Matters

Given the amplification effect of expectation regime shifts on sovereign debt crises and economic recessions presented in Chapter 2, I proceed to the evaluation of events that combining sovereign crises and adverse changes in economic sentiments. I identify the episodes and named them *2<sup>nd</sup> Generation sovereign crises (SGS)*<sup>8</sup>. In a second step, I explore the reasons behind their particular costs and consequences when compared to *1<sup>st</sup> Generation Sovereign crises (FGS)*, i.e., episodes of sovereign crisis without pessimist expectation reversal.

Table 3.6 provides the typology of crises and details the occurrence of four regime types<sup>9</sup>. *Expansion* corresponds to periods of particularly rapid economic expansion<sup>10</sup>. *Risk Free Recession*<sup>11</sup> corresponds to the occurrence of severe recessions only, free of sovereign risk and adverse expectations shift. *1<sup>st</sup> generation Sovereign Crises (FGS)* to question of sovereign debt crisis without coordinated panics. *2<sup>nd</sup> Generation sovereign crises (SGS)* corresponds to the simultaneous occurrence of sovereign debt pressures and negative shifts of expectations. Finally, *Normal times* correspond to the residual periods where no extreme events (positive or negative) occur<sup>12</sup>.

Crises periods represent close to 45% of the sample, risk-free recessions only account for 5.13%, FGS crises 29.28% and SGS crises 11.96%. Figure 3.1 plot the evolution in the number of crises of each category, and Table E1 provides the respective

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<sup>8</sup>The denomination echo to the classification of the type of currency crises, with the second generation denote self-fulfilling events where fundamental only play a limited role Obstfeld (1988)

<sup>9</sup>The classification is purely based on the perception extracted from the IMF bilateral surveillance and is constructed by sequentially classifying all country-year period into a single category

<sup>10</sup>Using the same methodology used in Chapter 1 I have identified all expressions synonymous to "rapid economic growth", "economic expansion", "strong recovery", etc ...

<sup>11</sup>Risk free should be understood as risk-free of sovereign debt crisis only. Those events are identified by severe recessions without reference to risk of default or concerns about sovereign debt dynamics but could well include events of banking or exchange rate crash.

<sup>12</sup>To concentrate on periods of acute pressure, I set to zero 25% of the lowest term frequencies for the variables of interest to remove transition phases.

occurrences for each country.

**Table 3.1:** Typology of Crises

Countries	Expansion	Risk Free Recession	FGS Crises	SGS Crisis	Normal
All	731(11%)	348(5%)	1988(29%)	812(12%)	2697(40%)
High	368(17%)	188(9%)	323(15%)	196(9%)	918(44%)
Low	55(5%)	19(2%)	467(45%)	126(12%)	366(35%)
Middle	308(8%)	141(4%)	1198(33%)	490(13%)	1413(39%)

**Source:** [Complex Crises Database \(CCD\)](#).

**Note:** The table shows the number of periods and proportion in parenthesis for each type of crises over the period 1960-2016 for all IMF members (181 countries). *Normal* corresponds to periods with term frequencies for expansion, severe recessions, sovereign crises and expectations regime shifts equal to zero. *Risk Free Recession* corresponds to periods with strictly positive term frequencies for severe recession only without sovereign crises and expectation regime shifts. FGS crises corresponds to 1<sup>st</sup> *generation of sovereign crises*, periods with strictly positive term frequencies for sovereign crises without expectation regime shifts. SGS crises corresponds to 2<sup>nd</sup> *Generation fo sovereign crises*, periods with strictly positive term frequencies for sovereign crises and adverse expectation regime shift. For each variables the 25% lower frequencies are set to 0 to limit false positives and exclude transition phases.

In Chapter 2, I argue that SGS crises are potentially more severe and difficult to address than isolated drops in output because they feature an important psychological amplification mechanism. The feedback effect between output drops, rollover tensions and negative expectations generate potential multiple equilibria with self-fulfilling dynamics and reinforcing mechanisms fueling multiple crises.

A large body of literature has documented the severity of multiple crises ([Kaminsky and Reinhart, 1999](#); [Reinhart and Rogoff, 2011](#); [Laeven and Valencia, 2013](#); [Na et al., 2018](#); [Brunnermeier and Oehmke, 2013](#)) and shown that they entailed larger and longer downturns. In this section I provide evidence that more than the multiplicity itself (*Twin* or *Triple crises*) it is the complexity, defined as events featuring a large psychological dimension that foster the co-occurrence of several crises, that is the source of the more severe macroeconomic disruptions.

Figure 3.1 shows the evolution of the number of countries that have experienced a crisis for each year in the sample. The *first generation sovereign crises* (FGS) was at its

peak during the period 1983-1995, with around 75 countries dealing with sovereign default and refinancing issues.

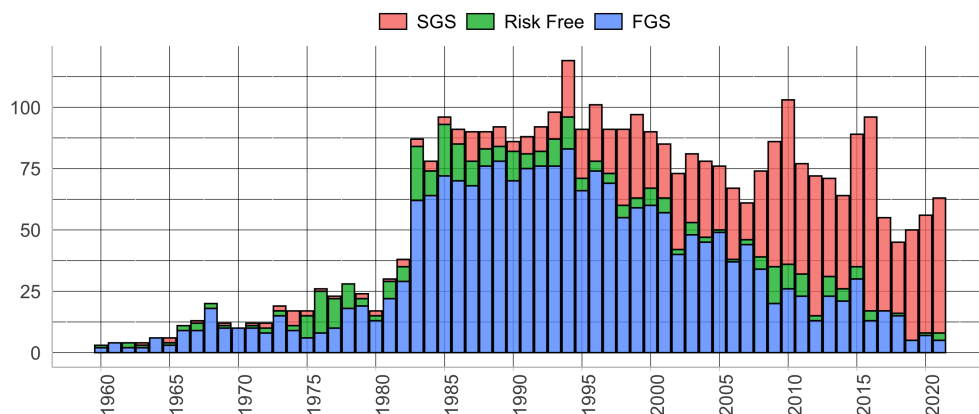
From 1995 to 2015 the number of countries experiencing FGS crises gradually decline to stabilize at around 25 countries. The second generation sovereign crises are very infrequent before 1994, only concerns a few countries and represent less than 5% of sovereign crises episodes.

The year 1994 and the triggering of the Tequila crisis, "The first crises of the *XXI<sup>th</sup>* century", marks a tipping point. The occurrence of FGS crises is gradually replaced by SGS crises, with close to 25 countries experiencing the combination of rollover pressures and expectation regime shifts from 1994 to 2007.

The GFC marks a second structural change, with SGS crises representing more than half of the occurrence of sovereign debt crises. *Severe Risk Free Recessions* also display a decreasing trend since 1994 with only a few countries hit by severe recessions only. Twenty-five years after the Mexican crises the prediction that the nature of crises was shifting to much more psychologically driven events, with strong financial, political, social and economic consequences was accurate.

FGS crises events have not vanished and can still concern a number of countries. Debt overhang, chronic deficits, exogenous domestic shocks and economic instability continue to generate country-specific concerns about the debt dynamics and the possibility of default. However, the novel nature of sovereign crises, often without default, put at the core of sovereign distress the volatile and sudden expectations of economic agents that amplify the shocks and generate severe doom-loops where macroeconomic policy responses either stop or fuel the snowballing events that lead to the crises and hamper the recovery.

**Figure 3.1:** Evolution of The Type of Crises



**Source:** *Complex Crises Database* (CCD).

**Note:** *Risk Free Recession* corresponds to periods with strictly positive term frequencies for severe recessions only. FGS corresponds to 1<sup>st</sup> *Generation Sovereign crises* periods with strictly positive term frequencies for sovereign crises without expectation regime shifts. 2<sup>nd</sup> *Generation Sovereign crises* corresponds to periods with strictly positive term frequencies for sovereign crises and adverse expectation regime shift.

Why some countries enter negative spirals triggered by sudden panics and loss of confidence, while others can resist severe shocks with no concerns about the capacity of the country to mitigate the shock and promote a strong recovery is still to a large extent a puzzle. The capacity to anchor expectations and ensure market participants that shocks are temporary, isolated and will be mitigated as announced is at the center of macroeconomic dynamics and central in the conduct of macroeconomic policy since [Kydland and Prescott \(1977\)](#) and the evidence of the effect of time inconsistent policies. In this context the capacity of a government to limit expectation regime shifts is rooted in the origin of credibility: *to say what you plan, do what you said and all the more say what you can.*

In the rest of this section I investigate the macroeconomic dynamics around the different types of crises, show that the vulnerability to SGS crises generate a strong

middle income trap in low credibility countries and explore some of the determinants of credibility that could account for these vulnerabilities.

### 3.1.1 Macroeconomic Outcomes Around Crises

Chapter 2 Section 2.3 shows that there is a doom loop between recessions, expectations regime shifts and sovereign crises that has consolidated in recent years. Such a link is destructive, as it strengthens negative dynamics and make recoveries slower and more fragile.

**Table 3.2:** Type of crises and Macroeconomic fundamentals

Crises	P[g<-0.01]	E[g]	E[BC]	E[CC]	E[SD]	E[d/y]
SGS	18.55%	3.89%	5.22%	1.76%	489.99	56.77
Normal	5.6%	4.25%	3.29%	0.72%	75.34	45.66
FGS	7.83%	5.01%	2.68%	4.18%	624.9	73.17

**Source:** [Complex Crises Database \(CCD\)](#) , Economic outlook (OECD), [Beers and Nadeau \(2015\)](#), [Laeven and Valencia \(2013\)](#) and author calculations.

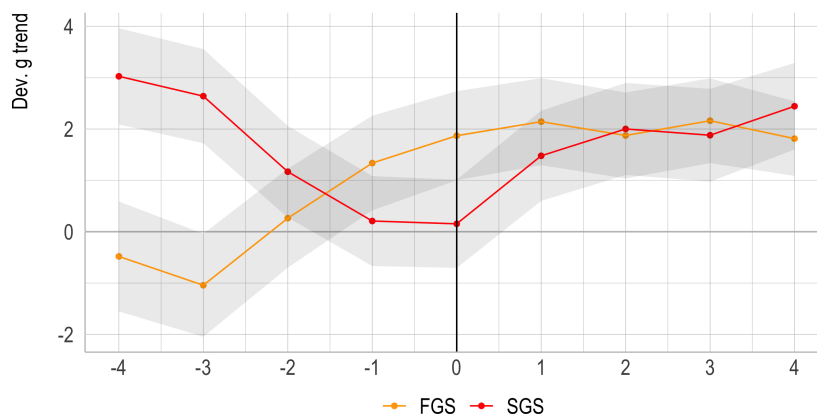
**Note:** *Normal* corresponds to periods with term frequencies for severe recessions, sovereign crises and adverse expectations equal to zero. *Recession* corresponds to periods with strictly positive term frequencies for severe recession only. *First generation of Sovereign crises* (FGS) corresponds to periods with strictly positive term frequencies for sovereign crises and no expectation regime shifts. *Second generation of sovereign crises* (SGS) crises corresponds to period with strictly positive term frequencies for sovereign crises and adverse expectations. E[g] is the average real GDP growth rate from the World Economic Outlook (WEO). P[g< -0.01] the probability of experiencing a GDP growth rate below -1%. E[BC] corresponds to the average fiscal cost of banking crisis in percent of GDP from [Laeven and Valencia \(2013\)](#). E[CC] is the average yearly depreciation of the exchange rate. E[SD] is the total amount of sovereign debt in default estimated by [Beers and Nadeau \(2015\)](#). E[d/Y] refers to the average public debt to gdp ratio from the historical public debt database (HPDD) of the IMF.

Table 3.2 compares the different macroeconomic states to different measures of macroeconomic activity. In particular, the probability of a growth rate lower than -1%, the average growth rate, the average GDP cost of banking crisis, average depreciation of the exchange rate, the amount of debt in default and the debt to GDP ratio.

When comparing across income groups (not reported), SGS crises are associated with the lowest average growth for both high and middle income countries and are associated with the lowest phase of the cyclical component of GDP and in particular the downturns with the largest amplitude but particularly short in duration. Across high income countries, SGS crises are coincident with the more costly downturns (amplitude x duration).

During all crises, countries experience a drop in output in the following years (Figure 3.2). SGS are the more costly, with a drop of 3 percentage point with respect to pre-crisis levels (t-4). The recessions associated with SGS stand out for the particularly sharp V-shaped recession and recovery that confirms the evidence suggested by Table 3.2 of events that involve sharp growth reversals. The evolution of the growth rate around FGS crises stand out in two aspects. First, during the pre-crisis (t-4 and t-3) the growth rate is on average slightly lower than trend growth what suggests that countries facing SGS crisis face sluggish economic development in the years preceding the crisis. Second, the growth recovery increase in a logarithmic shape and do not display a through at the moment of the crisis, suggesting that sovereign debt restructuring without disruption of confidence may indeed free up resources and contribute to reduce debt overhang pressures. In the aftermath of both type of sovereign crisis, growth rates converge within 2 years posterior to the crisis.

**Figure 3.2:** Deviation From Real GDP Growth Around Sovereign Crises



**Source:** *Complex Crises Database* (CCD), World Economic Outlook (WEO) and author calculations.  
**Note:** Each point corresponds to the separate estimation in the spirit of [Jordà \(2005\)](#) and considering as shock the year of sovereign crisis (SGS or FGS)

The amplitude of the drop in growth is in line with findings typically in the range of 1-4 percentage points of real GDP per capita growth in the first few years post-default ([Mitchener and Trebesch, 2021](#); [Borensztein and Panizza, 2010](#); [Furceri and Zdzienicka, 2011](#); [Kuvshinov and Zimmermann, 2019](#))<sup>13</sup>. The evidence of a heterogeneity in output costs of sovereign crises has also been largely documented in the literature. For instance, sovereign defaults involving high creditor losses (“haircuts”), long negotiation delays, and “coercive” government measures such as a unilateral payment suspension are associated with higher output losses and increased subsequent borrowing costs ([Cruces and Trebesch, 2013](#); [Trebesch and Zabel, 2017](#); [Catão and Mano, 2017](#); [Asonuma et al., 2019](#)). It also confirms the observation that financial related crisis that follow a boom-burst cycle dynamic are particularly costly. In particular, it provides empirical evidence for the Minsky hypothesis ([Minsky, 1986](#)) that

<sup>13</sup>It can be noted that the crisis identified by the IMF corresponds to the trough of the crisis inline with the evidence that the measure of crisis is relatively backward looking



particularly sharp recessions are usually preceded by large expansions with above trend growth rate suddenly collapsing in the aftermath of expectations reversals. This idea is rationalized by [Rancière et al. \(2008\)](#) who present a model where poor contract enforcement in financially liberalized economies can lead to higher growth and higher occurrence of systemic crises. The idea is that in economies with low contract enforcement, growth is hampered by higher borrowing constraint. In this context, the systemic risk taking induced by financial liberalization reduces the borrowing constraint and allow for higher investment and higher growth during the expansion, but expose the country to more severe crises whenever systemic crises arise.

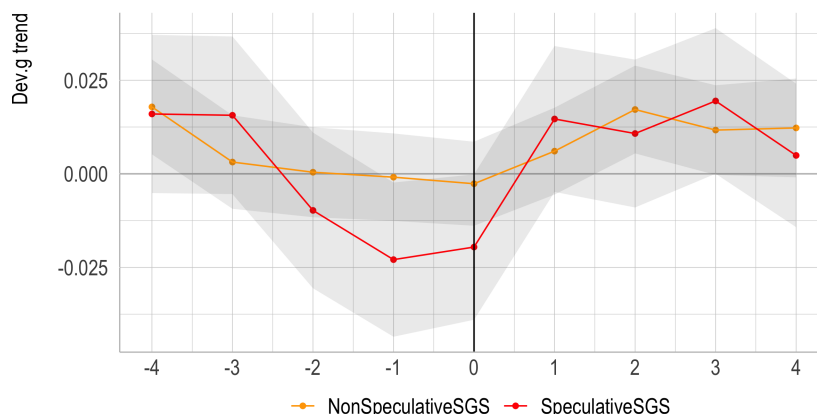
In this paper, I argue that the typology proposed in this paper help to discriminate severe from more modest sovereign crises with a simple identification strategy that relies on the perception from economic experts of negative expectation regime shifts of global investors. With such index, I intend to capture and synthesize a variety of hard and soft indicators that are monitored by the IMF staff (often even produced by the Fund) during the surveillance activity.

Historical records of sudden panics driven by speculative dynamics ([Kindleberger, 1975](#)) amount investors or bank depositors ([Diamond and Dybvig \(1983\)](#)) as well as the estimation of the system of crises in chapter 2 suggests that speculative expectations are particularly costly and generate severe sovereign crises and deep economic crises. Figure 3.3 tests this result by comparing the evolution of real GDP growth around SGS crises with speculative expectations and SGS crises that are not associated to speculative expectations<sup>14</sup>. Results show that during events of speculative distress, the recession is larger and sharper.

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<sup>14</sup>Speculative events are identified in Chapter 2. A dummy variable equals to 1 when the paragraphs mentioning expectation regime shifts contains the words “speculative attacks” (and variations). Speculative ERS identify to years that combine Sovereign crisis and expectation regime shifts with speculative dimension

**Figure 3.3:** Deviation From Real GDP Growth Around Speculative Sovereign Crises



**Source:** *Complex Crises Database* (CCD), World Economic Outlook (WEO) and author calculations.  
**Note:** Speculative ERS identify to years that combine Sovereign crisis and expectation regime shifts with speculative dimension. A dummy variable equals to 1 when the paragraphs mentioning expectation regime shifts contains the words “speculative attacks” (and variations). Refer to Section 2.2.1 for more details about the indicators

### 3.1.2 Multiplicity and the Road to Complexity

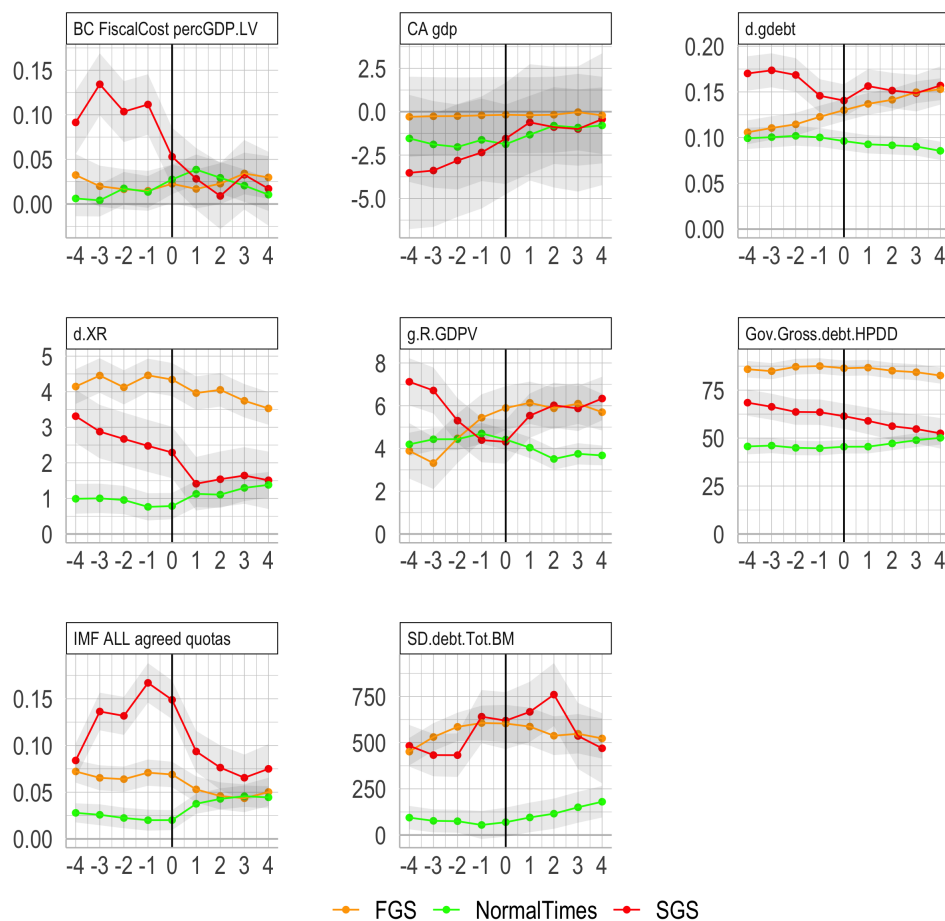
Macroeconomic crises are not only more likely to occur in fragile and vulnerable economies, but they are also more severe as frictions and imbalances accumulate, combine and strengthen each other. How recessions and sovereign crises spillover to other sectors of the economy is central to determine the severity of those events.

Figure 3.4 analyze the evolution of key macroeconomic variables around SGS and FSG crisis. The pre-crisis period suggests that banking crises usually pre-date the sovereign crisis and are particularly costly during SGS crises. The current account deficit and the increase in debt are particularly large in the preceding 4 years of the SGS crises, but are both recovering when the crisis are triggered. In contrast, during FGS crises the level of public debt is higher and the dynamic on the rise without signs of corrections in the years preceding the crises. In the perspective of SGS crises, gov-

ernments implemented stronger correction measures to limit macroeconomic imbalances (lower public debt, reduce external deficits, bailout banking sector, defend the currency) at the cost of stronger recessions.

In line with theoretical predictions, expectations regime shifts occur when the government's plan to stabilize output, lose credibility and reveal inconsistent macroeconomic policy, when this occurs, panic and distress regarding the capacity of the country to repay its debt kick-in and severe sovereign crises occur.

**Figure 3.4:** Projection of Macroeconomic Variables Around Sovereign Crises



**Source:** *Complex Crises Database* (CCD), World Economic Outlook (WEO), HPDD, [Laeven and Valencia \(2013\)](#) and author calculations.

**Note:** FGS stands for First Generation Sovereign Crisis, SGS stands for Second Generation of sovereign crisis, Normal times corresponds to periods where no sovereign crisis occur. BC FiscalCost.percGDP.LV is the estimated fiscal cost of banking crisis estimated by [Laeven and Valencia \(2013\)](#), d.XR measures the variation of the exchange rate, g.R.GDPV the growth rate of GDP in volume. Gov.Gross.debt.HPDD is the estimated public debt to GDP ratio. Imf All agreed quotas corresponds to the amount of IMF lending in percent of quotas. SD.debt.tot.BM is the estimated amount of sovereign debt in default (rescheduling) estimated by [Beers and Nadeau \(2015\)](#) and [Beers and Mavalwalla \(2017\)](#).

These results support the evidence of the particularly high cost of *Twin crises*

(Borensztein and Panizza (2010), Reinhart and Rogoff (2011), Laeven and Valencia (2013)). The risk of a feedback loop between sovereign risk and banking crises was particularly striking in the case of Greece in 2010-2012 or Argentina in 2001 and include both fundamental and non-fundamental transmissions. Brutti (2011), Bolton and Jeanne (2011), Gennaioli et al. (2014) provide models that link banking crises to sovereign default by considering the spillover effect of default on bank balance sheets and liquidity provision, all the more if the banking sector is highly exposed to sovereign bonds. In top of potential direct losses from default, *Latent* sovereign and banking crises can also be an important driver of the doom-loop. Bocola (2016) rationalize this finding using a model where the news about possible sovereign distress can impact bank wealth and funding costs, generating a recession. A number of other findings suggests that sovereign crises itself can originate in weak banking sectors (Acharya et al., 2014).

Regarding the timing between sovereign and banking crises, my findings suggest that the banking crises usually precede the sovereign crises inline with Laeven and Valencia (2013) and Reinhart and Rogoff (2011) who find that banking crises precede the default but in contrast to Borensztein and Panizza (2010) and Gennaioli et al. (2014) that rather find that sovereign crisis predate the banking crisis. Mitchener and Trebesch (2021) suggest however that the difference in timing is largely dependent on the methodology, sample of countries and crises dating<sup>15</sup>.

Indeed, using the indicator of banking crises from the *Complex Crises Database* (Figure 3.5) I find that the increase in financial crisis regime (that includes banking and financial risk) is symmetric around SGS crises in the range of  $-/+ 2$  years around the sovereign crises. The finding that sovereign and banking crises are more closely associated in the recent periods is confirmed by Mitchener and Trebesch (2021) who

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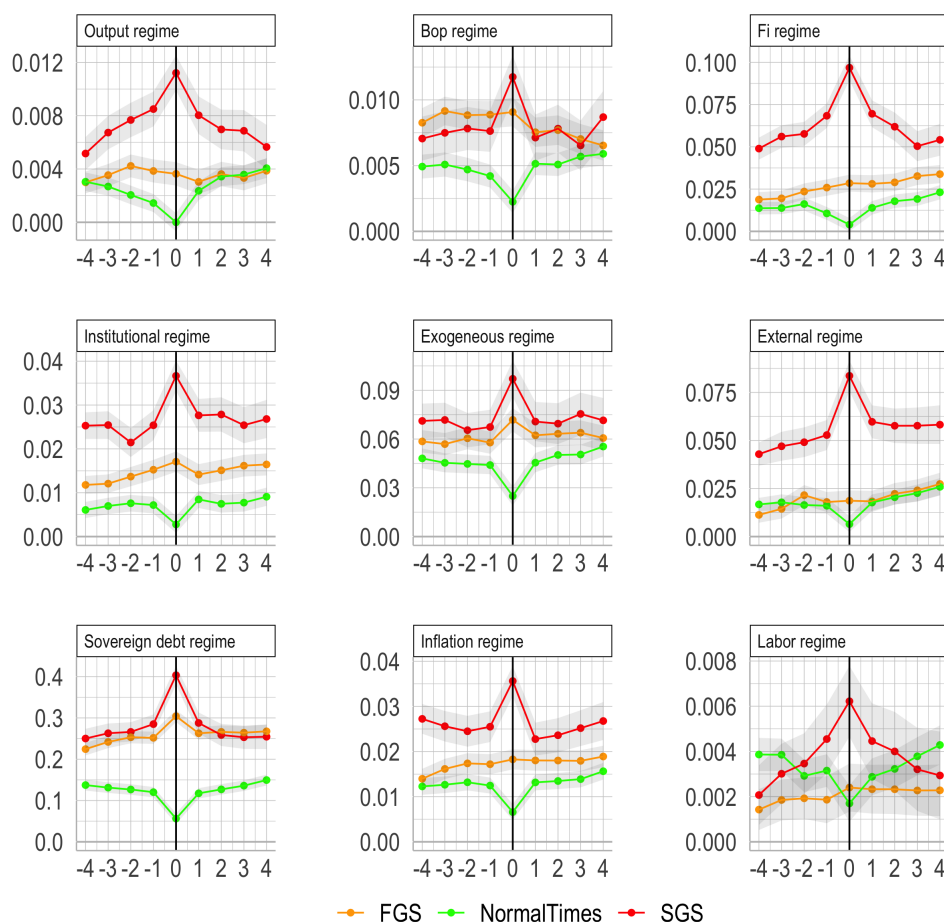
<sup>15</sup>The mismatch in the dating of crisis can be important (Bordo and Meissner, 2016), in particular in the present case the data for banking crisis corresponds to the first year of the distress while the measure of sovereign crisis identify the entire period of crisis.

finds that doom loops were relatively rare events until recently. The increasing co-occurrence of sovereign and banking crises, largely driven by expectation regime shifts (self-fulfilling) is likely to explain why SGS crises are particularly costly.

Figure 3.4 panel 8 displays the amount of debt in default around episodes of crisis. The relatively similar average amount during each of the cases confirms the evidence that the first order cost of default itself is not the main driver of a more severe drop in output. Both first and second generation sovereign crises are associated with higher levels of debt in default, with the highest amount of debt in default contemporaneous to the timing of the sovereign crises.

Table G.1 complements the comparative analysis of sovereign crises by looking at the different perception measures of crises at the time of sovereign crises. The results presented in Figure 3.4, regarding recessions, financial crises, balance of payments and debt dynamic during sovereign crises are confirmed when using the alternative measures of crises perceptions. Two additional evidence can be highlighted. First, regardless of the type of sovereign crises, difficulties to repay the debt is associated to the occurrence of exogenous shocks (defined as either Natural disasters, Epidemics, Commodity crises or violent conflicts). Second, that SGS crises are more closely associated to external shocks (regional contagion or world scale crises) and occur in periods of higher institutional instability.

**Figure 3.5:** Projection of Crises Perception Regimes Around Sovereign Crises



A key characteristic of SGS crises is to feature a particularly high level of uncertainty and fears. In this context, Figure 3.5 summarizes the perception of different crisis regimes. For the exercise, I rely on the different measures from the *Complex Crises Database* and regroup measures in 9 crisis regimes<sup>16</sup>. This projection exercise

<sup>16</sup>Output regime measures the intensity of severe recession; Bop regime measure the occurrence of balance of payment and currency crisis; Financial regime include financial and banking crisis; Institutional regime includes social and political crisis, Exogenous regime includes Natural disasters, Epidemics, Commodity crises or violent conflicts; External regime includes world outcomes and contagion; Sovereign debt regime indicate the occurrence of tensions on public debt (it is not default but rather mentions of high and rising public debt); inflation and labor regime refers respectively to inflation crisis and unemployment crisis.

and the common pattern for different dimension of crisis (rapid and nonlinear increase prior to the crisis and rapid stabilization in the aftermath) suggests that SGS crises are more strongly associated with perceived economic vulnerabilities across all economic dimensions, even if in most cases such risks do not materialize in the following years (see Figure 3.4).

**Table 3.3:** Probability of Crisis Regime During Sovereign Crises

Crises	output	External	Exogenous	Financial	Currency	Bop	Fiscal dev	Institutional
SGS	0.65	0.78	0.76	0.77	0.22	0.3	0.72	0.64
Normal	0.17	0.2	0.41	0.16	0.04	0.09	0.13	0.15
FGS	0.5	0.41	0.74	0.44	0.18	0.29	0.58	0.42

**Source:** [Complex Crises Database \(CCD\)](#)

**Note:** Output regime measures the intensity of severe recession; Bop regime measure the occurrence of balance of payment and currency crisis; Financial regime include financial and banking crisis; Institutional regime includes social and political crisis, Exogenous regime includes Natural disasters, Epidemics, Commodity crises or violent conflicts; External regime includes world outcomes and contagion; Sovereign debt regime indicate the occurrence of tensions on public debt (it is not default but rather mentions of high and rising public debt); inflation and labor regime refers respectively to inflation crisis and unemployment crisis.

In addition to the pure economic consequences, two characteristics of SGS crises stand out: a larger institutional cost and a much larger external origin (Table G.1 and Figure 3.5).

SGS crises display large differences with FGS sovereign crises in the intensity of regional contagion or world outcomes, suggesting that a key driver of SGS is related to the vulnerability to external shocks that spread throughout the economy through banking crises, financial crashes, inflation pressures or political uncertainty. The change in the nature of crises and the importance of the external dimension confirm the findings of a closer co-movement of bond yields across countries with a “global factor” and contagion gaining importance over country-specific fundamentals in sovereign risk pricing ([Mauro et al. \(2002\)](#), [Levy Yeyati and Gonzalez-Rozada](#)



(2005) and [Longstaff et al. \(2011\)](#)).

Not only SGS crises have deep economic consequences, they are also largely out of the scope of government short-term macroeconomic decisions and have a strong impact on institutional frameworks. Indeed, both political and social crises are more intense during SGS than during risk-free recessions and FGS crises. Both SGS and FGS crises are associated with institutional spillovers (Table [G.1](#)) however the institutional disruption around SGS crisis is much deeper and shows a significant spike coincident with the outburst of the crises (Figure [3.5](#)).

The central role of institutional and political instability around sovereign crises has been largely documented. [Sachs \(1989\)](#) highlight the linkage from social conflicts to poor economic performance and show in the case of Latin American countries that a populist policy cycle characterized by over expansionary policies and build-up of macroeconomic imbalances leading to a poor economic performance. [Adam and Karanatsis \(2019\)](#) shows for a sample of 105 countries from 1824 to 2004 that state defaults are associated with autocratic policy changes. [Burke and Leigh \(2010\)](#) provide evidence of the role of output contractions on the timing of democratic changes and show for a sample of 154 countries for the period 1963-2007 that better growth performance is associated with a higher likelihood of transition toward democratic institutions. In addition to the empirical evidence, [Cuadra and Sapriza \(2008\)](#), [Hatchondo and Martinez \(2010\)](#), [Hatchondo et al. \(2009\)](#) provide DSGE models that include the effect of political instability and polarization on spreads and default rates. As a complement, a number of events studies have documented volatile political environments around default episodes and provide evidence for Mexico in 1994, Argentina 2001, Ecuador 1999, Pakistan 1999, Russia 1998, and Uruguay 2003.

Figure [3.5](#) shows the intensity of external shocks associated with crises. FGS crises are characterized by domestic outcomes and are country specific events that have little to do with external dynamics. On the contrary, SGS crises are significantly as-

sociated with a sharp discontinuous disruption of the world economy or that of economic partners. The higher institutional vulnerability combined with above trend economic growth prior to the crises suggests that external events may act as the trigger of crises in countries experiencing clear underlying economic and institutional imbalances (overheating) but weakly anchored confidence.

Overall, these general stylized facts are in line with findings of more costly and rising occurrence of global shocks (Kose et al., 2020) and general co-movement across countries (Bacchetta and van Wincoop, 2016). The origin and developments of SGS crises are largely out of the scope of domestic governments and tend to undermine the political and social support of governments. This incapacity to react and weigh on the developments of such macroeconomic crises not only increases the economic costs, but also erodes the political and institutional credit of governments. Lacking the instruments to tackle global events, government lose the credibility and support that are crucially needed to limit panics and restore confidence. Those events are more than economic crises. They are crises that hit the core of societies in dimensions that escape the scope of traditional macroeconomic policy.

In a fragile global economy, sound macroeconomic policies, lower levels of debt and the build up of large international reserves did not always prove to be enough to avoid the sharp and severe consequences of SGS crises. In times of low confidence in policy response, great uncertainty and risk about possible shocks, the government range of action can narrow down extremely fast, pushing countries with sound fundamentals into sudden and severe economic and institutional distress.

## 3.2 2<sup>nd</sup> Generation of Sovereign Crises and Middle Income Trap

A “middle-income trap” occurs when an economy grows quickly to reach the middle-income level and then becomes relatively stagnant, failing to catch up to high-income countries (Spence (2011), Eichengreen et al. (2012), Eichengreen et al. (2013), Aiyar et al. (2018), Felipe et al. (2012), Bresser-Pereira et al. (2020)).

In Section 3.1 I documented the particular severity of SGS crises and showed that countries subject to sharp Expectation Regime Shifts are vulnerable to deeper recessions, higher institutional disruption and severe financial crises. In this section, I argue that countries may face a middle-income trap when vulnerable to SGS crises that cancel out the economic gains during expansions. The capacity of a country to bypass the income trap is then crucially dependent on the capacity of the country to anchor expectations and avoid a sudden loss of confidence and pessimistic expectation spirals about the conduct of macroeconomic policy and the solidity of the banking sector.

The literature of middle income traps has provided various thresholds and explanations for why some countries struggle to sustain strong growth. Eichengreen et al. (2012) and Eichengreen et al. (2013) identify a threshold of \$15,000 of GDP per capita in PPP terms in 2005 where economic growth slows (defined as a growth rate declining for 7 consecutive years).

Similarly, Aiyar et al. (2018) defines the income trap as the moment when large and sudden deviations from the expected growth trajectory. Among the causes invoked are high dependency rates, high investment rates that reduce the future return on capital, undervalued exchange rates that limit technological development, changes in government regimes, financial instability, trade liberalization and terms of trade shocks.

Felipe et al. (2012) underscore the role of structural determinant, highlighting the role of the successful shift from low to high productivity activities, the type of export products and the degree of diversification of the economy. The quality of institutions and the weight of history has been at the center of *institutionalists* who posit that countries fail to develop because they lack the right institutions, and in particular property rights and contract enforcement.

Challenging the idea that institutions deeply rooted in history can be detrimental to growth in countries where growth was high before the 1980s, Bresser-Pereira et al. (2020) argue that the difference in growth trajectory between Asian and Latin American countries since the 1980s is rooted in the agenda of structural reforms promoted in the aftermath of the debt crises episodes of the 1980s. In particular, they conclude that the main drivers of the slowdown in Latin America come from the integration of financial markets and commercial liberalization.

In this section I provide evidence for the non-linear relationship between the probability of SGS crises and income per capita and show that middle income countries with rapid and intense financial deregulation of bond markets are particularly vulnerable to destructive shifts of expectations. While economic development, financial integration and better institutions help to reduce the occurrence of FGS crises, it does not protect countries from severe downturns when markets lose confidence in the ability of the country to refinance its debt and doubt about the solidity of the financial institutions.

### **3.2.1 Severe Crisis and Middle-Income Traps**

*2<sup>nd</sup>* Generation Sovereign Crises correspond to severe rollover pressure on sovereign debt caused or/and amplified by adverse expectation regime shifts, that is an abrupt shift of perception of systemic agents regarding the rules of the game in the markets that drive sudden panics, uncertainty spikes or abrupt loss of confidence among

real and financial investors with systemic importance. The doom-loop caused by the loss of confidence and uncertain perspective about economic and financial outcomes can trigger a cascade of events and are closely associated with concerns about the health of the financial sector (bank run type mechanism in the spirit of [Diamond and Dybvig \(1983\)](#)) and the conduct of coherent and adequate macroeconomic policy.

The capacity of a country to properly hedge against sudden confidence collapses is deeply rooted in the capacity of the country to absorb shocks and prompt a steady recovery. Why and how expectations coordinate on a so-called *bad* equilibrium is widely debated in the literature. The arguments range from the existence of independent sunspots, to update beliefs following a news shock on the true state of fundamentals<sup>17</sup>. The reason and timing of sudden and unexpected loss of confidence can be diverse and country/period specific. However, two major sources of expectation concerns stand out. The trust in the solidity of the banking sector and the credibility in the conduct of macroeconomic policy.

In this context, I define the country credibility as the capacity of a country to contain policy and banking expectation regime shifts. Credible countries are identified as countries that can convince economic actors that shocks will not profoundly affect the bail-in or bail-out of fragile financial institutions and that optimal macroeconomic policy will be put in place and sustained inline with announcements.

Figure 3.6 defines high credibility countries as countries with a probability of experiencing a banking and policy driven SGS crises of less than 5%. Inline with the evidence that a key source of uncertainty is the capacity (willingness) of a government to bailout fragile financial institutions, I found a strong correlation between the vulnerability to banking driven SGS and policy driven SGS.

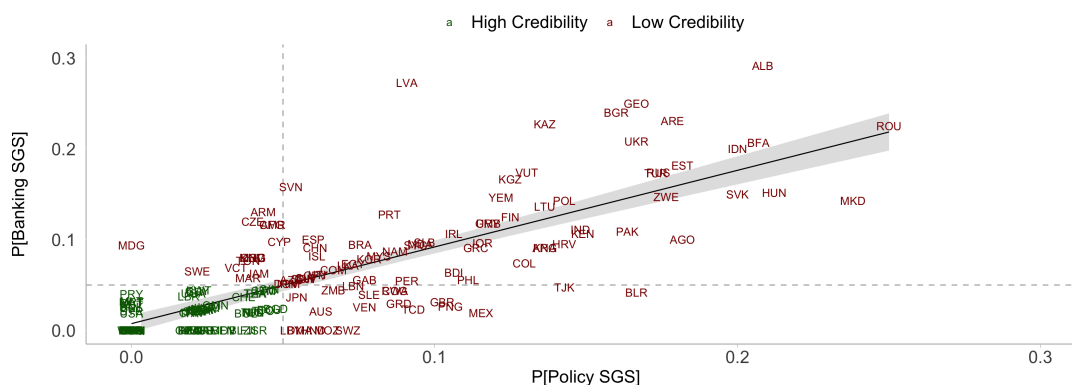
Nonetheless, this correlation excludes a number of countries with specific vulner-

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<sup>17</sup>See Chapter 2 Section 2.1 for more details on the source of non-fundamental drivers crises

abilities. For instance, Sweden display little policy related vulnerability but a banking vulnerability that is higher than the threshold. On the contrary, Mexico or the UK display little banking vulnerability but comparatively high levels of policy-related uncertainty. A number of countries, in particular among the Eastern European countries display particularly high vulnerabilities in both dimensions, for instance Romania, Albania, North Macedonia, Hungary or, outside Europe, Burkina Faso and Indonesia.

**Figure 3.6:** Correlation Between Banking and Policy Credibility



**Source:** *Complex Crises Database* (CCD).

**Notes:** *Low Policy Credibility* denote countries that have experienced policy related SGS crises or banking related SGS with a probability higher than 5%. P[SGS] is computed as the probability of the joint occurrence of sovereign debt crises and expectation regime shifts over the period 1960-2016. P[FGS] is computed as the probability of sovereign debt crises without expectation regime shifts over the period 1960-2016.

Figure 3.7 shows the relationship between the probability of sovereign crises and the level of income measured by the GDP per capita in PPP terms in 2005.

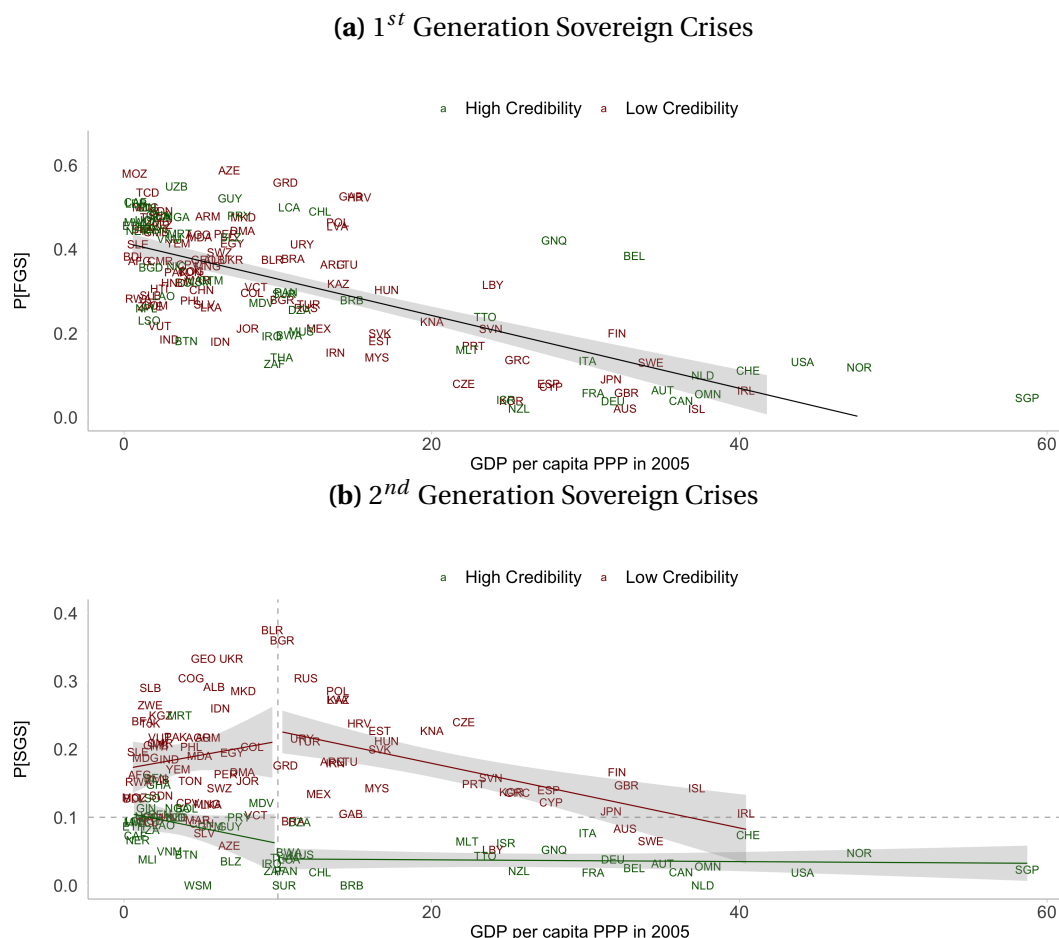
The probability of FGS crises (Panel b) is unconditionally negatively related to income. Sovereign crises without Expectation regime shifts tend to occur mostly in low income countries, where chronic over-borrowing generates debt tensions in close to 50% of the time. As economic development rises, risks of debt overhang and default,

decrease linearly.

In contrast, panel a) shows an inverse u-shape relationship between probability of SGS crises, income for countries with past history of banking and policy driven panics. The tipping point of the relationship, for a GDP per capita in PPP terms in 2005 of \$16,000 formally defines in this framework the threshold of the middle-income trap, a level close to [Eichengreen et al. \(2013\)](#).

Above \$ 16,000 of GDP per capita PPP (2005) the probability of experiencing a particularly severe sovereign crisis is either low and constant for high credibility countries or decreasing for low credibility countries. Under \$ 16,000 an increase in income is detrimental for countries with low credibility in contrast to high credibility countries for which a rise in income brings the probability of SGS crises close to the level of high income countries, above the \$ 16,000 limits.

**Figure 3.7: Economic Development and Sovereign Crises**



**Source:** *Complex Crises Database* (CCD).

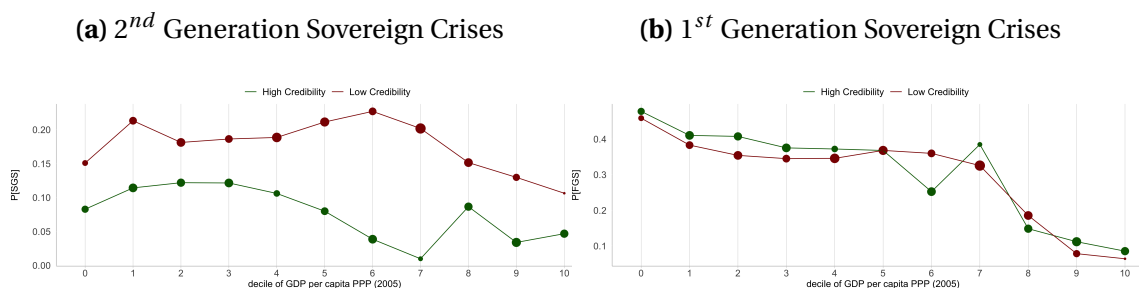
**Notes:** *Low Policy Credibility* denote countries that have experienced policy related SGS crises or banking related SGS with a probability higher than 5%. P[SGS] is computed as the probability of the joined occurrence of sovereign debt crises and expectation regime shifts over the period 1960-2016. P[FGS] is computed as the probability of sovereign debt crises without expectation regime shifts over the period 1960-2016.

Figure 3.8 classify countries by decile of income per capita and credibility status. It shows that the highest divergence in the probability of SGS between high and low credible countries occurs in countries in the 6th and 7th decile of income, with close to a 15 percentage point difference. In contrast, the degree of credibility is not as-



sociated with a heterogeneous relationship between income and the probability of simple sovereign crises (Panel b) and the occurrence of risk-free recessions (Panel c).

**Figure 3.8: Sovereign Crises And Income Deciles**



**Source:** *Complex Crises Database* (CCD).

**Notes:** *Low Policy Credibility* denote countries that have experienced policy related SGS crises or banking related SGS with a probability higher than 5%. P[SGS] is computed as the probability of the joined occurrence of sovereign debt crises and expectation regime shifts over the period 1960-2016. P[FGS] is computed as the probability of sovereign debt crises without expectation regime shifts over the period 1960-2016. The size of points corresponds to the number of countries in low and high credibility categories.

Expectation regimes shifts are sudden, sharp but short events. There are important amplification mechanisms, largely originating in the structure of financial market. They increase the severity of economic recessions and rollover pressures, and generate the most costly episodes of crises.

Historical evidence presented through this paper suggests that SGS crises tend to occur in countries with pre-existing institutional vulnerabilities, are closely associated with banking and policy-related expectation disruption and usually occur in countries subject to a pre-existing decline in confidence.

The credibility in the solidity of the banking sector and the conduct of sound macroeconomic policies is central to the capacity of a country to prevent costly rollover pressures. The rapid re-assessment of risk from market participants in a context of degraded confidence that spillovers to bond markets and generate capital flights and liquidity shortages for the sovereign are crucial in the risk of falling into a sticky mid-

dle income trap where costly crises erode the economic gains obtained during expansions.

Furthermore, such crises are not only costly for output in the short run, but critical for the institutional strength and credibility of authorities. In this context, the legacy of SGS crises is often a long-lasting expectation trap that put countries at risk of spillovers from external shocks and successive waves of crises.

### **3.2.2 Which Sovereigns Fail?**

Why sovereign fail to fulfill their financial commitments and are sometimes trapped in serial defaulting syndromes is an old question that have concerns mostly all countries in the last 200 years ([Reinhart and Rogoff, 2009](#)). In this section, I investigate the determinants of the vulnerability to sovereign crises. In particular, I test the validity of the main explanations provide by the literature, namely, the weakness of institutional and monetary frameworks, the high debt levels and explosive debt dynamics, the high degree of financial liberalization and the speed and scope of financial market deregulation.

After a period of relatively low default risk in the post WWII area, the high debt levels in emerging economies in the 1980s opened a period of large default episodes that expended in the late 1990 to countries with previously rapid economic and financial developments.

Ten years later, sovereign debt rollover pressure finally reached advanced European countries during the euro area sovereign crises. In the aftermath of the COVID-19 and the massive fiscal support in most countries, the debt levels have reached their all-time high and put a number of countries at risk of long term solvency. When and who will face the more acute rollover pressures and how countries should prepare to avoid severe sovereign crises is essential to undertake the adequate debt management policies.

In this section, I propose to highlight the determinants of the vulnerability to first and second generation sovereign crises and show that optimal debt management policy highly depend on the nature of sovereign crises and the vulnerability to sudden expectation shocks.

Institutionalist advocates highlight the prominent role that history and institutions play in fostering the capacity of countries to developed and reach economic maturity. In particular, the rule of law and respect of contracts is at the center of development and the capacity (and willingness) of countries to repay their debt (Acemoglu et al., 2003).

Figure 3.9 shows the relationship between the probability of sovereign crises and the index of rule of law in 2015 of the *World Governance Indicators* from the World Bank (Kaufmann and Kraay, 2007). Panel b) shows the largely documented relationship between the first generation sovereign crises and the respect of rule of law<sup>18</sup>.

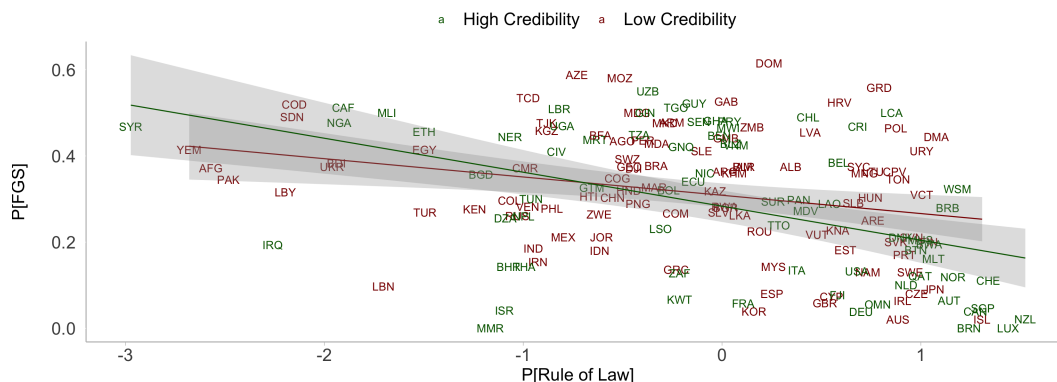
In contrast, panel a) shows no significant similar relationship for SGS crises where high confidence in the quality of contract enforcement is not associated with a lower occurrence of SGS crises in both high and low credibility countries. Similar results are found for the number of years of schooling (Barro and Lee (2013) and Lee and Lee (2016)) (Annex H) which suggests that weak institutions is not a significant precondition for the occurrence of SGS crises.

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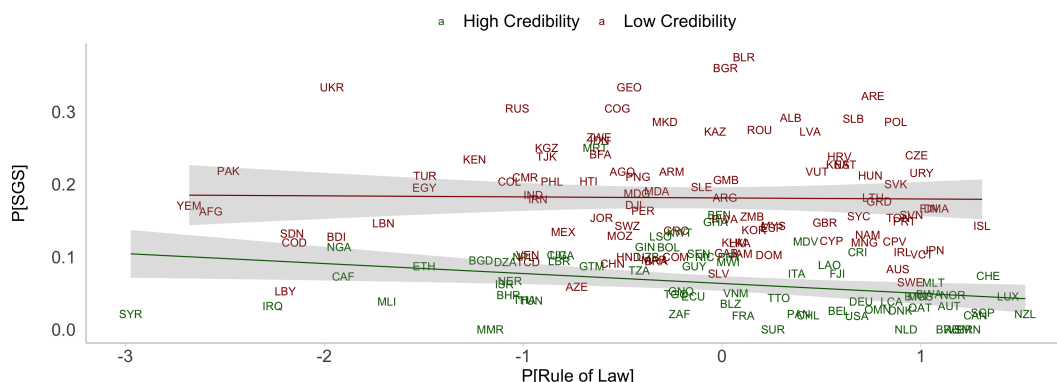
<sup>18</sup>Rule of law captures perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence. This table lists the individual variables from each data source used to construct this measure in the Worldwide Governance Indicators

**Figure 3.9: Rule of Law and Sovereign Crises**

**(a) 1<sup>st</sup> Generation Sovereign Crises**



**(b) 2<sup>nd</sup> Generation Sovereign Crises**



**Source:** *Complex Crises Database* (CCD).

**Notes:** *Low Policy Credibility* denote countries that have experienced policy related SGS crises or banking related SGS with a probability higher than 5%. P[SGS] is computed as the probability of the joined occurrence of sovereign debt crises and expectation regime shifts over the period 1960-2016. P[FGS] is computed as the probability of sovereign debt crises without expectation regime shifts over the period 1960-2016.

While rule of law and human capital capture a broad degree of institutional development, they may not reflect the institutional strength of financial market structure and monetary authorities. In particular, the credibility of the central bank is critical to anchor inflation expectations and maintain a credible exchange rate regime. In

this respect, the literature has underscored the importance of the Central bank independence (CBI) (Garriga, 2016) that corresponds to the capacity of the monetary authority to control monetary instruments.

The independence of the central bank is documented to be critical for the credibility of the monetary authority and mainly cover three dimensions: personnel (limits to the government's influence on the central bank board's membership or tenure), financial (restrictions to the government to use central bank's loans to fund its expenditures), and policy independence (capacity to formulate and execute monetary policy).

In the *rule vs discretion debate*, (Barro and Gordon, 1983) central bank independence is seen as an instrument to boost government credibility to tame inflation by limiting the time inconsistency problem (Kydland and Prescott, 1977). In the empirical literature CBI has mainly been found to have important stabilization properties in particular though lower inflation, lower output fluctuations, higher central bank credibility and lower uncertainty (Garriga, 2016).

The effect of CBI on sovereign risk can be two-fold. On the one hand its stabilization properties allow for stronger fundamentals and better repayment capacity, and on the other higher credibility ensures stable and anchored expectations that prevent expectation regime shifts.

However, as Heimonen and Maslowska-Jokinen (2014) argue, in some countries higher central bank independence could be seen as a substitute for stronger discipline and generate a credibility illusion where countries misused the perceived credibility to increase borrowing needs and increase fiscal risk.

I test this assumption in Table 3.5 by comparing the probability of sovereign crises for different levels of central bank independence using *de jure* measures from (Garriga, 2016) and find evidence that suggest that in line with Heimonen and Maslowska-Jokinen (2014), low credibility countries with higher central bank independence are

associated with a higher probability of second generation crises. This result suggests that expectations regime shifts can be associated with the breaking-down of the credibility illusion associated with monetary independence for countries that lack additional discipline and credible non-monetary institutional frameworks.

The conduct of fiscal policy and the need to trade off stabilization policies, political economy issues and long-term sustainability concerns require the build up of strong and credible fiscal institutions that make sure that temporary fiscal support does not slip into chronic borrowing and inefficient public spending. It is the principal agent problem between voters and politician and the common pool property of public budgeting that generate potential for excessive levels of spending, taxation and public borrowing (Von Hagen, 2002).

In this context, Von Hagen (2002) highlight three possible institutional approaches: Imposing fiscal rules, promoting political accountability and designing decision-making processes over public finances that induce policymakers to internalize the marginal social benefits and costs of their policies. Using data on fiscal rules from, (Lledó et al., 2017) I investigate the relationship between the number of fiscal rules and the history of sovereign crises. Similar to the stabilization effect of central bank independence, fiscal rules could be beneficial to reduce sovereign default risk by limiting the excessive borrowing due to generous stabilization policies or political cycles.

However, in a context of expectation driven crises not credible fiscal rule could also be counter-productive, if their compliance is low and the incentives to deviates are high. In this case, not credible fiscal rules could increase policy uncertainty and fuel negative expectation regime shifts in a logic similar to Obstfeld (1996) where not credible currency pegs generate potential self-fulfilling runs on currencies.

The role of unsustainable fiscal Policy (high and increasing debt) in low and middle income countries prone to debt intolerance and serial defaulter syndrome (Reinhart and Rogoff, 2009) has been at the center of the understanding of episodes of

sovereign default and explain the urge for fiscal rules and mechanism to reduce debt burden to dangerous situations. In the face of such symptoms successful debt crisis management has highlighted i) the need for tight fiscal policy to deleverage excessively indebted countries; ii) to provide lending assistance to avoid or minimize as much as possible the default and escape the vicious circle of serial defaults and iii) finally, promote economic recovery and raise potential growth through structural policies that foster financial, trade and economic integration.

**Table 3.4:** Government Gross Debt by Type of Country

Type	n	mean	median	75 <sup>th</sup> percentile	90 <sup>th</sup> percentile	sd
Risk free countries	36	50.26	42.52	65.86	95.28	36.68
Vulnerable to SGS Crises	64	53.77	41.86	68.17	104.77	42.61
Vulnerable to FGS Crises	80	63.46	49	77.57	110.25	77.66

**Source:** HPDD (International Monetary Fund, 2010), *Complex Crises Database* (CCD) and Author's calculations

**Note:** General Government debt to GDP ratio by type of Countries. Vulnerable to SGS (2<sup>nd</sup> Generation of Sovereign) crises countries are defined as countries with a probability of SGS crises of more than 15%. Similarly, Vulnerable to FGS (2<sup>st</sup> Generation of Sovereign) crises denote countries with probability of FGS crises lower than 15%. Risk free countries denote countries with the lowest probability of SGS and FGS crises.

Table 3.4 and Table 3.5 validates these findings in the case of countries vulnerable to FGS crises with an average debt to GDP ratio 13 percentage point higher than risk-free countries. The lower difference across the median and the twice larger standard deviation for the group of countries vulnerable to FGS crises confirm the evidence of debt intolerance phenomena.

In contrast, countries vulnerable to SGS crises are not associated with a higher debt level than risk-free countries. Chronic unsustainable spending and gradual accumulation of debt do not seem to be a precondition for SGS crises. Only FGS crises display systematically above the average government debt in the four years preceding the crises. Table 3.5 confirms the evidence that higher debt levels per se are only

a significant determinant of higher probability of crises in absence of consideration for history of default, institutional development, financial structure and vulnerability to external shocks.

In a context of strong psychological determinants with forward-looking actors, the difference between reality and the perception of this reality may be central, with the perception of risk more relevant than the risk itself. Sovereign debt markets are long-term markets where the sustainability of the debt is defined by the (uncertain and future) dynamics of debt rather than the stock of the debt itself.

To account for worries in the debt dynamics and negative changes in the sustainability assessment, I construct following the methodology in Chapter 1 a variable that track the debt dynamic assessment by the IMF <sup>19</sup>. Figure 3.5 panel 7 shows that the occurrence of both FGS and SGS crises are simultaneous to a spike in the perception of negative debt dynamics, although figure 3.4 shows that the level and dynamic of effective public debt is largely different (stable around 80% of debt to GDP in the four years around FGS crisis and decreasing debt dynamic from around 65% of GDP in t-4 to 50% in t+4 around SGS crisis).

This sudden and sharp panic about the potential sustainability of sovereign debt, contemporaneous to deep loss of confidence and increasing risk perception, explain the spikes in refinancing costs observed during liquidity crises in otherwise solvent countries. In contrast to FGS crises where the debt dynamic index only gradually increase throughout the year preceding the crisis, the behavior of the perception of the debt dynamic during SGS crises suggests that liquidity pressure are particularly high in countries with short term and volatile bond structure. Table 3.5 confirms the evidence that persistent concerns about rising debt are associated to higher probability of FGS crises in both high and low credibility countries. However, these results do

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<sup>19</sup>These indicators track the occurrence of expressions denoting rising debt, high debt levels and risky debt dynamics. Contrary to the sovereign default category, it does not include expression explicitly referring to sovereign crisis or default. Naturally, both indicators are highly correlated.



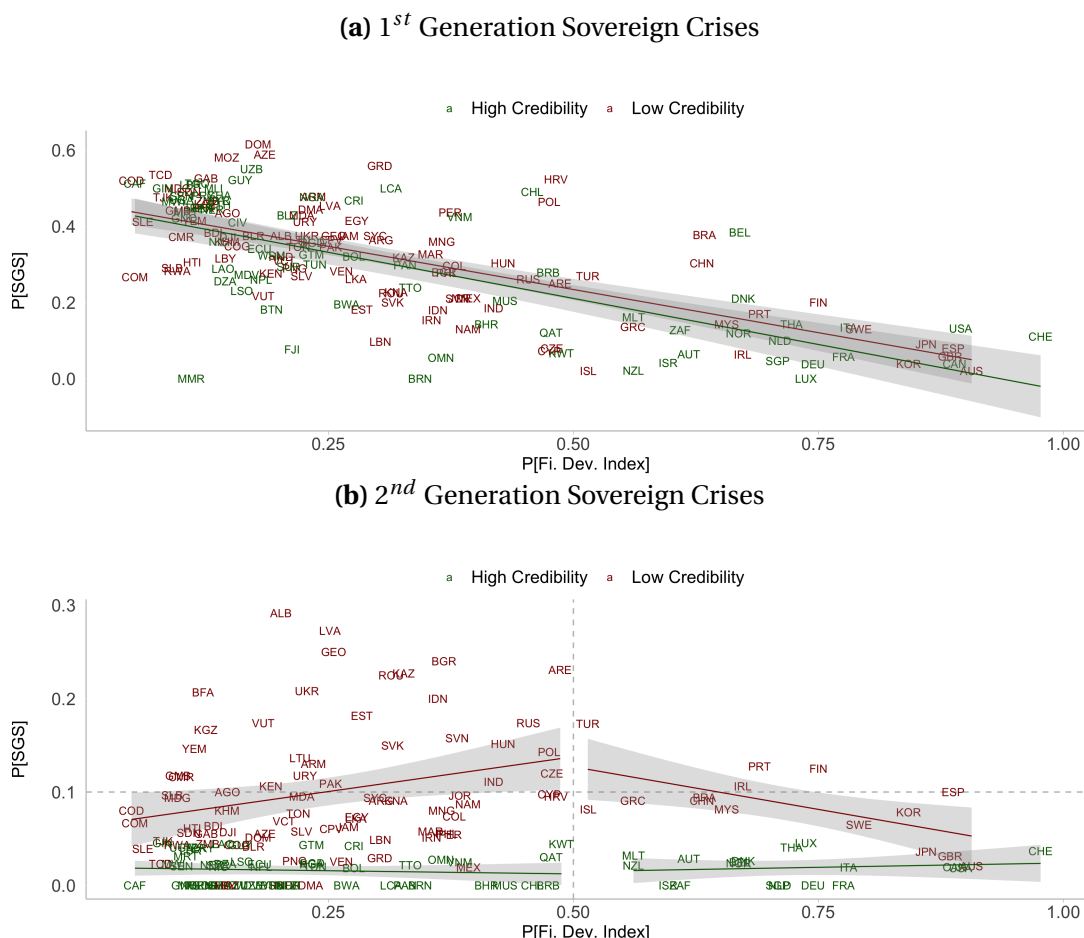
not hold when controlling for the level of financial development and the intensity of the financial liberalization. This suggests that liquidity crises are particularly likely to occur in countries with deep and liberalized bond markets, more than countries with high and rising debt.

An important lesson of these results is that SGS crises, that are the more painful for development, are not associated with particularly high levels of debt and tend to occur in countries with moderate debt burden but vulnerable to non-linear shifts in the perception of their debt dynamics. In the configuration of highly liberalized bond market, expectation regime shifts put pressure on the country by increasing the refinancing cost of debt and generating non-linear debt dynamics projections, putting the projected sustainability of the country at risk.

Section 3.1 showed that SGS crises are associated with costly banking crises and a high degree of uncertainty and loss of confidence in financial markets. They are strongly associated with severe doom-loops ([Mitchener and Trebesch, 2021](#)) and consequently are more likely to occur in countries with a high level financial market development. Figure 3.11 shows the relationship between the financial development index in 2015 from [Svirydzenka \(2016\)](#) and the probability of crises. The pattern is similar to the correlation observed with income. Further, financial market development among countries with low credibility and intermediate levels of financial development is associated with higher probability of SGS crises, while essentially no relationship can be observed for countries with high credibility.

The heterogeneous effect of higher financial development is similar to the findings of [Chinn and Ito \(2006\)](#) that shows that a higher level of financial openness spurs equity market development only if a threshold level of legal development has been attained. These findings also provide empirical evidence for the relationship between financial and trade globalization on the probability of financial crashes driven by pessimist expectations among middle income countries in [Martin and Rey \(2006\)](#).

**Figure 3.10: Financial Development and Sovereign Crises**



**Source:** *Complex Crises Database* (CCD).

**Notes:** *Low Policy Credibility* denote countries that have experienced policy related complex crises with a probability higher than 5%. P[SGS] is computed as the probability of the joint occurrence of sovereign debt crises and expectation regime shifts over the period 1960-2016. P[FGS] is computed as the probability of sovereign debt crises without expectation regime shifts over the period 1960-2016.

More broadly, a large body of literature has underscored the risk associated with more complex and integrated financial systems. [Castiglionesi et al. \(2019\)](#) analyze the effects of financial integration on the stability of the banking system and show that financial integration leads to more stable interbank interest rates in normal times, but to larger interest rate spikes during crises. [Ranci re et al. \(2008\)](#) provide the mech-

anisms that allow financial liberalization to compensate for weak institutions and ensure a higher growth rate at the cost of periodic systemic risk. Coherent with the evidence that SGS crises entail more costly crises, [Kaminsky and Schmukler \(2003\)](#) show that financial liberalization is followed by more pronounced boom-bust cycles in the short run but leads to more stable markets in the long run, reconciling the pro-liberalization advocates and the tenant of the negative effect of fast liberalizations.

In the context of financial market risk and taking into account the network properties of markets, [Acemoglu et al. \(2015\)](#) show that financial contagion exhibits a form of phase transition. Dense network allow for more efficient dissipation of low intensity shocks. However, for large negative shocks to financial institutions, dense interconnections serves as a propagation mechanism that amplifies shocks and increases systemic risk vulnerability.

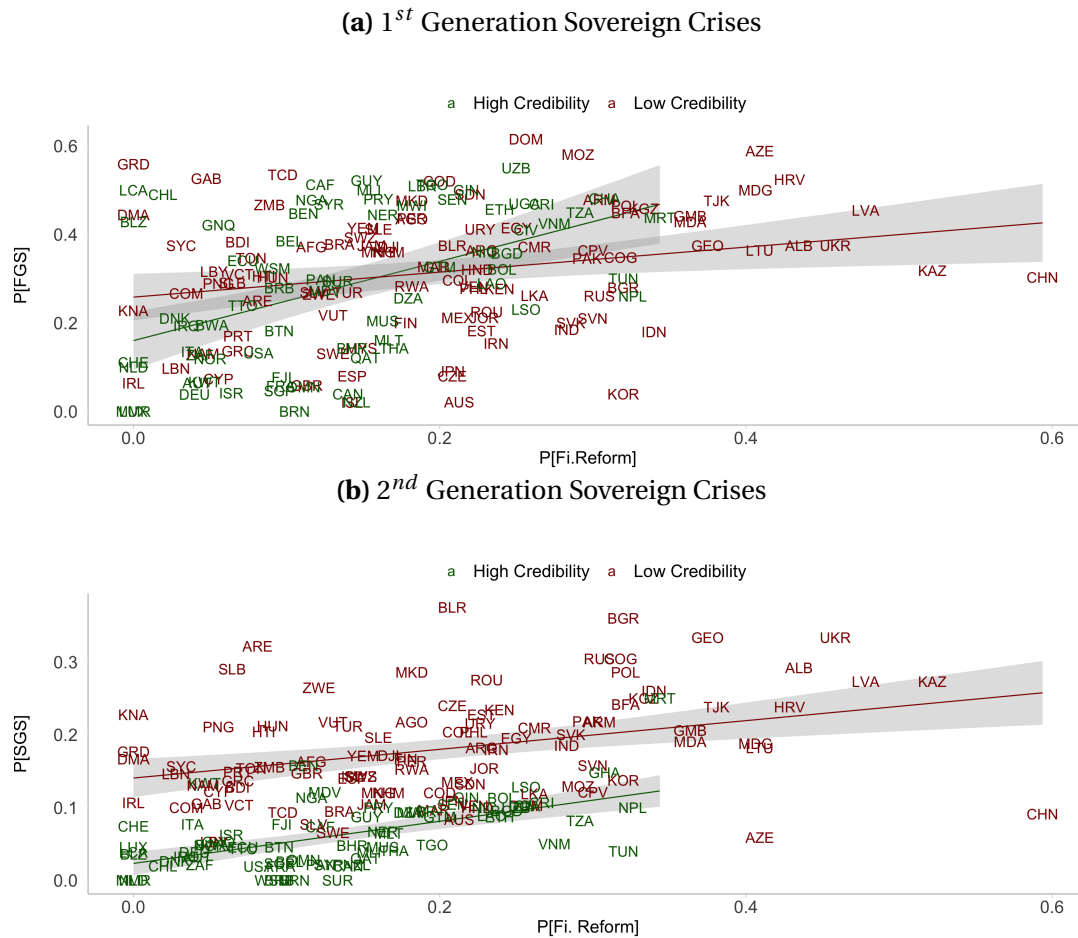
In addition to the level of financial development, the speed of the transition and the type of financial reform can also affect the vulnerability to crises. In particular, the so-called Washington consensus combining openness to trade, deregulation and financial development may increase the vulnerability to ERS by increasing the size of shocks and reducing the government credibility of to tackle these disruptions ([Bresser-Pereira et al., 2020](#)).

Table 3.5 shows that the degree of financial development is associated to lower probability of sovereign crises, in particular the first generation. This suggests that a deep and efficient financial market can help to maintain solid sovereign bond markets and efficient financing.

However, if the financial development alone and the access to external borrowing per se does not increase the probability of crises, the structure of the financial market and the speed and intensity of the deregulation can be critical. Indeed, both the intensity of financial market reforms and the intensity of the financial liberalization seems to be significantly associated to higher occurrence of SGS crises in both high

and low credibility countries. The intensity of the deregulation agenda however is only associate to higher probability of FGS crises in low credibility countries.

**Figure 3.11: Financial Reforms Before 2007 And Sovereign Crises**



**Source:** *Complex Crises Database* (CCD).

**Notes:** *Low Policy Credibility* denote countries that have experienced policy related SGS crises or banking related SGS with a probability higher than 5%. P[SGS] is computed as the probability of the joined occurrence of sovereign debt crises and expectation regime shifts over the period 1960-2016. P[FGS] is computed as the probability of sovereign debt crises without expectation regime shifts over the period 1960-2016.

In conclusion, Table 3.5 summarize the evidence on six assumptions regarding the preconditions associated with the vulnerability to different type of crises. 1) Eco-

economic development can protect against default, 2) default history matter, 3) strong institutions creates credibility, 4) levels and dynamic of debt are critical, 5) default is contagious, 6) financial integration and deregulation are central. Column (5) confirms the standard diagnoses that countries more vulnerable to FGS crises are low income countries with low credibility, a longer history of defaults, more market deregulation in low credibility countries and worrying debt dynamics.

Column (4) shows the same specification to account for the vulnerabilities associated with SGS crises. First, it confirms the intuition provided that economic development is no longer significantly associated with a lower probability of SGS crisis. It also confirms that the debt level and the dynamic of debt is not a significantly associated to higher probability of SGS crises after controlling for the level of financial development and the structure of the financial market.

The financial and trade openness generate risk of external shocks and contagion from other countries only in low credibility countries, suggesting that while dependence to international economic systems can be beneficial during expansions, it can be detrimental in countries lacking the structure to deal with the consequences of output collapse or financial crises in partner economies.

The structure of the financial system and the institutional characteristic of monetary authorities are also determinants in the vulnerability to SGS crises. Higher intensity of financial reforms in the 1990s and central bank independence in low credibility countries tend to be associated to higher probability of crises.

Those results suggest that the main diagnose regarding sovereign debt management policies are different when dealing with first or second generation sovereign crises. While debt dynamics and history of default are central determinants of traditional sovereign debt crises, it is not the case of modern sovereign crises, where the credibility and the structure of bond markets prove to be critical in the occurrence of violent liquidity shortages.

**Table 3.5:** Estimation Results: SGS and FGS Crises Determinants

	<i>Dependent variable:</i>					
	SGS	FGS	RFR	SGS	FGS	RFR
	(1)	(2)	(3)	(4)	(5)	(6)
Proba. Sov. Default				0.028 (0.020)	0.145*** (0.035)	-0.018 (0.015)
Years Scho.				0.001 (0.003)	-0.002 (0.005)	0.004* (0.002)
R. Law				-0.007 (0.006)	0.001 (0.010)	0.004 (0.004)
Fi. dev.				-0.075** (0.030)	-0.185*** (0.054)	0.131*** (0.023)
Gov. Debt : High Cred.	0.021 (0.015)	0.102*** (0.037)	-0.030** (0.014)	0.008 (0.015)	0.015 (0.027)	0.0002 (0.011)
Gov. Debt : Low Cred.	-0.035* (0.020)	0.098* (0.051)	-0.011 (0.019)	-0.015 (0.024)	0.001 (0.043)	0.003 (0.018)
Sov. Debt. Dyn. : High Cred.	0.064*** (0.014)	0.289*** (0.036)	0.086*** (0.013)	-0.028 (0.053)	0.396*** (0.096)	0.033 (0.041)
Sov. Debt. Dyn. : Low Cred.	0.234*** (0.014)	0.310*** (0.035)	0.062*** (0.013)	0.044 (0.044)	0.254*** (0.079)	0.090*** (0.034)
gdp pc ppp : High Cred.				0.013 (0.008)	-0.025* (0.015)	-0.016** (0.006)
gdp pc ppp : Low Cred.				0.008 (0.009)	-0.011 (0.016)	-0.011 (0.007)
Proba. Contagion : High Cred.				0.018 (0.126)	-0.149 (0.226)	0.112 (0.097)
Proba. Contagion : Low Cred.				0.185** (0.084)	-0.077 (0.152)	0.011 (0.065)
Proba. Fi. Reform : High Cred.				0.247*** (0.091)	-0.279* (0.164)	-0.042 (0.070)
Proba. Fi. Reform : Low Cred.				0.108* (0.055)	0.052 (0.099)	-0.030 (0.042)
Proba. Deregul. : High Cred.				0.010 (0.053)	0.084 (0.095)	0.002 (0.041)
Proba. Deregul. : Low Cred.				0.039 (0.051)	0.165* (0.092)	-0.079** (0.039)
CB Indep. : High Cred.				0.042 (0.035)	0.061 (0.064)	-0.033 (0.027)
CB Indep. : Low Cred.				0.099*** (0.032)	-0.021 (0.057)	-0.019 (0.024)
Observations	157	157	157	130	130	130
R <sup>2</sup>	0.884	0.847	0.510	0.926	0.946	0.762
Adjusted R <sup>2</sup>	0.881	0.843	0.497	0.914	0.938	0.724

**Note:** \* p<0.1; \*\* p<0.05; \*\*\* p<0.01.

The probability of sovereign default correspond to the frequency of Default from [Beers and Nadeau \(2015\)](#). Number of years of schooling are taken from [Barro and Lee \(2013\)](#). Rule of Law correspond to the indicator from the World Governance Indicators ([Kaufmann and Kraay, 2007](#)). The financial development index in 2015 from [Svirydzenka \(2016\)](#). The government goss debt from the historical public debt database. GDP per capita in PPP of 2005 from the world bank. The Central Bank independance indicator corresponds to the de jure measure provided by [Garriga \(2016\)](#). The probability contagion corresponds to the probability of World recession and contagion from ([Bétin and Collodel, 2021](#)). The probability of deregulation, and financial reform are qualitative index computed in line with [Bétin and Collodel \(2021\)](#) that respectively capture the frequency of financial reforms and liberalization of financial markets.

Table 3.6 shows the classification of the countries with respect to the nature of their vulnerability to sovereign crises.

I define countries vulnerable to SGS crises, countries that display a probability of SGS crises higher than 15%. If not vulnerable to SGS, I defined countries vulnerable to FGS crises as countries with a probability of FGS crises higher than 15%.

Countries that are neither vulnerable to SGS nor FGS crises are considered as risk-free countries. 36 countries are defined as risk-free and include mostly high income countries, oil exporter countries or highly credible middle income countries. 80 of countries, mainly low and middle income countries, are particularly subject to FGS crises and 64 to SGS crises.

**Table 3.6:** Country classification by Type of Crisis Vulnerability

Main Vulnerability	Countries
Risk Free	ATG, AUS, AUT, BHR, BRN, CAN, CHE, CYP, DEU, ESP, FJI, FRA, GBR, GRC, IRL, ISL, ISR, ITA, JPN, KOR, KWT, LBN, LUX, MMR, MYS, NAM, NLD, NOR, NZL, OMN, QAT, SGP, SWE, THA, USA, ZAF
FGS Crises	AZE, BDI, BEL, BGD, BLZ, BOL, BRA, BRB, BTN, BWA, CAF, CHL, CHN, CIV, COD, COM, CPV, CRI, DNK, DOM, DZA, ECU, ETH, GAB, GHA, GIN, GNQ, GTM, GUY, HND, IRQ, JAM, KHM, KIR, LAO, LBR, LBY, LCA, LKA, LSO, MAR, MDV, MEX, MHL, MLI, MLT, MNG, MOZ, MUS, MWI, NER, NGA, NIC, NPL, PAN, PLW, PRT, PRY, SDN, SEN, SLV, SMR, SOM, STP, SUR, SWZ, SYR, TCD, TGO, TKM, TTO, TUN, TUV, TZA, UGA, UZB VCT, VEN, VNM, WSM
SGS Crises	AFG, AGO, ALB, ARE, ARG, ARM, BEN, BFA, BGR, BIH, BLR, CMR, COG, COL, CZE, DJI, DMA, EGY, ERI, EST, FIN, GEO, GMB, GRD, HRV, HTI, HUN, IDN, IND, IRN, JOR, KAZ, KEN, KGZ, KNA, LTU, LVA, MDA, MDG, MKD, MNE, MRT, PAK, PER, PHL, PNG, POL, ROU, RUS, RWA, SLB, SLE, SVK, SVN, SYC, TJK, TON, TUR, UKR, URY, VUT, YEM, ZMB, ZWE

**Source:** *Complex Crises Database* (CCD) and Author's calculations.

**Note:** Vulnerable to SGS (2<sup>nd</sup> *Generation Sovereign*) crises countries are defined as countries with a probability of SGS crises of more than 15%. Similarly, Vulnerable to FGS (1<sup>st</sup> *Generation Sovereign*) crises denote countries with probability of FGS crises higher than 15%. *Risk free* denote countries with probability of SGS and FGS crises lower than 15%. A number of countries vulnerable to SGS Crises can also be vulnerable to FGS crises. The classification is performed according to computations over the period 1960-2016.

These results suggest that the profile of countries subjects to the more costly episodes of sovereign crises are middle income countries with high financial and economic integration but little associated policy and banking credibility.

This evidence and the gradual shifts from 1<sup>st</sup> to 2<sup>nd</sup> generation sovereign crises observed since the 1990 call for largely different crisis's management prescription.

The central role of credibility in the triggering and amplification of SGS crises highlights the need for a careful design of fiscal consolidation policies, all the more that such crises are not associated with particularly high debt levels. In particular, excessive consolidations efforts without credible objectives fuel destructive expectation regime shifts and make consolidation effort costly for growth, while not achieving the necessary deleveraging.

While the promotion of economic growth and the idea that economic development can shelter countries from the risk of sovereign crises is relevant in the case of FGS crises, it may prove hazardous for middle income countries if the associated gains in GDP growth are obtained though further economic and financial integration and the absence of solid and credible macroeconomic policy frameworks that solidly anchor market expectations and limit short term runs of sovereign bonds.

Reform programs that combine economic liberalization and pro growth reforms without particular attention to the build up of credible institutional frameworks are deemed to trade 1<sup>st</sup> generation sovereign crises for 2<sup>nd</sup> a generation that are more exogenous, more costly in terms of output losses, more dangerous for policy credibility and more synchronized across countries.



### **3.3 COVID-19: Keynesian Animal Spirits or Neoclassical Shock?**

The SARS COV 2 was declared pandemic by the World Health Organization (WHO) on 11 March 2020. A year and a half later most of the countries have experienced at least 3 waves of the virus, have gradually re-opened most economic activities but maintain restrictive measures in the form of sanitary pass, social distances, quantitative limitations for large scale events and in countries with limited vaccine coverage the possibility of localized lockdowns and strict restrictions.

The scale, intensity, and duration of this epidemic shock has been unprecedented since the Spanish flue, but was not the first (potentially) large scale epidemic in the last twenty years. [Baldwin and Weder \(2020\)](#) recall that the Ebola epidemic around 2015 in Sierra Léon, Guinea, and Liberia was the latest outbreak that generated global attention. High fatality rate, high transmission rates and missing cure or vaccines let most international organization and authorities to estimate potential very large death tolls that luckily did not materialize.

Among other episodes that generated large scale attentions and worrying forecast, we can cite the H1N1 outbreak in Mexico in 2009 as well as the SARS COV1 in East Asia. While both of those episodes had wide implications in their respective countries and regions, this virus failed to disseminated as far as the COVID-19 and did not paralyze entire countries has the COVID-19 did for more than a year and a half.

In the face of a fast spreading virus and variants, bottlenecks in hospitals, shortages of masks and protective equipment and incapacity to properly isolate and identify cases, most governments adopted highly restrictive mobility restrictions that took various forms, from voluntary social distancing to strict and mandatory shutdowns.

This combination of restrictions generated the largest recessions recorded since

WWII, with a world recession of 3.1% (4.5% in developed economies) (IMF, 2021). While unprecedented and highly heterogeneous (ranging from 5% to 20%) those figures were largely better than early forecasts (-5.2% in 2019) what highlights the relatively fast adjustments, in particular the fast adoption of teleworking practices, and the success of the very large scaled fiscal support programs adopted in particular in developed economies.

In the context of continuous restrictions and still ongoing infections in most countries, the scale and velocity of the recovery has also been surprising and contribute in part to the comeback of inflation concerns and localized shortages in specific sectors.

The wide disagreement among initial forecasters is only a symptom of the extremely high uncertainty and risks associated to the COVID-19 epidemic and its consequences. In all dimensions, the intensity of the health pressure and economic consequences, the scale of countries and sectors affected as well as the duration and the capacity of government to mitigate the epidemics and avoid economic collapses were wrapped in a dense fog of uncertainty and risk that raise concerns about potential panics and uncertainty traps that would deepen the recessions, complexity governments fiscal rescue plans and hamper recoveries.

Many of the ingredients necessary for the triggering of a highly psychologically driven crises similar to the Great Financial Crises seemed to converge. Nonetheless, an intense *Keynesian supply shock* with severe uncertainty traps and powerful financial doom loops did not materialize. Insofar, the COVID-19 shock has escaped the mechanisms at play during 2<sup>nd</sup> Generation sovereign Crises however, the uncertain recovery and persistent imbalances pose important challenges for the years to come.

### **3.3.1 Empirical Evidence of The COVID-19 Shock**

Most consequences of these crises are still to be understood and measured, but most of the literature highlights the evidence that more than the intensity and scope, it is

the very nature of this crisis that make the COVID-19 unprecedented (see [Brodeur et al. \(2021\)](#) for a literature review on the COVID-19). Brutally closing down simultaneously entire economies has never been experienced before and posed interesting theoretical and empirical challenges for researchers.

A first challenge was to know whether the shocks were a supply or a demand shock. The second was to wonder whether such large scale shock could generate a protracted panic on financial markets. The third was mainly to understand how to design (economically) cost-effective sanitary measure and to understand how to find the most effective restrictions that could limit the economic costs.

At the early stages of the pandemic and in the face of unprecedented shutdowns that paralyzed entire countries, three main transmission channels were expected: *Supply side disruptions* due to administrative closures, trade interruptions and the impact on supply chains. *Demand side shocks* due to mobility restrictions and loss of income that lower consumption. And a potential combination of the two in the form of *Keynesian supply shocks*, ([Guerrieri et al., 2020](#)) where supply shocks in production goods in some sectors of the economy spillovers into inefficient demand shock in other sectors.

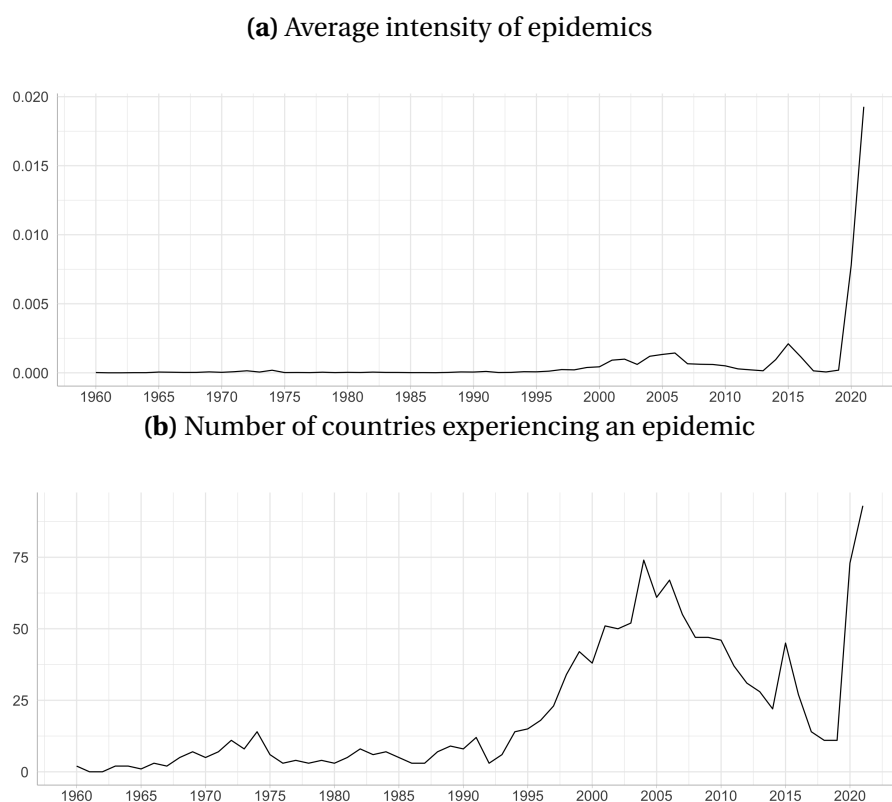
In top of the fundamental shocks, the high uncertainty and potential risks may generate stagnation traps, ([Benigno and Fornaro, 2018](#)) amplifying the supply-demand doom loop. [Fornaro and Wolf \(2020\)](#) highlight that the COVID-19 not only triggers a supply-demand doom loop, but it also pushes the economy in a danger zone in which *animal spirits* and agents' expectations can affect employment and productivity growth. In this case, the stagnation trap kicks in and the recovery is delayed.

Two main determinants have contributed to heterogeneous recessions and recoveries: the intensity and duration of shutdowns and mobility restrictions, and the scope of macroeconomic policy support ([IMF, 2021](#)). It is in particular the duration of the shutdowns, more than its direct stringency, appear to have been an impor-

tant driver of the severity of the crises (Guan et al., 2020). This evidence has led several researcher (Eichenbaum et al. (2021), Kaplan et al. (2020b), Atkeson (2020) and Berger et al. (2020)) to include in epidemiological models the effects of economic outcomes to highlights the trade-off at play between containment measures and economic costs of consumption and production restrictions.

The identification of the intensity of the COVID-19 shock is an empirical challenge that have been essential to calibrate theoretical models and provide empirical estimate of the costs and consequences of the epidemics. The need to measure the extent of containment measures has been an occasion to exploit original data capable of measuring real time and spatially heterogeneous effects. Several studies have tried to capture shutdown stringiness through the exploitation of geolocalized data provided by social medias applications (Bonaccorsi et al., 2020), telecommunication mobility data or to measure the fall of consumption by the use of real time credit card transactions data.

**Figure 3.12:** The COVID-19: an Unprecedented epidemic



**Source:** [Complex Crises Database](#) (CCD).

**Notes:** First panel displays the average term frequency with respect to epidemics, the second panel shows the number of countries with positive terms frequencies for the epidemics category. Averages are computed across the entire sample of countries.

In this exercise, we propose a macro approach to identify the COVID-19 shock and use the epidemic index from the [Complex Crises Database \(CCD\)](#) to gauge the qualitative assessment about the amplitude of the COVID-19 shock reported in IMF reports. Figure 3.12 panel a) and b) show respectively the average word frequency of epidemic shock across the full sample of countries and the number of countries reporting epidemic crises over the full sample.

Unsurprisingly, 2020 stands out as the year with the highest intensity of epidemic shock. The number of countries also reaches its all-time high, although the difference

with other periods is lower with already extended waves around 2004 and 2015<sup>20</sup>.

This construction of the index refers explicitly to the terms epidemic, pandemic, virus, or the name of specific plagues such as coronavirus, H1N1, ebola and others. This index is considered to provide a macroeconomic proxy for the intensity of the health shock and is taken as an estimate of the epidemic fundamental shock that summarize qualitatively the assessment made by the IMF through the use of the several measures of epidemic shock (death toll, number of contamination, extent of shutdown measure and restriction, sectorial projections, etc.).

### **3.3.2 Expectation Regime Shifts During The COVID-19**

In chapter 2, I documented the structural break in terms of risk and uncertainty measure undergoing since the *Great Financial Crisis* (Figure 3.13a). Prior to COVID-19, expectation volatility was already at high levels in a context of acute geopolitical and trade tensions in 2019 and after the large expectation swings around the 2016 US Presidential elections. In this respect, even if the early stage of the pandemic featured numerous sources of risk and uncertainty, the retrospective and medium term perspective of my approach shows that the years 2020-2021 did not stand out as years of particularly high expectation regime shifts.

In contrast to other short term and real time approaches that recorded all-time high levels of uncertainty across a variety of measures<sup>21</sup> (Altig et al., 2020) I find that the level of expectation regime shifts during the COVID-19 period is in the same range as the levels recorded around 2013 and 2016 and only prolonged a rising trend initiated in 2019. Those results reflect the facts that economic and financial expectations has been relatively resilient and have failed to materialized in aggregate coordination

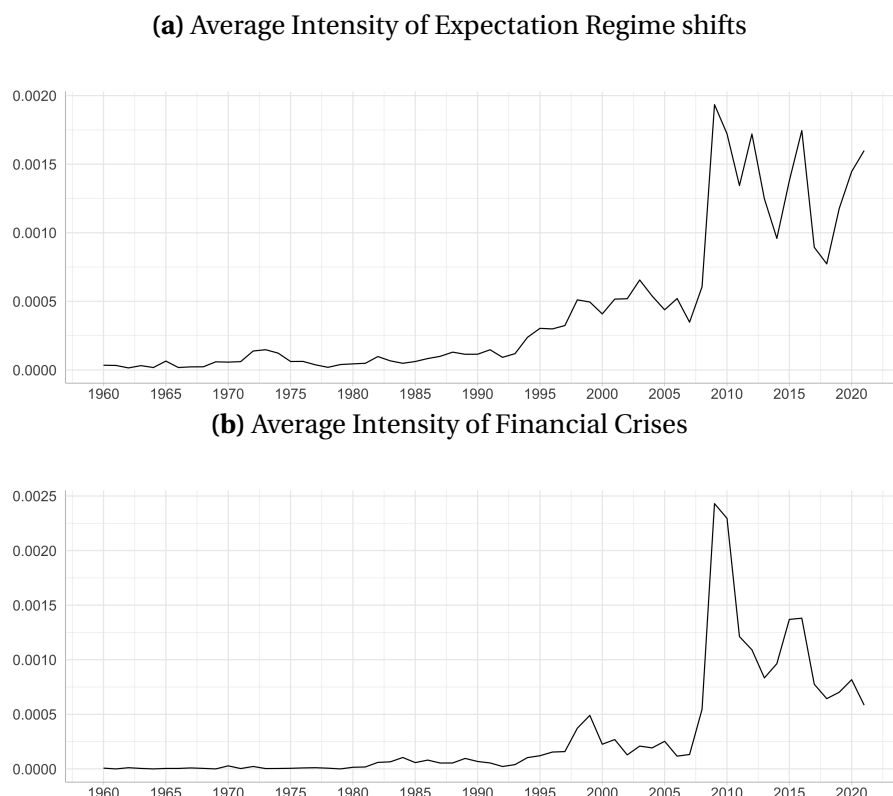
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<sup>20</sup>In contrast to the year 2020 where the index captures the outburst of the same virus, In most other episodes the index mix several and sometime unrelated epidemics.

<sup>21</sup>Implied stock market volatility, newspaper-based policy uncertainty, Twitter chatter about economic uncertainty, subjective uncertainty about business growth, forecaster disagreement about future GDP growth or model-based measure of macro uncertainty.

failures. Indeed, Figure 3.13b shows no particular surge in the financial crises index, in line with the evidence that financial markets proved particularly resilient to the shock and that timely policy interventions have successfully anchored financial and economic expectations.

**Figure 3.13:** Expectation Regime Shifts and Financial Crises



**Source:** *Complex Crises Database* (CCD).

**Notes:** First panel displays the average term frequency of the Expectation regime shift indicator. The second panel shows the average term frequency of the Expectation regime shift indicator. Averages are computed across the entire sample of countries.

This evidence suggests that the expectation volatility recorded during the COVID-19 has a specific nature with lower amplification power. What are the drivers of uncertainty during the COVID-19 was the question addressed by [Coibion et al. \(2020\)](#) that wonder whether it was uncertainty about the virus itself, the number of death

or the severity of lockdown. They find, using household expectation surveys in the United States, that uncertainty was primarily driven by lockdowns, rather than the infections themselves.

**Table 3.7:** Expectations Regime Shifts and Linguistic Frequencies during Covid 19 (1/2)

Word	N	Proportion
risk	2450	71.4%
distress	284	8.3%
uncertainty	223	6.5%
confidence	172	5%
expectation	134	3.9%
crisis	57	1.7%
stress	45	1.3%
sentiment	25	0.7%
aversion	22	0.6%
panic	17	0.5%
Total	3429	100

**Note:** The table provide the number of occurrences of a list of words characteristic of shifts in market expectations found in the paragraphs containing any of the keywords of the category *Expectations*.

In the spirit of the linguistic analysis in Section 2.2, I provide a description of the nature of the expectation index computed for the years 2020 and 2021 and discuss the difference with the pre-covid period. Table 3.7 and 3.8 provide the number of occurrence of selected number of expression of interest found in the paragraphs identified as related to expectation regime shifts in the IMF country reports for 2020 and 2021. Those results can be contrasted with the results for the sample 1960-2016 in Table C.1 and C.2. In 2020-2021 distress and uncertainty are the second and third more frequent expressions in contrast to the previous period where confidence was the second more frequent far behind distress or uncertainty. While risks were high



in 2020-2021, it was not largely associated to a loss of confidence able to coordinate expectations on the so-call bad equilibrium. Regarding the type of expectation, debt, and fiscal policy outcomes are still the more prevalent concern similar to the period 1960-2016, however a major difference stands out with COVID-19 related expressions ranking second and out-passing concerns about financial market dynamic or solidity of the banking sector.

**Table 3.8:** Expectations Regime Shifts and Linguistic Frequencies during Covid 19 (1/2)

Word	N	Proportion
debt	808	25.5%
covid	508	16%
fiscal	330	10.4%
outlook	299	9.4%
financial	276	8.7%
policy	262	8.3%
banking	225	7.1%
rate	169	5.3%
monetary	129	4.1%
economic	90	2.8%
oil	57	1.8%
commodity	19	0.6%
Total	3172	100

**Note:** The table provide the number of occurrences of a list of words characteristic of shifts in market expectations found in the paragraphs containing any of the keywords of the category Expectations. The expression Covid includes the words covid, pandemic, virus, vaccin, variant and epidemic.

Those results suggest that indeed the virus itself was an important driver of the recorded expectation regime shift, but that it is also its consequences on public debt, fiscal policy and in a lesser extent to the economy and financial institutions that raise

non-fundamental concerns.

### **3.3.3 The COVID-19 crises and *Expectation Regime Shifts***

The unprecedented fiscal support in most countries and the shortage of revenue due to severe collapse in output has generated a jump in the debt ratio of most countries. This rose concerns about fiscal sustainability and sign of rollover pressures in a number of emerging countries.

The rising concerns about inflation dynamics and the potential increased in central bank interest rate in advanced economies have added to the risk of protracted sovereign crises and have justified numerous interventions from the IMF (86 countries under assistance during the pandemic) and official creditors to limit the risk of drying out of resources and avoid the slash of public spending in the context of large need for health spending. For example, the *Common Framework for Debt Treatment* from the IMF has been presented as a mechanism for timely and orderly restructuring to limit costly debt crises. This framework was settled in the context of the *Debt Service Suspension Initiative* that tried to avoid the slashing of spending during the crises, but as not scaled up as expected.

The GFC and COVID-19 crises stand out as two of the worst recessions in the last century. The collapse of GDP was sudden, particularly large and widely spread across multiple countries. The trigger of the crisis was different, a localized housing crises that spillover to financial markets in the case of the GFC and an initially localized epidemic outbreak in the province of Hubei in China that spread in less than 3 months to almost all countries in the case of the COVID-19.

Undertaking a comparison between the sequence of events during the two episodes I show that while they both generated sharp contractions in output, during the COVID-19 episodes no sudden and sharp negative coordination of expectation was strong enough to trigger a negative doom loop on financial markets similar to the one ob-

served during the GFC.

Figure 3.14 provide the evolution of 20 indicators of crises during the GFC and the euro-area sovereign crises (2007-2013). This picture suggests the following unfolding.

A severe housing crises outburst in 2007. In 2008, Balance of payments, commodity, and banking crises start to show the first fundamental spillovers.

In 2009 the sudden start of the severe recession is contemporaneous to the slow-down in economic activity, suggesting that the economic crises was a consequence rather than the cause of the initial crisis. 2009 also coincides with the nonlinear increase in the contagion of the financial crises and expectation regime shifts, the collapses of international trade and the severe currency crashes in many economies that add to the continuous deterioration of the banking sector.

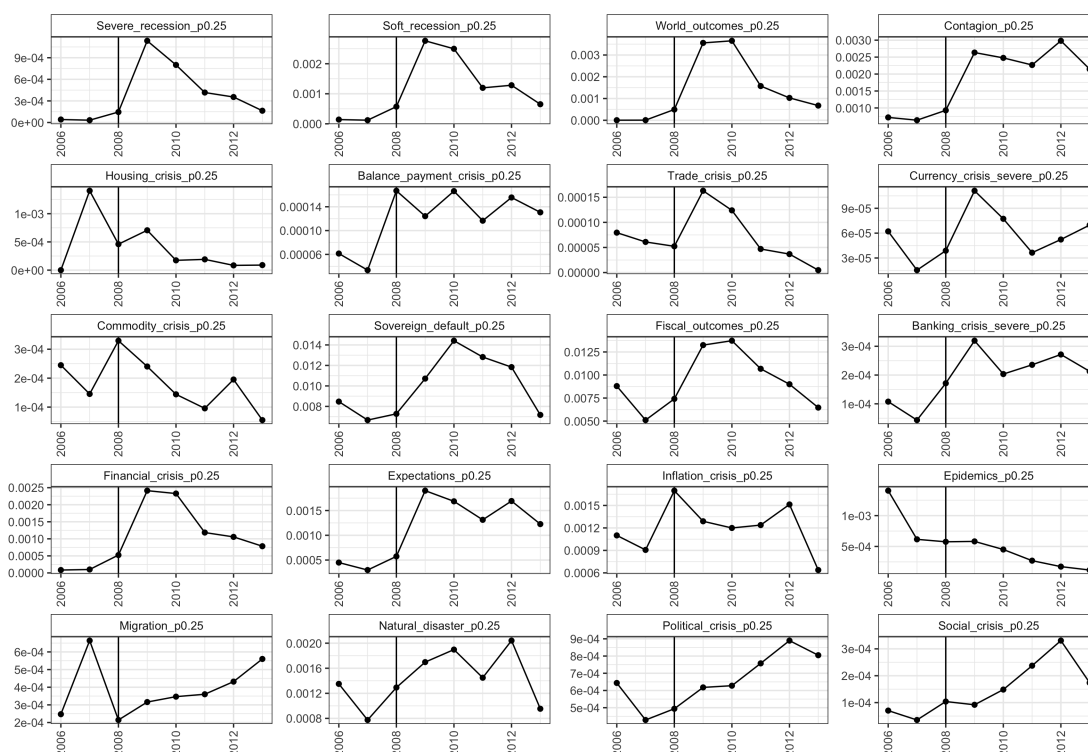
Finally, the degradation of the fiscal position of many countries that started in 2008 become particular acute in 2009 and 2010 while sovereign default, financial crises and the consequent international shock become the top concerns in 2010.

By 2012-2013, most fundamental and economic concerns have converged to their pre-crisis levels. However, the recovery coexisted with a number of persistent unbalances. Among others, a lack of “*expectation recovery*”, fragile banking sectors, persistent contagion and high levels of political and social instability.

In short, the collapse of the housing market and the complexity of its inter-connections with the banking sector fueled an expectation regime shift regarding the solidity of the banking sector that triggered a financial run, a sharp recession and a follow-up of sovereign and banking pressure.

The Great Financial Crises appeared as an endogenous collapse of banking and financial markets amplified by large adverse expectations in the spirit of the *animal spirits* of the Keynesian theory. The legacy of high uncertainty, pessimistic perspectives and persistent concerns about fiscal and banking sustainability were at the root of the double deep and sovereign crises experienced by euro-area countries.

**Figure 3.14: A Radiography of the Great Financial Crises**



**Source:** update of the [Complex Crises Database](#) (CCD) and author calculations.

**Notes:** The figure displays averages for each crisis around the Great Financial Crises. Data for 2021 only contains information from January to October 2021.

A similar picture for the COVID-19 (2017-2021) provides a largely different story. The first difference is that the slowdown in economic activity pre-dated the COVID-19. While the severe recessions peak up in 2020 the signs of slowdowns started in 2019 in a context of high trade tensions, concerns about housing sectors, fear of inflation, fragile fiscal positions and rising political and social instability.

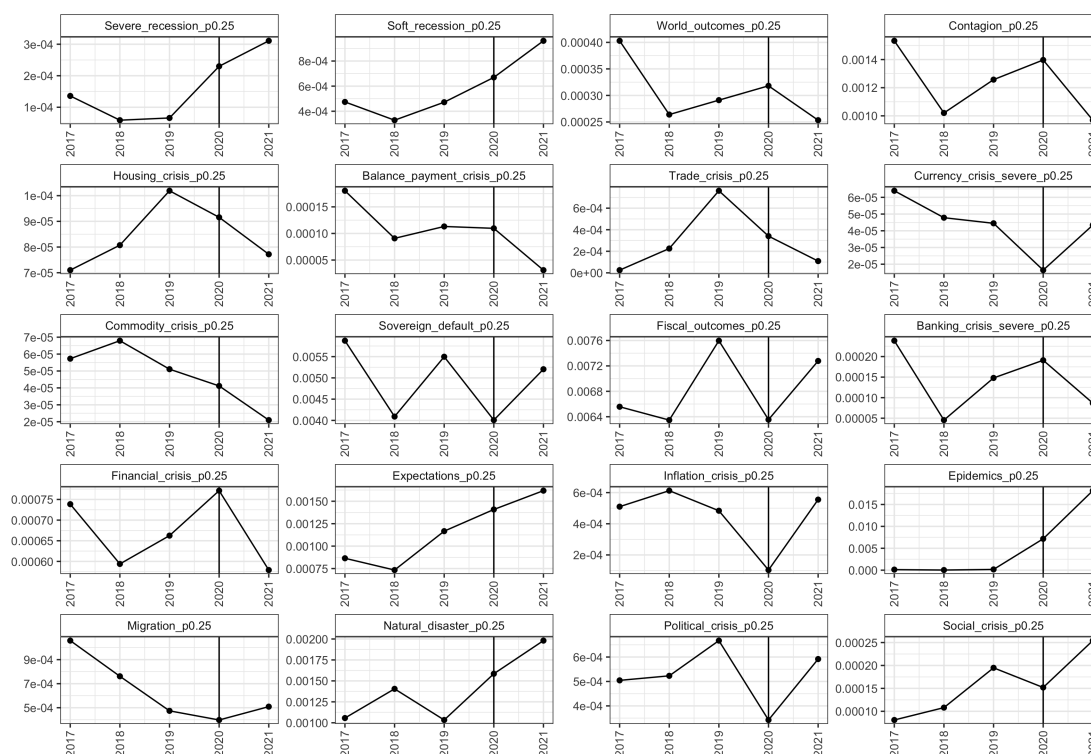
In contrast to the GFC, the COVID-19 shock struck an already fragile and slowing-down economy where the level of risks and uncertainty was already on the rise. Except for the epidemic shock (and natural disaster) itself and the severe recession due to the shutdown, no other indicator displays a linearity similar to those observed

during the GFC.

At that stage, a possible interpretation is that most economic and financial actors had started to adjust gradually their positions and expectations to the changing environment in 2019 and did not overreact in panic driven herd behaviors when the COVID-19 strokes. This smoother transitions and the massive, quick and coordinated policy reaction prevented high levels of uncertainty and expectations regarding the virus to spill over to severe uncertainty, risk, and uncertainty on financial markets, banking solidity and sovereign repayment capacity.

In this respect, the COVID-19 crises provide credit to the neoclassical interpretation of a temporary exogenous shock that hit the supply and reduce the output in the real sector without coordination failure mechanism generating spillovers to the financial sector and severe supply-demand doom loops.

**Figure 3.15: A Radiography of the COVID-19 crises**



**Source:** update of the [Complex Crises Database](#) (CCD) and author calculations.

**Notes:** The figure displays averages for each crisis around the COVID crises. Data for 2021 only contains information from January to October 2021.

The *Neoclassical* nature of the COVID-19 crises: exogenous shock, economic recessions, inflation pressures and limited financial and expectation spillovers recall the crises of the late 1970s/early 1980s.

The contagious nature of an exogenous shock and the consequent build up of high level of debt in emerging countries in a context of inflation pressures in developed countries that may lead to restrictive monetary policies allows for a number of parallels with the current challenges and call for a careful policy response to avoid large waves of severe economic and destructive sovereign crises triggered by uncontrolled fiscal and monetary responses.

## Conclusion

In light of the evidence that crises may be largely amplified by psychological driven events (Chapter 2), I provide in this chapter a typology of sovereign crises where I distinguish 1<sup>st</sup> *Generation Sovereign* (FGS) crises from 2<sup>nd</sup> *Generation Sovereign* (SGS) crises, where the latter is defined as the combination of sovereign crises and expectation regime shifts. Moments identified as featuring abrupt negative shifts of perception of risk by systemic agents (i.e., when major investors suddenly adopt pessimistic attitudes with respect to the rules of the game in the markets).

In this chapter, I provide a number of additional stylized facts. I find that, that the 2<sup>nd</sup> generation represents the majority of sovereign crises events in the XXI<sup>th</sup> century and that they out-pass in number traditional (1<sup>st</sup> generation) crises events. Besides, they are more costly in terms of output loss and institutional disruption, are preceded by more severe banking crises and are largely driven by a global component that increase the synchronicity of crises across countries. The evidence suggests that the vulnerability to such crises is deeply rooted in the loss of credibility in the conduct of government macroeconomic policy and the health of the banking sector. While FGS crises are associated with high debt levels, previous history of default and a lower level of income per capita, SGS crises have the particularity of occurring in middle-income countries, which are well integrated with the world financial, trade and economic system but lack the policy and banking credibility to withstand sudden loss of confidence.

Taking together, the three chapters of this thesis provide a useful material to understand the challenges of the post COVID-19 area. First, it provides the material to document precisely the events. Second, it highlights the key elements that determine the severity of crises. Third, it hints at the potential characteristics of countries vulnerable to the more severe sovereign crises. The last section of this work presented

an interpretation of contemporaneous events in the light of this framework and open the discussion on future challenges.

Indeed, at the onset of the COVID-19 epidemic, the recession that was looming appeared as probably the worst since WWII. Despite the size of the recessions in 2020, successful policy support and rapid recoveries prevented the occurrence of the Keynesian supply shock where large supply disruptions could transfer into demand shortages and negative adverse economic and psychological spirals.

After close to two years from the initial shock, the recovery is undergoing and the gap with pre-covid levels of activity is shrinking. In a context of fragile health situation and degraded fundamentals regarding levels of public and private debt, rising inflation and unemployment imbalances, a central question is to know whether the COVID-19 is a V or W-shape crises? So far, the crisis is mainly a neoclassical temporary shock that has not generated non-linear expectation regime shifts and has not so far generated enough concerns to coordinate negative expectations.

History has shown that first generations of sovereign crises are less severe than 2<sup>nd</sup> generations. However, it also shows that 2<sup>nd</sup> generations are often preceded by profound external shocks, paving uncertain recoveries. Economic systems tend to adjust to external temporary shocks and have the capacity to recover relatively quickly and orderly in the short term once the original shock has vanished. However, the short term recovery often tend to hide profound looming unbalances in the form of weaker balance sheets of banks, picking up inflation, higher public and private debt, weaker political credibility, unstable social environment, leveraged financial markets and potentially volatile expectations that increase the cost of macroeconomic policy mistakes.

The key challenge for the years to come is to ensure the smooth absorption of the imbalances inherited from the COVID-19 crises and prevent severe expectation regime shifts that would provoke a run on the more exposed banks and sovereigns,



converting a neoclassical (1<sup>st</sup> generation) type of crises into a Keynesian-animal-spirit crises (2<sup>nd</sup> generation).

Particular attention should be given to middle income countries, highly financially and economically integrated, that have little fiscal and monetary space to counteract potential swings of confidence. International cooperation and attention to ensure the smooth adjustment in the more exposed countries are not only essential for the economic stability and welfare of those countries but also for the global stability of the international system where a loss of confidence about a highly integrated middle income country could act as the trigger of a global expectation regime shifts that could coordinate expectations on a negative equilibrium and kick-in the mechanism of 2<sup>nd</sup> generation crises across more advanced economies. In a context of highly integrated financial and informational networks particularly prone to animal spirit behaviors, risks of such crisis are high. Its occurrence or not represent probably the main variable that will determine whether the COVID-19 crises will spill over into more severe crises in the coming years.

A number of lessons learned from the GFC crises proved to be critical for the quick and massive fiscal and monetary response to COVID-19. The rapidity and scope of the support to both firms and consumers to avoid a massive destruction of productive and human capital that would have prevented a quick recovery were dictated by the memory of the inadequate macroeconomic policy. Those policies largely avoided a situation similar to the period 2009-2013. The challenge for the future is to make sure that the lessons from the euro area sovereign crises will be drawn and that the absorption of the imbalances created by the initial COVID-19 shock will be better handled than the legacy of the 2008 financial crisis.

Careful private and public deleveraging, mitigation of social and political conflicts, careful attention and support to the weakest element of the international economic network are the essential challenges for upcoming years. In particular, the

weak link between the level and short term dynamic of the public debt and the occurrence of protracted *2<sup>nd</sup> Generation Sovereign Crises* should encourage policymakers to avoid the excessive focus on the level of debt and rather concentrate on the solidity of the credible response to losses of confidence and coordination failures regarding financial markets, banks, and the capacity of fiscal and monetary authorities to deal with volatile expectations.

# General Conclusion

Sovereign debt plays a critical role in modern economic systems and is at the center of economic and policy debates. On the one hand, public debt is at the core of economic and financial prosperity. It allows governments to foster future growth. It provides fiscal space necessary to pursue counter-cyclical fiscal policies and cushion economic downturns. In good times, public debt is the benchmark risk-free asset for financial markets and serves as collateral for financial regulatory purposes. Its pricing provides a thermometer for economic confidence, as well as for the credibility of government policy and the sustainability of public debt trajectory.

On the other hand, the conduct of fiscal policy is also one of the major policy instruments of incumbent governments and may be used for non-economic goals and political agendas. When inefficiently used, public debt can crowd out private investment and undermine long-term growth. Sovereign debt is an economic, financial, political and psychological complex matter where the frontier between proper action and irresponsibility, confidence and panics, evidence-based policymaking and ideology is often thin. In short, sovereign debt is more than the result of the financing of a shortage of revenue over spending. It is also a key instrument used for numerous objectives that affects institutional, political, economic and financial stability concerns.

In the context of the urgent need for public investment in health, education, the green transition and aging populations, unprecedented levels of sovereign debt and

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the well-known stories of painful episodes of sovereign debt crises; The debate about the proper level of debt is a hot topic.

In this respect, most of the literature has stopped to try to find the specific debt to GDP ratio that could act as *The Target* for public debt policy management. While excessive public debt for extended periods is indeed usually associated with lower long-term economic performance, this historical evidence could well be irrelevant in the context of the unprecedented environmental and economic transition challenges.

Furthermore, the evidence provided in the thesis shows that in terms of crises, the more painful episodes of sovereign crises do not concern countries with the highest levels of debt but rather countries that are vulnerable to external, contagious and financial coordination failures rooted in a general loss of confidence in the country's main institutions (political, fiscal, monetary, and banking).

In a world of strong *animal spirits*, herd behavior and deep and deregulated financial markets, high debt proved to be a very poor proxy for the capacity of the government to repay its debt and more generally for the capacity of the entire economy to grow and accumulate wealth.

More than the level of debt itself, it is the credibility of the country and the strength of the whole institutional framework (banking, financial and political) that constitute the safe haven that allows countries to undertake massive fiscal support and large scale investment programs without a sudden loss of confidence.

Instead of how much debt should countries have, the question should rather be how public debt management policies can contribute to the construction of credible frameworks that allow long-term investment and avoid negative short-term coordination failures that force governments to undertake costly and suboptimal adjustments. The COVID-19 epidemic has shown that a proactive, timely, apolitical and credible active fiscal policy does not necessarily generate large scale panics even in

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the context of a highly uncertain and risky economic environment.

Expectation regime shifts are destructive, and the capacity to withstand rapid and large adverse expectation shifts should be considered as the corner stone of sovereign debt crisis management policies. In countries that combine deep, foreign-denominated, external and short-term sovereign bond markets with complex debt profile and heterogeneous creditor base (including diverse commercial creditors, 'distress funds' and numerous retail investors subject to foreign law protocols) and high political instability and weak monetary authorities, the net marginal risk of higher market-financing needs could well be extremely high. A simpler and less exposed debt structure, sometimes non-market, and a well-designed official or bilateral lending solution that avoid conditionality on further financial integration and deregulation could well be safer. On the contrary, in countries with strong monetary authorities, locally-denominated debt with long-term maturities and credible long term investment plans to ensure more resilient economic systems in the face of numerous economic, environmental and societal challenges, the net marginal risk is likely to be very low.

The key question that emerges is not a question of the debt level itself, but rather, whether the additional marginal euro (dollar) of debt contributes to the building of a credible economic, financial and political future. When the answer is yes, risk, uncertainty and confidence, even when volatile, do not generate protracted irrational *animal spirits* and allow the government to pursue its economic and political agenda. On the contrary, when the ambitions exceed the capacity of the country, then complex non-linearity can appear and hamper development for decades.

Above the question of the level of debt, the structure of this debt matters for the existence of coordination failures. In particular when the creditor's based is complex and crises resolutions is expected to be difficult and tedious (involving different jurisdictions, large pooled of heterogeneous creditors, diverse maturities, etc. . .)

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risks that investors that lose confidence coordinate on the "*worse case*" scenario increase<sup>22</sup>. In this respect the prospect of complex restructuring processes due to the need for massive and urgent short term rollovers and the coexistence of multiple creditors with divergent objectives (commercial creditors ranging from long term oriented pension funds to vulture funds, retail creditors, bilateral creditors with diverse economic and geopolitical agendas) in a context of decision-making by investors dominated by heuristics makes the question of the financing of public debt a much broader issue than the question of the quantity of debt and its associated price (interest rate). The structure and nature of the public debt are additional components of the credibility of the country to ensure stable positive expectations even in the context of debt restructuring processes and preemptive default.

In this thesis, I provide an overview of 70 years of macroeconomic crises through the lens of the bilateral surveillance of the IMF and provide the empirical evidence for a mechanism that has made sovereign crises more severe in the last decades. The project aimed at improving the understanding of sovereign debt crises by better measuring those episodes, understanding what determines their severity and identifying the contemporaneous evolution as compared to the Bretton Woods period.

My approach follows pioneering work based on qualitative and historical studies of financial crises in the spirit of the seminal work by Kindleberger, but extends the traditional narrative economic approach with modern empirical techniques. Marrying a more quantitative approach with qualitative studies was at the center of this work. Bridging the gap between those two approaches helped me to reconcile the richness and precision of qualitative studies with the robustness and rigorous framework of quantitative (econometric) techniques.

Concretely, I provide a ready-to-use database on macroeconomic crises with a

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<sup>22</sup>One can think of the negative effect on government and creditor decisions in the face of debt distress when part of the debt is held by the so-called vulture funds

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particularly large coverage of countries, periods, and events. While the coverage of the existing database is among the largest to my knowledge, it only constitutes the top of the iceberg. This first vintage can be extended and complemented in many directions and should better be seen as one example of the type of approaches and analysis that the compiling, cleaning and organizing of the underlying qualitative information provides. Much more advanced *Natural Language Processing* techniques are available to extract and exploit such information, and I hope that this first *structuring* of the material will be useful to easily implement those complex techniques.

The choice to start with a relatively modest supervised approach was mainly driven by the need to provide a qualitatively interpretable set of data that would give credit to the validity of the approach and a perspective for future extensions.

My interest for economics started in 2008 at the occurrence of the so-called *Great Financial Crises*. The end of my education in economics coincided with the COVID-19 epidemic, which led to the worst collapse in output since WWII. In between, the *euro area sovereign crises* showed me that critical public debt problems were no longer restricted to low and middle income economies with weak institutions, but could hit high-income countries with similar intensity. I saw how a small distressed country could undermine the functioning of an entire economic union.

I studied the *standard* and most publicized case of a sovereign debt catastrophe in Argentina in 2001 and saw how neighboring sound countries, such as Uruguay, could be strongly hit but recover quickly while default is still looming in Argentina 20 years later.

I read how the prospect of a Mexican default in 1994 mobilized the top leaders of the world to avoid a large scale panic that could leak to advanced economies, but also how a run on debt could only constitute the focal point of a coincident disruption of banking systems, political institutions and natural disasters.

In all those cases, two regularities attracted my attention.

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First, it is the apparent disproportion between the initial problem (the trigger) and the scale of the outburst. During the GFC as well as during the COVID-19 epidemic, an apparent isolated trigger snowballed quickly into protracted global collapses.

Second, the scale of these events in terms of countries involved and scope of sectors impacted. In this respect it is the complexity of inter connections, relations of dependence and unexpected direction of events during those periods that motivate the name of the new database.

The intersections between these regularities and a long-lasting interest in fire and its consequences on forest ecosystems (revitalized by the severity of the *megafires* in Australia, California, or Siberia in the past few years) remind me that the conditions for large scale destructive and contagious fires are embedded in the so-called *Triangle of Fire* that combines oxygen, heat, and fuel.

In other terms, large scale events only occur when mature ecosystems are hit by an isolated trigger that meets the proper propagation mechanism. Drawing on this analogy and taking stock of the maturity of contemporaneous economic systems and the diversity of possible and unpredictable triggers, I attempt to understand what constituted the fuel of the recent *economic megafires* that we observed in the last decade. To answer this question, I chose to test the assumption that it was the conjunction of volatile and fragile psychological states of mind, herd behavior and large scale connected financial and information networks that are the fuel of macroeconomic crises.

In a more general perspective, I hope that this thesis has succeeded in convincing the reader that sovereign crises are complex events, often costly in many dimensions and largely contemporaneous. In a world where economic, financial and informational networks are dense and highly connected, sovereign debt crises with important psychological dimensions are an issue of the present for all countries, at all lev-



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els of development. However, It is also important to remember that while the second generation of sovereign crises became dominant in the early decade of the *XXI<sup>st</sup>* century and have proved particularly costly, those are not the only risk of sovereign distress.

In the wake of the COVID-19, the tensions on commodities, the geopolitical instability and the succession of exogenous shocks that have hit the real economy may well remind the succession of outcomes that predate the wave of sovereign default among developing countries in the 1980s. Higher debt levels, inflation pressure on developed countries that force large increases in interest rates, geopolitical driven agendas, political instability, low fiscal and monetary space in middle income countries and the need for rapid economic transitions toward new economic (sustainable) models are all ingredients that point toward the risk of first generation of sovereign crises among low and middle income countries. In this context lessons from 40 years of economic research on the need for preemptive, rapid and coordinate restructuring focused not only on ensuring quick recoveries but on the building of solid macroeconomic, social and political frameworks to foster credibility and limits risk of second generation of crises as many developed countries have experienced in the 1990s as legacy of the resolution approaches taken to resolve sovereign default in the 1980s.

## Conclusion Générale

Les dettes souveraines jouent un rôle essentiel dans les systèmes économiques modernes et sont au centre des débats économiques et politiques. D'une part, elles sont au cœur de la prospérité économique et financière des pays. Elles permettent aux gouvernements d'investir pour la croissance future. Elles donnent au gouvernement la marge de manœuvre budgétaire nécessaire pour mener des politiques budgétaires contracycliques et compenser les ralentissements économiques. Elles constituent l'actif sans risque de référence pour les marchés financiers et l'évaluation de la valeur des actifs financiers. Elles constituent aussi un thermomètre pour la confiance dans l'état de l'économie des acteurs privés ainsi que pour la crédibilité de la politique gouvernementale et des trajectoires de la dette publique.

D'autre part, la conduite de la politique budgétaire par la dette peut aussi être source de risques. La gestion de la dette constitue l'un des principaux instruments politiques des gouvernements en place et peut être utilisée pour des objectifs non économiques et des programmes politiques. Lorsqu'elles sont utilisées de manière inefficace, les dettes souveraines évincent l'investissement privé, limitent la croissance à long terme, érode le capital politique et financier des états et contraignent les marges financières des générations futures. Ainsi, la dette souveraine constitue une problématique qui concentrent des questions économiques, financières, politiques et psychologiques complexes où la frontière entre efficacité et irresponsabilité, confiance et panique, théorie et idéologie est souvent mince. En résumé, les dettes sou-

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veraines sont un instrument clés, utilisé pour de nombreux objectifs qui touchent à des considérations de stabilités institutionnelles, politiques, économiques et financières.

Dans un contexte de besoins pressants d'investissements publics dans la santé, l'éducation et la transition écologique, des niveaux sans précédent de dette et les récits bien connues d'épisodes douloureux de crises de la dette souveraine, le débat sur le niveau approprié de la dette est très discuté et débattu.

À cet égard, la plupart de la recherche sur le sujet a cessé de chercher *la règle d'or* qui pourrait servir de *cible* inconditionnelle pour la gestion de la politique de la dette publique. Alors que des dettes publiques excessives pendant de longues périodes sont en effet généralement associées à des performances économiques à long terme plus faibles, ce résultat empirique pourrait bien ne plus être pertinent dans le contexte des défis sans précédent de la transition écologique.

En outre, les preuves fournies par cette thèse montrent qu'en termes de crises, les épisodes les plus douloureux de crises souveraines ne concernent pas les pays ayant des niveaux d'endettement les plus élevés, ni les dynamiques les plus rapides, mais plutôt les pays vulnérables aux défaillances de coordination externe, contagieuse et financière, enracinées dans une perte de confiance générale dans les principales institutions du pays au sens large (politiques, fiscales, monétaires et bancaires).

Dans un monde dans lequel les *esprits animaux* sont puissants, les comportements moutonniers dominants et où les marchés financiers sont profonds et déréglementés, une dette publique élevée s'avère être un très faible indicateur de la crédibilité, de la capacité du gouvernement à rembourser sa dette et, plus généralement, de la capacité de l'économie tout entière à croître et à accumuler des richesses.

Plus que le niveau d'endettement lui-même, c'est la crédibilité du pays et la solidité de l'ensemble du cadre institutionnel (bancaire, financier et politique) qui constituent le refuge qui permet aux pays d'entreprendre un soutien fiscal massif lorsque

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nécessaire ainsi que de la mise en œuvre de programmes d'investissement à grande échelle sans perte de confiance soudaine et d'assèchement massifs des financements.

Au lieu de se demander quel niveau d'endettement les pays devraient avoir, la question devrait plutôt être de savoir comment les politiques de gestion de la dette publique peuvent contribuer à la construction de cadres crédibles capables d'investir à long terme et d'éviter les défaillances de coordinations parmi les investisseurs qui obligent les gouvernements à entreprendre des ajustements coûteux et sous optimaux. La COVID-19 a montré qu'une politique budgétaire active, opportune, apolitique et crédible ne génère pas nécessairement des paniques à grande échelle, même dans le contexte d'un environnement économique très incertain et très risqué.

Les changements de régime d'anticipations sont destructeurs et la capacité à résister à ces changements rapides et brutaux devrait être considérée comme la pierre angulaire des politiques de gestion des crises de la dette souveraine au-delà de la simple trajectoire de dette.

Dans les pays qui combinent des marchés obligataires souverains profonds, libellés en devises étrangères et à court terme, avec des profils de dettes complexes et une base de créditeurs hétérogène (incluant divers créditeurs commerciaux, des fonds voutours, et de nombreux créditeurs individuels soumis à des juridictions étrangères) et une grande instabilité politique avec une faiblesse des autorités monétaires, le risque marginal net d'un besoin de financement accru sur le marché pourrait bien être extrêmement élevé.

Des solutions de financement moins vulnérables aux anticipations volatiles des marchés financiers associé à une part de financement officiel stable pourraient bien être plus sûre pour assurer un développement économique et éviter des crises sévères. Au contraire, dans les pays dotés d'autorités monétaires fortes, d'une dette libellée en monnaie domestique à long terme et de plans d'investissement crédibles à long terme pour garantir des systèmes économiques plus résilients face aux nombreux dé-

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fis économiques, environnementaux et sociétaux, le risque marginal net d'un accès dérèglementé aux marchés obligataire est probablement assez faible.

La question clé qui se pose n'est pas celle de la dette en elle-même, mais plutôt celle de savoir si l'euro (dollar) marginal supplémentaire de dette, contribue à la mise en place de futurs cadres économiques, financiers et politiques crédibles aux yeux des investisseurs souverains. Si la réponse est oui, le risque, l'incertitude et la confiance, même s'ils sont volatils, ne génèrent pas de dynamiques de fuite en avant irrationnels et permettent au gouvernement de poursuivre son agenda économique et politique. Au contraire, lorsque les ambitions du gouvernement sont jugées par les investisseurs en inadéquation avec ces capacités réelles, des non-linéarités complexes peuvent s'installer et entraver le développement pendant des décennies.

Au-delà de la question du niveau de dette, la structure de cette dette à une importance majeure pour l'existence ou non de problèmes de coordinations. En particulier, quand la base de crédeur est complexe et la perspective de résolution de crises semble difficile et minutieuse (mise en jeu de différentes juridictions, large ensemble de crédeurs hétérogènes, maturités diverses, etc.), le risque que les investisseurs qui perdent confiance se coordonnent sur le "*pire des scénarios*", augmente. À cet égard, la perspective d'un processus de restructuration complexe liée au besoin d'un massif et urgent refinancement de court terme et la coexistence de crédeurs multiples aux objectifs divergents (crédeurs commerciaux de type fonds de pensions aux objectifs de long terme comme fonds vautours, petits porteurs ou crédeurs bilatéraux), dans un contexte de prises de décisions des investisseurs dominées par des heuristiques puissantes rend la question du financement des dettes publiques une problématique beaucoup plus large que la simple quantité de dette et son prix (taux d'intérêt). La structure et la nature de la dette publique sont des composantes additionnelles de la crédibilité d'un pays qui assurent des anticipations optimistes stables, y compris dans un contexte de processus de restructurations et de défauts anticipés.

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Dans cette thèse, je prends une perspective sur 60 ans de crises macroéconomiques et je fournis des éléments empiriques d'un mécanisme qui a rendu les crises souveraines plus sévères au cours des dernières décennies. L'idée était d'améliorer la compréhension des crises de la dette souveraine en contribuant à une meilleure mesure de ces événements, en comprenant ce qui détermine leur sévérité et en identifiant les évolutions contemporaines par rapport à la période antérieure aux années 1980.

Mon approche suit les travaux pionniers de [Kindleberger \(1975\)](#) sur les études qualitatives et historiques des crises financières, mais complète cette approche traditionnelle de l'économie narrative avec des techniques empiriques plus modernes. Réussir à apporter une approche plus quantitative aux études qualitatives était au centre de ce travail. Comblé le fossé entre ces deux approches m'a permis de concilier la richesse et la précision des études qualitatives avec la robustesse et le cadre rigoureux des techniques économétriques.

Concrètement, je fournis une base de données sur les crises macroéconomiques avec une couverture particulièrement large de pays, de périodes et d'événements. Bien que la couverture de la base de données existante soit parmi les plus importantes à ma connaissance, elle ne constitue que le sommet de l'iceberg. Cette première version de la base de donnée a vocation à être étendue et complétée dans de nombreuses directions et devrait plutôt être considérée comme un exemple du type d'approches et d'analyses que la compilation, le nettoyage et l'organisation des informations qualitatives sous-jacentes permettent. Des techniques beaucoup plus avancées de traitement du langage naturel sont disponibles pour extraire et exploiter ces informations et j'espère que cette première structuration de ce corpus sera utile pour mettre en œuvre facilement ces techniques complexes.

Le choix de commencer par une approche supervisée aux ambitions relativement modeste a été principalement motivé par la volonté de fournir un ensemble

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de données qualitativement interprétables qui donneraient du crédit à la validité de l'approche et des perspectives pour des extensions futures.

Mon intérêt pour l'économie a débuté en 2008 avec l'apparition de ce que l'on appelle la *Grande Crise Financière*. La fin de mes études en économie a coïncidé avec la COVID-19, le pire effondrement de la production depuis la Seconde Guerre Mondiale. Entre-temps, les *crises souveraines de la zone euro* m'ont montré que les problèmes critiques de dette publique n'étaient plus limités aux économies à revenu faible ou intermédiaire dotées d'institutions faibles, mais pouvaient frapper avec la même intensité les pays développés. J'ai vu comment la détresse d'une économie de petite taille pouvait entraver l'ensemble d'une union économique et monétaire.

J'ai étudié le cas le plus médiatisé de défaut en Argentine en 2001 et j'ai vu comment des pays voisins aux économies relativement saines, mais exposés comme l'Uruguay, pouvaient être fortement touchés puis se rétablir rapidement, au contraire de l'Argentine dont le défaut de paiement menace toujours 20 ans plus tard.

J'ai lu comment la perspective d'un défaut de paiement du Mexique en 1994 a mobilisé les principaux dirigeants du monde pour éviter une panique à grande échelle qui aurait pu gagner les économies avancées, mais aussi comment une ruée sur la dette ne pouvait constituer que le point focal d'une perturbation coïncidente des systèmes bancaires, des institutions politiques, des systèmes sociaux et de catastrophes naturelles.

Dans tous ces cas, deux régularités ont attiré mon attention. La première, c'est l'ampleur de ces événements en termes de pays impliqués et d'étendue des secteurs touchés. À cet égard, c'est la complexité des interconnexions, des relations de dépendance et de la direction inattendue des événements au cours de ces périodes qui motive le nom de la base de données.

La seconde, c'est l'apparente disproportion entre le problème initial (le déclencheur) et l'ampleur de l'explosion (les crises finales). Cela est particulièrement vrai dans

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deux des pires crises récentes. Dans la crise de 2008 ainsi que celle de 2020, on constate un déclencheur apparemment isolé qui a rapidement fait boule de neige et s'est transformé en effondrement généralisé et mondial.

L'intersection entre ce sentiment de régularité des crises et un intérêt de longue date pour le feu et ses conséquences sur les écosystèmes forestiers (revitalisé par la gravité des *méga feux* en Australie, en Californie ou en Sibérie ces dernières années) m'a rappelé que les conditions pour des incendies destructeurs et contagieux à grande échelle se retrouvent dans le *Triangle du feu* qui combine oxygène, chaleur et combustible.

En d'autres termes, les événements à grande échelle ne se produisent que lorsque des écosystèmes matures sont touchés par un déclencheur isolé qui rencontre le mécanisme de propagation approprié. En m'inspirant de cette analogie et en prenant la mesure de la maturité des systèmes économiques contemporains et de la diversité des déclencheurs possibles et imprévisibles, je me suis proposé dans cette thèse de comprendre ce qui a constitué le combustible des récents "*Méga-feux économiques*" que nous avons observés au cours des dernières décennies.

Pour répondre à cette question, j'ai choisi de tester l'hypothèse selon laquelle, c'est la conjonction d'un état d'esprit psychologique volatile et fragile, de comportements grégaires et de réseaux financiers et d'information connectés à grande échelle qui constitue le carburant des crises macroéconomiques.

Dans une perspective plus générale, j'espère que cette thèse a réussi à convaincre le lecteur que les crises souveraines sont des événements complexes, souvent coûteux dans de nombreuses dimensions et largement contemporains. Par ailleurs, dans un monde dans lequel les réseaux économiques, financiers et informationnels sont denses et fortement connectés, les crises de la dette souveraine avec une dimension psychologiques importantes, sont un enjeu particulièrement pressant dans tous les pays, à tous les niveaux de développement.



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Dans la continuité de la crise de la Covid-19, les tensions sur les marchés des matières premières, les instabilités géopolitiques et les successions des chocs exogènes qui ont impacté l'économie réelle peuvent largement rappeler l'enchaînement des événements qui ont précédé la vague des défauts souverains parmi les pays en développement dans les années 1980. Des niveaux de dettes élevés, des pressions inflationnistes dans les pays développés qui obligent la mise en place de politiques monétaires plus restrictives, des agendas dictés par les questions géopolitiques, des instabilités politiques, peu de marges de manœuvre fiscale et monétaire dans les pays émergents et la nécessité d'une rapide et profonde transition économiques vers de modèles plus durables, sont autant d'ingrédients qui pointent vers un risque de crises de première génération en particulier parmi les pays à revenu faible ou intermédiaire.

Dans ce contexte, il est nécessaire de tirer les leçons de 40 ans de recherche en économies sur la nécessité de restructurations anticipés, rapides et coordonnées, centrées non seulement sur un retour rapide à la croissance et la stabilité financière, mais aussi sur la construction d'un cadre macroéconomique, social et politique solide qui booste la crédibilité et limite les risques de crises de secondes générations telles que les ont connus de nombreux pays dans les années 1990, en héritage des méthodes de résolutions mises en œuvre pour résoudre les crises de dettes des années 1980.

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# Appendix

# Appendix A

## The Complex Crises Database

### A.1 The Corpus of IMF Documents

#### A.1.1 Scraping and Semantic Analysis

1. Scrape the URLs of all documents country by country using the form from the IMF archives website and consolidate into a single database of 250,000 documents that contains the title of the file, the date of publication and the country of interest
2. Find documents related to programs using a text analysis of the title. Specifically, find the occurrence of the following list of expressions: "arrangement under the flexible credit line", "letter on economic policy", "stand-by arrangement", "extended arrangement", "extended fund facility", "enhanced structural adjustment", "poverty reduction and growth", "structural adjustment facility".
3. Separate "requests" from "reviews" and isolate the number of the review excluding misleading expressions such as "request for increase in quotas", "request for enhanced article iv" or "request for postponement"

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4. Find the name of the countries in the title and check for mismatch with the metadata information, correct when necessary by considering the country name specified in the title.
  5. Find consultations and surveillance documents: "article iv consultation", "article xiv consultation", "recent economic developments", "selected issues", "article viii", "background papers", "consultations", "exchange system", "economic report".
  6. Find technical assistance documents

This initial cleaning of the metadata to maintain only relevant documents resulted in approximately 39,000 files remaining. After downloading all the PDFs, an additional cleaning was performed to remove files with less than 5 pages and files containing specific terms in the first page.

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## A.1.2 First Page Analysis

**Table A.1:** List of Keywords To Detect Problematic Documents

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Keyword
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minutes of executive board meeting
minutes of executive board minutes
executive board attendance
final minutes of executive board meeting
this is a working paper
working paper
a working paper of the international monetary fund
background paper
provides background to the paper
attached paper provides background information
background documentation for
draft issues paper
poverty reduction strategy paper
enhanced heavily indebted poor countries initiative
individual economy assessments
global financial stability report
debt sustainability analysis
triennial surveillance review
interim surveillance review
report on the observance of standard and codes

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**Note:** Authors' own elaboration.

## A.1.3 PDF Extraction

1. Convert PDFs to images: this step is necessary because Google OCR works only on images (pdf2img library).
2. Image Pre-processing: remove noise from images and make text prominent to improve accuracy when applying OCR (OpenCV library).
3. OCR Text extraction

4. Text Preprocessing: apply autocorrection techniques to increase the accuracy and erase spelling mistakes (spellchecker library)

5. Saving Output Text

## A.1.4 Final Corpus

**Table A.2:** Description of IMF Documents

Type of document	Purpose	Currently Issued	Regular production	Details
Article IV	Main tool of bilateral surveillance: inform about developments, vulnerabilities, outlook and furnish recommendations	Y	Y	Annually (not always)
Article VII & Article XIV	Bilateral surveillance of country maintaining exchange rate restrictions: motivate the measures and notify of any change	Y	Y	Required every 12 months: normally included in Article IV, but can be issued independently
Consultations	Bilateral surveillance	N	No info	Old version of Article IV
Exchange system	Communicate changes in par value of exchange rate	N	N	/
Recent Economic Developments	Economic and financial developments and trends in member countries	Y	No info	Internal paper for background analysis of <i>Article IV consultations</i>
Request	Set out the agreed policy goals and strategies in the economic program as well as conditionality and how observance will be monitored	Y	N	/
Review	Ascertain whether the relevant conditions for a purchase have been observed by member. If it is the case, the purchase becomes available	Y	Y (Conditional on program) <sup>2</sup>	Prior to purchase by member

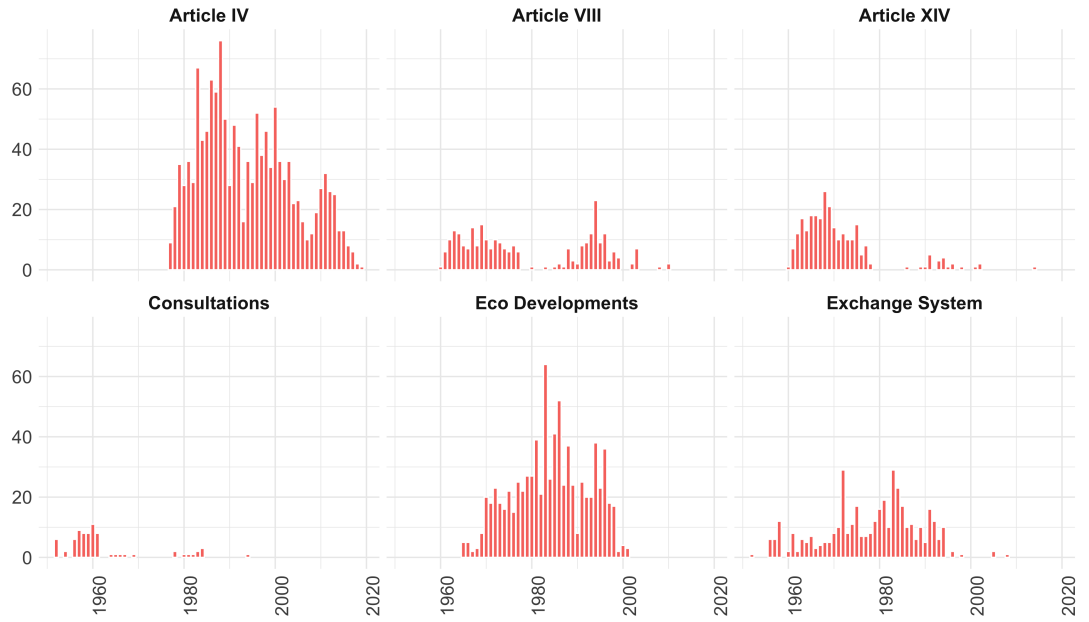
Source: Fritz-Krockow and Patmeshwar (2007)

Note: Some purchases do not require a review, e.g., in case of a Stand-By Arrangement that has quarterly purchases but semi-annual reviews

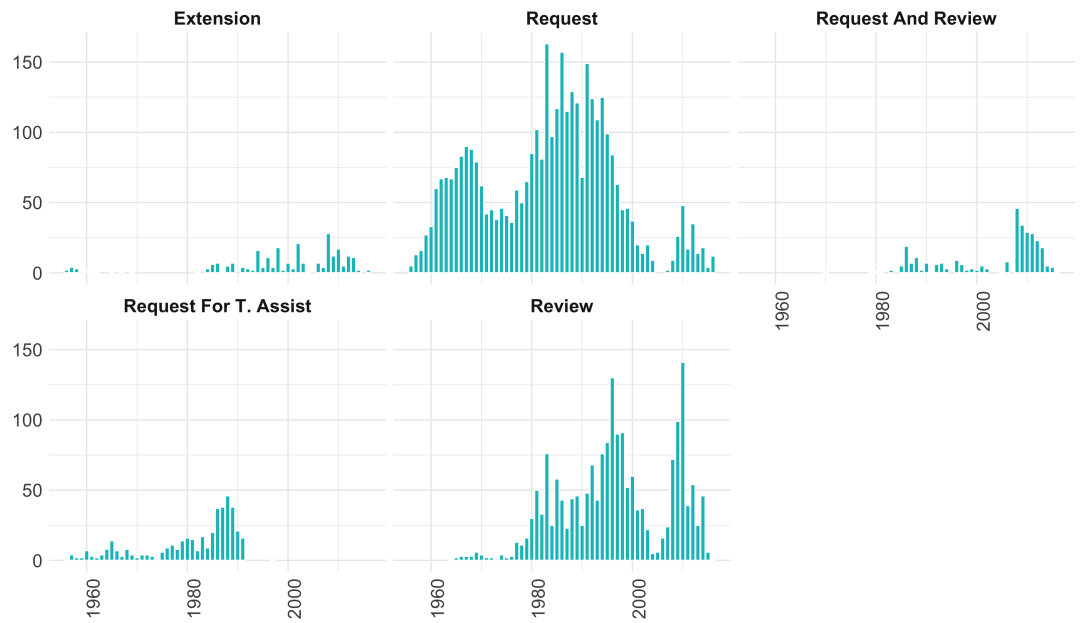


**Figure A.1: Number of IMF Documents per Year**

**(a) Country Reports**



**(b) Program Related**



**Source:** *Complex Crises Database (CCD)*

**Table A.3: Country Coverage**

	ISO3	Country name	First document	N. of documents
1	AFG	Afghanistan	1956	204
2	AGO	Angola	1989	135
3	ALB	Albania	1991	178
4	ARE	United Arab Emirates	1974	125
5	ARG	Argentina	1957	406
6	ARM	Armenia	1992	204
7	ATG	Antigua & Barbuda	1982	2
8	AUS	Australia	1949	187
9	AUT	Austria	1949	176
10	AZE	Azerbaijan	1992	133
11	BDI	Burundi	1965	223
12	BEL	Belgium	1949	220
13	BEN	Benin	1976	209
14	BFA	Burkina Faso	1984	217
15	BGD	Bangladesh	1972	268
16	BGR	Bulgaria	1990	185
17	BHR	Bahrain	1983	59
18	BIH	Bosnia & Herzegovina	1995	110
19	BLR	Belarus	1992	103
20	BLZ	Belize	1970	132
21	BOL	Bolivia	1949	349
22	BRA	Brazil	1946	402
23	BRB	Barbados	1971	167
24	BRN	Brunei	1973	65
25	BTN	Bhutan	1981	92
26	BWA	Botswana	1971	146
27	CAF	Central African Republic	1968	212
28	CAN	Canada	1955	191
29	CHE	Switzerland	1975	109
30	CHL	Chile	1946	335
31	CHN	China	1981	172
32	CIV	Côte d'Ivoire	1964	206
33	CMR	Cameroon	1967	221
34	COD	Congo - Kinshasa	1972	198
35	COG	Congo - Brazzaville	1969	95
36	COL	Colombia	1947	376
37	COM	Comoros	1978	144

	ISO3	Country name	First document	N. of documents
38	CPV	Cape Verde	1978	175
39	CRI	Costa Rica	1947	294
40	CYP	Cyprus	1961	141
41	CZE	Czechia	1990	134
42	DEU	Germany	1953	212
43	DJI	Djibouti	1978	132
44	DMA	Dominica	1978	184
45	DNK	Denmark	1946	133
46	DOM	Dominican Republic	1959	190
47	DZA	Algeria	1966	198
48	ECU	Ecuador	1948	320
49	EGY	Egypt	1946	252
50	ERI	Eritrea	1994	31
51	ESP	Spain	1949	190
52	EST	Estonia	1992	143
53	ETH	Ethiopia	1947	236
54	FIN	Finland	1951	164
55	FJI	Fiji	1971	128
56	FRA	France	1947	243
57	GAB	Gabon	1967	210
58	GBR	United Kingdom	1947	307
59	GEO	Georgia	1992	187
60	GHA	Ghana	1958	339
61	GIN	Guinea	1965	242
62	GMB	Gambia	1977	196
63	GNQ	Equatorial Guinea	1971	120
64	GRC	Greece	1947	191
65	GRD	Grenada	1975	182
66	GTM	Guatemala	1948	216
67	GUY	Guyana	1967	321
68	HND	Honduras	1947	307
69	HRV	Croatia	1993	106
70	HTI	Haiti	1947	295
71	HUN	Hungary	1982	242
72	IDN	Indonesia	1949	414
73	IND	India	1946	263
74	IRL	Ireland	1958	233
75	IRN	Iran	1948	205

	ISO3	Country name	First document	N. of documents
76	IRQ	Iraq	1951	127
77	ISL	Iceland	1948	240
78	ISR	Israel	1953	224
79	ITA	Italy	1949	226
80	JAM	Jamaica	1962	380
81	JOR	Jordan	1953	263
82	JPN	Japan	1953	248
83	KAZ	Kazakhstan	1992	147
84	KEN	Kenya	1965	310
85	KGZ	Kyrgyzstan	1992	182
86	KHM	Cambodia	1970	122
87	KIR	Kiribati	1986	69
88	KNA	St. Kitts & Nevis	1987	101
89	KOR	South Korea	1956	306
90	KWT	Kuwait	1963	136
91	LAO	Laos	1957	201
92	LBN	Lebanon	1952	126
93	LBR	Liberia	1963	392
94	LBY	Libya	1983	63
95	LCA	St. Lucia	1979	92
96	LKA	Sri Lanka	1972	279
97	LSO	Lesotho	1970	192
98	LTU	Lithuania	1992	127
99	LUX	Luxembourg	1971	80
100	LVA	Latvia	1992	130
101	MAR	Morocco	1959	315
102	MDA	Moldova	1992	130
103	MDG	Madagascar	1976	236
104	MDV	Maldives	1978	138
105	MEX	Mexico	1947	296
106	MHL	Marshall Islands	1992	41
107	MKD	Macedonia	1993	125
108	MLI	Mali	1964	312
109	MLT	Malta	1970	132
110	MMR	Myanmar (Burma)	1953	107
111	MNE	Montenegro	2006	41
112	MNG	Mongolia	1990	131
113	MOZ	Mozambique	1985	237

	ISO3	Country name	First document	N. of documents
114	MRT	Mauritania	1977	193
115	MUS	Mauritius	1968	190
116	MWI	Malawi	1967	302
117	MYS	Malaysia	1964	215
118	NAM	Namibia	1989	100
119	NER	Niger	1967	246
120	NGA	Nigeria	1963	177
121	NIC	Nicaragua	1947	303
122	NLD	Netherlands	1983	127
123	NOR	Norway	1948	139
124	NPL	Nepal	1963	238
125	NZL	New Zealand	1955	165
126	OMN	Oman	1972	106
127	PAK	Pakistan	1950	397
128	PAN	Panama	0001	289
129	PER	Peru	1946	423
130	PHL	Philippines	1949	390
131	PLW	Palau	1999	23
132	PNG	Papua New Guinea	1974	148
133	POL	Poland	1986	203
134	PRT	Portugal	1962	208
135	PRY	Paraguay	1946	275
136	QAT	Qatar	1973	94
137	ROU	Romania	1973	298
138	RUS	Russia	1992	224
139	RWA	Rwanda	1962	258
140	SAU	Saudi Arabia	1958	54
141	SDN	Sudan	1958	505
142	SEN	Senegal	1963	274
143	SGP	Singapore	1966	146
144	SLB	Solomon Islands	1978	127
145	SLE	Sierra Leone	1964	379
146	SLV	El Salvador	1957	235
147	SMR	San Marino	1992	45
148	SOM	Somalia	1964	62
149	STP	São Tomé & Príncipe	1978	41
150	SUR	Suriname	1978	104
151	SVK	Slovakia	1993	86

	ISO3	Country name	First document	N. of documents
152	SVN	Slovenia	1993	64
153	SWE	Sweden	1952	167
154	SWZ	Swaziland	1983	84
155	SYC	Seychelles	1972	160
156	SYR	Syria	1948	196
157	TCD	Chad	1967	190
158	TGO	Togo	1965	211
159	THA	Thailand	1949	268
160	TJK	Tajikistan	1992	107
161	TKM	Turkmenistan	1992	46
162	TON	Tonga	1985	105
163	TTO	Trinidad & Tobago	1962	172
164	TUN	Tunisia	1957	234
165	TUR	Turkey	1947	406
166	TUV	Tuvalu	2011	14
167	TZA	Tanzania	1965	269
168	UGA	Uganda	1965	301
169	UKR	Ukraine	1992	210
170	URY	Uruguay	1949	408
171	USA	United States	1947	221
172	UZB	Uzbekistan	1992	74
173	VCT	St. Vincent & Grenadines	1980	108
174	VEN	Venezuela	1946	182
175	VNM	Vietnam	1958	274
176	VUT	Vanuatu	1981	83
177	WSM	Samoa	1973	165
178	YEM	Yemen	1970	237
179	ZAF	South Africa	1948	211
180	ZMB	Zambia	1967	424
181	ZWE	Zimbabwe	1980	237

**Source:** *Complex Crises Database (CCD)*.

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## A.1.5 Transcripts

### Recent Economic Developments

To provide grasp of the type of economic description produced by the IMF bilateral surveillance I provide an example of *Recent Economic Developments* on March 28, 1995 during the executive board meeting<sup>1</sup>. Keywords of interest are highlighted the story that is indeed to be extracted from the report and in parentheses the category of crises reflected (ERS=expectations, S=sovereign default, C=Currency crisis, Y= recession, bop=balance of payment, I=inflation). The narrative captured by the term frequencies of these keywords reflects an intense expectation regime shifts in the context of sovereign and currency crises, a recession and fundamental imbalances regarding external accounts and inflation dynamics.

*The Mexican economy continued to be affected by uncertainty (ERS) and volatility in the financial and foreign exchange markets at the beginning of 1995. While this situation resulted from a combination of factors, a central determinant was the persistence of market doubts (ERS) as to the adequacy of the amounts, timing, terms, and the real availability of the external financing (S) to support Mexico's program of adjustment. Under a situation of uncertainty (ERS) concerning the availability of resources to meet external payments, market speculation (ERS) emerged on Mexico's need to resort to exchange controls. In this context, as serious difficulties were found to rollover (S) the external obligations coming due, the exchange rate depreciated (C) substantially and interest rates rose to levels well above those assumed in the AUSEE.*

*The adverse evolution of financial and exchange market conditions was reflected in inflation and economic activity. The monthly rate of growth of the consumer price index rose from 0.9 percent in December 1994, to 3.8 percent and 4.2 percent in January and February 1995, respectively. In the first 15 days of March, consumer prices increased 3.1 percent. Simultaneously, the upturn in GDP growth observed in 1994 (to 3.5 percent in real terms) was reverted since the end of the year. Preliminary estimates from a monthly*

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<sup>1</sup>Statement by Mr. Guzman on Mexico Executive Board Meeting 95/30 March 29, 1995

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*industrial survey show decreases in manufacturing output (Y) of 0.5 percent in January-February 1995 with respect to the same period of the previous year, after having recorded a real rate of growth of 3.6 percent in 1994. As a result, employment in this sector is estimated to have decreased by 2.9 percent in January at an annual rate. The Banco de Mexico has implemented a tight monetary policy over the course of 1995. Nevertheless, the stance of monetary policy in Mexico in recent months has been the subject of some discussion, and doubts have been expressed on the central bank's compliance with the limit of 10,000 million new pesos set for net domestic credit for 1995. These doubts and the accompanying criticisms have contributed to increase uncertainty (ERS). The confusion has originated mainly from the fact that frequently analysts fail to exclude from these figures Mexico's extraordinary net amortizations of external obligations, as well as the external support (S) received to finance them. These operations must not be considered given their extraordinary nature, and the fact that their impact on international reserves is unrelated to the monetary policy stance. When statistics on the central bank's net domestic credit are adjusted for both amortizations that could not be refinanced and resources of the exchange stabilization fund, an increase in net international reserves (and consequently an equivalent decline in net domestic credit) of some 2.3 billion dollars is observed as of the end of February. The magnitude of the adjustment of monetary policy is illustrated by the fact that this figure is equivalent to over 30 percent of the monetary base. One must in addition consider the impact on real liquidity of the sharp increase in the inflation rate (I). Furthermore, to allow complete transparency of monetary policy, the Banco de Mexico has started the publication of the bank's balance sheet on a weekly basis.*

*The evolution of interest rates during the first few months of 1995 is also a good indicator of the orientation of monetary policy. At the end of 1994, the yield on 28 day CETES stood at 31 percent; as of March 28, 1995, the corresponding figure was 82.7 percent; as explained below, this compares with a rate of inflation projected at 42 percent for the year. The increase in the interbank rate (TIIP) has also been substantial, from 39.7 percent at the end of 1994 to 91.1 percent on March 28, 1995.*

*Fiscal policy was kept tight during the first two months of 1995 and no problems are foreseen at this stage to meet the targets agreed for the first quarter of the year. The primary surplus of the Federal Government rose by 102.4 percent in real terms in January-*



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February with respect to the same period of the previous year, while the surplus in the economic balance of the non-financial public sector recorded in January figures slightly above the March targets. These results are noteworthy considering the adverse evolution of economic activity (Y) and an increase in interest payments on the public debt (S) of 34.2 percent in real terms with respect to January 1994. The combination of the sharp devaluation (C) of the peso and the implementation of tight fiscal and monetary policies has had a large impact on the external sector. Preliminary figures show that the trade balance recorded a surplus of 452 million dollars in February 1995, the first observed since November 1990 and the largest since April 1988. This evolution was the result of a 24 percent increase in exports with respect to the same month of the previous year, and a decrease in imports of 14.4 percent in annual terms. Even though statistics are not yet available, it is tentatively estimated that the achievement of a trade surplus in February appears to have resulted in an approximate balance in the current account. Figures for January 1995 showed a current account deficit of 1,019 million dollars, explained by deficits of 530 and 489 million in the balances of trade and services, respectively. If, as might be expected, the deficit in the balance of services remained at similar levels in February, it would be roughly matched by the trade surplus, thus bringing the current account into equilibrium.

This is indeed a huge adjustment. Recall that the current account deficit (Bop) amounted to almost 8 percent of GDP in 1994, and showed a monthly average of 2,405 million dollars during the year. A clarification is worth with respect to recent trade policies, since reference is made to them in the paper: The Mexican Government has decided to temporarily increase, within the limits set forth by Mexico's international commitments in the WTO and other international trade agreements, the commercial protection granted to the footwear, apparel and leather wear industries. These industries have suffered very serious losses in their employment (L) and their participation in the Mexican market in the past years as a result of intense import competition.

The unusual intensity of this competition is due to a large extent to the combination of a high degree of openness of the Mexican market for these products and the high barriers existing in many countries. Except for the case of apparel, where quantitative restrictions may be applied in accordance with WTO principles, the increase in protection will take place through an increase in most favored-nation tariffs. These measures are temporary, conditional upon the effective restructuring of these industries and not, in any way, in-

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*dicative of a general modification of Mexico's policy. It should be noted that these restrictions could be applied to a potential amount representing at most 1.6 percent of merchandise imports. With these reflections in mind, the measures can be placed in a more proper context. Despite the positive results of the trade figures, net international reserves have declined (C) significantly in 1995. But, as explained above, when figures are adjusted to exclude extraordinary amortizations and resources of the exchange stabilization fund, an accumulation of reserves is observed.*

*is also worth noting that the Banco de Mexico has intervened from time to time in the exchange market to avoid excessive and erratic movements in the exchange rate (C). By reducing the volatility of the exchange rate, this policy has alleviated the substantial costs that are usually associated with this phenomenon, such as the distortion of price and investment decisions, and its adverse impact on the supply of foreign currency. Moreover, in the absence of such interventions, relatively modest volumes of foreign currency transactions would have implied further significant downward adjustments in the peso value (C).*

## **Transcripts on Sovereign Crises**

- MEX 1982-11-12 request: "currently, a proposal is being prepared for presentation to the -international banking community with a view to reaching agreement on a debt restructuring program that would improve substantially the maturity structure of the external debt." [...] "in the case of arrears, the program for the elimination of any remaining amount will be agreed with the fund, at the time of the review envisaged prior to January 1, 1984." [...] "mexico is seeking a restructuring of its external debt with a view to achieving a more satisfactory maturity structure." [...] "in particular, the authorities are determined to eliminate existing payment arrears in the near future, and the exchange system is to be operated so as to avoid the emergence of new arrears." [...] "currently, a proposal is being prepared for presentation to the international banking community with a view to reaching agreement on a debt restructuring program that would improve substantially the maturity structure of the external debt." [...] "as a result of the massive debt restructuring that has been negotiated, the burden of servicing the external debt is expected to ease over the next few years." [...] "with respect to the outstanding external payments arrears, the authorities have indicated their intention to negotiate with foreign creditors for a prompt and orderly settlement of these arrears

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*and new facilities have been developed for that purpose."*

- MEX 1983-05-23 review: *"he had been pleased at the progress made by the authorities toward completing the formal requirements for debt restructuring and in particular the agreement reached with the banks to maintain interbank deposits at current levels, an agreement that contrasted with the difficulties being experienced by some other major debtor countries." [...] "with respect to the external obligations of the private sector, significant progress has been achieved in restructuring the existing debt and settling outstanding arrears." [...] "a parallel exchange market developed, external payments arrears emerged, large new subsidies resulted from the administration of the exchange rate system and the liquidation of the mex dollar operations, and the flow of imports was disrupted with adverse consequences for production and employment." [...] "the program envisages an increase in net international reserves of us\$2 billion (including the repayment of all remaining arrears), as capital inflows are expected to exceed the small current account deficit." [...] "during 1984 and 1985 mexico reached agreements with commercial banks on the restructuring of debts with original maturities amounting to us\$48.7 billion that would have fallen due in the period 1985-90."*
- MEX 1994-02-28 article IV: *"it is to be hoped that, after the elections, the new government will be in a position to quickly finalize negotiations on a fund-supported adjustment program, which could pave the way to much-needed debt relief." [...] "clearly, significant amounts of assistance and debt rescheduling will be needed." [...] "this is evident from the high level of the ratio of the fiscal deficit to gdp, the extremely high debt-service ratio and the associated large buildup of external arrears to 68 percent of gdp, the continuing large deficit-even with some improvement-in the external current account as well as in the overall external balance, and the uncertain trends in the level of the official reserves." [...]*
- MEX 1995-06-23 Eco developments: *"the key elements of the strategy were the maintenance of tight financial policies, a major external debt restructuring, and a comprehensive program of structural reforms including, notably, privatization and trade liberalization." [...] "as market interest rates more than trebled in the first quarter (from 28 to 86 percent), 2/ debtors had an incentive to be in arrears and be subject to the lower penalty rate, in the case of foreign currency denominated loans, debtors had an incentive to delay payments in order to benefit from the future appreciation of the peso." [...] "in particular, efforts have been made to extend the maturity and reduce the cost of external financing through a program of debt placements, debt swaps, and*

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*prepayments.*" [...]

### **Transcripts on Expectations Regime Shifts**

- 'MEX 1961-07-05: *"these objectives are: (1) to achieve an internal balance in 1961 and 1962 through appropriate financial policies that will enable Mexican to meet necessary expenditures, both for consumption and investment, public and private, (2) to strengthen confidence in the convertibility and stability of the Mexican peso both at home and abroad by establishing internal balance, thus checking speculative capital movements, arresting price increases, and stimulating savings, (3) to lay a foundation for further expansion in production and growth of the Mexican economy through increased savings that will not endanger the nation's balance of payments."*
- 'MEX 1982-11-12 request': *"in August of this year these events forced a modification of the exchange rate policy; a dual system was introduced, but the new arrangement was not able to slow the demand for foreign exchange, which at that time was being affected by speculative capital movements."* [...] *"within the framework of a flexible exchange rate policy, the aim will be to maintain an adequate level of competitiveness for exports of goods and services, reduce incentives to nonessential imports, and discourage speculative capital movements."*
- MEX 1983-05-09 review: *"as the crisis of confidence intensified, capital inflows virtually ceased and the deficit in the current account of the balance of payments declined abruptly and sharply in an inevitable adjustment to the tightening of the capital account."*
- MEX 1995-02-01 request: *"this confidence crisis is closely related to worries that the impossibility of rolling over tesobonos and other dollar denominated obligations coming due may represent an important source of pressures on the exchange rate."* [...] *"moreover, there had been clear signs of the re-emergence of financial panic, which had threatened to spread beyond Mexico to other emerging markets in the western hemisphere and other regions."* [...] *"this risk of a new form of debt crisis is of a systemic nature because the whole financing of emerging countries would be endangered if this perception was to become a self-fulfilling prophecy."* [...] *"we commend the staff and the managing Director for their quick and determined approach to help Mexico overcome its confidence crisis."* [...]
- MEX 1995-06-23 eco developments: *"this view would argue that the large number of adverse*

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*shocks that hit Mexico in 1994, added to the potential vulnerability stemming from weaknesses in the external accounts, called for a much tighter monetary policy than the one followed, and probably also for an early widening of the intervention band, so as to reassure the markets that the authorities were fully committed to sustaining the exchange rate regime."*

- MEX 1995-12-06 review: *"the latest market instability seems to have been related to concerns about the prospect for an early recovery and the health of the banking system; fears (in advance of the budget announcement) of a relaxation of economic policy, and a general uncertainty about Mexico's short-term pol [...] "the positive market responses to two recent international bond offers also suggest a strengthening of market confidence, possibly related to a generally favorable response to the 1996 budget, and the announcement of additional government support for commercial banks facing difficulties."*
- MEX 2002-09-23 article IV: *"the economy is much more resilient, and the economic policy environment much more favorable as evidenced by the agility with which macroeconomic policies have been rebalanced, especially over the past three years in response to shocks, external turbulences, and heightened risk aversion, a point well articulated in the staff report" [...] "Mexico pioneering issuance of international bonds with cacs under new york law earlier this year reflected the high degree of market confidence in Mexico debt management policies" [...]*
- MEX 2009-02-05 article IV: *"this reflected in part deleveraging by foreign investors, and generalized heightened risk aversion amongst market players" [...] "negative feedback effects between worsening credit quality, weakening bank capital, and a further growth slowdown, are key downside risks to the outlook." [...] "amidst a global confidence crisis, the authorities have so far managed to preserve market confidence in Mexico public finance." [...] "they believe that access to FCL resources could play a positive role to support their macroeconomic strategy and bolster confidence until external conditions improve, and complement financing from the fed (us\$30 billion swap line, expiring this October), as well as other multilateral (us\$5 billion in 2009 from the World Bank and IDB)" [...] "the objective of the flexible credit line (fcl) arrangement with Mexico, at the time of its approval, was to support the Mexican authorities overall macroeconomic strategy and bolster confidence until external conditions improve, by providing assurance that Mexico is in a very strong position to manage any potential risk and pressures in the event that the global situation were to deteriorate further."*
- MEX 2016-05-27: *"however, it also exposes Mexico to abrupt shifts in investor sentiment toward*

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emerging markets." [...] "external downside risks to the outlook include weaker-than-expected growth 4 International Monetary Fund Mexico in the u.s., deterioration in market sentiment towards emerging markets and a renewed decline in oil prices." [...] "in an environment of heightened risk aversion, foreign investors would reduce their equity holdings." [...] "we welcome the authorities' commitment to continued fiscal consolidation necessary to reduce the ratio of public-debt-to-gdp and to maintain market confidence." [...] "furthermore, the result of the u.s. presidential election adds uncertainty and downside risks to economic growth and international trade in the near term." [...] "while strong fundamentals and policy frameworks, complemented by the FCL arrangement with the fund, provide protection against adverse shocks, the outlook remains clouded with substantial downside risks."

- MEX 2018-11-27: "Mexico is particularly exposed to abrupt shifts in investor sentiment toward emerging markets." [...] "the downside scenario is based on the faster-than-expected tightening of global financial conditions scenario in the April 2018 WEO, and would be broadly consistent with the global tail risks relevant for Mexico: an inflation surprise in the United States, leading to a 100 basis points increase in the U.S. term premium, and heightened risk aversion, would cause a reduction of u.s. growth by 0.67 percentage point and lower oil prices by 5 percent relative to the baseline WEO projection.<sup>1</sup> the scenario also assumes a surge in global financial market volatility, with the vxeem rising by 3 standard deviations (for comparison, the vxeem increased by 4 standard deviations in both 2008:q4 and 2011:q3)."

## Transcripts on Speculation

- IDN 1969: "during the past year, there were speculative attacks on the rupiah fed by rumors regarding the timely availability of foreign aid, the danger of food shortages, and generally the ability of the government to meet seasonal exchange requirements."
- IDN 1983: "the authorities were understandably worried that large discrete adjustments of the exchange rate would encourage speculative capital movements"
- IDN 1988: "during the speculative attack, the authorities injected rp 1.7 trillion of liquidity (equivalent to 20 percent of the reserve money stock) into the banking system through rediscounts of money market securities at bank indonesia in order to prevent a significant increase in domestic interest rates (appendix table 43)." [...] "thus, during a speculative attack against the rupiah in december 1986, the authorities injected rp 1.7 trillion of liquidity (equivalent to 20

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*percent of the reserve money stock) to replenish losses due to short-term capital outflows and to prevent substantial increases in domestic interest rates."*

- IDN 1997: *"this was accomplished without jeopardizing either external viability or progress toward price stability on the basis of prudent financial policies and a steadfast commitment to market-oriented reforms conducive to high levels of savings and investment, the relatively strong fundamentals of indonesia have also withstood well the recent market test of speculative attacks that affected other -4lebm/97/69 7/9/97 countries in the region.", [...] nevertheless, the implementation of selective exchange controls in malaysia in early september has created panic selling in the jakarta stock exchange, owing to market speculation that indonesia would follow the path of malaysia.*
- PHL 1994: *("as monetary conditions eased and domestic interest rates declined, the peso began to depreciate steadily until the speculative attack of late september." [...] "el the shaded areas indicate periods of speculative attack. they helped trigger the september-november speculative attack." )*
- PHL 2000: *"foreign funds held in peso deposits for less than 90 days can no longer be reconverted into foreign currency by the banking system. the authorities stressed that the measure was designed to limit speculative capital movements and was not a precursor of further restrictive measures,<sup>15</sup> and they reaffirmed their commitment to maintaining open current and capital accounts for external transactions."*
- ARG 1994 *"such an arrangement could only work if there were no outstanding stock to guarantee, since it would not otherwise be proof against speculative attack." [...] "it is testimony to the resilience of the currency board arrangement that this speculative attack petered out after only a few days, and the us\$300 million—and more—was rapidly restored").*
- ARG 1997: *"however, such instances resemble plane crashes, in that no matter how terrible they are when they occur, they are too rare to provide a reason to abandon the benefits of air travel, in the same way, speculative attacks and currency collapses should not be considered sufficient reason to abandon the benefits of global financial markets, free movement of capital, or the absence of exchange and capital controls." [...]*
- ARG 1999: *("alternatively, the economy could be driven to a collapse equilibrium-characterized by an inevitable speculative attack on the fixed exchange rate system-in case investors face a large degree of uncertainty and are risk averse." [...] "for an intermediate range of uncertainty and risk*

*aversion, the economy would settle at a fundamentals equilibrium, in which a crisis abroad causes a speculative attack at home only when domestic fundamentals are precarious." [...] "a collapse equilibrium is one in which the economy inevitably experiences a speculative attack as a result of contagion." [...] "in view of the conflicting evidence as to the effectiveness of capital controls, particularly in the short-run or in the event of speculative attacks, i welcome, like other directors, the change in staffs views regarding the advisability of a swift liberalization of the capital account to a more balanced approach of analyzing the costs and benefits of eliminating controls.")*

## A.2 Lexicon

**Table A.4:** Full Lexicon of Crises

Category	Keyword
B.o.P.	shortage of foreign exchange bop crisis balance of payment crisis capital account crisis balance of payment crisis balance of payment problem balance of payment difficulties cessation of official foreign capital inflows decline in net international reserves pressures in the official foreign exchange market external account came under pressure external account came under severe pressure external account came under serious pressure balance of payments problems shortage of international reserves sharp reduction in international reserves strong decline in international reserves international reserves exhausted decline in reserves drop in reserves loss of official reserves decline in net capital inflows



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Category	Keyword
	decline in international reserves
	decline in official reserves
	official international reserves exhausted
	major loss in net international reserves
	foreign exchange scarcity
	decline in receipts of official foreign loans
	exhaustion of the disposable official international reserves
	capital flight
	flight of capital
	pull-back of capital
	capital flow reverse
	capital flow reversal
	pressure on capital flows
	large capital outflows
	strong balance of payment pressures
	balance of payment assistance
	depleted international reserves
	large external financing needs
	substantial capital outflows
	unforeseen balance of payments contingencies
	tail risks to the balance of payments
	large balance of payments imbalances
	exhausted official international reserves
	pressure on the capital account
	exceptional balance of payments need
	balance of payment sustainability
	reversal in the flow of private capital
	sharp reduction in access to international capital markets
	sharp fall in private inflows
	decline in net inflow
	severe external imbalances
	severe internal and external imbalances
Banking	bank resolution
	bank crisis
	banking sector restructuring
	restructuring of nonperforming loans
	undercapitalized banking system
	weak bank capitalization

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Category	Keyword
	reorganization of the banking sector
	restructuring of the banking
	fragility of the banking sector
	fragile banking sector
	banking crisis
	banking system restructuring
	insolvent banks
	insolvent banking sector
	bailout
	crisis in the banking sector
	take over of private banks
	private banks taken over
	recapitalize private banks
	collapse of the banking sector
	increase in nonperforming loans
	recapitalization of the banks
	recapitalizing the banking system
	recapitalizing the banking sector
	banking system collapsed
	additional nonperforming loans
	collapsed in the banking system
	banking system stability
	pressure on the banking
	bankrun
	bank recapitalization
	deteriorating credit quality
	recapitalization
	bank restructuring
	recapitalize private financial institutions
	confidence in the domestic banking system
	strengthen bank supervision
	financial support package
Commodity	oil crisis
	rice crisis
	crop crisis
	crop failure
	commodity crisis
	energy crisis

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Category	Keyword
	cotton crisis
	crisis in the cotton
	severe shortages{1} of rice
	fall in prices of raw materials
	price of copper continue to drop
	swing in copper price
	weakness in the copper price
	adverse movement in the price of copper
	decline in coffee prices
	decline in international coffee prices
	drop in world coffee price
	fell of agricultural prices
	tourism.*suffer
	terms-of-trade shock
	deterioration in the terms of trade
	deteriorating terms of trade
	adverse terms of trade
	terms of trade loss
	unfavorable terms of trade
	severe drop in terms of trade
	severe terms of trade drop
	severe terms of trade shock
	significant terms of trade loss
	sharp fall in its terms of trade
	large terms of trade loss
	adverse movement in the terms of trade
	terms of trade were adversely affected
	dependence on oil-related revenue
	budgetary dependency on oil revenue
	increase in world oil prices
	drop in world coffee price
	oil price increase
	fluctuations in oil prices
	increase in petroleum price
Contagion	regional crisis
	crisis in the region
	spillovers from the global crisis
	systemic crisis

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Category	Keyword
	crisis in emerging economies
	regional financial crisis
	spillovers from the global crisis
	vulnerable to external shocks
	crisis spillover
	regional economic situation turned adverse
	contagion from the crisis in neighboring
	external shocks
	external shock
	adverse exogenous events
	external vulnerability
	exogenous events
	contagion
	fears of contagion
	spillovers
	vulnerability to international
	russian debt crisis
	asian currency crisis
	crisis in southeast asia
	southeast asia crisis
	crisis in russia
	crisis in libya
	libya crisis
	regional currency crisis
	kosovo crisis
	cyprus crisis
	crisis in ukraine
	regional dimension of the crisis
	mexican exchange crisis
	gulf crisis
	middle east crisis
	mexican crisis
	crisis in argentina
	crisis in russia
	argentine crisis
	crisis in mexico
	the crisis of 1994
	the 1997 crisis

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Category	Keyword
	the crisis in 2002
	2002 crisis
	euro area crisis
	eurozone contagion
	eurozone crisis
	crisis in europe
	world financial crisis
	greek crisis
	brazil crisis
	asian and russian crisis
	asia crisis
	crisis in turkey
	argentinan crisis
	crisis in argentina
	crisis in greece
	asian crisis
	global economic crisis
	global financial shock
	international systemic spillover
	crisis in brazil
	linkage with the us
	contagion effects of the thai crisis
Currency	exchange rate crisis
	large real depreciation
	foreign exchange crisis
	severe disruption of exchange markets
	major devaluation
	currency crisis
	currency crash
	large devaluation
	large depreciation
	sharp depreciation
	sharp depreclatlon
	currency attack
	exchange rate crisis
	unsuccessful attempt to.*maintain the exchange rate unchanged
	foreign currency turmoil
Eco. recession	severe economic crisis

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Category	Keyword
	very difficult economic circumstances
	severe recession
	severe crisis
	economic crisis
	steep recession
	strong recessionary headwinds
	sharp slowdown
	sharp declines in output
	significant loss of output
	economic collapse
	deeper recession
	deepening recession
	painful recession
	prolonged recession
	lengthening recession
	severity of the recession
	economic recession
	sharp contraction of economic activity
	strong contraction of economic activity
	large contraction of economic activity
	deep recession
	large economic slowdown
	severe recession
	profond recession
	contraction in output
	deep recession
	severe contraction
	deep contraction
	profond contraction
	large decline in income per capita
	deep economic downturn
	severe economic downturn
	deep economic downturn
Eco. slowdown	slowdown in the economic activity
	slowdown in economic growth
	slowdown of the economy
	slowdown of output
	economic decline

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Category	Keyword
	activity remains weak
	the economy slowed down
	declining trend in economic activity
	decline in economic activity
	slowing down of business activity
	slow down
	low rates of economic growth
	low rate of economic growth
	economic activity on a downward trend
	depressed level of economic activity
	the economic situation worsen
	slowing the pace of economic recovery
	decline in economic activity
	weakening of economic fundamental
	recession
	contraction of output
	sluggish recovery
	contraction of economic activity
	economic downturn
	output is estimated to have contracted
	slowdown in the economic activity
	slowdown of output
	slow economic activity
Epidemics	epidemic
	epidemia
	pandemia
	pandemic
	virus
	infection
	\sflu\s
	relapsing fever
	typhoid fever
	leishmaniasis
	dengue
	mumps
	meningitis
	poliomyelitis
	measles

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Category	Keyword
	zika
	encephalitis
	\ssars\s
	\smers\s
	nipah
	vcjd
	\shiv\s
	hiv/aids
	typhus
	hepatitis
	h1n1
	h5n1
	ebola
	\ssida\s
	rotavirus
	\slyme\s
	hepatite
	chikungunya
	dysentaria
	dysentery
	smallpox
	yellow fever
	cholera
	malaria
	coronavirus
	covid 19
	\splague\s
Expectations	crisis risks
	market reversal
	economic sentiment remains poor
	market sentiment has collapsed
	increase uncertainty in the international environment
	heightened risk aversion
	high level of risk
	general uncertainty
	crisis of confidence
	risk of crisis
	confidence crisis



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Category	Keyword
	panic
	potential risks
	upward risk
	market confidence
	high risk
	downside risks
	increase the risks
	self fulfilling crises
	potential risks
	restoring market confidence
	major risks
	heightening risks
	deterioration in market sentiment
	increase uncertainty in the international environment
	deterioration in market sentiment
	weakening of investor confidence
	market confidence
	uncertainty in international capital markets
	uncertainty among market participant
	change in expectations
	speculative capital movements
	speculative attack
	uncertainty among market participant
	a time of heightened global uncertainty
	change in investors sentiment
	reassure the markets
	extreme global risk aversion
	provide assurances to financial markets
	restore market confidence
	reduce market uncertainty
	bolster confidence
	economic credibility
	slump in confidence
	undermining confidence
	confidence crisis
	signals to markets
	market confidence sagged
	vulnerable to abrupt swings in market sentiment

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Category	Keyword
Financial	heightened risk aversion
	increase in global risk aversion
	weakening of market confidence
	vulnerable to changes in the international investment climate
	confidence in the liquidity of the foreign exchange market
	increase uncertainty in the international environment
	pressures on confidence
	self-fulfilling
	shifts in investor sentiment
	bolstering market confidence
	confidence crisis
	financial stability crisis
	international monetary crisis
	crisis in financial market
	financial risks
	turmoil in financial markets
	turmoil in international financial markets
	volatility in financial markets
	restore the strength of the financial sector
	unfolding financial crisis
	global market sell-off
	global financial shock
financial shock	
financial contagion	
financial crisis	
collapse of financial markets	
fire sells	
collapse of equity prices	
financial market panic	
global financial turbulence	
viability and health of the financial sector	
Housing	home prices have been declining
	drops in real estate prices
	house price trends
	home-price overvaluation
	real house prices declining
	foreclosures
	house price inflation

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Category	Keyword
	house-price inflation
	foreclosures
	bust in housing
	home-price declines
	house-price declines
	house prices fall
	stalling house prices
	slower house price
	slowing housing wealth
	declines in house prices
	headwinds from housing
	problems in housing
	housing downturn
	cooling housing market
	cooling in the housing market
	change in housing wealth
	deceleration in house prices
	slowdown in the housing market
	housing slowdown
	house prices seemed overvalued
	housing boom
	falling house prices
	spillovers from the housing market
	spillovers from housing
	housing market weakness
	slowdown in the housing market
	subprime
	residential investment has declined rapidly
Inflation	inflation pressure
	inflationary pressure
	high.{0,10}inflation
	high rate of inflation
	severe.{0,10}inflation
	large.{0,10}inflation
	virulence.{0,10}inflation
	unprecedented.{10}inflation
	sharp.{0,2}increase in domestic prices
	large increase in.{0,10}prices

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Category	Keyword
	high pressure on prices inflation.*critical inflation.*unprecedented levels despite the acceleration of inflation the rate of inflation accelerated sharply inflation crisis hyperinflation large monetary creation combat inflation halting inflation halt to inflation efforts against inflation quick reduction.*inflation inflation down quickly lowering the rate of inflation entrenchment of inflationary behavior
Migration	refugee migrant inward migration population inflow asylum immigrant immigration
Nat. disaster	flood drought rainfall torrential rains natural calamities power shortage natural disaster earthquake hurricane typhoon cyclone calamity adverse weather conditions tsunami
Political	political turmoil

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Category	Keyword
	internal security situation
	political atmosphere
	political crisis
	political uncertainty
	political instability
	political transition spillovers
	political turn-over
	policies risks
	political turmoil
	political risk
	unstable political
	political instability
	poor governance
	disturbed political conditions
	political and economic developments
	political and security situation
	economic and political situation
	political crisis
	unsettled political situation
	political tensions
	geopolitical events
	policy-related uncertainty
	policy related uncertainty
	geopolitical risk
	election related uncertainty
	election related uncertainties
	governance issues
	complex geopolitical situation
	geopolitical tensions
	geopolitical turmoil
	weak governance
	adverse geopolitical events
	adverse geopolitical
	unexpected political events
	revolution
	uncertain policies
	uncertainty about policy
	political contagion

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Category	Keyword
	euro exit
	exit of the eurozone
	uncertain national election
	political transition
	political pressures
	change of administration
	risks linked to the electoral calendar
	uncertainty surrounding the outcome of the presidential election
	uncertainty regarding the political transition
	domestic political developments
	political risk
	facilitate an orderly transition to a new administration
	uncertainty about the continuity of policies
	uncertainty regarding future policies
	unstable political environment
	military coup
	coup d'etat
	annulment of the election
	parliamentary upheavals
	critical political.*juncture
	lack of an approved government
Social	social risk
	social strain
	social.*turmoil
	social disruption
	social climate as deteriorate
	social tension
	protest
	railroad-transport strike
	deteriorating social climate
	blockade
	social unrest
	walkouts
	events of may-june 1968
Sovereign	rescheduled debt
	external payments crisis
	difficulties in servicing its external debt
	difficult time in rolling over its debt

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Category	Keyword
	rescheduling of external debt
	rescheduling agreement
	suspend service payments
	fiscal crisis
	debt relief
	failure to roll over debt
	government bonds crisis
	government bonds crisis
	bond crisis
	debt reprofiling
	sovereign debt crisis
	public debt crisis
	default risks
	self fulfilling crises
	debt restructuring program
	gouvernement default
	restructuring of debt
	suspension of payments
	debt swap
	debt restructuring
	debt rescheduling
	debt service reduction
	debt restructuring program
	rescheduling of the debt
	arrears
	rescheduling of arrears
	arrears in the payment
	restructuring of its external debt
	restructuring agreements
	external payment arrears
	debt service reduction
	no debt service payments
	relation with external creditors
	paris club
	club of paris
	debt relief
	debt exchange
Trade	trade war

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Category	Keyword
	trade policy tension
	trade tension
	trade conflict
	escalation of trade restrictions
	disruption of trade
	trade crisis
	trade restrictions
	trade volatility
	weak trade
	disruption to trade
	slowdown in trade
	trade restricting measure
	decline in fdi
	decline in foreign direct investment
	fdi flows declined
	fdi have declined
	trade issues
	slowdown in trade
	trade slowdown
	uncertainty about future trade policy
	uncertainty about trade policy
	trade restraints
	trade policy unpredictability
	slowdown in global trade
	stronger competition of countries
Violence	war damage
	insurgency crisis
	security crisis
	civil conflict
	civil war
	ensuing conflict
	armed conflict
	armed internal conflict
	armed domestic conflict
	ongoing conflict
	violent conflict
	atlantic conflict
	internal conflict



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Category	Keyword
World	regional conflict
	conflicts in the region
	conflict zone
	conflict regions
	military coup
	military take-over
	coup d'etat
	escalated attacks
	breakdown of cease-fire
	ethnic rivalries
	terrorist attacks
	terrorism
	guerilla offensive
	continuing external aggression
	incidence de la guerre
	world-wide recession
	global economic crisis
	global crisis
	world recession
	worldwide recession
	international crisis
	global financial crisis
	deep international recession
	international downturn
	internation recession
	ongoing global downturn
	deterioration of external environment
	weakening of international economic activity
	turbulence in international markets
	external conditions deteriorated markedly
	unfavorable developments in the international economic environment
	deterioration of external environment
recession in the world economy	
international monetary crisis	
worsening international environment	
difficult external environment	
downside risks in the international environment	
further deterioration in the international environment	

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Category	Keyword
	uncertain external environment
	slowdown in international economy
	fragile global outlook
	international financial turmoil
	sharply deteriorating external conditions

**Note:** Authors' own elaboration.

## Appendix B

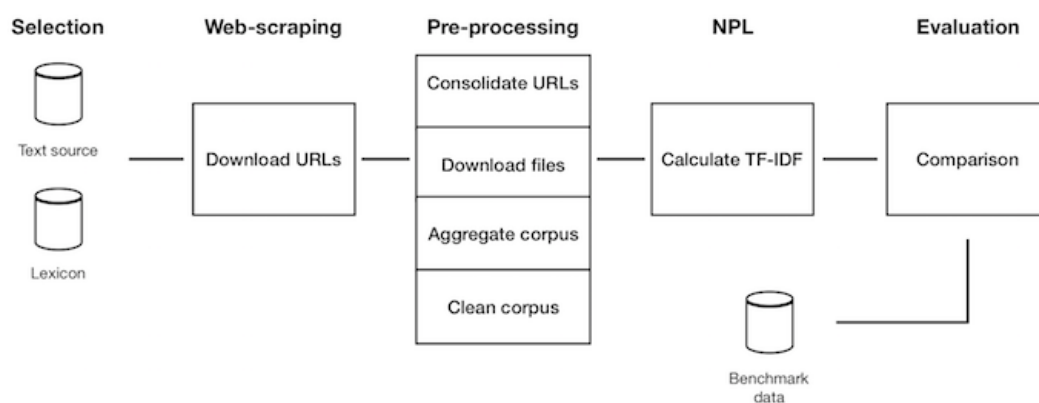
# The CCDr Package: A toolbox to update the Complex Crises Database

*ComplexCrises* is a package that wrap-up different method to extend and perform a supervised text mining (Natural Language Processing) using an ad hoc lexicon of economic crisis and a corpus of economic reports from the International Monetary Fund (IMF). For more details and vignettes, please refer to the GitHub project (add link) or the dedicated website.

The package is available on GitHub: <https://github.com/ComplexCrisesDb/CCDr>. It provides several functions to compute term frequencies on the corpus of reports. Due to the different potential usages and for the necessity to handle large amounts of data, several wrap up functions are provided to be able to perform the different steps one by one or sequentially. The package is constructed in three different blocs:

- Lexicon: define and prepare categories and keywords
- Corpus: download, explore and aggregate
- Term Frequencies: compute the indexes

**Figure B.1:** *ComplexCrises* Package Diagram



The main functions are:

- **data(BetinCollodel\_urls)**: Access urls of the IMF reports in the archives. The dataset "BetinCollodel\_urls" contains for document the relevant metadata including the name of the country, the date of publication, the URLs of the IMF archives where the documents can be downloaded and several other information extracted from the metadata of the documents. For instance, the document corresponding to the request for Standby Arrangement of Argentina on the 25 of January 1983 is accessible on the following [link](#):  
A data frame with 39491 observations on the following 17 variables.
  - **ID**: ISO 3 code of the country
  - **period**: date of the release of the document in date format
  - **title**: title as provided in the metadata during the extraction
  - **hierarchy**: The IMF code document if available
  - **pdf**: the URL to access the document
  - **type\_doc\_program**: type of document of lending arrangement (request/ Reviews/ modifications...)

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- **type\_program**: type of document lending arrangement (SBA, EFF,..)
  - **type\_doc\_consultations**: type of document of consultations
  - **Review\_number**: for reviews of lending arrangement the number of the review)
  - **perf\_criteria**: dummy equal to 1 if mention of performance criteria in the title)
  - waiver: dummy equal to 1 if mention of waiver in the title)
  - **repurchase\_transaction**: dummy equal to 1 if mention of repurchase transaction in the title)
  - **technical\_assistance**: dummy equal to 1 if mention of technical assistance in the title)
  - **expost\_assessment**: dummy equal to 1 if mention of ex-post assistance in the title)
  - **exchange\_system**: dummy equal to 1 if mention of exchange system in the title)
  - **overdu\_obligations**: dummy equal to 1 if mention of overdue obligations in the title)
  - **type\_hierarchy**: whether the document is a correction, a supplement, or the original file)
- **ccdr.lexicon()**: provide the list of categories and keywords
  - **scrap.ccdr.files()**: download reports in pdf formats:  
Download several reports in PDF format and store them locally in a specific folder.
  - **ccdr.corpus()**: transform PDF into a data frame of text.  
Documents in PDF format need to be properly transformed into text format to be able to perform the text analysis. The function `ccdr.corpus()` aggregates all the files into a single list of text character.
  - **ccdr.pages()**: To perform exploratory analysis on the reports, to extract specific paragraphs or to enrich your lexicon, you can perform a keyword search in a specific document.
  - **ccdr.tfs()**: run the term frequency on the corpus for several categories

- 
- **run.ccdr.tfs()**; run the term frequency on locally stored corpus.  
Wrapup function for `ccdr.tf()`. Given a corpus saved locally, compute the term frequencies for different categories.
  - **scrap.ccdr.files()** run the term frequency directly downloading the files.  
Wrapup function for `run.ccdr.tfs` that allows directly download the files and run the text mining with a single function.
  - **ccdr.tfs.update()** update the term frequency matrix with new categories.

## Appendix C

### Identifying The Nature of Expectations

To provide a precise assessment of the meaning of the expectation index, I performed a linguistic analysis by extracting additional information on the nature, source, and origin of risks as identified by the IMF staff. Concretely, I sub-sampled the reports identified by a positive term frequency of the expectation category and extracted the whole paragraph of the identified keywords. After a comprehensive cleaning (removing stop words and stemming) I tokenized the paragraphs, computed the term frequencies of each word and selected eight risk-related expressions for which I investigated the frequency of occurrence and linguistic relationship. Table C.2 provide the number of occurrences of each of those words. The most common word is *risk*. It represents the most frequent word in the paragraphs identified by the lexicon of expectations (19,828 occurrences), *Confidence* ranks second (7516 occurrences), and far less frequent, *stress* (442), *panic* (331) and *aversion* (237) refer to specific events and are only used for particularly acute and specific developments.

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**Table C.1:** Expectations Regime Shifts  
Linguistic Frequencies (1/2)

word	n
debt	4869
polic	4340
fiscal	3646
financi	3369
bank	3250
rate	2843
outlook	2707
economi	2291
global	1929
monetari	1507
domest	1240
oil	1085
commod	310

**Note:** The table provide the number of occurrences of a list of words characteristic of shifts in market expectations found in the paragraphs containing any of the keywords of the category Expectations.



**Table C.2:** Expectations Regime Shifts  
Linguistic Frequencies (2/2)

word	n
risk	19828
confid	7516
distress	1595
crisi	1318
expect	1295
uncertainti	1195
stress	442
panic	331
sentiment	262
avers	237

**Note:** The table provide the number of occurrences of a list of words characteristic of shifts in market expectations found in the paragraphs containing any of the keywords of the category Expectations.

In addition to the definition and concept behind the *Expectations* index, we can also investigate what are the drivers or/and causes of shifts in market expectations. Table C.1 provides the occurrences of a selection of related topics ranked by occurrence. Policy and government-related outcomes (such as debt (4869), policy (4340) and fiscal (3646) as well as financial (3369) and banking (3250) issues are the most often associated expressions with shifts in expectations. On the contrary, supply shocks such as oil (1085) or commodity (310) seem far less associated with macroeconomic uncertainty. Global related concerns (1929) are slightly more prevalent than domestic (1240) and have been gaining importance in recent periods, in line with [Bacchetta and van Wincoop \(2016\)](#) who emphasize the recent role of non-fundamental drivers in the co-movements across economies.

For instance, 92% of the occurrences of "*risk*" are associated with "*downside*" and 32% with "*potential*". Among the sources or consequences of "*risk*", "*financial*"

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(31%), *"growth"* (31%), *"outlook"* (30%) and *"authority"* (28%) are the most associated words with important external dimensions (*"external"* in 26% and *"global"* 17%). *"fiscal"* and *"bank"* are associated with *"risk"* respectively 21% and 18%. This suggests that the sources of risks are numerous and relatively evenly distributed around risks on financial markets, risk of lower future growth, risk on the conduct of the monetary and fiscal policy as well as risks on the health of the banking sector.

*"Confidence"* is associated 81% with the time with *"market"*, which suggests that it corresponds to the confidence among market participants and mostly related to *"financial"* (36%) and *"policy"* (31%). Confidence in the *"programs"* (18%) provided by the IMF appears also as an additional source of concern, and reflects both confidence in the credibility of the financial assistance itself and the confidence in the credibility of the reform agenda attached to the lending arrangement. Similar to risk, confidence seems to reflect tension around financial market dynamics (source and origin of uncertainty) and policy decisions regarding the conduct of fiscal and monetary policy.

*"Panic"* appears much less often. This reflects two facts. First, that IMF reports tend to avoid excessive terms and most of the time a more nuanced vocabulary is preferred. Second, the term panic has been largely used in the banking crises literature. Indeed, results for the collocation exercise of *"panic"* shows that it is largely associated with *"market"* (30%) and *"bank"* (27%). The frequency of the word *"deposit"* (17%) suggests that panic largely captures risks of bank runs, while *"exchange"* (15%) suggests potential panics on exchange rate markets. Panics are thus most commonly referring to abrupt shifts in expectations from either banking depositors or investors in exchange rate markets.

Similar to panics, *"distress"* seems to be the specific word used to characterize adverse expectation with respect to public debt. *"distress"* is associated with *"debt"*

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(111%)<sup>1</sup>, sustainability ("*sustain*" 45%), *dsa* (33%), "*public*"(23%) and "*fiscal*" (24%) suggesting that risks of distress concerns mainly public debt developments and considerations for rollover and sustainability.

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<sup>1</sup>Values higher than 100% suggest that

risk	confid	uncertainti	panic	distress	crisi	expect	stress	sentiment
downsid(92%)	market(81%)	risk(63%)	risk(35%)	risk(115%)	confid(55%)	risk(60%)	risk(58%)	investor(48%)
potenti(32%)	risk(50%)	downsid(54%)	market(30%)	debt(111%)	risk(51%)	downsid(51%)	downsid(41%)	market(47%)
financ(31%)	financ(36%)	financ(29%)	bank(27%)	extern(50%)	financ(40%)	growth(35%)	financ(33%)	shift(39%)
growth(31%)	downsid(32%)	growth(27%)	author(26%)	remain(49%)	market(32%)	financ(29%)	market(29%)	risk(37%)
outlook(30%)	polici(31%)	market(25%)	financ(26%)	sustain(45%)	downsid(31%)	market(27%)	polici(27%)	downsid(28%)
author(28%)	author(31%)	polici(25%)	rate(24%)	downsid(37%)	polici(22%)	term(26%)	confid(26%)	financ(27%)
remain(26%)	fiscal(25%)	econom(25%)	confid(21%)	dsa(33%)	author(21%)	confid(26%)	author(24%)	deterior(25%)
market(26%)	rate(21%)	global(24%)	crisi(17%)	analysi(32%)	bank(21%)	polici(23%)	potenti(23%)	confid(24%)
extern(26%)	bank(20%)	remain(24%)	downsid(17%)	countri(26%)	econom(18%)	remain(23%)	test(22%)	extern(24%)
polici(25%)	growth(20%)	outlook(24%)	deposit(17%)	financ(26%)	growth(18%)	econom(23%)	director(21%)	vulher(24%)
staff(24%)	econom(19%)	extern(23%)	potenti(17%)	author(26%)	potenti(18%)	extern(22%)	remain(21%)	econom(23%)
term(23%)	bolster(18%)	confid(22%)	exchange(15%)	continuu(25%)	econom(17%)	fiscal(20%)	growth(21%)	growth(21%)
confid(22%)	term(18%)	author(21%)	result(14%)	fiscal(24%)	rate(17%)	outlook(20%)	fiscal(21%)	polici(20%)
econom(21%)	program(18%)	potenti(20%)	govern(14%)	public(23%)	term(16%)	inerea(19%)	staff(20%)	remain(19%)
debt(21%)	crisi(18%)	staff(20%)	inerea(14%)	staff(23%)	remain(16%)	continuu(18%)	debt(19%)	global(17%)
fiscal(21%)	staff(17%)	term(20%)	polici(14%)	assess(21%)	global(16%)	econom(18%)	extern(19%)	recent(17%)
bank(18%)	inerea(17%)	inerea(18%)	avoid(13%)	term(19%)	staff(16%)	author(18%)	term(19%)	author(17%)
econom(17%)	remain(16%)	econom(18%)	develop(13%)	polici(19%)	inerea(15%)	inflat(17%)	includ(17%)	foreign(14%)
global(17%)	improv(16%)	continuu(17%)	system(13%)	bank(18%)	system(15%)	price(17%)	sustain(17%)	inerea(14%)
continuu(17%)	extern(16%)	fiscal(17%)	staff(13%)	threshold(17%)	fiscal(15%)	rate(17%)	bank(17%)	term(14%)

**Note:** The table provide the frequency of co-occurrence of words belonging to the same sentence in paragraphs identified as referring to expectational regime shifts. Sentences are defined as a proximity of + or - 15 words after cleaning of stop words. Words are stemmed to ensure proper counting. Only the 20 more frequent associated words are presented. Value higher than 100% denotes possible repetition of the word in the close proximity.

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Regarding the nature of expectations (Figure 2.2 panel (a)) shows an important spike around 2001-2003 that concerns *risk*, *confidence* but also to a lesser extent *uncertainty* and is similarly documented by the World Uncertainty Index (Ahir et al., 2018). The second large wave of adverse expectations emerge in the aftermath of the Great Financial Crises (GFC) and document the strong non-fundamental driver presented by Kamin and DeMarco (2012) and Bacchetta and van Wincoop (2016). The spike in 2008 is particularly sharp and rapid, similar to the decline in *confidence*. However, two main differences emerge with respect to the 2001-2003 spike. First, that the increase in the occurrence of risk is much larger than the increase in the occurrence of confidence. While the risk index reaches the level of the early 2000s, it remains below the levels of the second half of the 1990s for confidence. Second, while the recovery to positive expectations and confidence was as sharp as the spike in 2001-2002 it stayed at particularly high levels for risk with a clear W-shaped pattern at levels never reached before. The Great Recession and the following euro area sovereign debt crises seem to have triggered a structural change in the macroeconomic risk level, with a potential stagnation trap mechanism at play in the spirit of Benigno and Fornaro (2018). The level of confidence also failed to decrease quickly with a long period of slow recovery, that confirm the findings that low trust on recovery can be important in the aftermath of deep recessions (García (2013) and Guiso (2012)). A third important observation concerns the occurrence of *uncertainty*. In contrast to *risk* or *confidence*, *uncertainty* does not react abruptly and seems to rather steadily increase after crisis outbreaks. Furthermore, the level of uncertainty also plateaued in a pattern similar to *risk*. This suggests that the Great Financial Crisis has also acted as a structural break for uncertainty measures inline with Kozłowski et al. (2015). Confirming both the theoretical predictions from Cole and Kehoe (1996), Calvo (1988), Diamond and Dybvig (1983) or Obstfeld (1996) and empirical evidence of self-fulfilling crises from Stiglitz (1999), Cole and Kehoe (1996), Jeanne (1997) or

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[Jeanne and Masson \(2000\)](#) the role of adverse shifts in expectations in crises is not specific to the *XXI<sup>th</sup>* century with most expectation-related words already displaying volatile behaviors during the 1990s.

Figure 2.2 Panel (b) shows the evolution of the occurrence of global and domestic related expectations. While domestic seems to dominate relative to global in the period prior to the XXI century, the position reverses in the early 2000s after strongly diverging during the Great Recession period, confirming the major role of coordinated panics in [Bacchetta and van Wincoop \(2016\)](#) and the more recurrent occurrence of global fluctuations reported in [Kose et al. \(2020\)](#). Interestingly, the very last years in the sample 2014-2016 display an additional rise of both measures, suggesting that domestic-related negative expectations are not something of the past and not only originate in financial market related uncertainty ([Baker et al., 2018](#)). Figure 2.2 Panel (c) and Panel (d) investigate the origin of the shift in expectations over a number of potential dimensions. Fiscal, growth, bank and financial seems to be the top associated origin with particularly high levels remaining after the Great Recession. This suggests that the high level of risk during this period probably originated in the assessment about fiscal policy and financial crashes or banking failures. The evolution of inflation, exchange, and oil suggests that other sources of risk do not seem to be similarly affected by the structural break of the Great Recession. There are also two, interesting features concerning the behavior of expectations during the pre-1990 period. First, that the size of the spikes is far smaller and, second, the spikes seem more related to developments in the banking sector or exchange rate dynamics in domestic contexts.

# Appendix D

## Recessions and Expectations Regime Shifts in The United States

Figure D.1. Panel a) shows the years with severe recessions in the United States in red and economic slowdowns in orange. During the period, the index for economic recessions peaked on seven occasions: 1962, 1984, 1990, 1999, 2007, 2009 and 2011<sup>1</sup>. In most cases, the recession is short-lived, except for the aftermath of the GFC that feature a marked double dip. The index for economic slowdowns is more volatile, combining minor alerts (early 2000s, for instance) and more acute and intense episodes: 1962, 1972, 1976, 1984, 1992, 1994 or 2011<sup>2</sup> To validate this dating, I compare the dating of recessions in the United States presented in this paper with the NBER dating of the business cycle<sup>3</sup> since 1960 and provide a short narrative on the causes and consequence of each based on [Labonte and Makinen \(2002\)](#).

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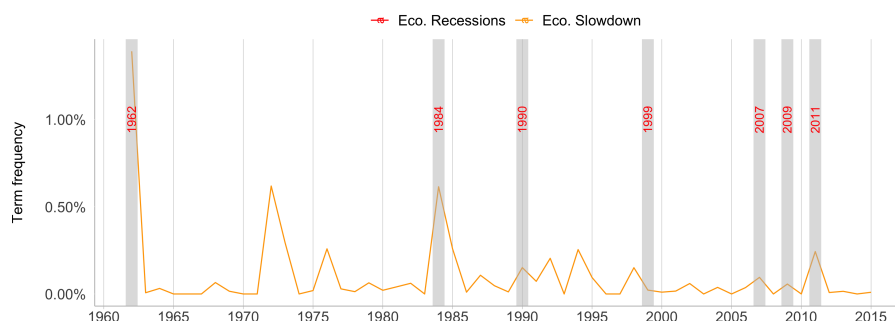
<sup>1</sup>The year 1960, 1961 are missing because no report was available for the United States

<sup>2</sup>see chapter 1 for more details about the matching of those indexes with traditional benchmark across the entire sample. The main results concerning fluctuation in output is that the severe recession index indeed captures the more severe downturns (the Peak to Trough with the largest amplitude) while soft recessions matches the early phase of the switch of regime from expansion to contraction).

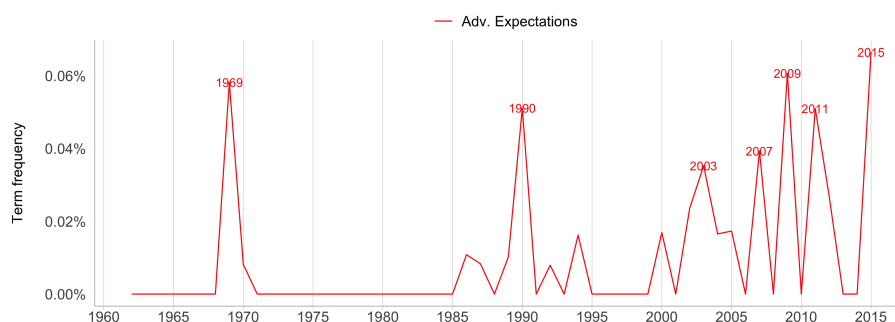
<sup>3</sup><https://www2.nber.org/cycles/>

**Figure D.1: Macroeconomic Risk in the United States**

**(a) Economic Recession**



**(b) Expectation Regime Shifts**



Source: *Complex Crises Database* (CCD).

The 1960-1961 episode corresponds to a contraction of 1.6% triggered by the interest rate hike by the FED in 1959 and the fiscal contraction in 1960. In our sample, the years 1960 and 1961 are missing and the occurrence of recession only reported in 1962. The second recession corresponds to a minor contraction of 0.6% in 1969-1970 and follows a long expansion with inflationary pressures forcing a reduction in budget deficits in the context of the Vietnam War and a tightening of the monetary policy. In this episode, our index captures a minor slowdown in 1968. The year 1973 to 1975 (“Stagflation” recession) see an important contraction of -3.2% combined with high inflation and high unemployment. It corresponds to the oil crises of 1973 and the



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following up stock market crash. Again, our index captures the large slowdown in the years 1972 and 1973, but no severe recession. While the oil shock of 1973 is often remembered as the trigger of the recession, [Labonte and Makinen \(2002\)](#) suggests that a number of signs of recessions were already present in 1972 with an inversion of the yield curve pre-dating the oil shock which supports our dating. In 1980 a recession occurred as the Fed raised interest rates dramatically to fight the high inflation period of the 1970s and was followed by a sharper episode in 1981-1982, leading to the first double-dip of the post WWII era. Surprisingly, our index only captures a minor slowdown in 1982 with the report of both slowdown and the severe recession only showing up in 1984<sup>4</sup>. The 1990s decade started with a relatively minor and short recession following the 1990 oil price shock, the debt accumulation of the 1980s, and growing consumer pessimism. In particular, [\(Kose et al., 2020\)](#) reports the effect of The 1990-91 Gulf War and the associated heightened geopolitical uncertainty and sharp increase in oil prices. After a decade of expansion, the 2001 recession was triggered by the collapse of the speculative dot-com bubble, a fall in business investment, and the 9/11 attacks. Similar to the crisis in 1973, the IMF report anticipated the recession, with an index picking up in 1999 and signs of a slowdown already provided in 1998. The last crises of the sample is the GFC of 2007-2009, following the collapse of the United States housing bubble and the outburst of the worst financial and banking crisis since the Great Depression.

These comparisons show that the dating of recessions is not straightforward, is uncertain, and often definitive only several years after the turning points. Indeed, as explained by [Kose et al. \(2020\)](#) recessions do not correspond to the decline in a single indicator but rather a contraction of the economy captured by several indicators and qualitative judgements. In this respect, it is important to recall the real time nature of the measure considered in this paper. In particular, the non-systematic

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<sup>4</sup>comment

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matching of the index with the NBER dating provides information on the degree of uncertainty, the velocity of the collapse and the existence of early warnings. Sudden and external events (1972, 1999 or 2007) seems better captured and assessed in real time, while more endogenous downturns triggered by monetary or fiscal policy seem more difficult to assess with more numerous alerts of slowdowns that did not materialize. Furthermore, it also explains the much higher uncertainty about potential slowdowns than actual severe recessions. In addition, the structure, nature and publishing of the reports may also contribute to the “smoothing” of events across periods with coexistence of backward looking descriptions and forward-looking predictions. While this generates discrepancies in the dating, it is not a major concern for the purpose of this exercise, as all variables used in the analysis are constructed similarly. The comparison of our index for the United States provide anecdotal evidence showing that the index nonetheless succeeds in capturing the major, well-documented events. Panel B shows the evolution of the adverse expectation measure that reflects the shift in macroeconomic expectations. The index displays a number of important spikes, in particular in 1969, 1990, 2003, 2007, 2009, 2011 and 2015. An important remark, is that these years correspond not only to major economic events such that the Great Financial Crisis, the 1987 fast crash, the 1999-2000 dot.com bubble, but also non-financial, such as the geopolitical tensions around 09/11, the war in Iraq and Afghanistan, the World.com and Enron scandal in 2001-2003, or the prospect of uncertain geopolitical tensions around 2015. The major uncertainty peaks captured since 1990 are in line with results in (Baker et al., 2016) who find a similar evolution of uncertainty for the United States. Based on their of risk sentiments (Nowzohour and Stracca, 2020) show the behavior of four uncertainty and confidence indices<sup>5</sup> over the period 2006-2016 and find little intra country correlation of those measures (across 1980-2016 period). While each of these measures is specific, we see that our index

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<sup>5</sup>namely: VIX, economic policy uncertainty, geopolitical risk and consumer confidence

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aggregates the four dimensions and captures the main peaks of all indices with 2007-2009 matching the peak in the VIX, 2011-2012 rather the policy uncertainty index and 2014-2015 geopolitical risk.



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# Appendix E

## Robustness checks of Estimation

### E.1 Instruments

**Table E.1:** 2SLS: First Stage Equation

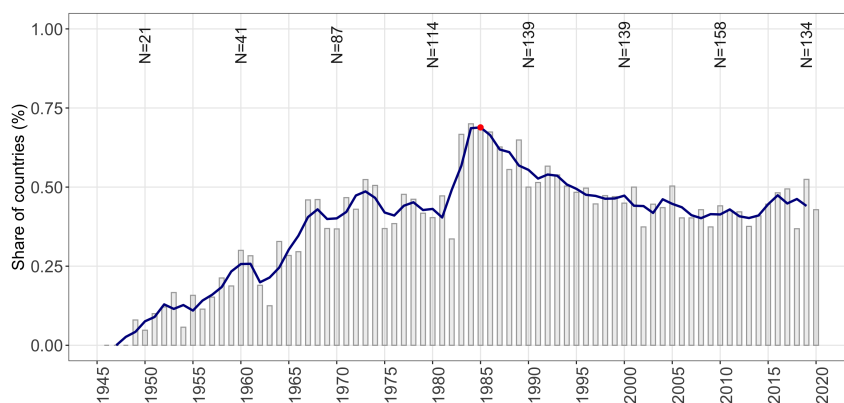
	IV First Stage		
	d.E	d.Y	d.S
N.IMFstatements	0.002*** (0.001)		
d.Epid.			0.060*** (0.010)
d.Nat.			0.066*** (0.010)
d.Com.			0.021*** (0.005)
d.Cont.	0.240*** (0.011)	0.139*** (0.016)	0.170*** (0.014)
d.Migr.			0.050*** (0.013)
d.Trad.		0.058*** (0.014)	0.072*** (0.013)
d.World	0.228*** (0.016)	0.278*** (0.022)	
Robust se	Yes	Yes	Yes
Robust F	65.69***	29.85***	19.1***
Observations	6,433	6,495	6,495
R <sup>2</sup>	0.126	0.050	0.056
Adjusted R <sup>2</sup>	0.092	0.014	0.020

Note: \* p<0.1; \*\* p<0.05; \*\*\* p<0.01

**Table E.2:** Descriptive Statistics: Estimations instruments (duration in years)

Category	Mean	P75	P95
Contagion	2.73	3	9
Nat. disaster	2.64	3	9
World	2.06	2.5	6
Epidemics	1.89	2	5
Migration	1.85	2	5
Commodity	1.71	2	4
Trade	1.46	2	3

**Figure E.1:** Occurrence of Natural Disasters



## E.2 Estimation

Table E.3 investigates a sub-sample to test whether self-fulfilling dynamics were also at play in the pre-2000 period. It provides a different picture and shows that the simultaneity of events is much less pronounced. The occurrence of recessions by itself does not seem to cause directly any market panic nor direct sovereign crises. In turn, while fundamental drivers of business cycles and the occurrence of other crises can push the economy into recession, there is no evidence that the shift in market expectations by itself could directly drive the economy into a recession. Expectations do not seem to be directly related to recessions, but they are still linked with the

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occurrence of sovereign crises (0.89 significant at the 10%). Indeed, the estimated self-fulfilling parameter is significantly positive, with higher magnitude than the one reported for the period 1960-2016. This result is in line with the literature of the 1990s about the important self-fulfilling components of many crises in Europe (currency), Latin America (sovereign) and Asia (banking and sovereign). For this sub-sample of periods, sovereign default is positively (although insignificantly) associated to severe recession, suggesting that severe recessions may have had a higher direct effect on default.

**Table E.3:** Estimation Results: Complex System (1960-2000)

	<i>Dependent variable:</i>					
	d.Y		d.S		d.E	
	OLS	IV	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)	(5)	(6)
d.S		0.35 (0.22)			-0.002 (0.01)	(0.16)
d.Y			(0.03)	0.53 (0.35)	0.004 (0.01)	-0.12 (0.25)
d.E	0.01 (0.04)	-0.24 (0.38)	(0.04)	0.89* (0.52)		
Controls	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>
Country FE	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>
Time FE	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>
Robust se	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>
Observations	4,339	4,277	4,339	4,277	4,339	4,277
R <sup>2</sup>	0.05	0.03	0.02	0.03	0.07	0.01
Adjusted R <sup>2</sup>	-0.0003	-0.03	0.02	-0.02	0.02	-0.05

Note: \*p<0.1; \*\*p<0.05; \*\*\*p<0.01

E, Y and S respectively stands for the expectation, recession and the sovereign crises indices. Controls includes 9 variables: armed conflicts, balance of payment crises, currency crises, banking crises, financial crises, housing crises, inflation crises, political crises and social crises. Heteroscedastic robust standard errors are specified. Com. stands for commodity crises, Epid. to epidemics, Nat. to natural disasters, Cont. to contagion, Migr. to migration, Trad. to trade crises, N.I.M.E. EBM to the Number of executive board meeting. All variables are from the *Complex Crises Database* (CCD). The operator d. correspond to the first difference of the normalized indices. IV specifications corresponds to the second stage of the 2SLS procedure where instruments for d.Y are contagion, world outcomes and trade conflicts, instruments for d.S are epidemics, natural disasters, commodity crises, contagion, migration crises and trade crises and instruments for expectation are contagion, world outcomes and number of executive board meetings.

Similarly, the occurrence of sovereign crises do seems to be associated with higher levels of panics among investors. In both sample, the pressure on sovereign debt repayment are important determinants of expectation regime shifts Table 2.8 and Table E.3 (column (6)) provide evidence of the contemporaneous feedback loop between the three variables of interest. Indeed, the results suggest the validity of both the recession and the failure hypothesis presented in (Gordon, 1988) where panics are driven by fundamental drivers rather than pure animal spirits and irrational and ex-



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ogenous sunspots. Across the whole sample, both recessions and sovereign crises have a significant direct effect on panics, respectively, 0.39 and 1.01. For the whole sample, controlling for other crises, panics are significantly caused by sovereign defaults, while the effect of aggregate output dynamic is not significant for the period 1960-2000. ‘

# Appendix F

## Dating of Sovereign Crises

**Table F.1: Dates of Sovereign Crises Events**

iso3	FGS	SGS
AFG	1965-1966,1973,1975-1976,1983-1986 1992,2002-2003,2006-2007,2009,2015	2004-2005,2008,2010-2012,2014
AGO	1990-1994,1999,2003,2006-2007,2012	2000,2009-2011,2014
ALB	1994-1995,1997-1999,2002,2004,2006 2009	1992-1993,2003,2008 2011,2014-2015
ARE	1979,1987-1988,1990-1991,2007,2014	1996-1998,2008-2013
ARG	1963-1964,1983-1990,1992-1993,1997 2003-2005	1968,1974,1991 1994-1996,2000-2001
ARM	1993-1997,1999,2002,2004-2007	1998,2001,2010,2012,2015
ATG		
AUS	1994	2005,2009,2014-2015
AUT	1988,1991	2013
AZE	1992-1994,1996-2000,2003-2004	1995
BDI	1974,1984-1989,1991-1992,1995-1998 2000,2004,2006-2008	2009-2014
BEL	1983-1984,1986-1988,1991-1992,1994 1997-1999,2003,2008-2009,2011	2014
BEN	1985-1987,1989,1991,1993-2000 2003,2008,2011-2012	2002,2004-2007,2010
BFA	1987,1991,1993-1998,2000,2005-2007,2014	1999,2001-2002,2009-2012
BGD	1987-1988,1990,1992-1993,1996-1998 2002,2007-2008,2011-2014	1989,1991,1999,2003
BGR	1991-1994,1997-1998,2000	1995-1996,1999,2001-2006
BHR	1992,2009,2011	2013
BIH	1995-1996,1998-2003,2009	2004,2010,2013-2014
BLR	1994-1995,1997,1999,2003-2005 2011,2015	1993,1996,1998,2000-2002 2006,2009-2010

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BLZ	1984-1987,1989,1991,2000,2008,2010-2011,2013-2014	2009
BOL	1982,1984-1986,1988-1992,1994 1996,1999-2001,2003,2007-2008	1995,1997-1998 2009,2013,2015
BRA	1961-1962,1964-1967,1971,1983-1984,1987-1988 1990-1991,1993-1995,1997-1998,2008,2013	1977,1999-2002
BRB	1973,1981,1983-1985,1988,1990-1993,1997,2015	
BRN		
BTN	1987,1994,1999,2003	2011
BWA	1988,1990,1993-1994,1996-1997,2005,2014	1987,1991
CAF	1972,1981,1983-1987,1991-1995,1997 1999-2000,2002,2005-2006,2008-2009,2012	1998,2004,2015
CAN	1993,2010	2015
CHE	1990,2013,2015	2010,2014
CHL	1964-1968,1970,1973-1976,1978, 1980,1984-1989,1991,1994,2008-2009,2013-2015	1977
CHN	1992,1995,2001-2006,2008,2010	1997-1999
CIV	1982,1984-1985,1987,1989-1992 1994-1996,1998-2001,2004	1986,2009-2010,2012
CMR	1989,1991-1995,1997-1998,2000-2001 2003,2007,2011-2014	1988,1996,1999,2002 2005-2006,2008-2009,2015
COD	1977,1979-1981,1983-1987,1989-1991,1995	1988,1992,1996
COG	1991,1994,1996,1998,2000,2007,2010-2011	2002-2006,2009,2013
COL	1961,1965,1968,1986,1988-1989,1991-1993 2001-2003,2005,2007,2013	1963,1967,1969,1999-2000 2004,2009,2011-2012,2014-2015
COM	1981,1989,1991,1993-1994,2002,2005,2010	2001,2008-2009
CPV	1989-1991,1993-1994,1996-1999,2003,2006-2007	1988,2008-2010
CRI	1968,1970,1981-1989,1991-1996 1998-1999,2001,2004,2006	1969,1973-1974,2009-2010
CYP	1986,2007,2009	2005,2011,2013-2015
CZE	1991-1992	1990,1994,1996,2011,2014-2015
DEU	1985,1989	1983,2015
DJI	1990,1992-1994,1996,1998-2004,2010	1997,2005,2008-2009,2012-2013
DMA	1981,1985,1994-2004,2006-2008	1984,2005,2009-2010,2014-2015
DNK	1964,1967,1972,1984-1985,1988,2010,2012	1997
DOM	1964-1965,1967-1969,1971-1972,1974 1980-1988,1991-1993,1995,1997,2003	1973,2004,2010-2011
DZA	1991,1994-1995,1997-1998,2000,2004,2006-2009	1996,2010-2012
ECU	1966,1983-1987,1989-1992,1994-1995,2000-2001,2004	2003,2015
EGY	1975,1977-1979,1983-1989 1991-1993,1995-1997	1972,1974,1980,1982,1998 2000-2001,2015
ERI	2000-2001,2004,2009	2006,2008
ESP	1985,1989,1995,2014	1994,1996,2009-2010,2012-2013,2015
EST	1992-1993,1996,2010	1994-1995,1997-1998,2011
ETH	1983-1988,1991-1994,1996-1999, 2001,2003-2004,2007-2010	2002,2006,2012,2015
FIN	1978,1989,1991,1997,2000,2014	1998-1999,2002-2003,2012
FJI	1991,2003	2002,2010
FRA	1988,2013,2015	1993
GAB	1978-1979,1981,1986-1991,1993-1994	1995,1997,2003,2015

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	1996,1998,2000-2001,2004-2007,2009	
GBR	1973,1996	1989,1993,2010-2012
GEO	1993,1995-2000,2004-2005	1994,2001,2003,2006,2008-2010,2012
GHA	1968-1969,1971-1973,1977-1979,1983-1989,1991-1992 ,1990,1995,1996,1998-1999,2001 2001,2004-2005,2007,2012,2015	1974-1976 2002-2003,2010
GIN	1977,1981-1982,1984-1985,1987-1992,1994 1996-1997,1999-2001,2004,2006,2010,2014-2015	1986,1998,2002,2008,2012
GMB	1982-1990,1992,1999-2001,2004,2015	1998,2006-2011
GNQ	1984-1989,1991,1993-1996,1998,2003,2007,2011,2015	1999,2001
GRC	1984-1986,1994,2006,2012	1989,1991,1993,2010-2011,2013
GRD	2003,2005,2008,2014 2003,2005,2008,2014	1979,1981,2009-2010,2012,2015
GTM	1983-1988,1990-1992,1994-1996,2001-2003	1998,2010-2012
GUY	1978-1981,1983-1999,2003,2006,2010	2005,2007,2009,2013
HND	1983,1985-1996,1998-1999,2015	2000,2003,2008,2010-2011
HRV	1993-1995,1997,2001-2003,2011-2012,2014-2015	1998-1999,2004-2006
HTI	1968-1971,1973,1982-1983,1986-1987 1989,1995-1996,2003,2005,2007	1972,1985,1998-1999,2009-2013,2015
HUN	1983,1987,1990-1992,1994-1997,2011	1993,2003,2008-2010,2012,2014
IDN	1968-1969,1971,1976,1985,1991-1992,2007,2011	1998-2006,2008-2010,2015
IND	1998,2004-2005 1998,2004-2005	1972,1996,2000-2001 2009-2010,2012-2015
IRL	1994,1996,2000	2010-2013,2015
IRN	1993-1995,1999,2006,2014	1996,1998,2000-2003,2015
IRQ	2006-2008,2010,2013,2015	2005
ISL	2015	1985,2008-2013
ISR	1981,1987	2009-2010,2012
ITA	1966,1986,1989,1992,1996,1999,2003	1965,1967,2011,2014
JAM	1977-1979,1981-1994,2000	2010-2011,2013-2015
JOR	1999,2001,2005,2013 1999,2001,2005,2013	1994-1995,1998 2002-2003,2012,2014-2015
JPN	1967,1986,1988,1999,2010	1984-1985,1993,2011,2013-2014
KAZ	1993-1997,2002,2005	1998-2000,2003,2009,2012
KEN	1971,1973,1983,1992-1994 1996 1998,2000,2003-2004,2007,2013	1995,1997,1999,2002 2008-2012,2014-2015
KGZ	1993,1995-2001,2005,2007,2010	2002,2006,2011-2013,2015
KHM	1992-1995,1997-2001	2002,2008,2014
KIR	1987,1989-1990,2009,2014	1991
KNA	1991,1993,2005,2010-2011	2004,2012-2015
KOR	1999,2002	1998,2000-2001,2010,2012,2014-2015
KWT	1967,1993-1994	1992,2008-2011,2013
LAO	1968,1988-1992,1994-1999,2001	2002,2008-2009,2013
LBN	1970,1988,1999,2001	2003,2006,2008-2010,2015
LBR	1980-1989,1991-2000,2002-2008	2009-2011,2013,2015
LBY	1989,1994,1996,2003,2005-2006	1999
LCA	1992,1994,2003-2004,2006,2014 1992,1994,2003-2004,2006,2014	2005

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LKA	2008-2010,2012-2013 2008-2010,2012-2013	2001-2003,2005,2011
LSO	1999,2001,2007,2014 1999,2001,2007,2014	1992,2002,2004,2012-2013
LTU	1992-1993,1996-1997,2002-2003,2009,2015	1994-1995,2000-2001
LUX		2012
LVA	1992-1994,1996,1999-2002,2011-2012	1995,1997-1998,2008-2010
MAR	1968-1969,1983-1992,1994,1996,1998,2000-2001	2009,2011-2013,2015
MDA	1993-1999,2002,2008	2004,2006,2011-2012
MDG	1981-1984,1986-1987,1990,1993,1995-1997 1999,2002-2004,2008	1985,1988-1989,1992 2006,2015
MDV	1986,1989-1990,1999-2001,2005,2010,2015	1988,1995,2007,2013
MEX	1969,1983-1986,1988-1990,1992-1993,2006	1982,1991,1995-1997,2014-2015
MHL	1996,1998,2000,2002,2006	
MKD	1993-1998,2000,2004,2007-2008	2002-2003,2005-2006,2013,2015
MLI	1979,1981-1989,1992-1999,2001,2003 2005-2006,2010-2011,2013,2015	2008-2009
MLT	1990,1992-1993,2001,2013	2012,2015
MMR		
MNE	2011-2012	2007,2009-2010
MNG	1992-1994,1997-1998,2000-2002,2010	1999,2005,2009
MOZ	1985-1995,1998-1999,2002-2003,2005,2008-2009	1996-1997,2000,2006
MRT	1983,1985-1986,1988-1997,1999	1984,1987,2000-2001,2006,2008,2010,2013
MUS	1983,1986,1989,1994,2008-2010,2013-2014	2004,2012
MWI	1982-1985,1987-1992,1994,1996,1998 2000-2001,2003,2006-2007,2013-2014	2008,2010,2012,2015
MYS	1968,1973,1984,1992,2002,2007,2015	1972,1974,1998-1999,2010,2012-2013
NAM	1993,1995,1997	2012,2014-2015
NER	1983-1990,1992-1998,2001-2002,2006-2007,2011	2000,2012,2015
NGA	1998-2001,2004,2006-2008 1998-2001,2004,2006-2008	1971,1974,1996 2002,2005
NIC	998-2001,2004,2007 1998-2001,2004,2007	2003,2005,2009-2011
NLD	1988,1993,2015	
NOR	1986,1991,1997,1999,2004	2010,2015
NPL	1983-1985,1987-1990,1993,2000,2003-2005,2007	2002,2006,2008,2011-2012
NZL	1990	2012
OMN	1985,2002	2001
PAK	1972-1974,1978-1983,1985-1991	1995,1998-2000,2002,2008-2011
PAK	1994,2001,2003	2013-2015
PAN	1984,1988-2000	2007
PER	1968,1971,1973,1978,1980,1983-1984 1987-1998,2000,2002,2005,2012-2013	1972,1974,1982,1999 2001,2003-2004,2008,2015
PHL	1970,1972,1974,1984,1986-1989,1991-1993 1995,1997,2002,2005	1981,1985,1990,1994,1996 1998-2000,2012-2013,2015
PLW	1999,2004,2006,2012	
PNG	1983-1984,1988,1995,1998,2000-2001 2003-2004,2012,2014	1985-1986,1996,1999, 2002,2006,2010,2015
POL	1986-1991,1993-1995,1997-1998,2005,2008	1992,1999,2009-2012,2014-2015

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PRT	1969,1974,1983-1984,1987-1989,2015	1995,2004,2009,2011-2014
PRY	1964-1968,1970,1972,1980 1983-1990,1992,1994-1996,2002-2005	1991,1998-1999,2006,2008
QAT	1985,1989-1990,1994	1992
ROU	1994-1995,1997,2001 1994-1995,1997,2001	1993,1999-2000,2002 2004,2009-2014
RUS	1992-1993,1995,2002,2004,2008	1994,1996-2000,2010
RWA	1984-1986,1989,1991-1992,1998-2002,2005,2011	1988,2007-2010,2012,2015
SDN	1972,1978-1984,1986-1994,1996-1997 2000-2002,2004-2005,2007,2011	1998-1999,2003,2006 2008,2010,2014
SEN	1981-1989,1991-1992,1994-2001 2004-2005,2009-2010	1990,2003,2007,2011-2012
SGP	1988,2014	2015
SLB	2013-2014 2013-2014	1996,1998,2001,2003 2005-2008,2015
SLE	1977,1979,1981-1986,1988-1993,1997 2001-2002,2005,2008,2010-2011	1980,1994-1996,2003 2006,2009,2012,2014-2015
SLV	1982-1987,1989-1995,2001	1996,1998,2009-2010
SMR	2004,2012	2015
SOM	1981-1983,1985,1987,2015	
STP	1988-1990,1992,2000,2004,2006-2007,2012-2013	2015
SUR	1987-1988,1992-1994,1996,2001,2005-2006,2011	
SVK	1993-1994,1997,2002	1998-2000,2012
SVN	1994-1996,2015	1993,1997-1998
SWE	1997-1999,2007-2008,2015	2009-2011
SWZ	1984-1986,1988-1989,2003,2005-2006 2010-2011,2013	1987,2007,2014-2015
SYC	2000,2004,2007,2009-2010,2015 2000,2004,2007,2009-2010,2015	2008,2011-2014
SYR	1995-2000,2003-2004,2008 1995-2000,2003-2004,2008	2005
TCD	1992-1996,1998-1999 1992-1996,1998-1999 2001,2003-2005,2008-2009,2011,2015	1997,2002,2006,2014
TGO	1979-1981,1983-1991,1994-1995 1997,2001,2006,2008,2010-2011,2015	2004,2009
THA	1986-1987,1989,1995,1997,1999,2003	2000,2015
TJK	1994,1996-1999,2001-2002,2005,2009-2010	2003-2004,2007,2011-2012
TKM	1992-1993,1995-1998,2004-2005,2010,2013	1999
TON	1988,1992,1994-1995,1997,2000,2003,2012-2013	2004-2006,2014
TTO	1988,1990-1994,1996-1997,1999,2011,2014	2012-2013
TUN	1969,1983,1985-1988,1990-1993,1997,1999-2000,2013-2014 1997,1999-2000,2013-2014	2010,2015
TUR	1962,1966-1968,1978-1981,1983-1985 1996,2006,2010	1982,1990,1994-1995,1999 2001-2005,2008
TUV	2011-2012	
TZA	1980-1981,1983-1984,1986-1988,1990-1992 1995,1997-2001,2005-2007,2010,2012,2015	1994,2002,2013-2014
UGA	1979-1980,1982-1999,2003,2007-2008	2009-2011,2014-2015

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UKR	1993-1998,2000-2001,2004	1999,2002-2003,2006,2010-2011,2014-2015
URY	1966,1968,1970-1974,1976,1984-1986 1989-1992,1994-1996,2000-2002	1978,1987-1988,1997-1999,2003-2007
USA	1986-1988,1992,1994,1996,1999	2015
UZB	1994-1998,2003-2005,2011-2012,2015	1993,2010
VCT	1983,1985,1987,1989,1992,1994,1996-1997,2011	2009,2014-2015
VEN	1969,1984-1990,1992,1995,2002	1994,1996,1998,2004
VNM	1983-1996,2000,2002,2004	1999,2001
VUT	1985,1994,2000,2009,2015	1987-1988,1995-1996,2002
WSM	1982-1987,1990-1991,1993-1994,2004	
YEM	1975,1977,1983-1985,1987-1990,1992-1993 1996,1999,2001,2005,2012-2013	1995,1997-1998,2003 2006,2009-2010
ZAF	1985,1988-1990,1993,2011	1987
ZMB	1976,1978-1981,1983-1986,1988-1994 1997,2000,2002,2007,2011	1996,1999,2001,2006 2009-2010,2015
ZWE	1993,2000-2006,2010	1998-1999,2007,2009,2011-2015

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# Appendix G

## Additional Evidence on Multiplicity

Table [G.1](#) provides evidence of the different co-occurrence of crises across income groups and type of crises. Specifically, I investigate the differences in the probability and intensity of banking crises (BC), currency crises (CC), sovereign default (D) and financial market crashes (SMC) <sup>1</sup>.

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<sup>1</sup>Banking crises corresponds to [Laeven and Valencia \(2013\)](#), Currency crises are defined as an exchange rate depreciation of more than 15%, Sovereign default corresponds to data from [Beers and Nadeau \(2015\)](#)



**Table G.1: Type of crises and Co-occurrence**

Crises	Income	P[BC]	E[BC]	P[CC]	E[CC]	P[SD]	E[SD]	P[SMC]	E[SMC]	obs
Normal	High	1.24%	1.68%	0.39%	-0.01%	17.7%	2.08	18.15%	10.27	1286
R. F. Reces.	High	1.06%	0.79%	5.85%	1.15%	20.93%	5.43	25.64%	4.35	188
FGS crises	High	2.79%	1.84%	5.57%	1.78%	45.12%	444.16	19.26%	6.22	323
SGS crises	High	5.1%	11.03%	3.06%	1.19%	34.52%	485.59	16.95%	13.05	196
Normal	Middle	1.39%	3.46%	2.73%	1.18%	47.9%	112.74	20.08%	46.42	1721
R. F. Reces.	Middle	2.84%	3.42%	5.67%	1.92%	56.15%	208.05	23.53%	30.32	141
FGS crises	Middle	2.84%	2.91%	13.11%	4.82%	80.95%	673.62	13.73%	27.99	1198
SGS crises	Middle	2.24%	2.9%	6.12%	1.99%	70.32%	491.75	18.54%	50.37	490

**Source:** [Complex Crises Database \(CCD\)](#) and author calculations.

**Note:** *Normal* corresponds to periods with term frequencies for severe recessions, sovereign crises and adverse expectations equal to zero. *Risk Free Recession* corresponds to periods with strictly positive term frequencies for severe recession without sovereign crises and expectation regime shifts. *1<sup>st</sup> Generation of Sovereign crises* (FGS) corresponds to periods with strictly positive term frequencies for sovereign crises without Expectation regime shifts. *2<sup>nd</sup> Generation of Sovereign crises* corresponds to period with strictly positive term frequencies for sovereign crises and adverse expectations. P[BC] is the probability of a banking crises from ([Laeven and Valencia, 2013](#)). E[BC] is the average fiscal cost of banking crises from ([Laeven and Valencia, 2013](#)). P[CC] is defined as the probability of an exchange rate depreciation of more than 15%. E[CC] is defined as the average depreciation rate of the exchange rate from the World Economic Outlook(WEO). P[SD] is the probability of a sovereign default from ([Beers and Nadeau, 2015](#)). E[SD] is the average estimated amount of debt in default from ([Beers and Nadeau, 2015](#)). P[SMC] is the probability of stock market crash from XXX. E[SMC] is the average stock market index from XXX.

In high income countries, SGS crises are more likely to feature a banking crisis (5.1% vs 2.79%) and coincide with events generating much larger fiscal costs (11.03% vs 5.1% of GDP). Currency and financial crises are larger during FGS crises in both the probability of the event and the intensity, inline with the twin D's idea in [E.2](#) that periods in which it is optimal to default are also periods in which it is optimal to bring about a large change in a relative price. Similarly, the probability of sovereign default is larger but with a slightly lower amount of debt in default. A vulnerable banking sector appear indeed as a corner stone of SGS crises due to the combination of direct costs (bailouts) and indirect costs linked to the fueling of the panic and the contribution to adverse economic sentiment.

The profile of SGS crises in middle income countries is slightly different. Pres-

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asures on the banking sector are no longer a contemporaneous characteristic of SGS crises, that rather feature a particular vulnerability to stock market crashes. Similar to high income countries, currency crises are more closely associated to FGS crises for both the probability of occurrence and the amplitude of currency shock.

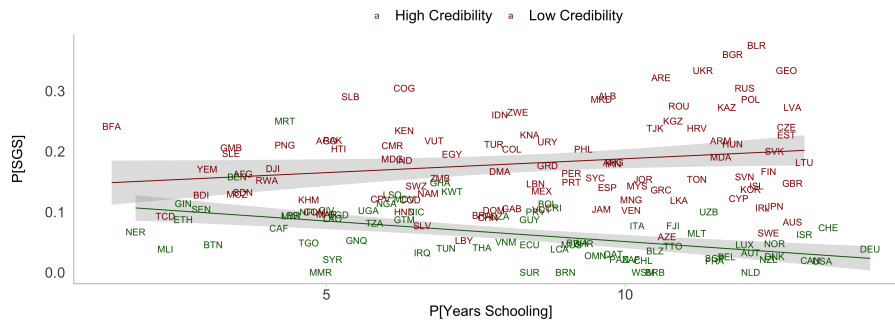


# Appendix H

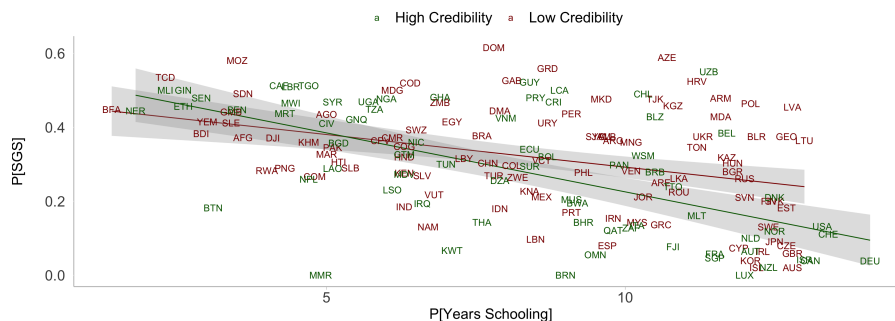
## Additional Evidence of Sovereign Crises And Institutional Characteristics

Figure H.1: Sovereign Crises and Years of Schooling

(a) Complex sovereign crises



(b) Simple Sovereign Crises



Source: *Complex Crises Database* (CCD).

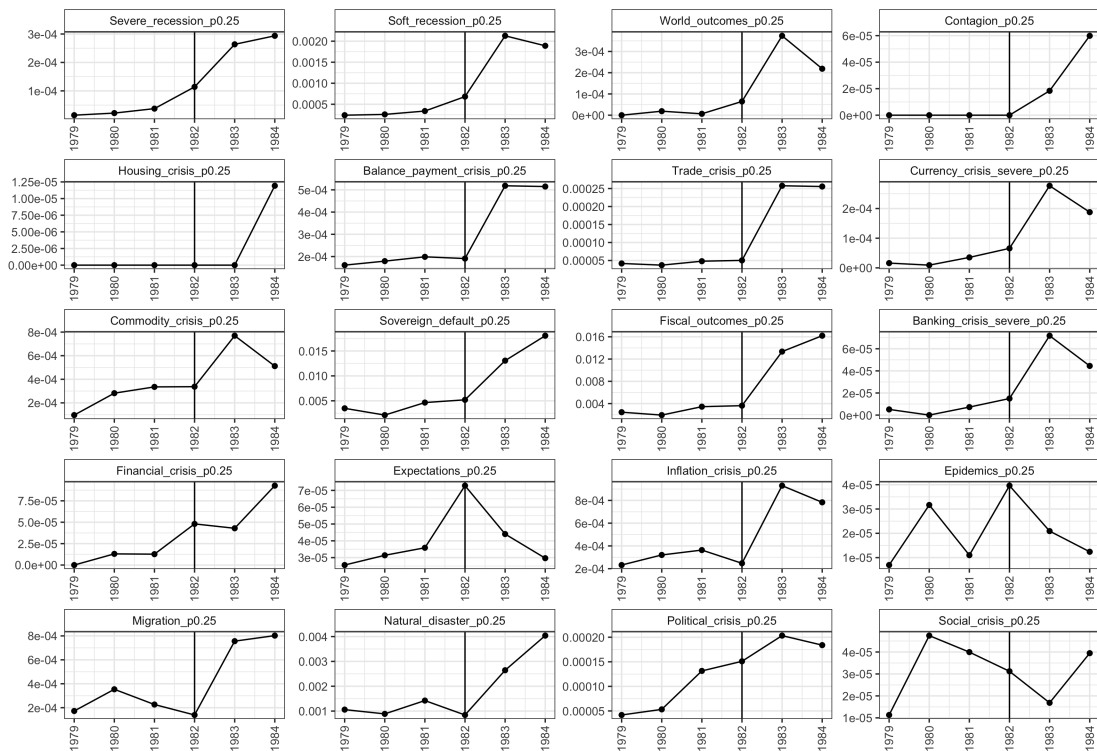
Notes: *Low Credibility* denote countries that have experienced policy related SGS and banking related SGS with a probability higher than 5%. P[SGS] is computed as the probability of the joined occurrence of sovereign debt crises and expectation regime shifts over the period 1960-2016. P[FGS] is computed as the probability of sovereign debt crises without expectation regime shifts over the period 1960-2016.



# Appendix I

## Radiography of crises in early 1980s

Figure I.1: A Radiography of Crises Around 1982



Source: [Complex Crises Database](#) (CCD) and author calculations.

Notes: The figure displays the average term frequencies for each crisis. Each index is standardized. Green lines show indices for which the average intensity of crises in 2020 is lower than in 2019. Red lines represent indices for which 2020 is higher than 2019. Data for 2021 only contains information from January to October 2021.

## RÉSUMÉ

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Cette thèse étudie le rôle des changements de régime des anticipations lors d'épisodes de crises de dettes souveraines. Elle repose sur la création d'une base de données spécifique construite à partir de la perception sur l'état de crises rapporté à travers l'activité de surveillance bilatérale du Fonds Monétaire International (FMI). Je m'attache à mettre en évidence le rôle central des changements brutaux d'anticipations de la part des investisseurs internationaux dans la sévérité des crises macroéconomiques. Dans le contexte des crises de dettes souveraines, je propose une typologie des crises dans une perspective historique qui distingue les événements de défaut qui coïncident avec une chute brutale de la confiance et des mouvements de paniques (2<sup>e</sup> génération), d'événements de défaut non accompagnés de mouvements psychologiques de ce type (1<sup>re</sup> génération). Ainsi, je montre que les crises souveraines de 2<sup>e</sup> génération sont plus sévères, plus contagieuses, génèrent une multiplicité de crises qui les rend particulièrement complexes et ont tendance à se produire dans des pays à revenu intermédiaire bien intégrés aux systèmes financiers et économiques internationaux.

## MOTS CLÉS

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Crises financières ; crises économiques ; Fonds Monétaire International ; surveillance bilatérale ; traitement du langage naturel ; amplification des crises ; crises des dettes souveraines ; sentiment de crise ; anticipations ; paniques ; récession ; incertitude ; risques ; changement de régime d'anticipations ; crises systémiques ; boucles de rétroactions ; crises auto-réalisatrices ; équilibres multiples

## ABSTRACT

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This thesis studies the role of expectations regime shifts during episodes of sovereign debt crises. It relies on the creation of a specific database that exploits the perception of the state of crises reported in the bilateral surveillance activity of the International Monetary Fund (IMF). Specifically, I highlight the central role of expectation regime shifts from international investors in the severity of the macroeconomic crises. In the context of sovereign debt crises, I propose a typology of crises in an historical perspective over the last 70 years that distinguish events of default that coincide with a brutal drop in confidence and panic movements (2<sup>nd</sup> generation), and events of defaults without such psychological mechanisms (1<sup>st</sup> generation). I show that episodes of crises of second generation are more severe, more contagious, generate a larger multiplicity of crisis that makes them particularly complex and tend to occur in middle income countries particularly well integrated in international financial and economic systems.

## KEYWORDS

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Financial crises; economic crises ; International Monetary Fund ; bilateral surveillance ; Natural Language Processing ; crises amplification; sovereign debt crisis ; crises sentiment; expectations ; panics; recessions ; uncertainty ; risks ; expectation regime shifts ; systemic crises ; doom-loop ; self-fulfilling ; multiple equilibria