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Essais sur la composition des recettes fiscales dans les pays en développement

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Essais sur la composition des recettes fiscales dans les pays en développement

Essays on tax revenue composition in developing countries

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Par

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Sous la direction de
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L'Université d'Auvergne n'entend donner aucune approbation ou improbation aux opinions émises dans cette thèse. Ces opinions doivent être considérées comme propres à leur auteur.

À mes parents, Béatrice et Guy

À mes sœurs, Catherine et Mélanie

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Introduction générale

Dans les pays en développement (PED), la mobilisation de ressources budgétaires propres, à travers la fiscalité, est nécessaire pour financer la croissance et atteindre les Objectifs du Millénaire pour le Développement (OMD). Au-delà des considérations d'augmentation des niveaux de recettes fiscales, la manière dont ces recettes sont obtenues, à travers les différents instruments fiscaux à la disposition des gouvernements (taxes sur le revenu, taxes sur la consommation et taxes sur le commerce international), est d'importance majeure puisqu'il est nécessaire de concilier des objectifs d'équité et d'efficience. Cette question de la composition des recettes fiscales dans les pays en développement sera analysée dans cette thèse, tant du point de vue de ses déterminants que des conséquences pouvant être engendrées par une structure fiscale particulière. Afin de mieux cerner ces enjeux, il est important de détailler quelle devrait être la structure fiscale optimale selon la théorie et quels ont été les changements principaux survenus au cours des trois dernières décennies dans la structure fiscale des PED.

La structure fiscale selon la théorie de la fiscalité optimale

La théorie de la fiscalité optimale apporte des indications sur la manière dont les différentes taxes devraient être imposées. Diamond et Mirrlees (1971) montrent que, pour maintenir l'efficience productive, le taux de taxe optimal sur tous les biens intermédiaires est nul. Il en découle que si un pays est preneur de prix sur les marchés mondiaux, ni les biens intermédiaires importés, ni les biens de consommation finale importés[1] ne devraient être assujettis à un tarif douanier (Dixit, 1985). Par ailleurs, Atkinson et Stiglitz (1976) prouvent que, lorsqu'une taxe non linéaire sur les revenus individuels est utilisable, la fiscalité optimale sur les biens de consommation finale est, quant à elle, uniforme[2]. L'outil de l'impôt direct sur le revenu est à privilégier dans la mesure où il n'y a pas d'information au sujet des capacités inobservées des individus se reflétant dans leurs choix individuels de consommation qui ne soient pas déjà révélée par leurs revenus.

La politique fiscale dans les pays en développement a suivi les directions suggérées par la théorie de la taxation optimale sur quelques dimensions mais demeure encore sur certains aspects éloignée de ces recommandations. En effet, l'utilisation des taxes sur le revenu individuel, par exemple, y est très limitée et les tarifs douaniers, bien qu'en baisse, représentent toujours une part importante des recettes de l'État. Ces divergences avec les recommandations théoriques peuvent en partie s'expliquer par des aspects d'économie politique de résistances aux réformes qui induisent des situations de statu quo (Fernandez et Rodrik, 1991) et découler également des nombreuses contraintes structurelles, plus largement étudiées, qui pèsent sur les pays en développement pour leur choix de politique fiscale. Ces contraintes viennent principalement de la prééminence de leur secteur informel (Schneider et al., 2010) qui échappe pour partie à la fiscalisation, et du recours

[1] Ceci afin d'assurer une taxation au même taux de la consommation finale de biens importés et de la consommation finale de biens produits sur le marché intérieur.

[2] Ce résultat part de l'hypothèse que la fonction d'utilité est faiblement séparable entre le travail et tous les autres biens et que les préférences pour les biens ne dépendent pas des capacités.

très limité au secteur financier, la plupart des opérations étant réglées en liquide (Gordon et Li, 2009) [3]. De plus, le manque de ressources - financières, humaines et matérielles – dans certains pays limite la capacité des administrations fiscales[4]. Au vu de ces spécificités, les modèles théoriques de politique fiscale et les recommandations qui en découlent ont été adaptés aux pays en développement (Burgess et Stern, 1993 ; Newbery et Stern, 1987 ; Tanzi et Zee, 2000 ; Keen et Simone, 2004). Depuis les années 1980, les gouvernements ont suivi ces recommandations et les réformes fiscales mises en place (Chambas, 2005 ; Bahl et Bird, 2008) ont résulté en de larges changements dans les structures fiscales, que nous allons détailler.

L'évolution des structures fiscales des pays en développement depuis 1980

Les bases statistiques du Fonds Monétaire International (FMI), habituellement utilisées pour l'obtention de données macroéconomiques, ne sont pas complètement renseignées pour tous les pays en développement sur une large période temporelle en ce qui concerne les recettes publiques et leurs différentes composantes fiscales. Nous nous appuyons donc sur les données de la base « Government Finance Statistics » (GFS) du FMI, complétées par les données publiées dans les Articles IV, qui sont réalisés par le FMI lors de leurs consultations périodiques avec les pays membres. Pour les pays d'Afrique sub-saharienne, sur la période 1980-2005, nous utilisons la base de données construite par Keen et Mansour (2010a) à partir des «FMI Staff Reports» qui détaille, de manière extensive, les différentes composantes des recettes fiscales de quarante pays africains.

[3] Il faut noter cependant que les fortes restrictions à l'entrée sur le marché formel (en raison des coûts d'entrée particulièrement élevés) peuvent également être vues comme résultant d'une politique choisie par les gouvernements pour encourager l'émergence de grands contribuables dans le secteur formel afin d'augmenter la collecte fiscale (Auriol et Warlters, 2005). Les auteurs mentionnent également que cette politique peut apparaître optimale sur l'horizon de court terme des gouvernements mais est très coûteuse à plus long terme.

[4] L'existence de rentes souveraines dans un pays, provenant soit de l'aide extérieure soit des exportations de ressources naturelles, a été identifiée comme un facteur affectant négativement la qualité de la politique fiscale et de l'administration fiscale (Knack, 2009).

L'encadré 1 détaille les différents concepts utilisés de recettes publiques totales, recettes fiscales et leurs différentes composantes.

Encadré 1. Définition des concepts utilisés

Les **recettes publiques, hors dons**, sont composées de l'ensemble des recettes fiscales et non fiscales du gouvernement central et des collectivités locales. Ce concept inclus les prélèvements des organismes sociaux, qui restent cependant très faibles dans les pays en développement. De même, les recettes issues de l'exploitation des ressources naturelles et perçues par l'État sont comprises, qu'elles soient fiscales (impôts sur les bénéfices des sociétés minières ou redevances pour l'exploitation, par exemple) ou non-fiscales (versements de dividendes à l'État).

Les **recettes fiscales** sont la somme des recettes émanant des différentes catégories d'impôts et de taxes en vigueur dans le pays (impôts directs, taxes sur la consommation et taxes sur le commerce international).

Les **impôts directs sur le revenu** regroupent principalement l'impôt sur le revenu des personnes physiques et l'impôt sur les sociétés. Les taxes sur les salaires sont également considérées dans cette catégorie.

Les **taxes sur la consommation** comprennent les taxes sur la valeur ajoutée, taxes sur les ventes ou taxes sur le chiffre d'affaires, selon les pays, et les droits d'accises.

Les **taxes sur le commerce international** : droits de douane, taxes sur les exportations ainsi que diverses taxes sur le commerce international, telles que les taxes statistiques. Cette catégorie ne comprend pas les recettes de TVA et droits d'accises collectées, à la frontière, sur les importations puisque celles-ci sont considérées dans la composante taxes sur la consommation.

La Table 1 présente l'évolution dans le temps du niveau et de la composition des recettes publiques, hors dons, des pays en développement et des pays de l'OCDE.

Table1. Évolution comparée des recettes publiques de 1980 à 2009

	Recettes Publiques Totales	Impôts sur le revenu	Taxes sur la conso.	Taxes sur le commerce inter.	Recettes Publiques Totales	Impôts sur le revenu	Taxes sur la conso.	Taxes sur le commerce inter.
	(% PIB)	(% Recettes Totales)			(% PIB)	(% Recettes Totales)		
	Pays en développement				**Pays OCDE**			
1980 – 1989	18.3	21.5	22.6	28.9	32,8	37,8	32,0	-
1990 – 1999	19.0	22.4	28.7	20.1	35,0	36,1	31,4	2,7
2000 – 2004	20.5	22.6	30.6	14.8	35,2	35,2	31,8	0,9
2005 – 2009	22.9	25.0	31.2	13.9	35,2	35,9	31,4	0,6

Source: GFS, Keen and Mansour (2010a), complétées avec les données issues des Article IV (FMI)
Note : « conso. » et « inter. » sont les abréviations respectivement de « consommation » et de « international ».

La mobilisation de recettes publiques, hors dons, dans les pays de l'OCDE, qui représente environ 35% du PIB, a été et demeure, de loin, plus élevée que dans les pays en développement où elle est proche de 20% du PIB (Zee, 1996). De nombreuses études se sont attachées à étudier quels étaient les déterminants de la performance fiscale des pays en développement et ont souligné plusieurs freins à la collecte fiscale, tant parmi des aspects structurels, des éléments de politique économique que des facteurs institutionnels (Gupta, 2007 ; Adam et al., 2001 ; Agbeyegbe et al., 2006 ; Mahdavi, 2008 ; Attila et al., 2009a).

Sur les trois dernières décennies, les recettes publiques, hors dons, des gouvernements des PED en part de PIB n'ont augmenté que légèrement. En outre, en Afrique sub-saharienne, ces hausses sont en partie dues à l'augmentation des recettes liées aux ressources naturelles (Keen et Mansour, 2010a). En revanche, les modifications dans la structure fiscale des PED ont été amples et conséquentes. Dans les années 1980, ces pays tiraient la plus grande partie de leurs recettes des taxes sur le commerce international (28,9% de leurs recettes publiques, hors dons), tandis qu'à partir des années 1990, ils se sont tournés vers les taxes intérieures sur la consommation qui sont devenues la plus grande composante des recettes de l'État (31,2% des recettes sur la période 2005-

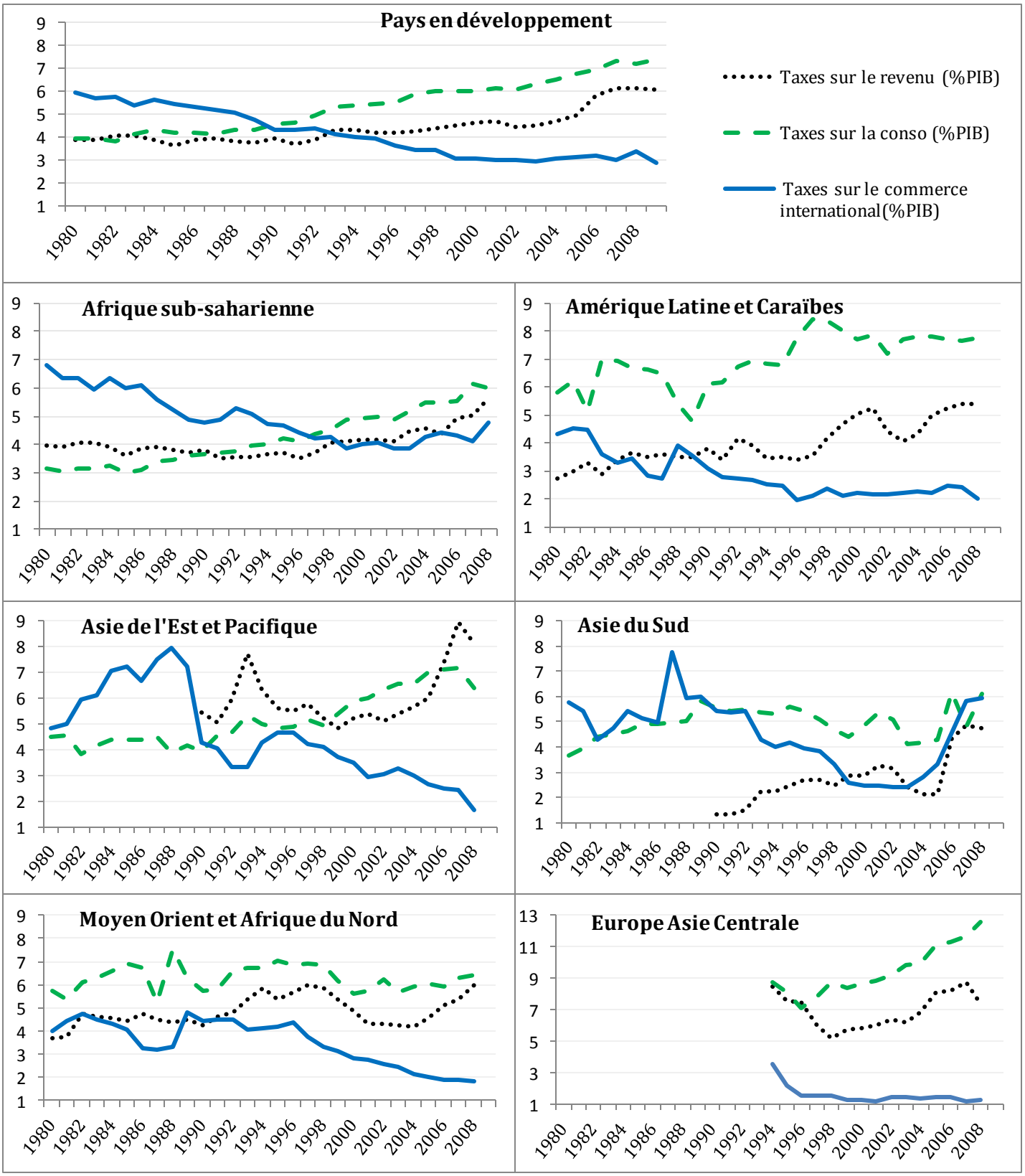
2009). A l'inverse, les recettes des pays de l'OCDE ont, constamment et majoritairement depuis les années 1980, reposé sur les impôts directs, les taxes sur le commerce international n'ayant qu'un rôle limité.

Ces amples changements dans la composition des recettes fiscales sont donc propres aux pays en développement et recouvrent des modifications profondes qui ont eu lieu dans chacune des composantes des recettes de l'État (taxes directes sur le revenu, taxes sur le commerce international et taxes sur la consommation) et qu'il nous faut discuter afin de mieux les appréhender.

Les impôts directs sur le revenu

D'après la figure 1, on constate que les impôts directs sur le revenu dans les pays en développement avoisinaient 4% du PIB dans les années 1980 et se sont progressivement élevées pour atteindre un niveau moyen proche de 6% du PIB à la fin de la décennie 2000. Cette tendance à la hausse a été constatée dans les pays en développement de toutes les régions du monde mais les schémas ont été divers. La hausse apparaît relativement régulière sur les 30 années en Amérique Latine, en Afrique sub-saharienne et en Asie du Sud. La progression a été plus mouvementée au Moyen Orient et Afrique du Nord, en Asie de l'Est ainsi qu'en Europe et Asie centrale puisque le niveau de ces taxes au début des années 2000 est apparu en retrait par rapport au niveau atteint dans la décennie 1990, puis est reparti en hausse sur la fin de la période.

Figure 1. Évolution des différentes composantes fiscales par régions (en % du PIB)



Source : GFS, Keen and Mansour (2010a) et données Article IV.

Les impôts sur le revenu sont constitués principalement de l'impôt sur le revenu des personnes physiques et de l'impôt sur les bénéfices des sociétés.

L'impôt sur le revenu des personnes physiques en vigueur dans la plupart des PED s'applique à la fois sur les revenus salariaux et sur les différents types de revenus du capital (dividendes, intérêts, rentes, etc.)[5]. Cet impôt joue cependant un rôle très limité dans les PED en raison du nombre très faible d'individus assujettis, les revenus salariaux ne représentant qu'une faible part du revenu national (Bird et Zolt, 2005). La faible part collectée sur les revenus du capital a initié les propositions de réformes. En effet, puisqu'il est difficile pour un pays en développement d'administrer un impôt sur les revenus des personnes physiques dans lequel les revenus de toutes les sources (travail et capital) seraient agrégés et sujets à une structure de taux unique, Alm et Wallace (2006) ont proposé que chaque type de revenu soit soumis à une structure de taux spécifique. Bird et Zolt (2011) préconisent quant à eux l'adoption d'un système dual d'impôt sur le revenu qui combinerait une taxe progressive sur les revenus du travail et une taxe plus faible, plate, sur les revenus du capital.

Les pays en développement perçoivent plus de recettes au titre de l'impôt sur les revenus des sociétés qu'au titre de l'impôt sur les revenus des personnes physiques. Les impôts sur les sociétés représentent, en moyenne dans les PED, environ 17% des recettes fiscales soit davantage que dans les pays de l'OCDE (Norregaard et Khan, 2007). Cependant, un déclin de la part de ces taxes dans le revenu du gouvernement est constaté (Keen et Simone, 2004), principalement en raison de la multiplication des programmes d'exonérations fiscales, notamment à travers la mise en place de zones franches (Mintz, 1990 ; Keen et Mansour, 2010b). La charge de l'impôt sur les sociétés est ainsi supportée de manière disproportionnée par les entreprises de taille moyenne puisque les

[5] Pour une comparaison des taux appliqués dans les différents pays et leur évolution dans le temps, se référer à l'analyse détaillée de Peter et al. (2010).

petites entreprises échappent plus facilement à l'impôt et les grandes entreprises bénéficient de nombreuses exemptions (Gauthier et Reinikka, 2006) [6].

Les taxes sur le commerce international

Comme l'illustre la figure 1, le déclin des taxes sur le commerce international [7], passant de près de 6% du PIB dans les années 1980 à environ 3% du PIB à la fin de la décennie 2000, s'est manifesté dans les PED de toutes les régions du monde, à l'exception de l'Asie du Sud où une forte remontée de ces taxes, en part du PIB, a été observée depuis 2005. Dans les régions d'Amérique Latine et Caraïbes, d'Asie de l'Est et Pacifique, du Moyen Orient et de l'Afrique du Nord et d'Europe et d'Asie Centrale, partant d'un niveau situé entre 4 et 5% du PIB, elles représentaient à la fin des années 2000 moins de 2% du PIB. En Afrique sub-saharienne, elles demeurent relativement plus élevées puisqu' à la fin des années 2000, elles avaient un niveau toujours proche de 5% du PIB, par rapport à 7% du PIB au début des années 1980.

La libéralisation commerciale, avec la réduction des barrières commerciales, est le principal vecteur ayant concouru à la variation des recettes des taxes sur le commerce international observée dans les pays en développement. Elle a été mise en place avec pour objectif l'amélioration de l'efficience productive et allocative, ainsi que le bien-être (Krueger, 1995 ; Dixit, 1985).

L'analyse de l'impact sur les recettes douanières de la libéralisation commerciale doit être sujette à caution car les modifications de taux peuvent avoir des effets non linéaires sur les recettes collectées (Pritchett et Sethi, 1994). Les premières étapes de la libéralisation commerciale ont en effet principalement consisté dans le remplacement des quotas existants par des tarifs douaniers et dans l'unification des tarifs, augmentant ou diminuant certains taux. Le début de la libéralisation commerciale n'a donc eu qu'un faible impact négatif sur les recettes du gouvernement, voire les ont

[6] Mc Kenzie et Sakho (2009) établissent toutefois que l'enregistrement fiscal, qui signifie le passage dans le secteur formel, permet d'augmenter significativement les profits des entreprises, en particulier de celles de taille moyennes.

[7] La majorité de ces taxes proviennent des tarifs douaniers sur les importations, la contribution des taxes sur les exportations n'étant que peu importante et en déclin sur la période (Emran, 2005).

augmentées (Ebrill et al., 1999). Néanmoins, les étapes suivantes des réformes commerciales ont pris la forme de réduction des tarifs douaniers et ont entraîné des baisses significatives de recettes dans la plupart des pays (Devarajan et al., 1999 ; Khattry et Rao, 2002). Pour bien cerner les implications budgétaires de la libéralisation commerciale, il faut également tenir compte de la relation entre le niveau des tarifs et l'évasion fiscale. Fisman et Wei (2004) ont estimé pour la Chine qu'un changement d'un point de pourcentage du taux des taxes douanières est associé à une modification de 3%, dans la même direction, de l'évasion fiscale. Van Dunem et Arndt (2009) confirment cette relation pour le Mozambique.

Les gouvernements ont cherché à compenser ces pertes substantielles de recettes par des modifications dans une autre catégorie de taxes, tout en minimisant les distorsions créées. Les taxes sur la consommation ont été indiquées comme source alternative clé pour compenser ces pertes de recettes[8].

Les taxes sur la consommation

La réduction des tarifs douaniers et l'augmentation parallèle des recettes issues des taxes sur la consommation (taxes sur les ventes, taxes sur la valeur ajoutée (TVA), droits d'accises) a été une recommandation de politique économique courante faite aux pays en développement.

En effet, plusieurs auteurs ont élaboré des modèles de commerce en équilibre général pour montrer que les réformes de tarifs-taxes, consistant à compenser point pour point la baisse des tarifs par une hausse des taxes sur la consommation, peuvent résulter en une situation gagnant – gagnant, permettant la hausse du bien-être sans diminution des revenus du gouvernement (Michael et al., 1993 ; Hatzipanayotou et al., 1994 ; Abe, 1995 ; Keen et Ligthart, 2002). Ce type de réforme a

[8] Clarete et Whalley (1987) ont calculé le coût marginal relatif en termes de bien-être des taxes sur le commerce international par rapport à celles sur la consommation et ont établi que les taxes sur la consommation apparaissent significativement supérieures, car elles induisent moins de coûts de mauvaise allocation.

également été jugé Pareto-améliorant (Diewert et al., 1989) et pouvant aboutir à une augmentation de la croissance, en sus de celles du bien-être et des revenus (Naito, 2006). Emran et Stiglitz (2005) établissent cependant qu'en tenant compte de la présence d'un secteur informel important, ces réformes de tarifs douaniers et de taxes sur la consommation peuvent, au contraire, résulter en une diminution du bien-être. En soulignant deux mécanismes souvent peu considérés dans la théorie, à travers lesquels le secteur informel supporte la fiscalité, Keen (2008) montre qu'il est possible, même en présence d'un secteur informel prépondérant, de mettre en place une réforme de tarifs-taxes qui améliore le bien-être.

D'après la figure 1, on constate que ces recommandations d'augmentation de la contribution aux taxes sur la consommation ont été globalement suivies puisqu'entre les années 1980 et la fin des années 2000, le ratio des taxes sur la consommation rapportées au PIB a progressé de 4 à 7%. Cette hausse n'a cependant pas été observée uniformément à travers le monde. Au Moyen Orient et en Afrique du Nord, les recettes issues des taxes sur la consommation ont stagné aux alentours de 6% du PIB tout au long de la période. La hausse a été particulièrement marquée dans les régions Asie de l'Est - Pacifique (de 4 à 7% du PIB), Amérique Latine Caraïbes (de 6 à 8% du PIB) en Europe et Asie Centrale (de 9 à 13% du PIB) et en Afrique sub-saharienne (de 3% à 6% du PIB).

L'aide au développement a été identifiée comme un facteur facilitant cette transition fiscale qui nécessite une hausse des taxes intérieures sur la consommation afin de compenser la baisse des taxes sur le commerce international (Attila et al., 2009b) même si cette transition s'est avérée être un grand défi. En effet, Baunsgaard et Keen (2010) trouvent que la baisse des recettes douanières n'a pas été compensée par une hausse suffisante des taxes intérieures dans certains pays à faible revenus. De plus, ils établissent que le degré de compensation n'a pas été significativement meilleur dans les pays ayant adopté la TVA.

L'adoption de la TVA par un très grand nombre de pays en développement a en effet constitué l'une des pièces centrales des réformes fiscales dans les PED, contribuant à la modification de la structure fiscale. Une littérature naissante analyse les conséquences qu'a eues cette réforme, principalement en termes de collecte de recettes fiscales, et nous abonderons à ce champ d'analyse en estimant les effets qu'elle a pu avoir sur des aspects différents, peu étudiés. Alors qu'au début des années 1980, seuls quinze pays en développement, principalement situés en Amérique Latine, avaient adopté la TVA, ils étaient 104 en 2008. La TVA s'est propagée géographiquement, au sein de chaque région, essentiellement dans des pays participant à des programmes du FMI et dans ceux à faible performance de collecte fiscale (Keen et Lockwood, 2010).

La taxe sur la valeur ajoutée est une taxe à base large collectée à de multiples étapes de la chaîne de valeur ajoutée, les taxes payées sur les intrants étant créditées contre les taxes collectées lors de la vente du produit (Ebrill et al., 2001). Le mécanisme de «credit-invoice» sur lequel repose la TVA souffre toutefois de quelques limites dans les pays en développement, car les crédits de TVA sur les intrants, lorsqu'ils excèdent le montant de TVA collectée sur le produit fini (pour les exportateurs, notamment), sont remboursés avec des retards importants ou parfois ne le sont pas. Au final, Keen et Lockwood (2010) trouvent que les pays ayant adopté la TVA ont connu une hausse significative de leurs recettes, même si l'effet n'est que de faible ampleur. Les auteurs mettent en évidence des hétérogénéités, les pays les plus ouverts et les plus grands étant ceux où les gains de l'adoption de la TVA ont été les plus importants.

L'ensemble de ces réformes entreprises dans les pays en développement, qui ont abouti à des profondes modifications dans les compositions de leurs recettes fiscales, ont été cruciales pour l'amélioration de la collecte de leurs recettes et l'atteinte d'une neutralité économique et d'une équité plus élevées. Il en découle une capacité accrue pour les États à offrir les biens publics indispensables au développement.

Cette description des modifications dans les différentes composantes fiscales nous permet de constater que des progrès en direction des structures fiscales qui apparaissent optimales ont été réalisés mais des disparités existent dans ces progrès. Nous avons vu par exemple que dans certaines régions du monde, la baisse attendue des recettes issues des tarifs douaniers n'a pas eu lieu et dans d'autres, des pays ont supporté une diminution nette de leurs recettes fiscales car leurs recettes intérieures sur la consommation n'ont pas suffisamment augmenté pour compenser la perte de recettes douanières (Baunsgaard et Keen, 2010). Au-delà des facteurs structurels traditionnellement étudiés et avancés pour expliquer les performances de recettes des différentes composantes fiscales, nous nous interrogeons sur le rôle que peuvent jouer des facteurs d'économie politique pour expliquer les différences dans la structure fiscale des pays en développement.

En particulier, on assiste depuis le début des années 1990 à une multiplication des élections[9], et l'on peut s'interroger sur l'incidence qu'elles peuvent avoir sur les variables fiscales en raison de l'opportunisme électoral des gouvernements.

De manière similaire, il est crucial d'appréhender si l'amélioration sensible de la gouvernance et du degré de démocratie observée dans les pays en développement depuis les années 1980 a également eu des impacts positifs sur la structure fiscale en contribuant à l'augmentation des taxes intérieures pour pallier à la baisse de la dépendance des ressources publiques vis-à-vis des taxes sur le commerce extérieur.

En outre, nous avons vu que la structure fiscale des pays en développement a subi de profondes modifications qui sont survenues sur une période de temps somme toute relativement courte. Afin d'orienter et de juger de l'opportunité de la poursuite des réformes fiscales, il est nécessaire d'estimer quelles sont les conséquences engendrées par ces bouleversements de structure, tant au niveau de la collecte des recettes fiscales que des conséquences sociales.

[9] en lien notamment avec la généralisation du multipartisme en Afrique.

D'une part, un aspect particulièrement néfaste pour l'exécution budgétaire des pays en développement, qui amoindrit les capacités des États à financer de manière régulière les biens publics, est l'instabilité des recettes fiscales. Il est donc nécessaire d'estimer si les modifications survenues dans la composition fiscale des pays en développement ont permis de collecter des recettes plus stables.

D'autre part, dans un contexte de lutte contre la pauvreté et les inégalités, il est crucial d'appréhender quelle est l'incidence sociale des taxes intérieures sur la consommation, par rapport à celle des taxes sur le commerce international qu'elles visent à remplacer.

Objectif et plan de la thèse

Cette thèse sera articulée en deux parties qui permettront de répondre à ces deux grandes problématiques que sont les déterminants d'économie politique de la composition des recettes fiscales et les conséquences d'une composition fiscale particulière. Pour ce faire, nous utiliserons à la fois des outils économétriques appliqués à des données de panel (Chapitres 1 à 4) et une modélisation en équilibre général calculable couplée à une microsimulation sur des données d'enquêtes de ménages (Chapitre 5).

La première partie de cette thèse, composée de deux chapitres, s'attache à la compréhension de l'importance des facteurs d'économie politique dans le modelage des niveaux des différentes taxes. Nous analyserons ainsi l'existence de cycles politico-budgétaires dans la composition des recettes fiscales et la relation entre le niveau de démocratie prévalent dans un pays et la mobilisation de recettes fiscales intérieures.

La seconde partie comprend trois chapitres qui estiment les conséquences, peu étudiées, de cette modification de la structure fiscale sur deux variables qui sont déterminantes pour le développement. En premier lieu, les recettes fiscales des pays en développement étant sujettes à une forte instabilité, nous estimons si la modification des structures fiscales en faveur d'une

contribution plus forte des taxes sur la consommation aux recettes fiscales permet de stabiliser les recettes. Nous nous interrogeons également si l'adoption de la TVA, qui a été la réforme majeure dans les taxes sur la consommation, a permis d'accentuer cette stabilisation des recettes fiscales. Enfin, l'incidence sociale des différentes taxes indirectes, taxes sur le commerce international et taxes sur la consommation, sera appréhendée afin de comprendre si la modification de composition fiscale permet d'aboutir à une situation plus équitable socialement.

Le chapitre 1 étudie l'impact des calendriers électoraux sur la composition des recettes fiscales (taxes directes versus taxes indirectes) plutôt que sur le niveau des recettes fiscales totales comme étudié auparavant dans la littérature. Il repose sur le modèle opportuniste de cycles politico-budgétaires de Drazen et Eslava (2010) pour prédire de quelle manière la structure fiscale va être modifiée lors des années d'élection. Nous utilisons un panel de 56 pays en développement, sur la période 1980-2006, pour étudier l'existence de schémas d'interventions électorales dans les recettes fiscales à l'aide de l'estimateur des moindres carrés ordinaires avec effets fixes et de l'estimateur GMM-system. La potentielle endogénéité de la tenue des élections est contrôlée et des tests de robustesse à des datations alternatives et sur des sous-échantillons sont menés pour s'assurer de la robustesse de nos résultats.

Le second chapitre analyse, à l'aide de données de panel de 66 pays en développement sur la période 1990-2005, dans quelle mesure les différences de régime politique peuvent expliquer les écarts de performance entre pays dans la mobilisation de recettes fiscales intérieures. Nous contrôlons pour l'endogénéité potentielle du régime politique et utilisons un instrument original, inspiré par la littérature sur les déterminants de la démocratie, à savoir le niveau de démocratie des pays voisins. En présence d'un faible système de pouvoirs et contrepouvoirs et si des élites économiques fortes contrôlent le processus politique, le gouvernement pourrait facilement accorder des faveurs à des groupes d'intérêts, limitant ainsi la mobilisation de recettes fiscales

intérieures. Nous étudions également quelle dimension de la démocratie est principalement requise pour l'atteinte de recettes plus élevées. De plus, puisque la présence d'importantes rentes de ressources naturelles crée des contraintes budgétaires souples qui retardent la nécessité de la mise en place de réformes fiscales, nous analysons si des institutions plus démocratiques pourraient rendre positive la contribution des ressources naturelles à la collecte de ressources fiscales

Le chapitre 3 étudie les conséquences de l'instabilité des recettes fiscales en Afrique sub-saharienne et présente des remèdes qui reposent sur la composition de la structure fiscale pour lutter contre cette instabilité. L'analyse est menée sur un panel de 37 pays d'Afrique sub-saharienne, observés sur la période 1980-2005, et démontre que l'instabilité des recettes fiscales engendre une instabilité, à la fois de la consommation courante du gouvernement et de l'investissement public, entrainant ainsi une réduction du niveau de l'investissement public. Nous analysons donc ensuite si une composition fiscale particulière, avec une contribution accrue des taxes sur la consommation aux recettes fiscales, pourrait être un remède efficace pour lutter contre cette instabilité néfaste.

Dans cette continuité, **le chapitre 4** étudie si l'introduction massive de la TVA dans les pays en développement a permis la stabilisation de leurs recettes fiscales. Sur un panel de 103 pays en développement observés sur la période 1980-2008, plusieurs méthodes alternatives d'estimation sont utilisées afin de traiter des biais d'auto sélection et d'endogénéité. Nous analysons également s'il existe des hétérogénéités dans l'impact stabilisateur de la TVA, selon les caractéristiques des pays afin de déterminer si certains pays ont particulièrement intérêt à recourir à la TVA pour lutter contre l'instabilité de leurs recettes fiscales.

Finalement, **le chapitre 5** compare l'incidence sociale des taxes sur la consommation (TVA et droits d'accises) par rapport à celle des tarifs douaniers qu'elles sont amenées à compenser. La

préoccupation de l'équité est centrale pour un gouvernement lors de l'imposition de différentes taxes et nous étudions quels sont les ménages qui supportent le plus fortement la charge fiscale de ces deux taxes distinctes relativement à leurs revenus. Pour mener cette analyse, nous nous concentrons sur le Burkina Faso en utilisant un modèle d'équilibre général calculable relié à des données d'enquête ménages. Nous estimons également si la régressivité de chacune de ces taxes affecte de manière différenciée les ménages ruraux ou urbains et si elle concerne principalement les produits alimentaires ou ceux non-alimentaires.

PART 1.

POLITICAL ECONOMY CONSIDERATIONS

ON TAX REVENUE COMPOSITION IN DEVELOPING COUNTRIES

CHAPTER 1.

Elections and the structure of taxation in developing countries[10]

Abstract

The present chapter goes beyond traditional political budget cycle studies by considering the impact of the election calendar on the composition of tax revenue (direct taxes versus indirect taxes) rather than on overall revenue. We rely on the opportunistic political budget model of Drazen and Eslava (2010) to predict how the taxation structure will be modified during election years. Using a panel of 56 developing countries over the period 1980-2006, our study reveals clear patterns of electorally timed interventions. Dealing properly with the potential endogeneity of election timing, we find robust evidence that reductions in indirect taxes are the preferred vehicle for incumbents in developing countries to increase their popularity just before elections. Indirect tax revenues in election years are 0.3 GDP percentage points lower than the average of the other years, a reduction of about 3.4% of the average in the sample countries, while the direct tax revenues remain unchanged in election years.

[10] This chapter is currently under the status "Resubmit after minor revisions" in the journal *Public Choice*.

1.1. Introduction

This paper investigates whether and to what extent the structure of taxation is manipulated in developing countries during election periods. Just before elections, governments may target reductions in a specific type of tax in order to improve their re-election chances. The theoretical idea behind these electoral manipulations, known as political business cycles, dates back to the seminal papers of Nordhaus (1975) and Lindbeck (1976). Empirical tests of the presence of political business cycles were firstly mainly conducted in developed countries but presented mixed results (Alesina and Roubini, 1992; Alesina et al., 1997). Rather than political cycles in real macroeconomic outcomes, studies found evidence of political cycles occuring in various policy variables in developed economies (see, e.g., Blais and Nadeau, 1992; Efthyvoulou, 2011; Hakes, 1988; Yoo, 1998) and especially in fiscal variables, whose cycles were termed political budget cycles (Drazen, 2001).

The idea then arises that political budget cycles might be an even more prominent phenomenon in countries where democracy is nascent because voters do not have much experience with the competitive electoral process, therefore fiscal manipulation might be rewarded rather than punished. In their study, Brender and Drazen (2005) establish that the existence of political cycles in fiscal balances is driven by the experience of "new" democracies. Another characteristic of political cycles is reported by Shi and Svensson (2006), who find that the political budget cycles are greater in developing countries than in developed ones. They explain this larger prevalence of electoral cycles in developing countries by the higher rents that accrue to politicians by remaining in power and the lower share of informed voters in the electorate.

It seems therefore that in developing countries and new democracies, fiscal balances are especially prone to electoral cycles. Many studies have tried to distinguish which aspect - revenue

or expenditures – causes these fiscal balance deteriorations. Block (2002) confirms the presence of political business cycles in a sample of sub-Saharan African countries, both in fiscal balances and in public expenditures, but finds no significant electoral manipulation of overall tax revenues. Schuknecht (2000) studies fiscal policy cycles in a sample of 24 developing countries for the 1973-1992 period. The estimations reveal that the policy instrument that is significantly used by policymakers before elections is to make increases in targeted public expenditures. No significant electorally oriented modification of overall revenue is revealed. Similarly, in country-level studies, Fall (2007) for Papua New Guinea and Gonzalez (2002) for Mexico find significant political manipulation of fiscal balances and public spending but no significant effect on the overall revenues. However, the absence of an effect on the aggregate variables can mask significant electoral manipulation of specific components, as found for expenditures by Vergne (2009). The modification of taxes for election purposes may be in the structure of tax revenues rather than in the overall revenue. We will therefore study whether and to what extent governments manipulate specific components of tax revenue in election times.

There is, to our knowledge, no study that analyzes, for a cross-section of developing countries, the political budget cycle of different components of tax revenues. The evidence for developed economies is scarce and mixed.[11] For developing countries, the study by Khemani (2004) on India distinguishes the types of both expenditures and revenues, finding significant evidence of targeted commodity tax breaks, which is more suggestive of responses to narrow interest groups than populist policies in favor of mass voters.

[11]See Andrikopoulos et al. (2004) who find significant election effects on indirect taxes but only in a few EU countries, Katsimi and Sarantides (2011) on direct taxes in a sample of 19 OECD countries and Mikesell (1978) on broad-based taxes in American states. Ashworth and Heyndels (2002) find evidence of a political budget cycle in national tax structures in OECD countries but focus on tax structure turbulence and therefore provide no information on which specific tax component is mainly affected.

With taxes, contrary to expenditures, there is no possibility of targeting a specific geographic area, but it is possible to target voters through a specific type of tax cut. The aim of this paper is to understand, by adapting the model of Drazen and Eslava (2010), which kind of taxes are more likely to be politically manipulated in election times to enhance governments' chances of re-election and confront these theoretical predictions with an empirical analysis in 56 developing countries over the period 1980-2006.

The existence of electoral budget cycles in autocracies may be questioned but, as mentioned by Rogoff (1990), even in dominant-party systems where election issues are often known before the end of the poll, the country's leader still generally cares about his party's margin of victory. He also has to satisfy all the voters in order to reduce the risk of the occurrence of a coup d'etat. In light of the democratization process in developing countries, elections are becoming more frequent over time (in our sample, 82 elections were held in the 1980s, 114 elections in the 1990s and 83 elections in only 6 years, between 2000 and 2006). This multiplication of elections can, as highlighted by Chauvet and Collier (2009), increase the accountability of governments and lead to policy improvements. However, if elections are badly conducted, the cyclical negative effect of elections on economic variables can be predominant and raises several concerns. It is therefore crucial to know whether this higher frequency of elections will lead to more political manipulations in tax revenues and thus create reversals in tax reforms.

Theoretical models predict how the composition of government expenditures can be changed by incumbents to influence voters (Rogoff, 1990; Drazen and Eslava, 2010) but, to our knowledge, no existing theoretical model predicts how the tax structure could be modified by incumbents for election purposes. We therefore draw a parallel – but for the composition of taxes – with the model of Drazen and Eslava (2010), which establishes the existence of a political budget cycle in the composition of expenditures because voters and policy makers have differing preferences. The

resulting theoretical prediction for developing countries is a decrease in indirect taxes in election years compared with non-election years with a corresponding pre-election increase in direct taxes. This proposition of electoral manipulation of the tax structure is then empirically tested in a panel of developing countries. Our empirical findings, using a GMM-system estimator, dealing properly with the potential endogeneity of the election timing, provide strong evidence that indirect tax decreases are the preferred vehicle for incumbents in developing countries to increase their popularity just before elections. A drop of 0.3 percentage points of GDP in indirect tax revenues in election years is identified, which corresponds to a fall of 3.4% in the average indirect tax revenues in the sample, while the direct tax revenues increase but not significantly. This result holds when we consider only the effect of the predetermined elections on tax composition and when we use alternative ways of dating elections. The identified political cycle in indirect tax revenues appears larger in weaker democracies or autocracies than in established democracies.

The paper is divided into five sections. The theoretical underpinnings of the political budget cycle in tax revenue composition are presented in section 2. Section 3 describes our empirical framework and the results of the panel analysis are detailed in section 4. Finally, section 5 concludes.

1.2. The theoretical existence of a political budget cycle in tax composition

There are two theoretical approaches of political business cycles: opportunistic and partisan. Opportunistic political cycles on policy variables occur both in developed and in developing countries, though they are of a larger magnitude in developing countries. Regarding political cycles on macroeconomic real outcomes, a consensus has emerged that in developed economies they are mainly subject to temporary partisan electoral effects rather than opportunistic electoral effects

(Alesina, 1987; Alesina and Roubini, 1992). This wisdom is however questioned by Grier (2008), who finds robust evidence of sizeable opportunistic political business cycle effects in the US real GDP growth.

Given that our focus here is on developing countries and on fiscal policy variables, we will adopt an opportunistic approach to the political cycles rather than a partisan one.

In the category of opportunistic political budget cycle models (Rogoff and Sibert, 1988; Persson and Tabellini, 1990), cycles arise due to information asymmetry between electors and politicians about the latter's competence. Voters have to infer policymakers' competence from the observable economic data, inciting opportunistic governments to manipulate policy variables in order to appear competent prior to elections. Some theoretical models predict cycles in expenditure composition rather than in the total expenditure level. According to the signalling model of Rogoff (1990), the incumbent has an incentive to "signal" its competence by modifying the fiscal policy toward easily observed consumption expenditures, and away from government investment. Drazen and Eslava (2010) suggest a different approach to the "competence" argument and present a model of voter-friendly opportunistic changes in the composition of expenditures arising because citizens and politicians have different preferences for types of government spending.

Here we draw a parallel with the conclusions of the Drazen and Eslava (2010) model for tax revenue composition. We therefore need first of all to determine the preferences in terms of tax policy of the citizens in a developing country. Having established the citizens' preferences for tax composition in developing countries, we explain, in light of the model of Drazen and Eslava (2010), why a political budget cycle can arise.

In developing countries, a distinction can be made between indirect taxes, representing on average 9% of GDP in our sample countries and direct taxes, on average 3.8% of GDP. Indirect taxes are constituted of taxes on international trade and domestic broad-based consumption taxes,

namely sales or value-added taxes and excises. The reliance on taxes on international trade has been decreasing since the 1990s in developing countries, while domestic consumption tax revenues were increasing (Baunsgaard and Keen, 2010). Direct taxes are composed of both taxes on individual income and taxes on companies' income.

The preferences of citizens regarding the different components of taxes, direct or indirect ones, can be determined by considering two aspects. Firstly, in developing countries, given that the stock of capital owned by the median voter is lower than the average endowment, he bears a relatively larger burden of taxes on his consumption than on his income from capital. He should therefore have a preference for low indirect taxes and high direct taxes. Secondly, given that a large part of the citizens work in the informal sector, which is particularly prominent in developing countries (Schneider and Enste, 2000 and Dreher and Schneider, 2010), only a few people pay income taxes on their wages. Indeed, contrary to developed economies, where the personal income tax raises a significant share of the tax revenues, in developing countries, the bulk of the direct tax revenues is obtained from corporate income taxes, the personal income tax playing at most a very limited role (Bird and Zolt, 2005). Citizens in developing countries should therefore prefer decreases in indirect taxes to decreases in direct taxes.

Political budget cycles will happen because some politicians differ from voters in the value they assign to different types of taxes but, in order to be re-elected, want to signal themselves as social welfare-oriented.

Drawing on the political budget cycle model of Drazen and Eslava (2010), which expresses the electoral manipulation of expenditure composition, we apply a parallel of their result to explain the existence of tax composition manipulation in election periods. The binding government budget constraint is therefore modified compared with the model of Drazen and Eslava (2010). Here, the incumbent has the possibility of modifying the composition of taxes instead of the expenditure

composition. As explained previously, in a developing country, the favored decrease is in indirect taxes, so we consider that citizens solely value decreases in indirect taxes whereas politicians value decreases in the other component of tax revenues, namely direct taxes.[12]

Two types of policymakers are assumed in their model. These politicians put different weights on the citizens' welfare compared with their own interest. On the one hand, the people policymaker gives high value to citizens' utility and will implement the preferred policy of citizens, low indirect taxes, both in an election period and in a non-election period. On the other hand, a desk policymaker gives high value to his own interest and will prefer, in non-election periods, relatively high indirect taxes, in order to provide low direct taxes to companies. These weights are unknown to the voters but are crucial to voters' choice. Voters will try to infer how socially-oriented the incumbent is from observations of the level of indirect taxes before the election. The probability of re-election is therefore dependent on tax policy decisions.

The equilibrium outcome depends on whether a desk policymaker values re-election more than decreasing direct taxes. Indeed the desk policymaker may retreat from his favorite policy during election periods in order to mimic a people policymaker and increase his chances of re-election. Specifically, a political budget cycle will exist because a desk-type policymaker chooses, in the election year, low indirect taxes with some probability, while in a non-election year, he will definitely choose his preferred policy. By shifting the composition of taxes toward what voters prefer, an incumbent politician will try to signal that his preferences are close to those of voters. The resulting proposition implies therefore that, if re-election is valuable enough, a political budget cycle exists with indirect taxes expected to be lower in an election year than in a non-election

[12] As explained by Drazen and Eslava (2010), the second component should be one that politicians may value but that voters do not. We can think, for instance, of politicians who value low direct taxes in order to favor companies and potentially receive contributions. However, we assume that modifications to the second components are not helpful at all to win elections.

period. Given that the government's budget constraint is binding, the level of direct taxes is conversely modified and the budget cycle appears in the taxation structure.

In the context of developing countries where relatively low indirect taxes, rather than low direct taxes, are preferred by the median voter, political cycles might occur with significantly lower indirect tax revenues in election years than in non-election years. We now assess the empirical validity of this theoretical prediction in a sample of developing countries.

1.3. The Empirical Framework

To test empirically the electoral effect on tax policy choices, we perform a panel data analysis for 56 developing countries[13] (see Appendix 1.1). Our period of analysis is 1980-2006. For each kind of tax, namely direct taxes and indirect taxes, the estimated equation to assess the presence of tax manipulation for electoral purposes takes the following form:

$$Taxrev_{i,t} = \alpha_1 Election_{i,t} + X'_{i,t}\alpha_2 + \mu_i + \lambda_t + u_{i,t}$$

where *i* and *t* are country and year indicators, respectively, and *Taxrev* is the dependent variable, being alternatively direct tax revenue over GDP and indirect tax revenues over GDP. The direct tax variable corresponds to the income tax (corporate tax revenue plus individual tax revenue) whereas the indirect tax variable comprises taxes on international trade and domestic taxes on consumption (sales tax, value-added tax and excises). The dummy Election takes the value 1 in an election year and 0 otherwise and the vector X captures other explanatory variables, discussed

[13]We consider all the developing countries classified as low income, lower middle and upper middle income in the World Bank classification but require that they have data for at least 15 years in the period 1980-2006 to be included in our sample. Four of the remaining countries (Bhutan, Jordan, Myanmar and the Syrian Arab Republic) held no election during the considered period and are thus excluded from the sample.

further below, affecting the direct and indirect tax revenues. The term μ is a country-specific effect,[14] λ is an unobserved time fixed effect and u is an unobserved random error term.

Election years are taken from the Database of Political Institutions (DPI) of Beck et al. (2001) and completed by data from "The Voter Turnout Since 1945 to Date" of the Institute for Democracy and Electoral Assistance (IDEA) and the election guide of the International Foundation for Electoral Systems (IFES). We consider legislative elections for countries with parliamentary systems and presidential elections for those with presidential systems. Appendix 1.1 summarizes both the type of political system in place in the year 2000 and the occurrence of elections in all our sample countries. In our sample, two-thirds of the elections took place in democratic countries (countries with a positive Polity2 index on the scale ranging from -10 to +10). Data on taxes for African countries come from Keen and Mansour (2010a), who compiled an almost balanced data set from IMF Government Finance Statistics (GFS) and from IMF Staff Reports. For the other developing countries, data are taken from similar sources, namely GFS and Article IV.

Drawing on the empirical literature that models the share of tax revenues in GDP (Adam et al., 2001; Khattry and Rao, 2002; Keen and Lockwood, 2010), we include the following variables as a control. The lagged dependent variable controls for the persistence of tax revenues over time. The theoretical prediction that is tested derives from comparative statics and the econometric specification is therefore also by essence static. The inclusion of the lagged dependent variable is however essential to control for the high persistence of tax revenues and to ensure that the results are reliable. This variable is commonly included in the literature testing the predictions of electoral budget cycle models based on comparative statics (see, e.g., Block, 2002; Shi and Svensson, 2006; Vergne, 2009; Drazen and Eslava, 2010). The GDP per capita is a proxy for overall development; a higher level of per capita income is usually found to be positively related to tax revenues. The

[14] The inclusion of country fixed effects helps to control for the institutions' heterogeneity across countries, which is higher in multi-country studies than it is in cross-sectional units within the same country.

structure of the economy is measured by the degree of urbanization, which is expected to have a positive impact on tax revenue since it is easier to collect taxes in urban areas. We also allow demographic variables, namely the share of the population aged 14 or younger, to play a potential role. The relationship should be positive because it creates a need for tax revenue to support those out of the market. Higher inflation is supposed to reduce tax yields according to the Tanzi-Olivera effect. Finally, the level of imports should be positively associated with indirect taxes' performance given that, in developing countries, a large part of the value-added tax is levied on imports. All these variables are collected from the World Development Indicators (WDI) database. The table in Appendix 1.2 reports descriptive statistics for the variables used in our analysis.

The presence of the lagged dependent variable as an explanatory variable may produce biased coefficient estimates with the fixed-effect estimator since the lagged level of tax revenue is by construction correlated with the error-term (Nickell, 1981). In order to deal with this problem and ensure the robustness of our results with the OLS-fixed effect estimator, we adopt the GMM estimator. We rely on the GMM-system estimator, rather than on the difference-GMM estimator, since it reduces the potential biases and imprecisions that are associated with the difference-GMM estimator (Arellano and Bover, 1995; Blundell and Bond, 1998).

This GMM-system estimator combines, in a system, equations in level where the right-hand side variables are instrumented by lagged (of one period or more) first differences of the series with an additional set of equations in first differences, using lagged levels of the series as instruments. To test the validity of our GMM-system estimations, we present the Hansen test of over-identification where the null hypothesis is that our instruments are valid since they are not correlated with the residual. We also present the test of serial correlation of the residuals, which assesses the presence of first-order serial correlation and the absence of second-order serial correlation. Since our time dimension (27 years) is quite long compared with the number of countries (56), we check the

stationarity of the dependent variable to ensure that our estimation technique is appropriate. The Maddala-Wu test of stationarity performed on the direct and indirect tax revenues as a share of GDP rejects the null hypothesis that the series are non-stationary.

Since elections are constitutionally planned, the assumption of exogeneity of the election variable could seem reasonable. However, because of political exigencies, governments often call for mid-term elections or postpone elections. Thus, the timing of elections is in this case no longer exogenous to government policy choices. To deal with the potential endogeneity of elections, due to reverse causality or shocks affecting both the date of election and tax revenues, we use two alternative strategies. Firstly, as in Block (2002) and Shi and Svensson (2006), the GMM estimator can partly resolve the problem of endogeneity since we treat the election variable not as exogenous but rather as predetermined (Arellano and Bond, 1991), the election being therefore instrumented by its past values. The second strategy, which will confirm whether or not the results from the GMM estimations are robust and unbiased, is to distinguish the pre-determined elections,[15] defined as elections occurring according to the constitutionally established interval, from the "endogenous" ones. In our sample, 190 out of 279 elections (68%) are classified as pre-determined.

1.4. Results

In this section, we present the results of both the OLS fixed-effect and the GMM-system estimations of the presence of electoral manipulations in the direct and indirect components of taxes. We then assess whether the results are sensitive to an alternative measure of the election variable and whether there are specific modifications occuring in the year after an election. To assess the robustness of these results, we then estimate the distinctive effects of predetermined

[15]To distinguish them, we use the data from Brender and Drazen (2005).

versus endogenous elections on tax policies. Lastly, we examine whether our results are mainly driven by election experiences in weak democracies or those in established democracies.

1.4.1. Estimation of the election effect on tax revenues components

We present in Table 1.1 several specifications of the tested equation with both the fixed-effect estimator and the GMM-system estimator, to assess the robustness of the results. In the first four columns of Table 1.1, with the fixed-effect estimator, we find a significant decrease in indirect tax revenues during the election year and a positive but non-significant effect of elections on direct tax revenues. The GMM-system estimator, which controls for the potential endogeneity of election timing, confirms these results (columns 5 and 6). Including the share of the population aged below 14 as an additional control variable (columns 7 and 8) does not alter the conclusion that indirect tax revenues decrease around election time.

Table 1.1. Estimation of the election effect on the tax structure (Direct Taxes and Indirect Taxes (%GDP))

	OLS - Fixed Effect				GMM - System			
VARIABLES	Direct Taxes (1)	Indirect Taxes (2)	Direct Taxes (3)	Indirect Taxes (4)	Direct Taxes (5)	Indirect Taxes (6)	Direct Taxes (7)	Indirect Taxes (8)
Election	0.0375	-0.166**	0.0359	-0.171**	0.0343	-0.294***	0.0305	-0.311***
	(0.045)	(0.077)	(0.046)	(0.077)	(0.056)	(0.076)	(0.057)	(0.077)
Y_{t-1}	0.706***	0.692***	0.705***	0.686***	0.727***	0.630***	0.716***	0.636***
	(0.045)	(0.028)	(0.045)	(0.029)	(0.12)	(0.069)	(0.12)	(0.064)
GDP per capita	0.394*	-0.428	0.474**	-0.0201	0.461**	0.308	0.447*	-0.0710
	(0.22)	(0.31)	(0.21)	(0.36)	(0.21)	(0.51)	(0.25)	(0.60)
Imports (%GDP)		0.0201***		0.0203***		0.0384***		0.0367***
		(0.006)		(0.0067)		(0.012)		(0.012)
Inflation (log)	-0.299**	-0.166	-0.289**	-0.148	0.495	0.340	0.571	0.335
	(0.12)	(0.19)	(0.12)	(0.18)	(0.60)	(0.23)	(0.61)	(0.23)
Urbanization	-0.0114	0.00518	-0.0103	0.0107	-0.0125	-0.000783	-0.0078	0.00131
	(0.014)	(0.016)	(0.014)	(0.017)	(0.0098)	(0.020)	(0.0094)	(0.017)
Population below			0.0140	0.0735**			0.0191	-0.0610
			(0.015)	(0.031)			(0.022)	(0.046)
Observations	1,070	1,238	1,070	1,238	1,070	1,238	1,070	1,238
R-squared	0.591	0.549	0.591	0.552				
Number of	56	56	56	56	56	56	56	56
Nb of instruments					40	44	42	45
Hansen Test (p-val)					0.220	0.397	0.250	0.456
AR(1) Test (p-val)					0.000	0.000	0.000	0.000
AR(2) Test (p-val)					0.786	0.851	0.748	0.861

Notes: Robust standard errors in brackets. *** p-value<0.01, ** p-value<0.05, * p-value<0.1. Constant and time fixed effects included in all estimations. GMM-system estimations are two-steps estimations with Windmeijer (2005) finite-sample correction. Urbanization and the share of population under 14 are considered as exogenous; election, the lagged dependent variable and imports are instrumented with first-order to third-order lags and inflation and GDP are instrumented with second to third-order lagged values. The matrix of instruments has been collapsed.

This empirical finding of decreased indirect tax revenues being the preferred vehicle for governments to increase their popularity in times of election can also be viewed in light of some countries' experiences. First of all, from the recurrent demonstrations that happen in developing countries when citizens perceive the modification of consumption taxes as unfair, as in Niger in 2005 when people protested in the street for one month against the new dispositions concerning the value-added tax, we can infer that citizens do care about the level of indirect taxes prevalent in their countries. Indirect tax exemptions on sensitive goods, such as rice or oil, directly benefiting the citizens, can therefore be enacted by governments in periods close to elections. For instance, in Ghana, major cuts in petroleum taxes were announced just before the 2008 elections.

Among the control variables, several regularities emerge. The level of GDP per capita is positively and significantly related to direct tax revenues, whereas it has no significant effect on indirect tax revenues. Adam et al. (2001) also find a non-significant effect of the level of GDP on indirect and trade taxes and Khattry and Rao (2002) even find a negative effect of the level of GDP per capita on trade taxes in lower middle income countries. As expected, imports as a share of GDP are positively and significantly related to indirect tax revenues. The inflation rate affects direct taxes negatively and significantly, though not robustly, as found by Adam et al. (2001) and Ghura (1998). This can be explained by the Tanzi-Olivera effect, which states that, in an inflationary environment, when actual tax payments lag the transactions to be taxed, tax obligations are lower in real terms at the time of tax payments. The reported Hansen, AR(1) and AR(2) tests confirm that our results are reliable. The results largely support our theoretical prediction that governments may modify, for election purposes, only a specific type of tax, indirect taxes, in order to attract voters. The cut in indirect tax revenues for election purposes is non-negligible. Indeed, in our preferred specification (column 8), the indirect tax revenue is 0.31 percentage points of GDP lower in election years than in non-election years. For the mean level of indirect tax revenue in our

sample (9.1% of GDP), this corresponds to a decrease of 3.4% in indirect tax revenues as a share of GDP in election years.

However, since we are considering tax revenues as a share of GDP we cannot distinguish whether these significantly lower indirect tax revenues originate from a decrease in the tax rates of some commodities, which is translated into lower prices for consumers, or from a decrease in the tax collection effort, thus being a favor given to companies. In the context of local government elections in India, Khemani (2004) concludes that, local governments being unable to modify tax rates, the decrease in commodity tax revenues near elections is a favor to producers through lower tax collection. In our case, the elections considered occur at a national level, the incumbent being therefore easily able to modify the tax rates on some sensitive goods consumed by a large share of voters. The significant decrease in indirect tax revenues can therefore be considered as a voter-friendly manipulation. Direct taxes, contrary to the theoretical predictions, are not significantly increased to counter the decrease in indirect taxes during the election year but remained unchanged. This can be explained by the fact that it is less easy for governments to increase tax mobilization, because of structural impediments, than to decrease it. Our result that governments decrease solely a specific type of taxes, namely indirect taxes, for election purposes is an interesting insight adding to the results of studies finding no electoral manipulation of the global tax level. The results are consistent because statistically significant variations in the indirect taxes but no variation in the direct taxes might lead to the overall tax revenues remaining statistically unchanged in election years.

1.4.2. Election dates

Our dummy variable Election, following much of the literature, is equal to one in the year of an election, regardless of when in the year the election was held. When the election occurs during the

six last months of a year, the dummy indeed mostly captures the period before the election. However, when the election occurs during the first six months of the year, pre-electoral manipulations are more likely to happen during the year before the election and the dummy might capture primarily post-electoral effects.

To tackle these issues and assess whether our results are robust after removing the noise in our initial election dummy variable, we resort to two alternative measures. Firstly, we split the electoral dummy into the elections that occurred in the first half of the year and those that occurred in the second half of the year (Brender and Drazen, 2005). Secondly, as in Chauvet and Collier (2009), Drazen and Eslava (2010) and Vergne (2009), we test an alternative definition of the variable election in which an election held during the first half of the year is coded with the previous year equal to one and zero otherwise. When the election occurs during the second half of the year, the dummy variable remains coded as previously with the value one during the election year.

Table 1.2 presents the results with the two distinct dummy variables and the revised dating. In the first four columns, for the elections held in the second half of the year, where the variable is less noisy, we find a significantly negative effect of elections on indirect tax revenues and no effect on direct tax revenues. Turning now to the results where the dummy Election is coded differently (columns 5, 6, 7 and 8), we notice that the resulting estimates on the dummy variable have the same sign as when the dummy variable equals one, regardless of the month in which the election occurred. Indirect tax revenues significantly decrease immediately before an election and direct taxes remain unmodified.

Table 1.2. Alternative datation of elections and their effect on the tax structure (Direct Taxes and Indirect Taxes (%GDP))

	OLS-Fixed Effects		GMM-System		OLS-Fixed Effects		GMM-System	
VARIABLES	Direct Taxes (1)	Indirect Taxes (2)	Direct Taxes (3)	Indirect Taxes (4)	Direct Taxes (5)	Indirect Taxes (6)	Direct Taxes (7)	Indirect Taxes (8)
Elect - 1st half	0.0796	-0.0809	-0.0145	-0.295				
	(0.068)	(0.15)	(0.095)	(0.18)				
Elect – 2nd half	0.0071	-0.236**	0.0693	-0.273***				
	(0.059)	(0.089)	(0.072)	(0.093)				
Election (datation 2)					-0.0108	-0.200**	0.0224	-0.207**
					(0.051)	(0.082)	(0.052)	(0.094)
Y_{t-1}	0.705***	0.687***	0.705***	0.632***	0.705***	0.686***	0.705***	0.641***
	(0.045)	(0.029)	(0.11)	(0.067)	(0.045)	(0.029)	(0.11)	(0.074)
GDP per capita (log)	0.473**	-0.0191	0.562**	-0.0192	0.480**	-0.00792	0.597**	-0.0555
	(0.21)	(0.36)	(0.25)	(0.64)	(0.21)	(0.36)	(0.26)	(0.69)
Imports (%GDP)		0.0202***		0.0317***		0.0203***		0.0381***
		(0.0067)		(0.010)		(0.0067)		(0.012)
Inflation (log)	-0.292**	-0.152	0.533	0.244	-0.290**	-0.161	0.288	0.179
	(0.12)	(0.19)	(0.55)	(0.23)	(0.12)	(0.18)	(0.51)	(0.27)
Urbanization	-0.0103	0.0107	-0.00964	0.000308	-0.0103	0.0107	-0.0109	0.00184
	(0.014)	(0.016)	(0.010)	(0.018)	(0.014)	(0.017)	(0.0096)	(0.020)
Population below 14	0.0136	0.0729**	0.0279	-0.0611	0.0144	0.0739**	0.0274	-0.0522
	(0.015)	(0.030)	(0.020)	(0.053)	(0.015)	(0.030)	(0.021)	(0.053)
Observations	1,070	1,238	1,070	1,238	1,070	1,238	1,070	1,238
R-squared	0.591	0.552			0.591	0.553		
Number of countries	56	56	56	56	56	56	56	56
Nb of instruments			45	49			41	45
Hansen Test (p-val)			0.290	0.254			0.281	0.166
AR(1) Test (p-val)			0.000	0.000			0.000	0.000
AR(2) Test (p-val)			0.773	0.908			0.865	0.768

Notes: Robust standard errors in brackets. *** p-value<0.01, ** p-value<0.05, * p-value<0.1. Constant and time fixed effects included in all estimations. GMM-system estimations are two-steps estimations with Windmeijer (2005) finite-sample correction. Urbanization and the share of population under 14 are considered as exogenous; elections, the lagged dependent variable and imports are instrumented with first-order to third-order lags and inflation and GDP are instrumented with second to third-order lagged values. The matrix of instruments has been collapsed.

If we compare the results of Table 1.2 with those of Table 1.1, by the criterion of the p-value, the original dating of the variable Election slightly outperforms the alternative dating system. Having confirmed that our main result is robust to an alternative timing of elections, we therefore retain the original calendar dating of the election dummy for the remainder of the study.

1.4.3. Post-election effects on tax revenues

With indirect tax revenues being significantly decreased during election years, one can wonder whether there is also a post-election reaction to these tax revenues. According to the theoretical model, tax revenues are modified only during election years. In the year just after the election, tax revenues are supposed to go back to normal and to be the same as those in an average non-election year. A dummy variable Post-election$_{i,t}$, taking the value of one if t is a post-election year and zero otherwise, is included.

The results are presented in Table 1.3 and show that there is no significant manipulation of indirect tax revenues in the year following an election. This absence of a post-election reaction of fiscal variables is also found by Brender and Drazen (2005). These results suggest that indirect tax revenues are not significantly expanded following an election to counterbalance the loss of revenue experienced during the election year. The 0.3 percentage point of GDP drop in indirect tax revenues that happens in election years is therefore not compensated for.

Table 1.3. Post-election effects on the tax structure (Direct Taxes and Indirect Taxes (%GDP))

	OLS-Fixed Effects		GMM-System	
VARIABLES	Direct Taxes	Indirect Taxes	Direct Taxes	Indirect Taxes (4)
Election	0.0167	-0.171**	-0.000685	-0.311***
	(0.046)	(0.078)	(0.054)	(0.079)
Post Election	-0.0837	-0.000213	-0.0876*	0.00104
	(0.056)	(0.10)	(0.051)	(0.099)
Y_{t-1}	0.706***	0.686***	0.721***	0.651***
	(0.044)	(0.029)	(0.093)	(0.063)
GDP per capita (log)	0.484**	-0.0201	0.565***	-0.222
	(0.21)	(0.36)	(0.20)	(0.62)
Imports (%GDP)		0.0203***		0.0378***
		(0.0067)		(0.013)
Inflation (log)	-0.0100	0.0107	-0.0114	0.00698
	(0.014)	(0.017)	(0.0077)	(0.019)
Urbanization	-0.286**	-0.148	0.545	0.332
	(0.12)	(0.18)	(0.49)	(0.25)
Population below 14	0.0149	0.0735**	0.0233	-0.0635
	(0.015)	(0.031)	(0.021)	(0.047)
Observations	1,070	1,238	1,070	1,238
R-squared	0.592	0.552		
Number of countries	56	56	56	56
Nb of instruments			43	47
Hansen Test (p-val)			0.514	0.409
AR(1) Test (p-val)			0.000	0.000
AR(2) Test (p-val)			0.805	0.863

Notes: Robust standard errors in brackets. *** p-value<0.01, ** p-value<0.05, * p-value<0.1. Constant and time fixed effects included in all estimations. GMM-system estimations are two-steps estimations with Windmeijer (2005) finite-sample correction. Urbanization, the share of population under 14 are considered as exogenous; the lagged dependent variable, imports, election and postelection are instrumented with first-order to third-order lags and inflation and GDP are instrumented with second to third-order lagged values. The matrix of instrument has been collapsed.

1.4.4. Pre-determined elections versus endogenous ones

In order to ensure that our results in the GMM-system estimation really reflect a causality from elections to indirect tax revenues and are not fraught by an endogeneity problem, we follow

Brender and Drazen (2005) and Shi and Svensson (2006) by distinguishing the constitutionally determined elections from the endogenous ones.

Table 1.4. Estimation of the effect of pre-determined and endogenous elections on tax structures

	Fixed Effect		GMM-System	
VARIABLES	Direct Taxes (1)	Indirect (2)	Direct (3)	Indirect Taxes (4)
Election Pre-determined	0.0694	-0.208**	0.0231	-0.374***
	(0.053)	(0.095)	(0.057)	(0.097)
Election Endogenous	-0.0297	-0.0706	0.0360	-0.195
	(0.075)	(0.104)	(0.082)	(0.141)
Y_{t-1}	0.705***	0.687***	0.707***	0.646***
	(0.045)	(0.029)	(0.110)	(0.066)
GDP per capita (log)	0.471**	-0.0143	0.531**	-0.101
	(0.210)	(0.363)	(0.239)	(0.613)
Imports (%GDP)		0.0203***		0.0374***
		(0.0067)		(0.012)
Inflation (log)	-0.287**	-0.144	0.575	0.308
	(0.121)	(0.188)	(0.551)	(0.234)
Urbanization	-0.0102	0.0106	-0.0107	0.00354
	(0.014)	(0.017)	(0.0097)	(0.018)
Population below 14	0.0140	0.0734**	0.0222	-0.0573
	(0.015)	(0.031)	(0.021)	(0.046)
Observations	1,070	1,238	1,070	1,238
R-squared	0.592	0.552		
Number of countries	56	56	56	56
Number of instruments			39	43
AR(1) Test (p-val.)			0.000	0.000
AR(2) Test (p-val.)			0.762	0.865
Hansen Test (p-val.)			0.225	0.314

Notes: Robust standard errors in brackets. *** p-value<0.01, ** p-value<0.05, * p-value<0.1. Constant and time fixed effects included in all estimations. GMM-system estimations are two-steps estimations with Windmeijer (2005) finite-sample correction. Urbanization, the share of population below 14, predetermined and endogenous elections are considered as exogenous; the lagged dependent variable and imports are instrumented with first-order to third-order lags and inflation and GDP are instrumented with second to third-order lagged values. The matrix of instrument has been collapsed.

By isolating the strictly exogenous elections, which occurred as constitutionally planned, we make sure that their estimated impact on the different kinds of taxes is unbiased. The results are presented in Table 1.4 and suggest that the previous estimations with the GMM-system estimator

correctly dealt with the endogeneity issue. This is because there is a significantly negative effect of the predetermined elections on indirect tax revenues of a similar magnitude to previously. Again, no significant manipulation of direct taxes is revealed in election years. In developing countries, the incumbent therefore seems more likely to decrease broad-based taxes that could benefit a large number of voters than direct taxes affecting solely firms.

1.4.5. Level of democracy

Given that several of the elections in our sample occurred in autocracies and weak democracies, we will try to assess whether the identified effect of elections on tax composition is mainly driven by elections occuring under consolidated democracies or by those under weaker democracies.

In Table 1.5, to address this question, we first split the electoral dummy into elections that occurred when the level of democracy in the country was scoring above 5 on the Polity2 scale and elections that occurred in a context of weak democracy or anocracy (Polity2 score of 5 or below) (columns 1 and 2). Second, we consider the effect of predetermined elections in two sub-samples: in a sample of observations where the polity2 score is relatively high (columns 3 and 4) and in a sample where it is lower. In columns 1 and 2, the results indicate that both elections held under consolidated democracies and those held under weak democracies or autocracies have a significant negative effect on indirect tax revenues. However, the magnitude of the effect is smaller in the case of consolidated democracies. This distinctively lower impact in established democracies holds when we consider only predetermined elections (columns 3 to 6). These results are consistent with those found by Brender and Drazen (2005).

Table 1.5. Estimation of the electoral effect on tax structures according to the level of democracy (GMM-System estimations)

VARIABLES	Direct Taxes	Indirect Taxes	*Polity Score < 6*		*Polity Score >=6*	
			Direct Taxes	Indirect Taxes	Direct Taxes	Indirect Taxes
	(1)	(2)	(3)	(4)	(5)	(6)
Elections in democracy	0.0702	-0.203*				
	(0.081)	(0.112)				
Elections in weak democracy / autocracy	-0.00893	-0.481***				
	(0.092)	(0.149)				
Election Pre-determined			0.0423	-0.488**	-0.0288	-0.214**
			(0.131)	(0.210)	(0.108)	(0.105)
Election Endogenous			-0.106	-0.111	0.0497	0.228
			(0.155)	(0.178)	(0.121)	(0.226)
Y_{t-1}	0.694***	0.660***	0.805***	0.698***	0.814***	0.802***
	(0.123)	(0.065)	(0.089)	(0.082)	(0.198)	(0.058)
GDP per capita (log)	0.401	0.0866	0.617**	-0.582	0.683	2.933**
	(0.255)	(0.588)	(0.295)	(0.744)	(1.076)	(1.217)
Imports (%GDP)		0.0362***		0.0504**		0.0365*
		(0.011)		(0.024)		(0.022)
Inflation (log)	0.422	0.281	0.880*	0.396	-0.382	0.711***
	(0.594)	(0.279)	(0.472)	(1.131)	(1.731)	(0.227)
Urbanization	-0.0066	-0.00097	-0.0225	0.0237	-0.00957	-0.0387
	(0.009)	(0.018)	(0.014)	(0.035)	(0.014)	(0.023)
Population below 14	0.0137	-0.0427	-0.0157	-0.0467	0.0354	0.242**
	(0.023)	(0.043)	(0.033)	(0.064)	(0.116)	(0.097)
Observations	1,070	1,238	616	663	454	575
Number of countries	56	56	38	42	40	41
Number of instrument	46	49	38	41	38	41
AR(1) Test: p-val.	0.000	0.000	0.001	0.000	0.011	0.000
AR(2) Test: p-val.	0.785	0.882	0.209	0.527	0.686	0.783
Hansen Test: p-val	0.343	0.538	0.473	0.699	0.306	0.857

Notes: Robust standard errors in brackets. *** p-value<0.01, ** p-value<0.05, * p-value<0.1. Constant and time fixed effects included in all estimations. GMM-system estimations are two-steps estimations with Windmeijer (2005) finite-sample correction. In columns 1 and 2, urbanization and the share of population below 14 are considered as exogenous; election, the lagged dependent variable and imports are instrumented with first-order to third-order lags and inflation and GDP are instrumented with second to third-order lagged values. In columns 3 to 6, predetermined and endogenous elections are considered as exogenous. The matrix of instrument has been collapsed.

They establish that the political budget cycle is more pronounced in new democracies than in old democracies because fiscal manipulation is more rewarded in those countries where citizens are inexperienced with electoral politics or lack the information needed to evaluate fiscal manipulation. In our sample of elections occuring in established democracies, where we find a weaker political tax cycle, most of the countries are old democracies[16] (for instance, several Latin American countries, India and Botswana or Mauritius in Africa, among others).

1.5. Concluding Remarks

Most studies have analyzed the presence of political budget cycles in total tax revenues without considering the possibility of an electoral manipulation of specific types of taxes. In this paper we explained, by relying on the model of the political budget cycle in expenditure composition of Drazen and Eslava (2010), the existence of political cycles in the composition of taxes. In developing countries, where the median voter's share of capital is lower than the mean capital endowment of the population and only a few citizens pay income taxes, we showed that the median voter is more likely to favor low indirect taxes compared with low direct taxes. A political cycle will arise in the composition of taxes because voters and politicians have different preferences regarding tax policy. Voters value decreases in indirect taxes whereas politicians prefer decreases in direct taxes in order to favor companies. If re-election is valuable enough, a political budget cycle exists with indirect taxes expected to be lower in an election year than in a non-election period. These theoretical predictions were confirmed empirically in a sample of 56 developing countries over the period 1980-2006. Our results reveal significant pre-electoral political budget cycles with non-negligible contractions in indirect taxes. No evidence of statistically significant expansions in direct

[16] The vast majority of the elections held in these countries, over the period 1980-2006, occurred at a time when the countries were democracies.

tax revenues was found; they remain unchanged during election periods. By decreasing the indirect tax revenues in the election year, governments target the mass of voters rather than firms. This result held when we considered only the effect of the predetermined elections and when we used alternative ways of dating elections. The identified political cycle in indirect tax revenues appeared larger in weaker democracies or autocracies than in established democracies.

These significant tax cuts in indirect taxes during the election year are found not to be counterbalanced by any significant increase in the year following an election. They can therefore constitute an impediment, in addition to developing countries' structural limitations, to enhancing tax mobilization.

1.6. Appendices

Appendix 1.1 - 56 Countries in the sample, type of regime and election years

Argentina (PR)	83, 89, 95, 99, 03	Lesotho (PA)	93, 98, 02
Belize (PA)	84, 89, 93, 98, 03	Madagascar (PR)	82, 89, 93, 96, 01, 06
Bolivia (PR)	80, 85, 89, 93, 97, 02, 05	Malawi (PR)	94, 99, 04
Botswana (PA)	84, 89, 94, 99, 04	Malaysia (PA)	82, 86, 90, 95, 99, 04
Burkina Faso (PR)	91, 98, 05	Mali (PR)	92, 97, 02
Burundi (PR)	84, 93, 05	Mauritania (PR)	92, 97, 03
Cameroon (PR)	80, 84, 88, 92, 97, 04	Mauritius (PA)	82, 87, 91, 95, 00, 05
Cape Verde (PR)	85, 91, 96, 01, 06	Mexico (PR)	82, 88, 94, 00, 06
Central African Rep. (PR)	86, 93, 99, 05	Morocco (PR)	84, 93, 97, 02
Chad (PR)	96, 01, 06	Mozambique (PR)	94, 99, 04
Chile (PR)	89, 93, 00, 06	Niger (PR)	89, 93, 96, 99, 04
Colombia (PR)	82, 86, 90, 94, 98, 02, 06	Nigeria (PR)	83, 93, 99, 03
Congo Rep. (PR)	92, 02	Pakistan (PR)	90, 93, 97
Costa Rica (PR)	82, 86, 90, 94, 98, 02, 06	Peru (PR)	80, 85, 90, 95, 00, 01, 06
Cote d'Ivoire (PR)	80, 85, 90, 95, 00	Philippines (PR)	81, 86, 92, 95, 98, 04
Dominican Rep. (PR)	82, 86, 90, 94, 96, 00, 04	Rwanda (PR)	83, 88, 03
Ecuador (PR)	84, 88, 92, 96, 98, 02, 06	St Vinc.& Grenad. (PA)	84, 89, 94, 98, 01, 05
Egypt Arab Rep. (PA)	84, 87, 90, 95, 00, 05	Senegal (PR)	83, 88, 93, 00
El Salvador (PR)	84, 89, 94, 99, 04	Sierra Leone (PR)	85, 96, 02
Ethiopia (PA)	00, 05	Sri Lanka (PR)	82, 88, 94, 99, 05
Fiji (PA)	82, 87, 92, 99, 01, 06	Sudan (PR)	80, 81, 96, 00
The Gambia (PR)	82, 87, 92, 96, 01, 06	Tanzania (PR)	80, 85, 90, 95, 00, 05
Ghana (PR)	92, 96, 00, 04	Thailand (PA)	83, 87, 92, 95, 96, 01, 05, 06
Guatemala (PR)	82, 85, 90, 95, 99, 03	Togo (PA)	86, 94, 99, 02
Guinea-Bissau (PR)	94, 00, 05	Tunisia (PR)	89, 94, 99, 04
India (PA)	80, 84, 89, 91, 96, 99, 04	Uganda (PR)	96, 01, 06
Iran (PR)	89, 93, 97, 01, 05	Uruguay (PR)	84, 89, 94, 99, 04
Kenya (PR)	83, 87, 92, 97, 02	Zambia (PR)	83, 88, 91, 96, 01, 06

PR: Presidential Regime; PA: Parliamentary Regime in 2000

Appendix 1.2 - Summary statistics

Variable	N	Mean	Std. Dev.	Min.	Max.
Indirect Tax Revenue (%GDP)	1379	9.101	4.066	0.652	31.153
Direct Tax Revenue (%GDP)	1201	3.795	1.990	0.174	12.0175
Election	1512	0.177	0.382	0	1
Election 1st half	1512	0.075	0.263	0	1
Election 2nd half	1512	0.101	0.302	0	1
Election (datation 2)	1512	0.176	0.381	0	1
Post Election	1512	0.167	0.373	0	1
Election Predetermined	1512	0.1237	0.329	0	1
Election Endogenous	1512	0.0536	0.225	0	1
Election in democracies	1512	0.1005	0.301	0	1
Election in weak democracies or	1512	0.0754	0.264	0	1
GDP per capita (log)	1492	7.343	0.979	5.278	9.475
Urbanization	1456	39.702	20.110	4.3	92
Imports (%GDP)	1490	36.608	20.355	2.982	130.923
Inflation (log)	1444	4.122	0.413	3.525	9.376
Share of population below 14	1512	5.140	0.206	4.731	6.322

CHAPTER 2.

Assessing the relationship between democracy and domestic taxes in developing countries[17]

Abstract

To what extent differences across developing countries in their domestic tax mobilisation can be explained by their political regime? Using a panel of 66 developing countries over 1990-2005, we found that democracy matters for achieving higher domestic taxes, which are needed to finance public goods. The constraints on the executive are especially of importance to counter the government's propensity to cave in for special interests and be insufficiently welfare minded. Moreover, democracy is specifically needed in natural resource rich countries to make natural resource rents contribute to higher domestic taxes and no longer be an impediment to a sustained tax system.

[17] Currently under the status "Revise and resubmit" in the Journal *Economics Bulletin.*

2.1. Introduction

With globalization, new fiscal challenges are imposed on developing countries, forcing them to modify their tax systems (Aizenman and Jinjarak, 2009). These coordinated tax-tariff reforms favor a decrease in tariffs to enhance efficiency with an increase in domestic taxation in order to maintain enough revenue to finance public goods. However, for many developing countries, this revenue substitution is difficult. According to Baunsgaard and Keen (2010), in low income countries, for one dollar of loss from tariffs, only thirty cents were recovered from domestic taxation (direct taxes - taxes on income and profit - and domestic indirect taxes – value added/sales taxes and excises). A sustained tax system able to generate higher domestic tax revenue is crucial in order to finance much needed public goods. Moreover, developing countries are really in need of increased domestic tax revenues since the 66 countries in our sample collected only, on average over the period 1990-2005, about 10 per cent of GDP from domestic taxation while international trade taxes are falling. However, tax reforms and enhanced mobilisation can only be achieved when there is a strong political will and leadership to adopt the necessary measures.

The only slow progresses in domestic tax mobilisation might therefore be due to political economy factors which should be taken into consideration. As far as trade taxes are concerned, it is well established in theory and in empirical work that trade policy decisions are used by governments of both developed and developing countries to favor special interest groups, making a trade off between welfare and rents (see Grossman and Helpman, 1994; Goldberg and Maggi, 1999; Cadot et al., 2003 among others). The importance of political economy factors in the developing countries' domestic tax decisions has however been less studied. Nonetheless, experiences in these countries let us think that they may play a huge role. Indeed, governments could be tempted either to protect specific sectors by enacting non neutral VAT and excises or by

according exemptions to some interest groups or to set the VAT threshold at a particular level,[18] for example, thus leading to significantly less tax revenues. Similarly, reforms of direct taxes on personal income are often delayed due to interest groups pressures.

Given this background, the contribution of this paper is to show that, if political economy factors matter in domestic tax policies, they can be accommodated by increased democracy. We thus examine whether the type of political regime in place, with all its inherent features, is relevant for explaining the performances of domestic tax revenues in developing countries. In the presence of a weak system of checks and balances and if powerful economic elites control the political process, the government might be less welfare minded and it may be easier to grant favors to special interests. Only few studies used the components of democracy indicators to distinguish which aspect of democracy is of importance, we will therefore examine which aspect of democracy is necessary to ensure higher domestic taxes mobilisation. Another research question is, in which kind of countries, this positive effect of democracy would especially be needed to build a sustained tax system? Given the fact that the presence of high natural resource rents in the beginning of the period undeniably creates soft budget constraints which serve to delay the tax policy changes needed, one may wonder whether more democratic institutions in natural resource-rich countries could make these natural resource rents contribute to higher domestic taxes revenues and no longer be an obstacle to a sustained tax system.

It is of paramount importance to explain the design of taxation policies and identify what is relevant to limit tax mobilisation impediments. If democracy appears to be also important for domestic tax revenues, because democratic regimes respond less to special interests, the wave of democratisation in developing countries since the 1990s might help countries to achieve higher tax revenues. Political economy factors can be taken into account by policy makers who should

[18] In Uganda, for instance, the near-failure of the VAT introduced in 1995 was quelled in large part by rapidly increasing the threshold from $20 000 to $50 000 (Keen and Mintz, 2004).

communicate on the consequences of the reform in order to reduce the uncertainty and garner a sufficient number of groups in favor of the domestic tax reform.

Institutional factors as determinants of tax revenue in developing countries have been taken into consideration by some authors. Gupta (2007) shows that corruption is a significant determinant of tax revenues. Bird et al. (2008) postulate that if taxpayers both perceive that their interests are properly represented in political institutions and that the governance is good, their willingness to contribute by paying taxes increases. Using cross section data, they find that corruption and voice and accountability play a significant role in the determination of developing and transition countries tax effort. Cheibub (1998) studied in 108 developed and developing countries over the period 1970-1990 whether the infant democracies will be as able as autocracies to collect taxes. The use of a discrete measure of political regime is quite limiting but he found that there are no grounds for believing that democracies are any less able than dictatorships to extract resources from society through taxation.

Our study is in the continuity of this research field but sheds a light on the detrimental presence of interest groups for domestic taxes that could be accommodated by democracy. We use a continuous measure for political regime to test the importance of the political regime, with its inherent features, for domestic tax performance showing that the slow increase in domestic taxes might be due to delays in tax reform implementation and responses to special interest groups. We also add to the literature by focusing on which aspect of democracy is important and in which countries it is especially needed. Contrary to Bird et al. (2008) the focus will not be on the increased citizen's willingness to pay due to good governance but on the presence of political economy factors with interest groups seeking less taxation. The above mentioned papers mainly studied the total tax revenue, mixing the growing domestic taxes and the declining taxes on international trade. We will only focus here on the domestic part of the tax performance reflecting properly the country's political will. Moreover, we treat the political regime as being endogenous to the performance of tax revenue. The adequate instrument for democracy is an

issue almost not addressed in the literature, we therefore propose an original instrument, inspired by the democracy determinants literature, namely the democracy level of the country's neighbors.

To preview our results, we find that the level of democracy is of importance in explaining the differences in domestic tax revenue performances. Our evidence reveals that the level of constraints on the executive seems to be the driving force behind the result. Democratic institutions are particularly important in natural resource abundant countries where higher levels of democracy can transform the negative influence of the initial presence of natural resource rents on domestic tax revenue into a positive one. The paper is divided into five sections. Section 2 presents the relationship between the political regime and taxation. Section 3 describes our empirical framework. Section 4 presents the results of the panel analysis. Finally, section 5 concludes.

2.2. Political Regimes and Taxation

How might a country's political regime influence its domestic tax performance? The economic theory highlights some features of political regimes that might be of importance for enhanced domestic tax mobilisation.

First of all, representation is critical since the economic reforms implemented depend on who controls the political office. Indeed, Acemoglu and Robinson (2006) model autocracy as a dictatorship of the rich and democracy as a dictatorship of the poor or middle classes. As the rich are acting against redistribution and therefore against taxation, less reforms to increase taxes should be implemented in an autocracy. Alesina and Rodrik (1994) confirm this idea by predicting that, in societies where the choice of policy is determined by the median voter theorem, as in democracies, and where a large proportion of population does not have access to capital, there will be a strong demand for taxation. This corresponds particularly to developing

countries where the median voter's share of capital income (relative to his labor income) is low, thus his ideal tax is high. Mitra et al. (2002), using Turkish industry level data, found that the government's weight on welfare, compared to the weight on lobbies' contributions, is generally higher for democratic regimes than for dictatorships. Drawing on these predictions, it can be hypothesised that democracies might take more into account the social welfare and be characterised by larger tax reforms, taking the form of higher taxation, to mobilise more revenue for redistributive policies.

Secondly, the accountability structures might also be different according to the political regime. In democracies, the level of constraints on both executive and legislative powers should be greater since they demand accountability to a broad set of citizens at regular intervals whereas dictatorships are mainly accountable to a smaller group such as the military. Adam et al. (forthcoming) found both theoretically and empirically that democratic institutions are able to restrain public sector inefficiencies because of electoral control. Thus, more accountability structures in democracies give less latitude for decision makers to respond to special interests. For instance, in Morocco, the value added tax, implemented in 1986, still generates insufficient revenues because of its complexity and the numerous exemptions that were granted in response to various interest groups (Brun et al., 2007). Acemoglu and Robinson (2008) show that the impact of institutions on economic outcomes depends on the interaction between de jure political power, whose allocation is determined by political institutions, and de facto political power, which is determined by the equilibrium investments and organisations of different groups. In democracy, the balance of de jure power is tilted toward the citizens, while in nondemocracy the elite have greater de jure power. If the elite is able to garner sufficient de facto political power in democracy, the equilibrium probability of pro-elite institutions may be higher in democracy than in nondemocracy. However, if democracy creates a substantial advantage in favor of the citizens, it may destroy the incentives of the elite to engage in activities that increase its de facto power. This idea is confirmed by Calderon and Chong (2006) who found that higher political constraints in the policy decision process are negatively and

significantly associated with rent-seeking behavior. Therefore, democracies with specific constraints structures, effective checks and balances, can decrease the possibilities for leaders to respond to interest groups seeking for less domestic taxation.

Given these theoretical predictions, democracies in developing countries should be more able than autocracies to implement tax reforms, taking the form of higher domestic tax revenues. Indeed, they should implement more redistributive policies and less respond to special interests, by enacting fewer specific tax exemptions detrimental to public revenues.

2.3. The Empirical Framework

To estimate the influence of the political regime on domestic tax revenue, we use a panel data analysis for 66 developing countries (see Appendix 2.1). Our period of analysis is 1990-2005. All variables are three year averages, the sub periods being 1990-1992, 1993-1995, 1996-1998, 1999-2001 and 2002-2005. The basic estimated equation is of the following form:

$$Domestictaxrev_{it} = \alpha + \beta Democracy_{it} + \delta X_{it} + \mu_i + \lambda_t + u_{it}$$

where *i* and *t* are country and time period indicators respectively, *Domestictaxrev* is the domestic tax revenue as part of GDP composed of direct taxes (taxes on income and profit) and domestic indirect taxes (value added/sales taxes and excises), *Democracy* is the measure of democracy and the vector *X* captures other explanatory variables, discussed further below, affecting the domestic tax ratio. The term μ_i is a country specific effect, λ_t is an unobserved time effect included to rule out results driven by common time varying factors not otherwise included in our model and u_{it} is an unobserved random error term.

2.3.1 Data Sources and Statistics

Reliable data on domestic tax revenues in developing countries are relatively scarce. Our data are based on the Government Finance Statistics (GFS) produced by the IMF and completed by the Article IV data. They are collected during IMF's periodic consultations with member countries and are therefore more trustworthy. A major difficulty is that what is recorded as international trade taxes often also include value added taxes and excises collected at the border leading to an underestimation of the domestic tax revenue. This flaw has progressively been corrected and, since 1990, the distinction has been generally correctly made, thus generating more reliable data on domestic taxes. We therefore choose to begin our study in 1990. We use a variety of variables to capture the level of democracy. Firstly, as in De Haan and Sturm (2003) or Tavares and Wacziarg (2001) among others, we employ Freedom House's ranking of countries with respect to their political rights. This political rights measure expresses the degree to which individuals have control over those who govern. Secondly, we follow Besley and Kudamatsu (2006) and Mulligan et al. (2004) and use the Polity2 variable, from the Polity IV project, which captures the regime authority spectrum from hereditary monarchies to consolidated democracies. All these variables were normalised so that they range between zero (autocracy) and unity (full democracy). Thirdly, in order to show that our results are not sensitive to the choice of the democracy measure, we use as alternative indicator, the dichotomous regime classification from the recent dataset Democracy Dictatorship extended by Cheibub et al. (2010). The democracy dummy takes the value of one if the country is a democracy and zero otherwise.

Drawing on the empirical literature that models the share of tax revenues in GDP (Adam et al., 2001; Khattry and Rao, 2002; Keen and Lockwood, 2010), we include the following variables as control. The GDP per capita is a proxy for overall development, higher level of per capita income is usually found to be positively related to domestic tax revenues. The structure of the economy is both measured by the share of agriculture in GDP usually negatively associated with domestic tax revenues and by the degree of urbanisation which is expected to have a positive impact on domestic tax revenues. The level of imports should be positively associated with

domestic tax performance given that, in developing countries, a large part of the VAT collected is levied on imports. Higher inflation is supposed to reduce domestic tax yields according to the Tanzi Olivera effect. The relationship between aid per capita and tax revenue is uncertain and might depend on the purposes of aid. Demographic variables are included, the proportion of the population over 65 years and the share under 14 years old, the tax ratio usually being increasing with the number of dependent in the population. All these variables are from the World Development Indicator (WDI) database. Finally, we introduce the measures of bureaucracy quality and of corruption compiled by the Political Risk Services Group (ICRG) and rescaled from 0 to 1. Descriptive statistics are presented in Appendix 2.2.

2.3.2. The econometric issues

Given the persistence of domestic tax revenues, there is a suspicion of serial correlation which is confirmed by a Wooldridge test. To correct for it, we can either include the lagged dependent variable and estimate the model with the generalized method of moments (GMM) proposed by Arellano and Bond (1991) or use an estimator which fits panel regression models when the disturbance term is first-order autoregressive (Gupta, 2007). We will use the latter solution in our estimations since we are not interested in distinguishing the short term effects from the long term ones. A concern may also arise about the endogeneity of democracy with tax performance. One can argue that the relationship between democracy and tax revenue is unlikely to be unidirectional for two reasons. Firstly, a higher level of taxes might be needed to invest and build expensive democratic institutions. Secondly, the Tilly (1975) hypothesis postulating that citizens are provoked into scrutiny by taxation was tested empirically by Ross (2004) who finds that the larger the share of government expenditure financed through taxation, the more likely the government is to become representative. There is therefore a potential reverse causality from taxes to democracy. Ordinary least squares with specific effects estimates are thus likely to be biased. To correct this endogeneity, we resort to an instrumental variable estimation with an original instrument for democracy, namely the democracy level of the country's neighbors. The choice of adequate instruments for democracy is not widely addressed

in the literature. However, following Persson and Tabellini (2009),[19] it is easily imagined how the experience with democracy in foreign, neighboring countries could spill over into greater domestic appreciation of democracy and greater willingness to defend these values. Thus, we create the variable neighboring democratic capital to measure a country's "closeness to democracy", given the incidence of democracy in neighboring countries. Specifically, for the country *i* with n_i neighbors *j* in year *t*, we define

$$Ndemocracy_{it} = \sum_{j=1}^{n_i} \frac{1}{n_i} * democracy_{jt}$$

This variable is constructed for each of our democracy measures, namely NPoliticalRights, NPolity2, NDummyDemo, NPoliticalcompetition and NExecutiveconstrainsts. The first stage regressions will be presented in order to check whether our instrument is significantly related to democracy.

2.4. Results

In this section, we will firstly examine whether the political regime has an impact on domestic tax mobilisation. Secondly, we test which aspect of the political regime is crucial to reach higher domestic tax revenues and relate this result to the presence of various interest groups. Lastly, we investigate in which countries the positive effect of a certain kind of political regime might be especially necessary.

2.4.1 The influence of the political regime on domestic tax revenues

Estimations of the influence of the political regime on domestic tax ratio are reported in Table 2.1 for our first measure of democracy, Polity2. The fourth column shows the results of the

[19] Persson and Tabellini (2009) use a weighting matrix of the distance between all countries whereas we deviate slightly by considering only the neighbouring countries with a weighting matrix taking the value of one if two countries are neighbours and zero otherwise.

instrumental variable regression with random effects (the Hausman test did not reject the null hypothesis that the random effects model is consistent and efficient) corrected for first-order autocorrelation of a basic tax effort equation with only few control variables. These results, corrected for endogeneity, suggest a positive and significant effect of democracy on the domestic tax revenues as part of GDP.

Table 2.1. Influence of democracy on domestic tax revenues (%GDP)

VARIABLES	Polity2 *First Stage*			Domestic tax rev. (%GDP) *IV AR(1) correction*		
	(1)	(2)	(3)	(4)	(5)	(6)
Polity 2				6.11**	7.23**	9.57***
				(2.60)	(3.03)	(3.37)
GDP capita (log)	0.012	-0.14***	0.018	0.38	0.74	0.49
	(0.03)	(0.04)	(0.05)	(0.68)	(0.91)	(0.94)
Imports (%GDP)	-0.002**	-0.002**	-0.0007	0.04**	0.05***	0.067***
	(0.001)	(0.001)	(0.001)	(0.02)	(0.02)	(0.02)
Agriculture (%GDP)	-0.001	-0.004**	0.00008	-0.06*	-0.04	-0.03
	(0.002)	(0.002)	(0.002)	(0.03)	(0.04)	(0.04)
Inflation (log)		-0.02	-0.008		-0.08	-0.13
		(0.02)	(0.02)		(0.2)	(0.22)
Urbanisation		0.003**	-0.003*		-0.03	-0.04
		(0.001)	(0.002)		(0.03)	(0.04)
Population sup 65		-0.04***	-0.04**		0.96***	1.14***
		(0.01)	(0.02)		(0.32)	(0.37)
Population inf 14		-	-0.03***		0.29**	0.33**
		(0.005)	(0.006)		(0.12)	(0.13)
Aid capita (log)			0.05			0.43
			(0.04)			(0.6)
Corruption			-0.26*			3.13*
			(0.14)			(1.81)
Bureaucracy Quality			-0.11			3.69***
			(0.09)			(1.31)
Npolity2	0.52***	0.43***	0.43***			
	(0.07)	(0.07)	(0.09)			
Observations				277	252	197
Nb of countries				66	61	48
Hausman Test (p-val)				0.93	0.17	0.4
R-squared	0.21	0.3	0.31	0.21	0.23	0.32

Note: Robust standards errors in brackets. ***p-value<0.01, **p-value<0.05, *p-value>0.1.
Constant and time fixed effects included.

The results of the associated first stage equation in column 1 indicate support for the validity of our instrument, the level of democracy in the neighborhood being a highly significant determinant of democracy.

After introducing the level of inflation, the two demographic variables and the degree of urbanisation (column 5) and then, in column 6, the bureaucracy quality, the corruption level and the transfers of aid as additional control variables, the coefficient of democracy remains strongly positive and significant at one per cent. With the last specification, an increase of one standard error in the democracy index permits a rise of 9.57*0.29=2.77 percentage points in the domestic tax revenue as part of GDP. For the mean level of domestic tax revenue in our sample, 9.86 per cent of GDP, this corresponds to a non negligible rise of about 25 per cent.

A number of regularities among the control variables emerge. As expected, the imports as share of GDP are positively and significantly related to domestic tax revenues and a higher bureaucracy quality leads to significantly higher domestic taxes. The level of corruption is positively related to domestic tax revenues and this can either be due to the "grease the wheel" hypothesis (Huntington, 1968) that in an inefficient bureaucratie, some grease is needed to circumvent inefficiencies or be due to the endogeneity of the corruption variable with tax revenues. The proportions of dependent in the population (people above 65 and under 14) are significantly associated to the domestic tax revenues. Lastly, the coefficients of the level of per capita GDP and of the agricultural sector share are negative though non significant.

In order to corroborate our results and check whether they are robust, whatever the democracy indicator used, we present the results with two additional alternative measures for democracy using the instrumental variable estimator with our last specification of Table 2.1. In Table 2.2, we present the results with the Political Rights indicator (column 2) and with the Dummy Democracy (column 4).

Table 2.2. Robustness – Influence of democracy on domestic tax revenues (%GDP)

VARIABLES	Pol. Rights *First Stage* (1)	DomTaxRev IV AR(1) (2)	Demo Dummy *First Stage* (3)	DomTaxRev IV AR(1) (4)
Political Rights		10.73**		
		(4.69)		
Democracy Dummy				5.41*
				(2.96)
GDP capita (log)	0.008	0.45	-0.02	0.88
	(0.04)	(0.87)	(0.07)	(0.82)
Imports (%GDP)	-0.0008	0.08***	-0.002	0.08***
	(0.001)	(0.02)	(0.002)	(0.02)
Agriculture (%GDP)	-0.002	-0.02	-0.0003	-0.01
	(0.002)	(0.04)	(0.004)	(0.03)
Inflation (log)	-0.01	-0.09	-0.006	-0.16
	(0.02)	(0.22)	(0.03)	(0.21)
Urbanisation	-0.003**	-0.02	-0.001	-0.04
	(0.002)	(0.04)	(0.003)	(0.03)
Population sup 65	-0.02	1.09***	-0.01	0.83***
	(0.02)	(0.33)	(0.03)	(0.31)
Population inf 14	-0.02***	0.37***	-0.03***	0.30***
	(0.006)	(0.13)	(0.01)	(0.12)
Aid capita (log)	0.12***	-0.4	-0.04	1.14**
	(0.04)	(0.81)	(0.06)	(0.54)
Corruption	-0.17	3.04*	-0.38	2.91
	(0.14)	(1.74)	(0.23)	(1.77)
Bureaucracy Quality	-0.002	3.07**	-0.092	2.86***
	(0.09)	(1.22)	(0.16)	(1.11)
NPoliticalRights	0.31***			
	(0.08)			
NDemocracyDummy			0.29***	
			(0.09)	
Observations		210		229
Number of countries		51		55
Hausman Test (p-val.)			0.95	0.99
R-squared	0.25	0.29	0.2	0.24

Note: Robust standards errors in brackets. ***p-value<0.01, **p-value<0.05, *p-value>0.1.
Constant and time fixed effects included.

The coefficient of democracy, measured with the Political Right indicator, remains significantly positive and of similar magnitude than with the Polity2 measure. The corresponding instrument, NeighborPoliticalRights, is statistically significant, at one percent, in the first stage equation (column 1). In column 4, the democracy index is a discrete measure

extracted from the Democracy Dictatorship dataset. The instrument for the democracy dummy is statistically significant in the first stage equation and can therefore be considered as valid. The 2SLS estimates corrected for first-order autocorrelation, with the democracy dummy, corroborate the result that more democratic regimes are able to achieve higher domestic tax revenues hypothetically because they are able to accommodate political economy factors and grant less tax exemptions.

Another concern is whether this positive effect of democracy on domestic taxes is not solely due to a better quality of public spending in democracies which could enhance the citizen's tax morale, leading to an increased tax mobilisation. Rajkumar and Swaroop (2008) shows that higher public spending quality can be achieved only when good governance is present, because low levels of corruption and good bureaucracy quality are necessary to ensure the development effectiveness of public spending.[20] Therefore, the two control variables, bureaucracy quality and level of corruption, already in our estimations, permit to ensure that our result of democracies achieving higher domestic tax mobilisation is not only due to an enhanced quality of public expenditure under democratic regimes but might also come from the fact that, as developed in the theoretical part, democracies are more social welfare oriented and respond less to private interests. We will now investigate this issue by distinguishing the different components of the democracy measure.

2.4.2 What matters in democracy for increased domestic tax revenues?

It is interesting to know which aspect of democracy is the driving force behind the result of increased domestic tax collection in more democratic regimes. We explore this issue in Table 2.3 by using two component measures of the Polity2 index that might be of importance, namely Political Competition and Constraints on Executive. The variable Political Competition represents the extent of competitiveness in political participation whereas the Executive Constraints variable assesses the extent of institutional constraints on the decision making

[20] Frey and Torgler (2007) found that tax morale is increasing with these two aspects of institutions quality.

powers of the chief executive. Limits on the chief executive may be imposed by any "accountability group" present in the political regime. If our hypothesis of autocracies being less welfare minded, since they tend to respond more to special interest groups who seek less domestic taxation is valid, it might be particularly high levels of executive constraints that could limit the possibility for the governments to cave in for special interests. In Table 2.3, we test the impact of both component of democracy to assess whether one aspect of democracy is predominantly important to achieve higher domestic tax mobilisation.

Column 1 and 3 present the first stage regressions of the two endogenous variables, in which the validity of our instrument is confirmed. In the second and fourth columns, the results of the second stage estimation corrected for first-order autocorrelation are reported. The level of constraints on the executive impacts significantly the domestic tax performance whereas column 4 reveals that the level of political competition has a statistically non significant impact on domestic tax revenues. One may conclude that the level of executive constraints in a country is really of significantly great importance for enhanced domestic tax mobilisation. The reason is probably that they oblige policy makers to take more into account the social welfare in their decision making process, through redistributive taxation and less favors accorded to various interest groups.

Table 2.3. Influence of democracy's components on domestic tax revenue (%GDP)

VARIABLES	Exec. Constraints (1)	DomTaxRev IV-AR(1) (2)	Political Competition (3)	DomTaxRev IV-AR(1) (4)
Executive Constraints		6.88**		
		(2.86)		
Political Competition				14.11
				(9.46)
GDP capita (log)	0.07	0.0008	0.05	-0.14
	(0.06)	(0.98)	(0.05)	(1.07)
Imports (%GDP)	-0.0007	0.09***	-0.001	0.10***
	(0.002)	(0.02)	(0.001)	(0.03)
Agriculture (%GDP)	0.005	-0.09*	-0.00007	-0.06
	(0.003)	(0.05)	(0.003)	(0.05)
Inflation (log)	0.01	0.05	0.02	-0.12
	(0.03)	(0.28)	(0.02)	(0.35)
Urbanisation	-0.003	-0.02	-0.003*	-0.009
	(0.002)	(0.04)	(0.002)	(0.04)
Population sup 65	-0.05**	1.09***	-0.03	1.26***
	(0.02)	(0.39)	(0.02)	(0.47)
Population inf 14	-0.03***	0.35**	-0.02***	0.41*
	(0.007)	(0.15)	(0.01)	(0.21)
Aid capita (log)	0.06	0.66	0.09**	-0.22
	(0.05)	(0.67)	(0.04)	(1.07)
Corruption	-0.35**	2.08	-0.23	2.23
	(0.17)	(2.27)	(0.16)	(2.79)
Bureaucracy Quality	-0.009	3.34**	-0.12	5.24***
	(0.11)	(1.55)	(0.10)	(1.90)
NExecutiveConstraints	0.49***			
	(0.1)			
NPoliticalCompetition			0.17**	
			(0.08)	
Observations		157		157
Number of countries		45		45
R-squared	0.36	0.42	0.24	0.42

Note: Robust standards errors in brackets. ***p-value<0.01, **p-value<0.05, *p-value>0.1.
Constant and time fixed effects included.

2.4.3 Where can the positive effects of democracy be especially needed?

Since we identified a positive effect of democracy on domestic taxes, one may wonder in which countries this positive effect of democracy will especially be needed? The abundance of natural resource rents as part of GDP is expected to be an impediment to tax mobilisation (Bornhorst et al., 2009). Indeed, the availability of high natural resource rents in the beginning of

our period of analysis (id est the first three years of the 1990s) might have created a soft budget constraint and not induced governments to implement substantial domestic tax reforms therefore leading to lower tax revenues on the entire time period. In their model, Collier and Hoeffler (2009) show that the abundance of natural resources might be detrimental to tax mobilisation probably both because higher rents are creating lower incentives for governments to mobilise tax revenue and because governments of oil rich countries consciously set low tax rates so as not to provoke scrutiny of the natural resource revenues. The measure of natural resource rents is calculated using environmental economic data from the World Bank which includes costs of production and world prices. Higher levels of democracy might induce resource rich governments to undergo through substantial tax reforms to create a sustainable tax system. Hence, as expressed by Robinson et al. (2006), countries with institutions that promote accountability might be able to benefit from resource booms since democratic institutions are able to limit the detrimental political economy aspects generated by resource booms. In presence of an efficient tax system, the existence of natural resource rents can contribute to increased tax revenues both through direct profit taxation and through increased VAT revenues. We test this assumption in Table 2.4 by introducing an interactive variable between the democracy measure and the initial natural resource rents (INatRes).

Results with the 2SLS estimator are presented for two measures of democracy, the Polity2 index and the component that was found of importance to increase tax mobilisation, the level of constraints on the executive. We instrument both the democracy and the weighted variable INatRes*Democracy (see in columns 1, 2 and 4, 5 the first stage equations). Across all specifications, the initial natural resource rents variable is negative and significant whereas the weighted variable (Initial Natural Resource Rents * Democracy) is significantly positive. Consequently, for a given level of natural resources, sufficiently high levels of democracy and of constraints on the executive can transform the negative impact of the presence of these initial natural resource rents on tax mobilisation into a beneficial one.

Table 2.4. Natural resources influence on domestic tax revenue conditional to democracy levels

VARIABLES	Polity2	INatRes* Polity	DTaxRev	ExConst.	INatRes* Exconst	DTaxRev
	First Stage		IV AR(1)	*First Stage*		IV AR(1)
	(1)	(2)	(3)	(4)	(5)	(6)
Polity2			3.4			
			(4.263)			
INatRes*Polity			0.7**			
			(0.32)			
ExConstraints						0.92
						(3.64)
INatRes*ExConst						0.63***
						(0.21)
INatRes	0.01	0.28***	-0.42**	-0.002	0.06	-0.34***
	(0.01)	(0.08)	(0.19)	(0.006)	(0.07)	(0.12)
GDP capita (log)	-0.001	0.76	0.12	-0.001	0.19	-0.12
	(0.05)	(0.57)	(0.96)	(0.06)	(0.71)	(0.96)
Imports (%GDP)	-0.0002	-0.01	0.08***	0.00009	-0.01	0.1***
	(0.001)	(0.02)	(0.02)	(0.002)	(0.02)	(0.02)
Agriculture (%GDP)	0.0004	0.068**	-0.09*	-0.0002	0.024	-0.12**
	(0.002)	(0.03)	(0.05)	(0.003)	(0.04)	(0.05)
Inflation (log)	0.001	0.34	-0.33	0.0006	0.28	-0.08
	(0.02)	(0.24)	(0.26)	(0.03)	(0.34)	(0.28)
Urbanisation	-0.0001	-0.03	-0.02	0.0001	-0.01	-0.004
	(0.002)	(0.02)	(0.04)	(0.002)	(0.02)	(0.04)
Population sup 65	-0.002	-0.15	1.32***	0.0001	-0.17	1.29***
	(0.02)	(0.26)	(0.38)	(0.03)	(0.31)	(0.38)
Population inf 14	-0.001	-0.04	0.39***	0.00	-0.01	0.40***
	(0.009)	(0.10)	(0.14)	(0.01)	(0.13)	(0.15)
Aid capita (log)	0.01	0.76	-0.08	-0.005	0.45	0.25
	(0.04)	(0.53)	(0.7)	(0.05)	(0.62)	(0.68)
Corruption	0.001	-0.33	3.39*	0.0009	-0.86	1.74
	(0.15)	(1.84)	(1.93)	(0.18)	(2.23)	(2.21)
Bureaucracy Quality	0.01	1.69	2.84*	-0.003	0.92	2.94*
	(0.10)	(1.21)	(1.55)	(0.12)	(1.4)	(1.56)
Polity2 hat	1.10***	4.82*				
	(0.24)	(2.83)				
INatRes*Polity hat	-0.01	0.56***				
	(0.01)	(0.13)				
Exconst hat				0.96***	1.63	
				(0.24)	(2.86)	
INatRes*ExConst hat				0.004	0.90***	
				(0.01)	(0.13)	
Observations			188			155
Number of countries			46			44
F-test (p-val)			0.004			0.0004
R-squared	0.32	0.75	0.39	0.37	0.72	0.46

Note: Robust standards errors in brackets. ***p-value<0.01, **p-value<0.05, *p-value>0.1. Constant and time fixed effect included. Following Wooldridge (2002a), Polity2 hat is the predicted dependent variable of a preliminary regression: Polity2=NPolity2+INatRes+Corrupt+BurQual+GDP+Imp+Aid+Infl+Urb+ Pop65+ Pop14+Agri and INatRes*Polity hat is the result of Polity hat * INatRes. These two variables are then used as instrument for our two endogenous variables: Polity and Polity*INatRes. A similar procedure was used for the ExConst variable.

This corroborates, but for taxes, the findings of Collier and Hoeffler (2009) that for higher growth achievements resource rich economies need a distinctive form of democracy with particularly strong checks and balances. The coefficient of the democracy variable is positive but non significant, however the F-test of joint significance of the two variables Democracy and INatRes*Democracy indicates that they are jointly significant.

To explore more deeply the idea of a turning point in the natural resource influence, the threshold of democracy above which the negative impact of natural resource rents on tax revenue disappears is calculated in Table 2.5.

Table 2.5. Turning point in the effect of natural resources rents on domestic taxes

	Polity 2	Executive Constraints
$\frac{\partial Tax\,Revenue}{\partial INat\,Res}$	= -0.42 +0.7*Polity2	= -0.34+0.63*ExConst
Threshold	Polity2 = 0.61	ExConst = 0.54
Countries	Bolivia, Mongolia, Namibia, Papua New Guinea,…	

The thresholds are higher than the mean level of democracy in our sample. Among the natural resource abundant economies, only few are characterised by levels of democracy above the estimated threshold but it corresponds, for example, to democratic institutions like the ones in Bolivia, Mongolia, Papouasia New Guinea or Namibia. In Mongolia, for instance, significant steps have been taken to improve procedures and fiscal discipline within governments and noteworthy achievements were made in improving transparency (IMF, 2001). Despite its mining rents abundance, Namibia presents a comparatively high tax revenue/GDP ratio reflecting consequent tax effort undertaken by the government. So conditional to sufficiently high levels of democracy, the net influence of natural resources can be positive because governments will not anymore rely solely on these rents but build a sustainable tax system where the natural resources sector could be a major contributor to tax revenues.

2.5. Concluding Remarks

Little analytical or empirical works have studied the importance of political economy factors, in addition to traditional factors, as determinants of domestic tax revenue performance. The only slow progresses in domestic tax revenues seen in many developing countries doubtlessly reflect in part the power of vested interests. Using a panel of 66 developing countries over the period 1990-2005, we estimated the influence of democracy on domestic tax revenues, properly correcting for the endogeneity of democracy with an original instrument. We find strong evidence that the political regime in a country does influence the extent to which domestic tax reforms are implemented and higher domestic tax revenues achieved. The estimated effect of increased democracy on tax revenue is quite large and it is the level of constraints on the executive that seems to be the driving force behind the result. Increased checks and balances are needed to counter the propensity of governments to cave in for special interests and to be less social welfare minded. High levels of democracy are specifically needed in natural resource rich countries to make natural resource rents contribute to higher domestic taxes revenues and no longer be an impediment to a sustained tax system for financing public goods. These findings highlight the presence of political economy factors which should seriously need to be taken into consideration in the design of domestic tax reforms. Moreover, the results bear important policy implications by showing which dimension of democracy, constraints on executive, could help developing countries to achieve higher domestic tax mobilisation. To counter the influence of various interest groups, policy makers should communicate on the consequences of the reform in order to reduce the uncertainty and garner a sufficient number of groups in favor of the reform.

2.6. Appendix

Appendix 2.1 - Illustrative list of countries used in the regressions

66 countries:
Angola, Armenia, Azerbaijan, Bangladesh, Benin, Bhutan, Bolivia, Burkina Faso, Burundi, Cambodia, Cameroon, Central African Republic, Chad, Colombia, Congo Rep., Djibouti, Dominican Republic, Ecuador, El Salvador, Eritrea, Ethiopia, Gabon, Gambia, Georgia, Ghana, Guinea, Guinea Bissau, Honduras, India, Islamic Rep. of Iran, Ivory Coast, Kenya, Kyrgyz Rep., Laos, Lesotho, Liberia, Malawi, Mali, Moldova, Mongolia, Mozambique, Namibia, Nepal, Nicaragua, Niger, Nigeria, Pakistan, Papua New Guinea, Paraguay, Peru, Rwanda, Senegal, Sierra Leone, Sudan, Swaziland, Tajikistan, Tanzania, Thailand, Togo, Tunisia, Uganda, Ukraine, Vietnam, Yemen, Zambia, Zimbabwe.

Appendix 2.2 - Summary statistics

	Obs.	Mean	Std. Dev.	Min.	Max.
DomTaxRev	277	9.86	4.64	1.73	24.67
Political Rights	277	0.41	0.27	0	1
Polity 2	277	0.54	0.29	0	1
Democracy Dummy	277	0.37	0.47	0	1
Political Competition	275	0.45	0.27	0	0.90
Executive Constraints	273	0.49	0.31	0	1
GDP capita (log)	277	6.15	0.87	4.67	8.35
Population sup 65	277	3.93	1.91	2.16	15.48
Population inf 14	277	41.25	6.46	15.44	51.24
Aid capita (log)	277	3.92	0.53	2.12	5.39
Imports (%GDP)	277	40.66	20.04	8.98	124.29
Agriculture (%GDP)	277	28.04	14.05	3.45	73.83
Urbanisation	277	36.85	18.99	5.98	85.26
Inflation (log)	252	2.74	0.84	0.09	7.89
Corruption	209	0.577	0.14	0.17	1
Bureaucracy Quality	209	0.39	0.20	0	0.87
Initial Natural Resources	259	5.73	7.64	0	38.34

PART 2.

CONSEQUENCES OF SPECIFIC TAX REVENUE COMPOSITIONS IN DEVELOPING COUNTRIES

CHAPTER 3.

Tax instability in sub-Saharan Africa: Consequences and Remedies[21]

Abstract

This chapter focuses on the sources and consequences of the instability of tax revenue in sub-Saharan African countries. We took advantage of a unique and extraordinarily rich dataset on the composition of tax revenues for a large number of countries. Using panel data for 37 countries observed over the period 1980-2005, we find that our results are twofold. First, the instability of government tax revenue leads to the instability of both public investment and government consumption, and also reduces the level of public investment. Second, the reliance on domestic indirect taxation-based systems appears to have a robust stabilizing effect.

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3.1. Introduction

Tax revenue mobilisation in Sub-Saharan Africa (SSA) is not only low compared to spending needs (Stotsky and Woldemariam, 1997; Keen and Mansour, 2010a) but also suffers from a high level of instability (Brun et al., 2006). Tax revenue instability has been documented as particularly important in SSA and, from the tax instability measures presented in Table 3.1, one can note that countries did not succeed in eliminating this instability over the period 1980-2005. Since the beginning of the 2000s, there has been a small decrease in tax instability, but it remains an ongoing issue that needs to be seriously addressed. As far as the components of tax revenue are concerned, we can highlight some stylised facts. Corporate taxes were the most unstable taxes during the period 1980-2005, whereas indirect taxes have become slightly less volatile than trade taxes since the 1990s.

Table 3.1. Tax revenue instability and public spending instability in SSA

	1980/85	1986/90	1991/95	1996/2000	2001/05
Total tax revenue	2.59	2.77	2.64	2.49	2.22
Trade tax revenue	3.04	3.18	3.14	3.07	2.79
Indirect tax revenue	3.22	3.26	3.08	3.06	2.64
Income tax revenue	3.03	2.91	2.83	2.78	2.61
Corporate tax revenue	3.32	3.37	3.34	3.41	3.17
Individual income tax revenue	3.06	2.96	3.09	2.8	2.73
Public investment	2.92	3.30	3.15	3.30	3.22
Government consumption	2.24	2.37	2.36	2.42	2.37

Note: instability is measured as the standard deviation of the log difference of the variables. Instability is in logarithmic terms.

The primary concern that is linked with tax revenue instability is that it may result in public spending instability, which is a grave concern for SSA countries as it has been found to be detrimental to growth and welfare (Guillaumont et al., 1999; Fatas and Mihov, 2003; Furceri, 2007; Loayza et al., 2007). Indeed, unstable revenues are costly, because they may force the government to consequently cut public spending, leading to public spending instability. According to the instability measures in Table 3.1, the instability of both public investment and government consumption has not decreased compared to the levels from the 1980s, and assessing the extent to which this fact is due to revenue instability is therefore crucial.

It is worth noting that the public investment ratio seems to be less stable than the government consumption ratio in our sample. This is not very surprising, as government consumption contains some items such as wages and salaries that are renewed every year.

Only two studies, to our knowledge, have thus far tackled the problem of tax revenue instability. Lim (1983) estimated that tax revenue instability was the major cause of expenditure instability in less developed countries during 1965-1973. He therefore called for further research investigating ways in which the degree of tax revenue instability could be reduced. Bleaney et al. (1995) analyzed the sources and the consequences of revenue instability in developing countries. They found that tax revenue instability is more common in poor, more open and more inflationary economies. Moreover, the cross-sectional evidence shows that countries with high tax revenue instability also tend to have high total expenditure instability.

Given this background, the aim of this paper is to implement a thorough analysis of tax revenue instability in a panel of SSA countries for the period 1980-2005, judging its impact on both public investment and government consumption instability and the level of public investment. This paper then aims to derive concrete solutions to deal with these issues.

This study takes advantage of a recent and unique dataset on the composition of tax revenues over a long time period which was compiled by Keen and Mansour (2010a). This dataset presents the tax revenues of 40 sub-Saharan African countries.

From an exploration of Keen and Mansour's (2010a) dataset, three main conclusions emerge. First, the issue of tax revenue mobilisation in the region is still a concern. Indeed, the average level of the total tax revenue ratio in the region stands at 16.4% of GDP, a level that is near the International Monetary Fund (IMF) recommendation of a minimum of 15% of GDP for developing countries. This ratio has increased significantly since the end of the 1990s, reaching approximately 20% of GDP in the mid-2000s. However, this increase is mainly due to the contribution of the oil-exporting countries in the region where revenue from natural resources increased markedly (Keen and Mansour, 2010a). With regard to non-resource-related revenues, in contrast, there was almost no change over the sample period, from an average of around 13% of GDP at the start of the period to closer to 14% 25 years later. Second, there is an obvious heterogeneity in the performance in terms of revenue mobilisation among the countries in the region. When disaggregated by income groups, the data reveal that the level and the pattern of the total tax revenue ratio are higher for the middle-income countries (MICs) compared to the low-income countries (LICs). For example, in 2005, the total tax revenue to GDP ratio stood at 15% for the LICs, 25% for the lower MICs and 29% for the upper MICs.[22] Third, in terms of the composition of the tax revenues, the dataset also reveals an obvious downward trend in international trade taxes, from 6 to about 4% of GDP. Domestic indirect taxes increased by broadly the same magnitude, while income taxes (mainly personal and non-resource corporate) remained at around 4% of GDP. It is worth noting that there has been a clear shift since the mid-1990s away from a dependence on trade tax revenues and towards a dependence on indirect tax revenues expressed as a percentage of GDP. This seems to be consistent with the era of VAT reforms in many African countries and, at the same time, with the observed pressure to implement trade liberalization.

We first assessed the consequences of tax revenue instability on the volatility of both public investment and government consumption and on levels of public investment, which is one of the

[22] The reader may wonder whether this may be due to the fact that the MICs are disproportionally resource-rich (half of them being 'resource' countries, compared to only 20 percent of the LICs). However, the story remains qualitatively consistent even if the non-resource tax revenue to GDP ratio is analyzed.

most crucial components of public spending for economic growth in developing countries. In a second step, we investigated the means available to governments wishing to address the issue of tax revenue instability.

We focused solely on African countries because these countries are often unable to resort to financial markets (domestic or international) in order to smooth out their revenue. Finding alternative ways of dealing with revenue instability in these countries is therefore of the utmost importance. Countries can enhance their risk preparedness by analyzing the determinants of tax revenue instability and especially by investigating whether a specific tax structure can limit the instability of the total tax revenue ratio.

To summarise our findings, we established that tax revenue instability in SSA leads to public investment and government consumption instability, which in turn generates a lower public investment ratio. Our study revealed that the departure from trade taxes toward indirect domestic taxes, a reform that is currently occurring in developing countries, is beneficial with regard to limiting tax revenue instability.

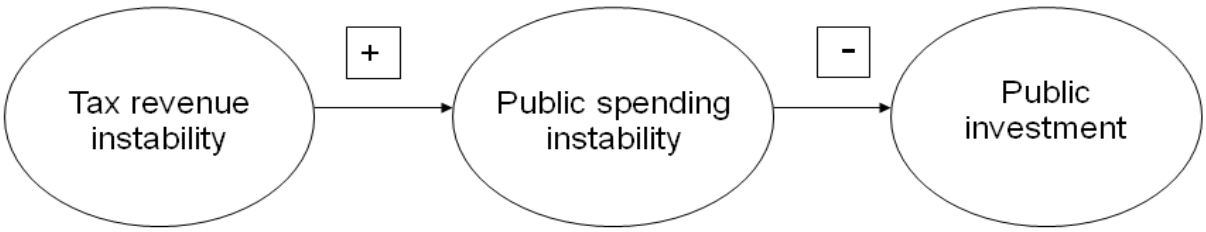
In the next section, we will discuss the impact of the instability of tax revenue on both public consumption and investment in SSA. Section 3 is devoted to an analysis of various ways to deal with tax revenue instability by investigating the stabilizing effect of reliance upon domestic indirect taxation mechanisms. Section 4 presents the conclusion.

3.2. Consequences of tax revenue instability in the SSA region

The principal objective of this empirical section is to establish the consequences of the high level of tax revenue instability in the sub-Saharan region. We will analyze the impact of tax instability on the instability of both public investment and government consumption. In a second step, we will assess the effect of this public spending instability on the level of public spending.

Nevertheless, for the impact on the level of public spending, our interest lies solely in public investment, which is one of the productive components of public spending and is crucial for long-term growth (Barro, 1990; Ramirez and Nazmi, 2003). As depicted in Figure 3.1, we expected to find a positive association between tax instability and public spending instability and a negative association between public investment instability and the level of public investment. Overall, we are interested in the relationship between tax revenue instability and public expenditures that look like communicating vessels: tax revenue instability leads to an increase in the instability of public investment, and public investment instability lowers the level of public capital spending.

Figure 3.1: Influence of tax revenue instability on public spending instability and public investment level



It is plausible to think that the ability of public authorities to provide public goods is weakened by the volatility of their revenues. One could argue that if the variation in the tax revenue ratio is perceived as temporary by the government, then they should not change the level of public spending as a result. As recommended by Barro (1979), public spending should be smoothed out and based on the permanent component of revenue. According to this view, public spending should not be affected by tax revenue cycles. However, as shown by Akitoby et al. (2006), the public investment component is the most erratic category of public expenditure in developing countries. This can be explained by two factors. On the one hand, governments face political pressures which mean that during booms, they can easily increase their spending, but

during downturns, it becomes more difficult to sustain the effort. On the other hand, governments may be affected by 'myopia' and thus are not always able to identify whether revenue shocks will be temporary or permanent. We therefore expect a significantly positive effect of tax instability on both public investment and government consumption instability.

This instability of government expenditure in developing countries (Talvi and Vegh, 2005; Akitoby et al., 2006; Thornton, 2008; Diallo, 2009) may contribute to reducing the mean level of public spending. This hypothesis may seem to be counterintuitive, as several papers have underlined the existence of a positive relationship between procyclical fiscal policy and the size of the government, namely the voracity and the cyclical ratcheting effects (Collier and Gunning, 1999; Tornell and Lane, 1999; Akitoby et al., 2006). However, the category of expenditure that is most affected by these effects is current public expenditure (government consumption). With regard to the public investment category, things appear to be relatively different. Indeed, recent papers have pointed to the fact that the governments of developing countries tend to cut capital expenditure more easily during recessions than other spending categories (Akitoby et al., 2006). This can be partly explained by the lower political cost of a reduction of public investment than a reduction of spending on wages and salaries or on current goods and services. Conversely, during booms, public investment may not be increased proportionally. We therefore expect a negative association between public investment instability and the level of public investment, which is detrimental to long-term capital accumulation.

3.2.1. The transmission of the instability of the tax revenue ratio to the instability of public spending ratios

As far as the relationship between tax revenue instability and the instability of public spending is concerned, Lim (1983) provided the first empirical test. The author concluded that one of the main consequences of the instability of tax revenues is increased instability of aggregate public spending. By using recent econometric techniques and datasets, we will be able

to provide and quantify the intensity of this positive relationship. The estimated econometric model is as follows:

$$\textbf{Model [1]}: \log\left(\sigma_{i,t}^{s}\right) = \alpha + \theta \log\left(\sigma_{i,t}^{t}\right) + \mathbf{X}'_{i,t-4}\,\gamma + u_i + \eta_t + \varepsilon_{i,t}$$

where the superscripts s and t refer to the public spending variable (either public investment or government consumption) and to the tax variable respectively. σ is the measure of public spending and tax revenue instability.

There are several ways to measure the instability of a variable, and we will therefore implement several of them in order to ensure the robustness of all our estimates. The use of the standard deviation to assess instability is widely approved in the literature. Our first instability measure is therefore the standard deviation of the variable, either tax revenue over GDP or public spending over GDP. Second, as Nelson and Plosser (1982) highlighted the presence of a trend in the macroeconomic data, we apply the first-difference operator to these data in order to ensure that they are stationary before measuring their standard deviation. Hence, the second measure of instability is therefore the standard deviation of the change in the variable, as in Bleaney et al. (1995). Lastly, we first log-linearise our variables, namely the tax revenue, public investment and government consumption ratios, in order to normalise the distribution and avoid issues relating to outliers. We then took the first-difference (change) of the logarithm of these variables prior to applying the standard deviation operator to them. This final measure was implemented recently by Brun et al. (2006) and Aghion et al. (2009) as a measure of the instability of the tax revenue ratio and the real effective exchange rate, respectively.

For all these measures, we followed the advice of Bekaert et al. (2006) and measured the standard deviation over five-year rolling windows.[23] Therefore, we had yearly data regarding

[23] We have not retained the five-year non-overlapping sub-periods as a measure of instability because of the limited number of observations that this computation generates.

these measures of instability. Because volatility is measured over five-year periods (t-4, … t-1, t), all the explanatory variables in the econometric models are evaluated at their value at t-4 in order to ensure that they are exogenous. Due to the way instability is computed, there is a suspicion of a serial correlation in $\varepsilon_{i,t}$. We therefore use an Ordinary Least Square (OLS) estimator with Newey-West standard-errors where the error structure is assumed to be heteroscedastic and first-order autocorrelated. **X** is the matrix of basic control variables. It includes the proxy for the level of development (GDP per capita in log terms) and three indicators of the availability of sources of funding at the government level, namely foreign aid per capita, external debt as part of GDP and domestic claims on government as part of GDP (all in log terms). We expect that GDP per capita, external debt, domestic public debt and foreign aid would be negatively correlated with the instability of public spending. We also include political and social factors that could affect spending instability. The dummy variable of executive election from the Database of Political Institutions takes the value of one for the year when a presidential election occurred and zero for the other years. This captures fiscal instability due to the existence of politically-driven budget cycles in developing countries, where before elections, public spending increases while revenues fall (Block, 2002; Shi and Svensson, 2006; Ehrhart, 2010, among others). The occurrence of armed conflicts can also be a contributing factor to the high instability of fiscal variables. We introduce the variable of conflict, taken from the UCDP/PRIO Armed Conflict Dataset (Gleditsch et al., 2002), which measures the number of active internal conflicts in a given year in a country. The error terms u_i and η_t are the country and year fixed-effects that allow us to control for cross-sectional time-invariant heterogeneity and common shocks, respectively. Our hypothesis tested is that $\theta > 0$.

The models are estimated for the period 1980-2005 with yearly data for the 37 sub-Saharan countries listed in Appendix 3.1. Data on tax revenues were drawn from the recent work of Keen and Mansour (2010a). Public investment is the public gross fixed capital formation as ratio of GDP, which was extracted from the IMF World Economic Outlook database. Government

consumption as part of GDP represents current government spending and was drawn from the World Development Indicator (WDI). All the remaining control variables were also extracted from the WDI. Descriptive statistics of all the variables used in the paper are presented in Appendix 3.2.

Results

Table 3.2 shows the estimation of the model [1]. The first three columns present the results for public investment instability with the three instability measures, whereas in the three subsequent columns, the results represent government consumption.

Table 3.2. Impact of tax revenue instability on public spending instability, 1980-2005

Dependent Variable	Public Investment Instability			Governement Consumption Instability		
Instability measured as the standard deviation of the	*Variable*	*Change in the variable*	*Change in the log of the variable*	*Variable*	*Change in the variable*	*Change in the log of the variable*
	(1)	(2)	(3)	(4)	(5)	(6)
Tax revenue instability	0.140**	0.140**	0.219***	0.126**	0.186***	0.215***
	(0.063)	(0.07)	(0.063)	(0.054)	(0.061)	(0.047)
GDP per capita	0.136	-0.0602	-0.111	-0.442*	-0.318	-0.101
	(0.270)	(0.275)	(0.260)	(0.253)	(0.248)	(0.167)
Foreign aid per capita	0.177	0.0698	-0.123	0.0430	0.0847	-0.0277
	(0.142)	(0.129)	(0.120)	(0.101)	(0.0984)	(0.0968)
External debt	0.205	0.285**	0.0682	-0.0111	-0.0332	-0.131
	(0.135)	(0.135)	(0.131)	(0.0961)	(0.0959)	(0.0843)
Domestic claims on	-0.0408	0.204	0.511***	-0.133	0.203	0.280
	(0.221)	(0.200)	(0.195)	(0.322)	(0.322)	(0.230)
Conflict	0.238**	0.108	0.0570	0.212***	0.238***	0.124*
	(0.099)	(0.095)	(0.0987)	(0.0763)	(0.0776)	(0.0696)
Elections	0.00390	0.0234	-0.0735	0.0893	0.0305	0.00919
	(0.104)	(0.096)	(0.0997)	(0.0636)	(0.0660)	(0.0593)
Observations	730	729	726	735	733	733
Number of countries	37	37	37	37	37	37

Note: Robust standard errors in parentheses. All the variables are expressed in logarithmic terms except conflict and elections. The OLS estimator with Newey-West standard-errors and country and year fixed effects is used. *** p<0.01, ** p<0.05, * p<0.1.

The results confirm the hypothesis that, whatever the measure of instability retained, tax revenue instability is translated into public spending instability. The coefficients are highly significant at the 1% level and the 5% level, and remain robust regardless of the instability measure used. The coefficient measuring the impact of the instability of tax revenues is slightly higher for public investment than for government consumption, revealing the fact that public investment is more prone to decreasing than current spending during bust periods.

We estimated the effect of current tax revenue instability on the present instability of public spending, but it could also be hypothesized that it is the past level of tax instability that affects government spending decisions and thus current spending instability. Table 3.3 presents the results obtained by including the lagged value of tax instability (measured over t-5 to t-1) rather than the current value of tax instability.

We find that lagged tax instability also significantly increases current public spending instability. The coefficients of past tax revenue instability appear, however, to be slightly smaller than those of current tax instability, according to Table 3.2.

Table 3.3. : Impact of the lagged tax revenue instability on public spending instability

Dependent Variable:	Public Investment Instability			Governement Consumption Instability		
Instability measured as the standard deviation of the	*Variable*	*Change in the variable*	*Change in the log of the variable*	*Variable*	*Change in the variable*	*Change in the log of the variable*
	(1)	(2)	(3)	(4)	(5)	(6)
Tax revenue instability (lag)	0.108*	0.126*	0.182***	0.104*	0.137**	0.178***
	(0.0578)	(0.072)	(0.0597)	(0.0550)	(0.0595)	(0.0450)
GDP per capita (log)	0.218	-0.0533	-0.00422	-0.435	-0.247	0.00431
	(0.242)	(0.239)	(0.235)	(0.266)	(0.265)	(0.174)
Foreign aid per capita	0.160	0.0846	-0.0978	0.0563	0.0990	-0.0131
	(0.136)	(0.103)	(0.122)	(0.101)	(0.0979)	(0.0953)
External debt	0.252*	0.224**	0.0913	-0.0272	-0.0142	-0.118
	(0.131)	(0.106)	(0.127)	(0.102)	(0.100)	(0.0862)
Domestic claims on	-0.127	0.289	0.425**	-0.131	0.218	0.312
	(0.221)	(0.178)	(0.198)	(0.331)	(0.335)	(0.240)
Conflict	0.279***	0.112	0.0886	0.230***	0.268***	0.153**
	(0.096)	(0.094)	(0.099)	(0.075)	(0.077)	(0.068)
Elections	0.0997	0.0775	-0.0148	0.112*	0.0215	-0.00713
	(0.075)	(0.07)	(0.077)	(0.064)	(0.066)	(0.059)
Observations	704	703	700	708	706	706
Number of countries	37	37	37	37	37	37

Note: See notes to Table 3.2.

Having established that tax revenue instability results in the instability of both public investment and government consumption, we will assess, in the next sub-section, the impact of public investment instability on the level of public investment.

3.2.2. The detrimental effect of the instability of public investment on the level of public investment

We test the hypothesis that there is a negative association between the instability of public investment and the level of this investment. This could be due to the fact that booms and busts in the dynamics of public spending reduce the level of public spending observed at the end of the

period. On the contrary, when public spending is relatively stable over time, it results in a higher level of spending than in the previous scenario. While model [1] informed us that the instability of spending originates from the instability of tax revenues, it is interesting to directly measure the contribution of tax revenue instability to the level of public investment, which passes through the channel of public spending instability. This task is assigned to model [2]. In order to evaluate the importance of the instability of tax revenues on the level of public spending, we regress the level of public investment on the component of public investment instability that is induced by tax revenue instability.[24]

$$\textbf{Model [2]: } \log\left(s_{i,t}\right) = \alpha + \beta \ \widehat{z}^{s}_{i,t} + \mathbf{Y}'_{i,t}\,\lambda + u_i + \eta_t + \varepsilon_{i,t}$$

where z represents the prediction of the log term of the instability of public investment from an auxiliary regression of public investment instability on tax revenue instability and control variables.[25] In model [2], β quantifies the effect of the instability of public spending induced by the instability of tax revenue. Following the literature on the determinants of government expenditure in developing countries (Dreher et al., 2008; Fielding, 1997; Fosu, 2007), the matrix **Y** of control variables includes the level of economic development, the level of foreign aid per capita, the level of external debt, the level of domestic claims on the government, the population density, the conflict variable, the occurrence of elections and the level of inflation. The dependent variable s represents the ratio of public investment as part of GDP.

Results

Table 3.4 presents the results of the estimations of model [2]. With regard to the first instability measure in column 1, the results obtained with country and year fixed effects suggest

[24] Identifying the transmission channels through this two stage procedure is now common in the literature (see Fatas and Mihov, 2003; Gomanee et al., 2005).

[25] The auxiliary equation and model [2] are jointly estimated in order to ensure that the standard error associated with the coefficient β is not affected by the well-known bias in the case of generated regressors.

a negative but non-significant relationship at the 10% threshold between the instability of public investment and the level of public investment.

However, in columns 2 and 3, with regard to the two different measures of instability, public investment instability induced by tax instability appears to have a negative and statistically significant effect on the level of public investment.

Table 3.4. How does tax revenue instability lower the level of public investment through public investment instability?

Dependent Variable:	Public Investment Ratio		
Instability measured as the standard deviation of the	*Variable* (1)	*Change in the variable* (2)	*Change in the log of the variable* (3)
Public investment instability [a]	-0.255	-0.881*	-0.825***
	(0.321)	(0.536)	(0.232)
GDP per capita	0.329**	0.401*	0.217
	(0.149)	(0.216)	(0.172)
Population density	-0.0064**	-0.0093**	-0.00705**
	(0.0031)	(0.0044)	(0.0033)
Inflation	-0.196	-0.421*	0.257
	(0.163)	(0.252)	(0.232)
Domestic claims on government	-0.207	-0.175	0.230
	(0.149)	(0.194)	(0.212)
External debt	0.581***	0.904**	0.504***
	(0.215)	(0.357)	(0.121)
Foreign aid per capita	0.0570	-0.0735	0.0102
	(0.0841)	(0.153)	(0.109)
Conflict	-0.0123	0.0877	0.142
	(0.0873)	(0.144)	(0.102)
Elections	0.134**	0.125	0.0479
	(0.0675)	(0.105)	(0.0966)
Observations	665	664	661
Number of countries	35	35	35

Note: Robust standard errors with Newey-West correction for autocorrelation in parentheses. Country and year fixed effects included in all estimations All the variables are expressed in logarithmic terms except conflict and elections. *** p<0.01, ** p<0.05, * p<0.1.

[a] This variable is the component of public investment instability solely induced by tax instability.

These results confirm the idea that one channel through which the instability of tax revenue reduces public investment is the instability of spending. The control variables included in the models exhibit the expected signs. The population density is negatively linked to the level of public investment, whereas external debt is positively correlated with the public investment ratio in SSA.

Having established that tax revenue instability results in the instability of both public investment and government consumption and that this, in turn, decreases the level of public investment, we will assess in the next section how governments could address the issue of tax instability and its detrimental effects.

3.3. How to deal with tax revenue instability

This section is devoted to an analysis of the solutions available to governments to help them to cope with tax revenue instability. First, we will investigate the stabilizing effect of dependence upon a domestic taxation-based system and second, we will derive policy recommendations and present country case studies.

3.3.1. Does tax composition affect revenue instability?

This section is devoted to forming an understanding of the sources of tax revenue instability in SSA and of the ways to reduce it. We take advantage of the new dataset released by Keen and Mansour (2010a), which includes disaggregated tax data on international trade taxes, indirect taxes (VAT, sales taxes and excises) and income taxes (individual and corporate income taxes) that are expressed as a percentage of GDP.

We focus primarily on the stabilizing effect of the domestic taxation-based systems vis-à-vis the dependence on trade tax revenues. The hypothesis that is tested is that a greater dependence on trade taxes rather than on domestic taxes (indirect or direct) leads to increased revenue

instability because trade taxes are more vulnerable to external shocks (Bleaney et al., 1995). In contrast, the dependence upon domestic indirect taxes should be associated with lower tax revenue instability, because the corresponding tax base, which is mainly made up of private consumption, is more stable and less likely to be affected by the business cycle.[26]

This analysis of the stabilizing effect of the reliance on domestic taxes is also a valuable contribution to the recent literature that has analyzed the effectiveness of domestic tax instruments in the recovery of tax revenue losses following trade liberalisation in many developing countries (Baunsgaard and Keen, 2010). Our paper therefore adds to this literature another relevant motive to enhance the efficiency of domestic tax instruments by looking not at their effect on the level of the tax revenues collected, but at the stability of this level.

In order to quantify the differential effects of the different categories of tax on tax instability, several specifications can be retained. The estimation of the effects of the dependence on trade taxes vis-à-vis the dependence on domestic taxes cannot be done by additively introducing the two variables into the same equation because of the high and negative collinearity between these two variables (the sum of the two is 100%). We tackle this potential issue by introducing a new variable *R*, which is the ratio of domestic tax revenues to trade tax revenues, in order to approximate the structure of the taxation system in each country. Therefore, an increase in this ratio should be associated with a decrease in the instability of government tax revenues according to our hypothesis, meaning that reliance on a domestic taxation system has a stabilizing effect. The specification derived from this is presented in model [3]:

$$\textbf{Model [3]: } \log\left(\sigma_{i,t}\right) = \alpha + \mathbf{X}'_{i,t-4}\,\delta + \theta_1 \log\left(R_{i,t-4}\right) + u_i + \eta_t + \varepsilon_{i,t}$$

where $\sigma_{i,t}$ is the instability measure of the total tax revenue and **X** is the matrix of the control variables.

[26] Even though, on average, about 55% of VAT is collected at the border on imports (Ebrill et al., 2001), the remaining 45% relies on domestic consumption and is therefore more likely to be stable.

Second, we break down the domestic tax revenues into the indirect tax and the direct tax revenue ratios in order to assess their respective impact on the instability of government tax revenue in Africa. In model [4], we introduce both the logarithm of the trade tax dependence *ttx* and the logarithm of the direct taxes dependence *directtx* in order to quantify their differential effect. Then, in model [5], in order to compare the effect of the dependence on trade tax revenue with that of the domestic indirect tax dependence, the same model is estimated by replacing *directtx* by the logarithm of the domestic indirect tax revenue dependence *indirecttx*.

$$\textbf{Model [4]: } \log\left(\sigma_{i,t}\right) = \alpha + \mathbf{X}'_{i,t-4}\,\delta + \theta_2 ttx_{i,t-4} + \theta_3 directtx_{i,t-4} + u_i + \eta_t + \varepsilon_{i,t}$$

$$\textbf{Model [5]: } \log\left(\sigma_{i,t}\right) = \alpha + \mathbf{X}'_{i,t-4}\,\delta + \theta_4 ttx_{i,t-4} + \theta_5 indirecttx_{i,t-4} + u_i + \eta_t + \varepsilon_{i,t}$$

However, there may be an issue with collinearity. Indeed, as mentioned by Bleaney et al. (1995), the two tax variables in model [4] (trade tax dependence and direct tax dependence) are, by necessity, negatively correlated with the domestic indirect tax ratio (the sum of the three is 100%), and an arithmetical transformation is needed to reduce the collinearity problem. As a solution, we follow Bleaney et al. (1995) by computing the dependence on the direct tax revenues and on the domestic indirect tax revenues as the level of these tax revenues divided by the level of the total tax revenue excluding trade taxes.

The matrix of control variables include the standard determinants of the instability of taxes (see Lim, 1983; Bleaney et al., 1995) and other potential correlates. Among the structural factors is GDP per capita, trade openness and the level of natural resource rent. The other determinants are GDP per capita instability, the presence of elections and the existence of internal conflicts. We expect that the instability of the tax base (GDP per capita instability), the occurrence of elections and the existence of internal conflicts would be positively correlated with the instability of the total tax revenues. The level of economic development (GDP per capita) we predicted would be negatively associated with the instability of taxes because it is a proxy for the

degree of risk management and the diversification of production activities, which can lower the degree of volatility. The contribution of trade openness to tax instability is less striking. On the one hand, trade openness may act as a proxy for an openness policy, behind which there exists a willingness to provide better management of economic affairs as well as good institutions and policies for competitiveness. On the other hand, trade openness may be a proxy for the "natural openness" that increases the vulnerability of a small open economy to external shocks. Overall, the sign of the coefficient of the trade openness variable (exports plus imports divided by the GDP) is ambiguous. Finally, we expect to find a positive association between the levels of natural resource rent and tax revenue instability, because the price of natural resources is known to be highly volatile.

The measure of natural resource rent was calculated using environmental economic data from the World Bank, which included the cost of production and global prices; the election variable was taken from the Database of Political Institutions, the conflict variable from the UCDP/PRIO Armed Conflict Dataset and all of the other control variables drawn from the WDI (2009). The estimation concerns the period 1980-2005, and the estimator is a two-way fixed-effects OLS method with Newey-West standard errors accounting for a heteroscedastic and first-order autoregressive error structure in the residuals.

Results

Table 3.5 shows the estimation of the coefficients associated with the tax structure variables. In columns 1, 4 and 7, using our three alternative measures of instability, the coefficient associated with the ratio of domestic taxes to trade taxes appears to be significantly negative. This means that a greater dependence on domestic as opposed to trade taxes has a stabilizing effect on government tax revenue in SSA.

Table 3.5. Effect of the tax composition on tax revenue instability

Dependent variable: Total tax revenue instability									
Instability measured as the standard deviation of the	*Variable*			*Change of the variable*			*Change of the log of the variable*		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Tax composition									
Ratio	-0.0844**			-0.135**			-0.155***		
	(0.0381)			(0.0561)			(0.0458)		
Trade taxes		-0.00703	0.0488		0.00856	0.0562		0.0956	0.160**
		(0.0655)	(0.0608)		(0.0681)	(0.0619)		(0.0830)	(0.0736)
Direct taxes		0.245**			0.213**			0.284**	
		(0.108)			(0.0992)			(0.131)	
Domestic Indirect			-0.180***			-0.135**			-0.163**
Dependence			(0.0623)			(0.0561)			(0.0733)
Structural factors									
GDP per capita	-0.219	-0.185	-0.195	-0.318**	-0.296**	-0.291*	-0.302*	-0.236	-0.253
	(0.151)	(0.158)	(0.161)	(0.140)	(0.147)	(0.153)	(0.159)	(0.167)	(0.169)
Trade openness	0.111	0.127	0.112	0.138	0.149	0.142	-0.225**	-0.220**	-0.226**
	(0.109)	(0.105)	(0.108)	(0.0972)	(0.0950)	(0.0965)	(0.103)	(0.100)	(0.103)
Natural resource rent	1.292***	1.570***	0.744	0.617	0.895**	0.239	0.823	1.313***	0.517
	(0.432)	(0.430)	(0.502)	(0.457)	(0.441)	(0.530)	(0.528)	(0.491)	(0.620)
Shocks variables									
GDP per capita	0.178***	0.182***	0.163***	0.261***	0.268***	0.253***	0.286***	0.296***	0.275***
	(0.0356)	(0.0355)	(0.0357)	(0.0347)	(0.0344)	(0.0352)	(0.0419)	(0.0406)	(0.0419)
Elections	-0.0173	-0.0329	-0.0219	-0.0579	-0.0719	-0.0624	-0.0694	-0.0861	-0.0752
	(0.0560)	(0.0557)	(0.0554)	(0.0510)	(0.0509)	(0.0514)	(0.0587)	(0.0580)	(0.0594)
Conflict	0.0280	0.0342	0.0290	0.0239	0.0281	0.0232	-0.00968	-0.00167	-0.00805
	(0.0582)	(0.0574)	(0.0565)	(0.0570)	(0.0555)	(0.0554)	(0.0629)	(0.0622)	(0.0622)
Observations	775	780	774	775	780	774	775	780	774
Countries	37	37	37	37	37	37	37	37	37

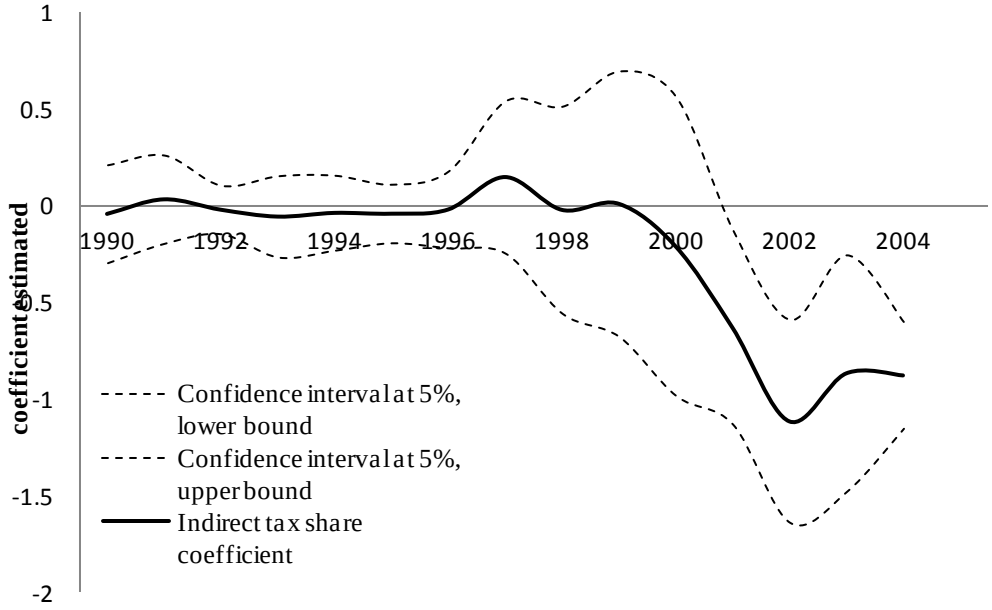
Note: Robust standard errors in parentheses. OLS with Newey-West standard-errors and country and year fixed-effects is used. All the variables are expressed in logarithmic terms except conflict and elections. *** p<0.01, ** p<0.05, * p<0.1.

Domestic taxes are composed of both direct taxes on personal or company income and indirect taxes, such as VAT or excises, and so we investigate in the remaining columns of Table 3.5 whether the stabilizing effect of a greater reliance on domestic taxes is due to direct taxes or to domestic indirect taxes (models [4] and [5]). In columns 2, 5 and 8, the coefficient associated with dependence on direct taxes exhibits a significantly positive sign, revealing the fact that dependence on direct taxes leads to the increased volatility of tax revenues. Corporate income, which is the main base of direct taxes, is strongly related to the business cycle and is therefore highly volatile. In contrast, we can see in columns 3, 6 and 9 that a greater dependence on domestic indirect taxes is significantly associated with decreased tax instability, whatever the instability measure we retained.

As domestic indirect taxes underwent several reforms in developing countries over the period 1980-2005, the impact of domestic indirect taxes on tax revenue instability may not be constant over the entire period. Put differently, it is possible that the effect of domestic indirect taxes varies over time and thus has become more significant in the recent period, a period characterised by peaks in the VAT adoption in SSA and by several reforms that have been implemented in order to improve tax administration. The era of VAT adoption in developing countries is associated with significantly more domestic indirect tax revenue being collected (Keen and Lockwood, 2010), and we investigate whether this has led to more stable tax revenues in SSA.

In order to tackle this issue, we perform cross-sectional rolling regressions year by year to assess the distinctive impact of dependence on domestic indirect taxes on the instability of tax revenues in each year. Figure 3.2 depicts the evolution of the coefficient associated with the indirect tax revenue variable. A greater dependence on domestic indirect taxes significantly decreased the instability of tax revenues, mainly since the end of the 1990s in SSA.

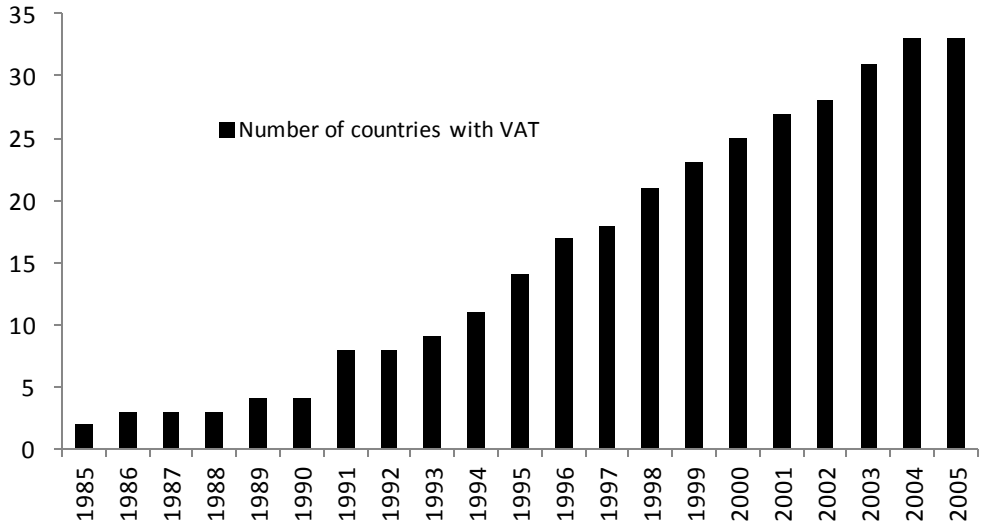
Figure 3.2. Coefficient of the domestic indirect tax share variable



Source: Authors' calculations. Note: Instability of tax revenue is measured as the standard deviation of the log difference of the tax revenue ratio. The results are similar for the other two measures.

The reinforced negative effect of dependence on indirect taxes on government revenue instability in the recent period coincides with the period in which more SSA countries adopted VAT (Figure 3.3).

Figure 3.3 The number of African countries with VAT



Source: Authors' calculations and Ebrill et al. (2001)

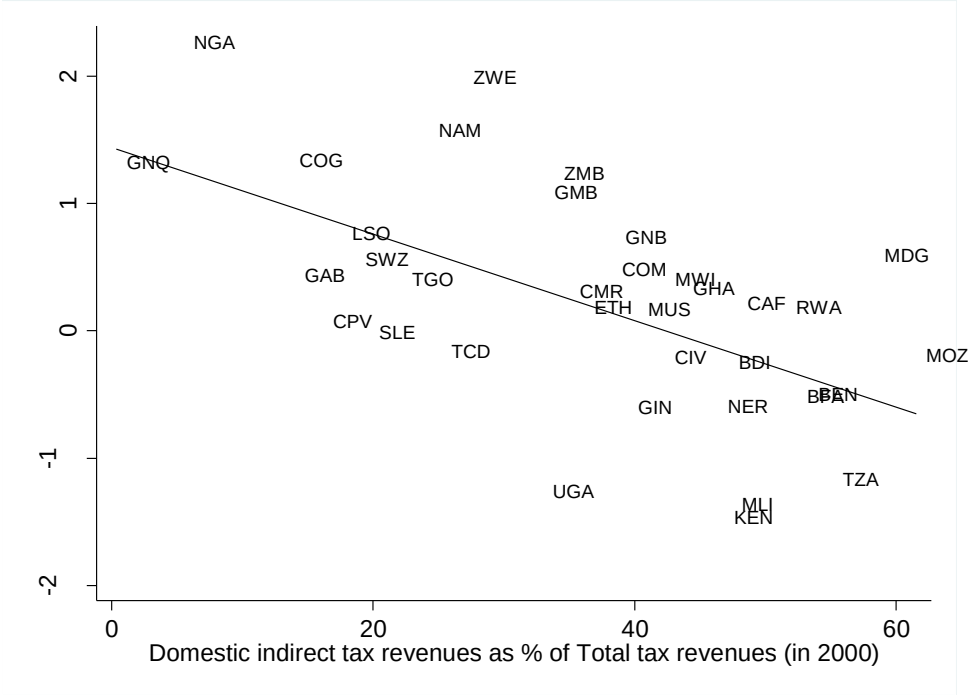
Beyond the stabilizing effect of increased dependence on domestic indirect taxes, other variables are also significant determinants of tax instability on which governments should focus. The instability of the aggregate tax base (GDP per capita instability) is significantly and positively associated with the instability of tax revenues. This result highlights the importance of macroeconomic stability as one of the main policy with which to reduce the instability of government tax revenues in Africa. Moreover, the level of natural resource rent also appears to be positively correlated with the instability of government revenues in Africa. This can be explained by the instability of oil prices, which is transferred to government revenues, thereby reinforcing macroeconomic uncertainty and the difficulties for these countries in the implementation of fiscal and developmental policies.

3.3.2. Policy implications

Our results indicate that countries that rely heavily on domestic indirect taxes are characterised by more stable total taxes. Figure 3.4 presents the correlation between reliance on domestic indirect tax revenues and the level of tax instability in the SSA countries in our sample, and does not reject the findings.

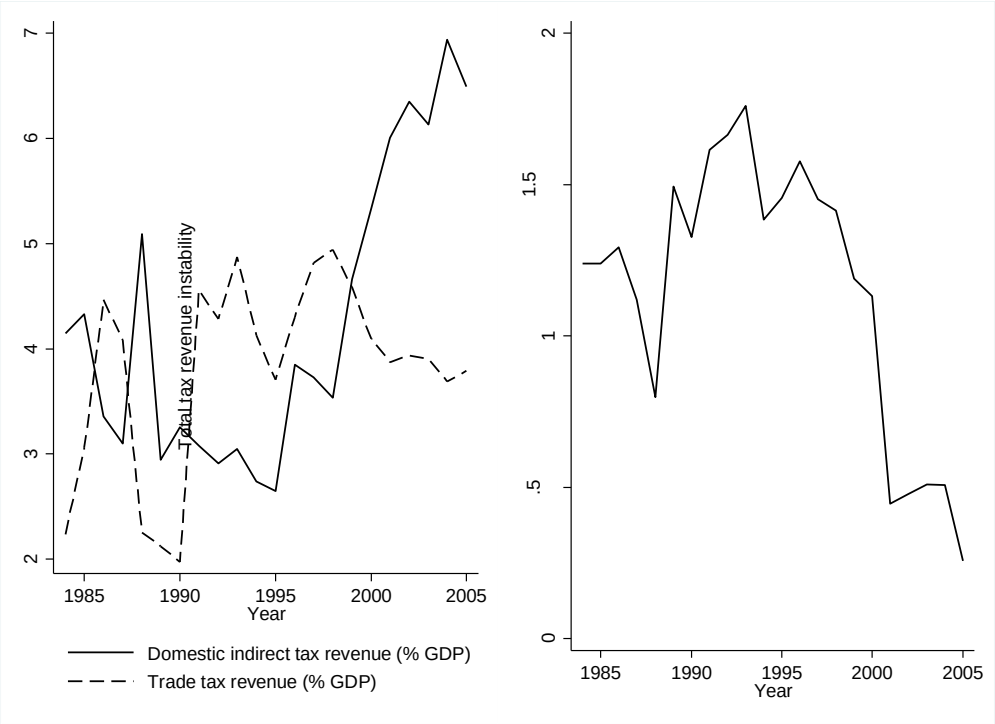
We can see that Mali, Kenya and Tanzania are all characterised by a high reliance on domestic indirect tax revenue and low levels of tax revenue instability. We will retain these three countries as case studies with which to illustrate our policy recommendations.

Figure 3.4. Correlation between dependence upon domestic indirect tax revenues and the instability of the total tax revenues



Figures 3.5, 3.6 and 3.7 describe the specific evolution over the period 1980-2005 of the structure of taxation and the instability of the tax revenues of Mali, Tanzania and Kenya, respectively. For Mali and Tanzania, it is worth noting that surges in the share of domestic indirect taxes as part of GDP going beyond the share of trade tax revenue are associated with a decreasing trend in total tax instability. These features emerged in 1995 in these two countries.

Figure 3.5. Dynamics of the structure of taxation and the instability of the total tax revenues in Mali

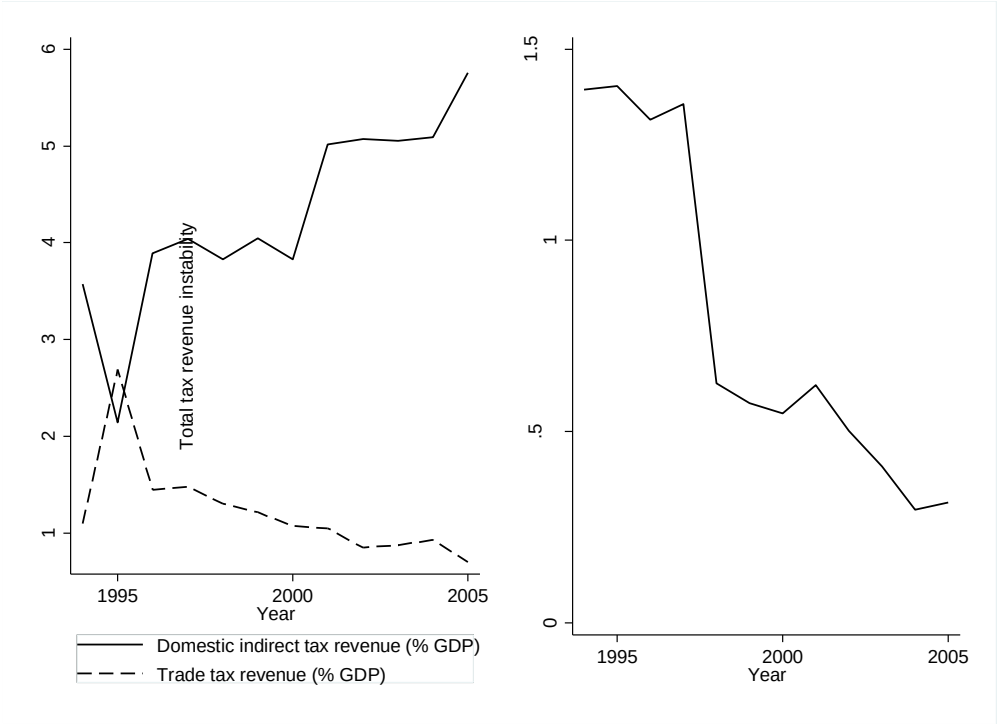


Source: Keen and Mansour (2010a) and authors' calculations

According to a recent IMF Policy Paper (IMF, 2011, Appendix 6), Tanzania is identified as a strong tax performer among developing countries, as it has undergone major reforms aimed at raising domestic tax revenues.

Most notably, key reforms included the introduction of a common taxpayer identification number (TIN) for all taxes, the creation of a Large Taxpayers Department and the consolidation of VAT and income tax administration into a single, functionally structured Domestic Revenue Department.

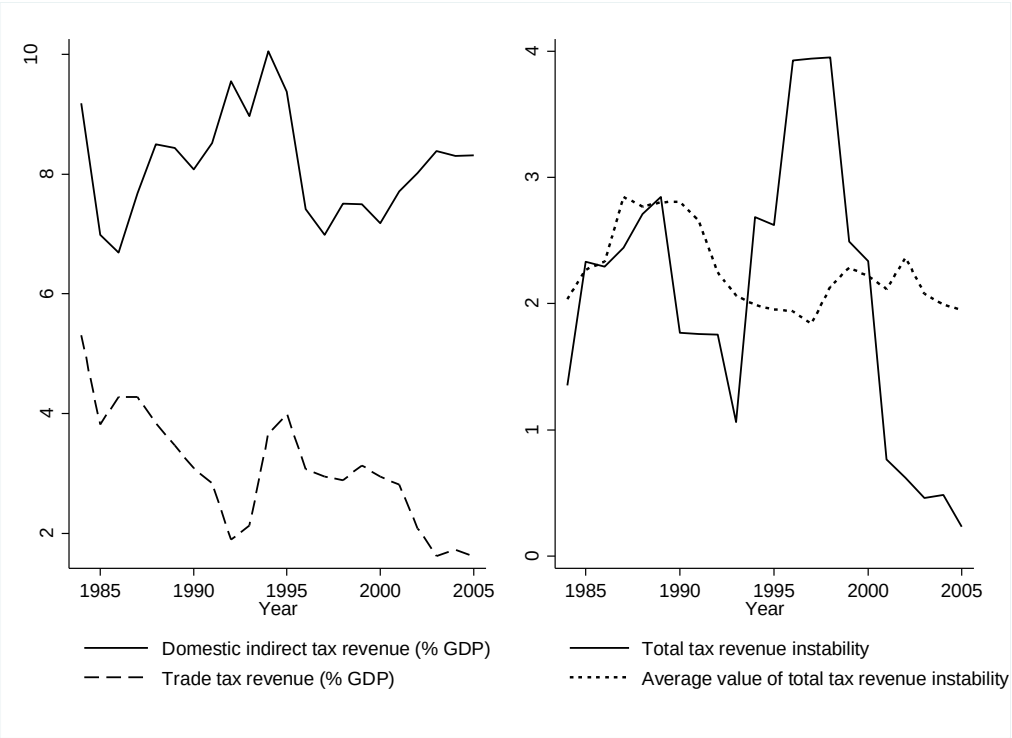
Figure 3.6. Dynamics of the structure of taxation and the instability of the total tax revenues in Tanzania



Source: Keen and Mansour (2010a) and authors' calculations

In Kenya, the story is slightly different, because domestic indirect taxes were, over the whole period, higher by far than trade taxes. This means that the Kenyan tax structure is highly domestic-indirect based (Kenya was among the first African countries to adopt VAT in the early 1990s). As a result, Kenya enjoyed, over most of the years, more stable tax revenues than the sub-Saharan average (see Figure 3.7).

Figure 3.7. Dynamics of the structure of taxation and the instability of the total tax revenues in Kenya



Source: Keen and Mansour (2010a) and authors' calculations

These case studies confirm the general result that dependence upon domestic indirect tax has a stabilizing effect. Therefore, countries that exhibit high levels of tax instability could greatly reduce these levels by increasing the proportion of their total tax revenue made up by domestic indirect taxes. This could be a policy agenda for Nigeria, Equatorial Guinea and the Republic of Congo for example, where tax instability is particularly high.

3.5. Conclusion

Tax revenue instability has proved to be a crucial issue for decades in sub-Saharan Africa and therefore really needs to be addressed. In this paper, we investigated the consequences of tax revenue instability for a panel of 37 sub-Saharan African countries for the period 1980-2005

and derived solutions in order to mitigate these consequences. Tax revenue instability in SSA is not only high, but also highly detrimental, as we found that it leads to increased public spending volatility. Moreover, we found evidence that the instability of public investment induced by tax revenue instability has a negative impact on the level of public investment.

Given these negative consequences of tax revenue instability, we studied the ways in which governments could manage the instability of tax revenues. We found that tax composition is an important factor. A higher dependence on domestic indirect taxes leads to significantly lower levels of tax revenue instability. Therefore, the move from trade taxes towards indirect domestic taxes, which is currently occurring in developing countries, is beneficial in terms of limiting tax revenue instability. The presentation of various countries' experiences supported this policy recommendation, as countries with the lowest levels of tax instability during the period 1980-2005 relied highly on domestic indirect taxes.

3.6. Appendices

Appendix 3.1 – List of countries (37 sub-Saharan African Countries)

Benin, Burundi, Burkina Faso, Botswana, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Congo Republic, Côte d'Ivoire, Equatorial Guinea, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Madagascar, Malawi, Mali, Mauritius, Mozambique, Niger, Nigeria, Rwanda, Senegal, Sierra Leone, South Africa, Swaziland, Tanzania, Togo, Uganda, Zambia, Zimbabwe.

Appendix 3.2 - Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Total tax revenue instability[a]	730	0.320	0.770	-1.917	2.529
Public investment instability[a]	730	0.203	1.028	-6.709	3.711
Government consumption instability[a]	730	0.347	0.801	-1.988	2.803
GDP per capita instability[a]	730	1.076	0.853	-1.608	3.829
Total tax revenue instability[b]	774	0.499	0.781	-1.760	2.611
Public investment instability[b]	769	0.398	1.018	-6.043	3.035
Government consumption instability[b]	774	0.434	0.845	-2.036	3.142
GDP per capita instability[b]	774	2.507	1.127	-0.232	6.504
Total tax revenue instability[c]	726	2.484	0.707	0.350	5.466
Public investment instability[c]	726	3.187	0.911	-3.788	5.729
Government consumption instability[c]	725	2.425	0.760	0.191	4.304
GDP per capita instability[c]	726	1.071	0.833	-1.594	3.434
Ratio Domestic/Trade taxes	774	5.137	0.913	1.949	10.531
Trade Tax dependence	774	3.318	0.686	-1.385	4.504
Direct Tax dependence	774	3.508	0.572	0.881	4.526
Indirect Domestic Tax Dependence	774	3.507	0.871	-1.013	4.463
Public investment ratio	732	1.808	0.667	-1.558	4.550
Inflation	688	4.726	0.183	4.465	6.277
Natural Resource Rent	774	0.045	0.0883	0	0.865
Population density	774	76.958	108.326	2.006	612.44
Openness	774	4.086	0.506	1.844	5.618
GDP per capita	774	6.035	0.929	4.662	8.601
External debt (%GNI)	740	4.309	0.728	2.050	6.219
Number of Conflicts	774	0.182	0.437	0	3
Claims on government	743	0.053	0.199	-2.001	0.625
Executive Elections	774	0.121	0.327	0	1
Foreign aid per capita	762	4.012	0.552	2.594	5.806

Notes: all the variables are expressed in logarithmic terms except conflict and elections.
a instability measured as the standard deviation of the variable
b instability measured as the standard deviation of the change in the variable
c instability measured as the standard deviation of the change in the log of the variable

CHAPTER 4.

Is VAT stabilizing?[27]

Abstract

We study whether the adoption of the value-added tax in developing countries was an effective way of stabilizing tax revenues. Using a large panel of 103 developing countries observed over 1980-2008 and several alternative estimation methods in order to deal with the self-selection bias and the endogeneity issue of VAT adoption, we find robust evidence that the presence of VAT leads to significantly lower tax revenue instability. On average, countries with a value added tax experience tax revenue instability forty to fifty percent lower than the countries which do not have a VAT system. Those effects decrease with the levels of economic development and trade openness.

[27] The article on which this chapter is based is co-authored with Christian Ebeke.

4.1. Introduction

Over the last twenty years, a large number of countries implemented major tax reforms, mainly by adopting the value-added ta. As a result, at the beginning of the 2010's, more than 130 countries worldwide have a VAT and among developing countries, about 70% of them (104 out of 144) have adopted this kind of indirect taxation. VAT has tended to spread as regional bursts, in countries participating in an IMF program and in countries with low past performances of tax revenue (Keen and Lockwood, 2010).

Several papers assessed what are the gains associated with switching to VAT with regards to several outcomes. Gordon and Nielsen (1997) show that by relying more on value-added taxes rather than on income taxes, it is possible to decrease the real cost of evasions activities. Computing estimates of the marginal cost of public funds for 5 tax instruments in 36 African countries, Auriol and Warlters (2011) found that, on average in the sample, VAT is the tax instrument with the lowest marginal cost of funds. A large literature on tax-tariff reforms[28], also established that a rise in domestic consumption taxes, notably in the value-added tax, to compensate a decrease in import tariffs is welfare improving (Michael et al., 1993; Hatzipanayotou et al., 1994; Abe, 1995; Keen & Ligthart, 2002). Emran and Stiglitz (2005) questioned however this result in presence of a large informal sector while Keen (2008) found that if both a VAT and withholding taxes are deployed, tax-tariff reforms are leading to a rise in the welfare even with a large informal sector. Finally, Keen and Lockwood (2010) found that the introduction of this value added tax has been globally associated with significantly more tax revenue being collected even though the impact is modest in size.

Beyond these identified consequences of the reliance on a VAT system, a largely unexplored aspect is whether VAT also permits to stabilize tax revenues. From Table 4.1, we can see that,

[28] For a quantification of the relative marginal welfare costs of trade and commodities taxes, but not for VAT in particular, see also Clarete and Whaley (1987).

since the 1980's, developing countries have been experiencing much larger tax revenue instability than developed economies. Tax instability has decreased over time in developing countries but, in the 2000's, it still remained significantly larger than in OECD countries. The two regions of the world which exhibit the higher degree of tax instability are the Middle East and North Africa and sub-Saharan Africa.

Table 4.1. . Tax instability in OECD countries and developing countries

	1980's	**1990's**	**2000's**
OECD	1.093	0.920	1.002
Developing countries	2.379	2.369	1.891
East Asia and the Pacific	*2.397*	*2.297*	*1.823*
Europe and Central Asia	-	*2.937*	*1.766*
Latin America and Caribbean	*2.195*	*1.904*	*1.535*
Middle East and North Africa	*2.247*	*2.605*	*2.435*
South Asia	*2.224*	*1.717*	*1.206*
sub-Saharan Africa	*2.473*	*2.564*	*2.099*

Note: Instability of the tax revenue ratio over GDP calculated as the standard deviation of the change in the variable over the decades.

The instability of tax revenue is of great concern, especially for developing countries, since it leads to a volatility of the much-needed public expenditures (Lim, 1983; Bleaney et al., 1995; Ebeke and Ehrhart, 2011). Bleaney et al. (1995) found for the period 1970's to the mid 1980's that the tax structure matters for the stabilization of revenue with indirect domestic taxes being stabilizing. Ebeke and Ehrhart (2011) confirmed this result for the period 1980-2005 for the case of sub-Saharan African countries and add that the stabilizing effect has been reinforced since the mid 1990's. The aim of this paper is therefore to assess whether the adoption of a particular type of domestic indirect taxation, namely the value-added tax, leads to an enhancement in the stability of tax revenues in developing countries. Using a panel of 103 countries over the period 1980-2008, we apply several estimation methods, controlling for endogeneity and self-selection issues, to robustly examine the impact of the introduction of the VAT on the stability of tax revenues.

To preview our results, we find that VAT has indeed a stabilizing power on the tax revenue ratio. Countries which have adopted the VAT system enjoy much more stable tax revenue than other countries. This effect is particularly important in low income countries and in a context of a low exposure to external shocks through trade openness.

The paper is organized as follows. Section 2 presents why the adoption of a VAT can be stabilizing. The estimation methodology is depicted in section 3 and section 4 exposes the results of the VAT impact on tax revenue volatility. Finally, Section 5 concludes.

4.2. The stabilizing effect of VAT

The value-added tax is a "broad-based tax levied at multiple stages of production, with – crucially- taxes on inputs credited against taxes on output" (Ebrill et al., 2001, p.3). This tax has been adopted in replacement of other sales taxes, either retail sales tax or turnover tax, and, according to its definition, the key advantage is that revenue is secured by being collected throughout the process of production – unlike a retail sales tax – (Cnossen, 2009) but without being cascading and distorting production decisions, as, in particular, a turnover tax does (Bird and Gendron, 2007). VAT is therefore less vulnerable to evasion than a retail sales tax where collection occurs at the final stage. However, Aizenman and Jinjarak (2008) emphasizes that VAT collection efficiency remains largely dependent of the quality of enforcement and the efficiency of monitoring, which are both increasing with the political stability and the ease and fluidity of political participation. Moreover, more administrative expenditure to administer the VAT and a longer experience with VAT has been found to be significantly associated with increased compliance (Agha and Haughton, 1996). Fortunately, the adoption of the VAT was generally part of wider reforms of tax systems aiming at improve tax administration and tax compliance.

Two main reasons can be postulated as to why the adoption and the presence of a VAT in a country can lead to enhanced tax stability.

The first reason derives from the fact that a VAT can generate less instable revenues than the retail sales tax that it often replaces. Indeed, as emphasized above, the VAT being collected throughout the whole value added chain, if one part of this chain is hit by an idiosyncratic shock, the tax revenues collected by the remaining parts of the value added chain might still be secured. Therefore, the collection of VAT revenues at numerous stages of the value-added chain can act as a diversification of the risk and render tax revenues less sensitive to shocks, and thus more stable, than in a situation where consumption taxes are collected only at the final retail stage.

Secondly, the adoption of VAT has been found to be associated with a rise in the level of taxes being collected (Keen and Lockwood, 2010), the relative share of tax revenue originating respectively from tariffs and from income taxes being therefore reduced. This idea is reinforced by the fact that VAT implementations often occurred in the context of trade liberalization where the lost revenues from tariffs were trying to be recovered from domestic sources (Keen, 2009; Baunsgaard and Keen, 2010). The presumption is that since the VAT relies mainly on final consumption[29] and this component being relatively more stable than exports, imports or companies' profit, a greater reliance on VAT revenues for tax mobilization rather than on income taxes or on import duties, is expected to stabilize tax revenues (Bleaney et al. 1995; Ebeke and Ehrhart, 2011).

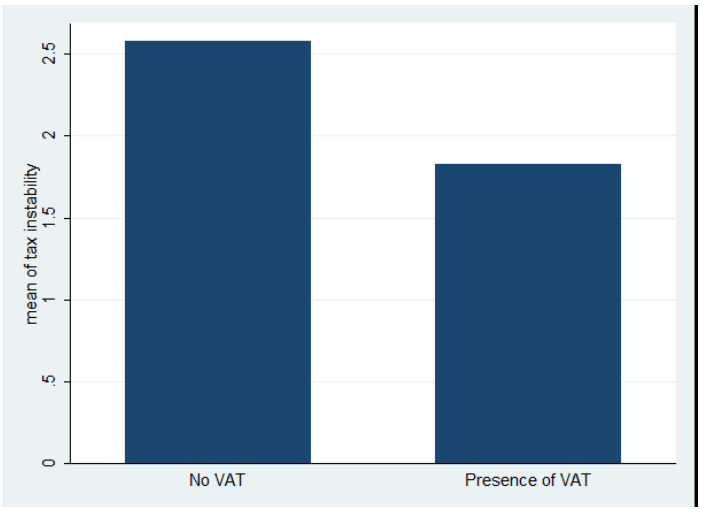
4.3. Estimation Method

4.3.1. Data and Methodology

Our dataset consists of 103 developing countries over the period 1980-2008 (see Appendix 4.1). According to Figure 4.1, preliminary evidence shows that the average level of tax instability in countries without the value-added tax is significantly larger than in countries that adopted VAT.

[29] Even though, on average, about 55 percent of VAT is collected at the border on imports (Ebrill et al., 2001), the remaining 45 percent relies on domestic consumption and is therefore more likely to be stable.

Figure 4.1: Tax revenue instability in countries with and without a VAT



Source: authors' calculations

To assess the effect of the adoption of the VAT on the instability of government revenues, the estimated econometric model is the following:

$$\log(\sigma_{i,t}) = \alpha + \beta_1 VAT_{i,t} + \beta_2 X'_{i,t} + u_i + \lambda_t + \varepsilon_{i,t}$$

where i and t are country and years indicators respectively. $\sigma_{i,t}$, tax revenue to GDP ratio instability, is the dependent variable.[30] The use of the standard deviation to measure instability is widely approved in the literature. However, as Nelson and Plosser (1982) highlighted that macroeconomic data are integrated of order 1, we apply the first-difference operator to these data in order to ensure that they are stationary before measuring their standard deviation. Hence, our measure of instability is the standard deviation of the change in the variable over 5 year non overlapping sub-periods, as in Bleaney et al. (1995) and Combes and Ebeke (2011). $VAT_{i,t}$ is a dummy for the presence of VAT and equals one when the VAT is present for at least 3 years inside the 5-year sub-periods. The six sub-periods are 1980-1984, 1985-1989, 1990-1994; 1995-1999; 2000-2004, 2005-2008. The vector $X'_{i,t}$ captures other explanatory variables,

[30] By using a log-linear specification, we ensure that the fitted values for $\sigma_{i,t}$ are strictly positive and we can directly interpret the estimated parameters as semi-elasticities.

discussed further below, affecting the instability of tax revenues. The terms u_i and λ_t are country-specific and time-specific effects respectively and $\varepsilon_{i,t}$ is an unobserved random error term.

The matrix of control variables includes the standard determinants of tax revenue instability (see Lim, 1983; Bleaney et al. 1995; Ebeke and Ehrhart, 2011). Among the structural factors is GDP per capita, trade openness and the level of natural resource rent. The level of economic development (GDP per capita) would be negatively associated with the instability of taxes because it is a proxy for the degree of risk management and the diversification of production activities, which can lower the degree of volatility. The contribution of trade openness to tax instability is less striking. On the one hand, trade openness may act as a proxy for an openness policy, which can be growth enhancing (Dufrénot et al, 2010), and behind which there exists a willingness to provide better management of economic affairs as well as good institutions and policies for competitiveness. On the other hand, trade openness may be a proxy for the "natural openness" which increases the vulnerability of a small open economy to external shocks. Overall, the sign of the coefficient of the trade openness variable (exports plus imports divided by the GDP) is ambiguous. We expect to find a positive association between the levels of natural resource rent and tax revenue instability, because the price of natural resources is known to be highly volatile. The other determinants are GDP per capita instability, inflation instability, the level of inflation and the presence of elections. We expect all these variables to be associated with increased tax revenue instability. Data for government revenue, excluding grants, are drawn from IMF's Government Finance Statistics and completed by Article IV data. The dummy Executive Elections is taken from the Database of Political Institutions and all the other variables are from the World Bank's World Development Indicators. Descriptive statistics are presented in Appendix 4.2.

4.3.2. Endogeneity and self-selection issues

The OLS estimator does not take into account that the presence of the VAT is not a random assignation to countries. In fact, a country could choose to adopt this taxation system in order to enhance its tax collection and also to enjoy more stable revenues through the taxation of a specific component of the tax base (here the private consumption) which is more stable than the other components of the tax base. Therefore to ensure that the estimated effect is the correct one, we would have to deal with the self-selection bias which is another way that an explanatory variable, namely the VAT dummy, can be endogenous (Wooldridge, 2002b).

To correct for this endogeneity bias, we resort to an instrumental variables technique. As external instruments for the adoption of VAT we use the lagged percentage of geographical neighbor that have already adopted VAT and the lagged value of the level of tax revenue ratio which are two variables that Keen and Lockwood (2010) found to be significant determinants of the VAT adoption. The first instrument is expected to be positively correlated with the presence of a VAT because of neighborhood imitation effects but should not have any direct impact on the instability of tax revenue. The second instrument is used to capture the idea that countries with initially lower tax revenue performances are those with the higher marginal benefit of adopting a VAT. We rely on the 2SLS estimator given that using a linear regression for the first-stage estimates generates consistent second-stage estimates even with a dummy endogenous variable (Angrist and Krueger, 2001). However, given that the VAT is a dummy variable, we will also employ, as robustness test, an estimation method which uses a probit model in the first-stage rather than a linear regression model.[31]

[31] We use the routine *treatreg* in StataCorp suited for binary endogenous regressors (see Cameron and Trivedi, 2009).

4.4. Results

4.4.1. The impact of VAT on tax revenue instability

The results with the instrumental variable estimators are presented in Table 4.2. The first-stage estimations with the 2SLS estimator are displayed in columns 5 and 6 while the results of the corresponding second-stage estimations are shown in columns 1 and 2. The results of the first stage estimations of the VAT adoption, columns 5 and 6, indicate that the external instruments (the lagged share of neighbors with the VAT and the lagged level of tax revenue) are statistically significant and the F-test statistics are above 10, indicating the strength of our two instruments. In column one, the results highlight a negative and significant effect of the presence of the VAT on the tax revenue volatility. We do not reject the null hypothesis of the Hansen test which means that our instruments are valid. In the second column, with some additional control variables, the effect of the VAT remains significantly negative at the 5% level, indicating that the VAT is reducing tax revenue instability. When taking into account the fact that our endogeneous variable of interest is a dummy, we obtain the results presented in column 3 and the first-stage probit model of the VAT adoption is displayed in column 7. The negative impact of the VAT on tax revenue instability holds and is significant at the 1% level.

Table 4.2. The effect of VAT on tax revenue instability - Instrumental variable techniques

	Tax Instability (log)				VAT adoption *First Stage*		
	2SLS	2SLS	Treatreg	IV GMM-System			
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dummy VAT	-1.007**	-0.978**	-0.916***	-0.658**			
	(0.503)	(0.494)	(0.219)	(0.335)			
Log Tax instability (lag)				0.245***			
				(0.086)			
GDP pc (log)	-0.009	-0.0004	0.136**	0.150	0.134	0.137	0.714***
	(0.283)	(0.284)	(0.058)	(0.096)	(0.123)	(0.123)	(0.124)
Instability GDP pc (log)	0.0642	0.0631	0.105**	0.0982*	0.00004	-0.0004	-0.0834
	(0.059)	(0.058)	(0.048)	(0.052)	(0.028)	(0.028)	(0.100)
Inflation (log)	0.452**	0.463**	0.236	0.169	0.130	0.133*	-0.413
	(0.182)	(0.183)	(0.197)	(0.155)	(0.073)	(0.074)	(0.440)
Inflation instability (log)	0.0227	0.0202	0.0818*	0.0544	0.00285	0.0023	0.0821
	(0.045)	(0.045)	(0.045)	(0.045)	(0.213)	(0.021)	(0.099)
Openness (log)	0.169	0.0647	0.281***	0.176*	0.0655	0.0488	-0.479**
	(0.226)	(0.232)	(0.078)	(0.092)	(0.104)	(0.11)	(0.189)
Oil rent (log)		0.148	0.166***	0.117**		0.0326	-0.172**
		(0.124)	(0.037)	(0.050)		(0.060)	(0.077)
Executive Elections		0.0942	0.105	0.0708		-0.00095	0.455***
		(0.088)	(0.084)	(0.079)		(0.051)	(0.166)
Lagged Presence of VAT in the region					0.0081***	0.0081***	0.0172***
					(0.002)	(0.002)	(0.006)
Lagged Tax Revenue					-0.0099*	-0.0103*	-0.0472***
					(0.005)	(0.006)	(0.013)
Observations	377	377	389	367	377	377	389
Number of countries	103	103	103	99	103	103	103
Hansen Test (p-value)	0.658	0.823		0.309			
F-Test instruments					10.35	10.12	
Nb of instruments				23			
AR(1) test (p-val)				0.000			
AR(2) test (p-val)				0.353			

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. A constant and time and country fixed effects are included in all estimations. In the GMM-system estimation, the one-step estimator is used with robust standard errors. Elections, inflation, inflation instability, oil rent and GDP instability are considered as exogenous. The lagged dependent variable and the level of GDP per capita are instrumented with first-order to fourth-order lagged values. We include the lagged presence of VAT in the region and the lagged tax revenue as external instrument for the adoption of VAT. The matrix of instruments has been collapsed.

In column 4, we consider the possibility that tax revenue instability might be persistent. The lagged level of the dependent variable is thus included to catch the persistency which might characterize the dynamics of tax revenue instability. The IV-FE estimator becomes inconsistent because the lagged level of tax instability is correlated with the error term due to the presence of

country fixed effects (Nickell, 1981). One way to handle these issues is to use the Generalized Method of Moments (GMM) technique (Blundell and Bond, 1998). The System-GMM estimator combines, in a system, first-difference equations, where the right-hand-side variables are instrumented by lagged levels of the series with an additional set of equations in levels, using lagged first differences of the series as instruments. We use our two external instruments (lagged share of neighbors with a VAT and lagged tax revenues) for the dummy VAT. The first- and second-order autocorrelation tests of the residuals in first-difference (AR(1) and AR(2) tests) and the Hansen test confirm the validity of our estimation with the two external instruments. The results remain unchanged, the presence of a VAT is leading to more stable tax revenues. The average effect stands at exp(-0.658) = 0.52 therefore countries with a VAT system experience about 48% lower tax instability than countries without a VAT.

The results of Table 4.2 also highlight that the presence of the VAT is not the only significant determinant of the volatility of government tax revenues. Indeed, it appears that an unstable macroeconomic environment (high inflation and growth volatility) is fueling the volatility of tax revenue, a result which is consistent with earlier studies (Lim, 1983, Bleaney et al. 1995; Ebeke and Ehrhart, 2011).

Whatever the instrumental variable estimator used, the results confirm the main hypothesis presented in this paper, namely that countries which have adopted the VAT system enjoy much more stable tax revenue than countries which did not.

4.4.2. Accounting for heterogeneity in the impact

After having established a robust stabilizing impact of the presence of the VAT on the tax revenue ratio, the paper extends the analysis by testing the existence of heterogeneous effects of the VAT. We argue that some countries could better enjoy the stabilizing effect of the VAT than others. This paper follows Keen and Lockwood (2010) for the choice of the conditional variables. Indeed, these authors found that the VAT is more likely to increase the total tax revenue ratio as

the levels of per capita income and trade openness increase. Therefore, our paper extends this analysis by testing the effect of these two variables (per capita GDP and trade openness) on the sensitivity of the instability of tax revenue with respect to the presence of the VAT.

The previous econometric model is modified slightly to allow an interactive term of the dummy VAT crossed with each of the two conditional variables while controlling additively for each component of the interactive term. Keen and Lockwood (2010) argued that the VAT is more likely to increase tax revenue in countries with relatively high levels of GDP per capita and trade openness for the following two reasons. First, higher income countries cope more easily with the distinct administrative and compliance requirements of the VAT. Second, VAT collections at the border typically account for a large part of total VAT revenues in most of the developing countries. All else being equal, one would thus expect the VAT to function better in more open economies, since the tax base is then more readily accessible. Now, how this translates into the tax revenue stability analysis? Are the effects found by Keen and Lockwood (2010) – regarding the impact of the levels of economic development and trade openness on the relationship between the level of tax revenue and the presence of VAT – similar to those that can be estimated in the case of the tax revenue ratio stability?

This paper hypothesizes that the effects of the levels of economic development and trade openness on the strength of the negative relationship between the VAT and the instability of tax revenues is unclear regarding the level of economic development but somewhat clear regarding the trade openness variable. On the one hand, one could argue that the implementation of the VAT is less difficult for countries having attained a relatively high level of economic development, and they can therefore much more enjoy the stabilizing properties of this taxation instrument. On the other hand, the marginal benefit in terms of tax revenue stability of having a VAT could be higher in low income countries since they are less diversified and are the countries that suffer the most from high output volatility (Koren and Tenreyro, 2007). Therefore, relying upon the VAT in these countries could help overcome the strong macroeconomic instability

environment by taxing an aggregate which represents a high proportion of domestic wealth and at the same time is amongst the more stable one.

Regarding the role of the trade openness variable, one would expect the presence of the VAT to have a marginal stabilizing effect which decreases with the degree of trade openness. Based on the findings that trade openness is a source of macroeconomic volatility in developing countries (di Giovanni and Levchenko, 2009), one could expect that a VAT system which is not less dependent upon the external sector, would help stabilize tax revenues.

The results of econometric investigations are presented in Table 4.3. Due to the strong inertia characterizing the tax revenue instability variable, the econometric model includes the lagged dependent variable and is estimated by the System-GMM estimator. Column 1 adds an interactive term of VAT crossed with GDP per capita. The results indicate a significant and positive sign of the coefficient associated with the interactive variable while the coefficient of the VAT dummy exhibits a significantly negative sign. This means that the stabilizing effect of the VAT is decreasing with the level of development. Based on the two coefficients associated with the VAT dummy, we computed the threshold level of GDP beyond which the stabilizing effect of the VAT disappears. It stands at $8,224 USD, which corresponds to the category of upper middle income countries ($3,976 to $12,275USD) according to the World Bank income classification. This results highlights that the VAT contributes to reduce the volatility of public tax revenue essentially amongst the low income and lower middle income countries.

In column 2, the results suggest a marginal stabilizing effect of the VAT which decreases with the degree of trade openness. Indeed, the coefficient of the additive term of the VAT dummy is negative whereas the one corresponding to the interactive term exhibits a positive sign. This result highlights that the benefit of having a VAT in terms of tax revenue stability is higher when the level of trade openness is lower. However, the relatively high value of the estimated trade openness threshold suggests that in our sample the bulk of countries are all located on the stabilizing area of the effect of the VAT.

Table 4.3. Heterogeneous impact of the VAT

	Tax instability (log) *GMM-System*	
VARIABLES	(1)	(2)
Dummy VAT	-3.651***	-2.095**
	(1.411)	(0.891)
VAT x GDP pc (log)	0.405**	
	(0.185)	
VAT x Lagged Openness (log)		0.386*
		(0.206)
Lagged tax instability (log)	0.261***	0.205**
	(0.0893)	(0.0848)
GDP pc (log)	-0.242	0.144
	(0.158)	(0.111)
GDP pc instability (log)	0.0898*	0.0897*
	(0.0532)	(0.0502)
Inflation (log)	0.211	0.212
	(0.166)	(0.172)
Inflation instability (log)	0.0174	0.0474
	(0.0459)	(0.0462)
Oil rent (log)	0.172***	0.138***
	(0.0521)	(0.0517)
Openness (log)	0.308***	
	(0.0971)	
Lagged Openness (log)		0.0803
		(0.138)
Executive Elections	0.0694	0.0723
	(0.0823)	(0.0757)
Observations	367	366
Number of countries	99	99
Joint significance of VAT coefficients: p-value	0.014	0.046
Threshold of the conditional variable	$8,224USD	228%
Number of instruments	25	25
Hansen Test (p-val)	0.210	0.546
AR1 Test (p-val)	0.000	0.000
AR2 Test (p-val)	0.322	0.585

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. A constant and time and country fixed effects are included in all estimations. The one-step system-GMM is used. Elections, inflation, inflation instability, oil rent and GDP instability are considered as exogenous. The lagged dependent variable and the level of GDP per capita are instrumented with first-order to fourth-order lagged values. The dummy VAT and the dummy VAT crossed by each conditional variable (GDP and openness) are instrumented by external instruments lagged vat, lagged tax rev and their interactive terms with each of the conditional instruments. The matrix of instruments has been collapsed.

These two results contrast with those of Keen and Lockwood (2010) who analyzed the conditional impact of the VAT on the level of the tax revenue ratio. Our paper shows that the level of economic development and the degree of trade openness reduces the marginal effectiveness of the VAT in terms of tax revenue stabilization while, it has been shown by Keen and Lockwood (2010) that they contribute to increase the effectiveness of the VAT in terms of revenue mobilization.

4.5. Conclusion

In this paper we investigated whether the large wave of adoption of the VAT system in developing countries over the last twenty years has permitted to stabilize their tax revenues. Using several alternative estimation methods in order to deal with the self-selection bias and the endogeneity issues of VAT adoption, we find robust evidence that the presence of VAT leads to an enhancement in the stability of tax revenue. On average, countries with a value added tax experience tax revenue instability of 40 to 50% lower than countries which do not have a VAT. We established that the effect is stronger in low income countries and in a context of low exposure to external shocks through trade openness.

4.6. Appendices

Appendix 4.1 - List of 103 countries in the sample (Year of VAT adoption)

Afghanistan, Albania (1996), Algeria (1992), Angola, Argentina (1975), Armenia (1992), Azerbaijan (1992), Bangladesh (1991), Belarus (1992), Belize (2006), Benin (1991), Bhutan, Bolivia (1973), Botswana (2002), Brazil (1967), Bulgaria (1994), Burkina Faso (1993), Burundi, Cambodia (1999), Cameroon (1999), Cape Verde (2004), Central African Republic (2001), Chad (2000), China (1994), Colombia (1975), Democratic Republic of Congo, Republic of Congo (1997), Costa Rica (1975), Cote d'Ivoire (1960), Djibouti, Dominican Republic (1983), Ecuador (1970), Egypt (1991), El Salvador (1992), Ethiopia (2003), Fiji (1992), Gabon (1995), The Gambia, Georgia (1992), Ghana (1998), Guatemala (1983), Guinea-Bissau, Haiti (1982), Honduras (1976), India (2005), Indonesia (1985), Islamic Rep.of Iran, Jamaica (1991), Jordan (1994), Kazakhstan (1992), Kenya (1990), Kyrgyz Republic (1992), Lao PDR (2004), Lesotho (2003), Liberia, Lithuania (1994), Madagascar (1994), Malawi (1989), Maldives, Malaysia, Mali (1991), Mauritania (1995), Mauritius (1998), Mexico (1980), Moldova (1992), Mongolia (1998), Morocco (1986), Mozambique (1999), Namibia (2000), Nepal (1997), Nicaragua (1975), Niger (1986), Nigeria (1994), Pakistan (1990), Panama (1977), Papua New Guinea (1999), Paraguay (1993), Peru (1973), Philippines (1988), Romania (1993), Rwanda (2001), Samoa (1994), Senegal (1980), South Africa (1991), Sri Lanka (1998), Sudan (2000), Swaziland, Syrian Arab Republic, Tajikistan (1986), Tanzania (1998), Thailand (1992), Togo (1995), Tunisia (1988), Turkey (1985), Uganda (1996), Ukraine (1992), Uruguay (1968), Vanuatu (1998), Venezuela (1993), Vietnam (1999), Yemen (2005), Zambia (1995), Zimbabwe (2004).

Appendix 4.2 - Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Tax instability (log)	389	0.449	0.808	-1.721	2.561
Dummy VAT	389	0.622	0.485	0	1
GDP per capita (log)	389	7.752	0.958	5.395	9.680
GDP per capita volatility (log)	389	0.808	0.821	-1.300	3.406
Inflation (log)	389	4.769	0.327	4.574	7.799
Inflation instability (log)	389	1.673	1.509	-1.259	9.190
Oil rent (log)	389	0.752	1.163	0	4.301
Openness (log)	389	4.170	0.527	2.644	5.337
Elections	389	0.578	0.494	0	1
Share of countries with VAT in region (lag)	389	35.006	24.712	0	82.857
Tax revenue as % of GDP (lag)	389	18.715	7.784	2.870	53.10

CHAPTER 5.

Incidence of indirect taxes in Burkina Faso:

Evidence from a macro-micro computable general equilibrium

Abstract

This chapter assesses the progressivity of indirect taxes in Burkina Faso and focuses on whether import tariffs are more or less progressive than domestic indirect taxes (value added taxes or excise taxes). Using a linked macro-micro model, we take account of both the heterogeneity of households and the general equilibrium effects of tax changes on prices. We found that, in Burkina Faso, the burden of the current consumption taxes is regressive but less regressive than import taxes. Tariffs are regressive both for food and non-food products whereas VAT are regressive only for non-food products. In rural areas, tariff and vat are equally regressive while for urban households, tariffs are more regressive than consumption taxes.

5.1. Introduction

Recent tax reforms in developing countries are tax-tariffs reforms which favour decreases in tariffs and increases in domestic indirect taxes, namely value-added taxes or excises. On a theoretical point of view, for a small economy, a cut in import tariffs combined with a point-for-point increase in domestic consumption taxes has been found to lead to an increase of the citizens' well-being (Michael et al., 1993; Hatzipanayotou et al., 1994; Abe, 1995; Keen and Ligthart, 2002; Naito, 2006; Keen, 2008).

Auriol and Warlters (2011) calculated the marginal cost of funds for five key instruments in 38 African countries and derived the result that in most countries an optimal structure, minimizing the marginal cost of funds, would include a VAT, a small imports tariff, and a zero exports tax. Clarete and Whalley (1987) found for Philippines that the marginal welfare cost of commodity taxes is relatively lower than the marginal welfare cost of trade taxes. Sah (1983) emphasizes however that the redistribution that can be achieved through commodity taxes is meager.

Many African countries implemented tax-tariff reforms over the last two decades and are now largely relying on commodity taxes as a major source of funding. One can therefore wonder whether these commodity taxes are regressive. And especially whether they are more or less regressive than the trade taxes they often partly replaced. A regressive tax is imposed in such a way that taxpayers at higher income brackets pay a lower proportion of their income in taxes than taxpayers at lower income brackets. The equity concern urges to consider how various tax instruments affects rich and poor households according to their consumption patterns and factor earnings.

We focus on Burkina Faso, which can be viewed as a representative landlocked country. It belongs to the West African Economic and Monetary Union (WAEMU) with seven other countries. All these countries underwent through similar schemes of trade liberalization because

of the creation of a common external tariff. Regarding consumption taxes, several implementation rules were decided at the regional level with the aim to reach a relatively harmonized tax system in all the WAEMU countries. In Burkina Faso, tax revenues grew substantially over the first decade of the 2000's, from 10.9% of GDP in 2000 to slightly more than 13% in 2009.

The purpose of this paper is to investigate the comparative incidence of import taxes versus domestic consumption taxes in Burkina Faso. To reach this goal, we use a linked macro-micro model where a computable general equilibrium (CGE) is mixed with microsimulations permitting to deal with both heterogeneity in the distributional effects and general equilibrium effects of tax changes. This study will contribute, with a relatively advanced methodology, to the existing tax incidence literature which is still nascent in developing countries. It will bear important policy implications by highlighting whether indirect taxes are regressive or progressive and why they are so. If taxes are regressive, governments should direct their effort toward an equitable targeting of public spending in order to render the global fiscal system progressive. To preview our findings, we established that both consumption taxes and trade taxes are regressive taxes but trade taxes in Burkina Faso appear even more regressive than domestic consumption taxes. Therefore, the current move away from import tariffs to domestic consumption taxes is advisable since they are less regressive than import tariffs.

The rest of the paper is structured as follows. The next section provides a literature review of the tax incidence analysis implemented in developing countries. Section 3 discusses our simulation methodology and the results are presented in section 4. Finally, section 5 concludes.

5.2. Tax incidence in developing countries

This section reviews existing studies on tax incidence in developing countries by detailing the various techniques, micro simulation models, computable general equilibrium models and integrated macro-micro models that can be used for this purpose and the results they found.

Microsimulation models enable researchers to simulate the effects of a policy on a sample of economic agents at the individual level. They offer the possibility to fully account for the observed heterogeneity of socioeconomic agents (for a detailed survey of microsimulation techniques see Bourguignon and Spadaro, 2006). Several existing studies who assed tax progressivity in Africa applied microsimulations, based on surveys detailing households' income and expenditure.

Essama-Nssah (2007) evaluates the social incidence of commodity taxes, based on survey data for Guinea, by relying on both the price elasticity of the poverty measure used and the consumption pattern for each commodity. It shows that imposing taxes on certain food expenditure (particularly cereals, grains and roots) induces a detrimental social outcome and therefore argues that they could deserve exemptions from VAT. Hossain (1995) found that a uniform VAT in Bangladesh is regressive. Yitzhaki and Thirsk (1990) focus on excise taxes in Cote d'Ivoire and use the concept of welfare dominance to establish that excise taxes on electricity and telephone services are the most desirable taxes since they welfare dominate all the other potential candidates on which excises taxes could rely on. Younger et al. (1999), in their study for Madagascar establish that most taxes are progressive with consumption taxes being more progressive than import duties. Sahn and Younger (1999), for eight sub-Saharan countries, found that most of the taxes are progressive however they consider statutory tax rates which might be drastically different from the actual taxes paid. For Dominican Republic, Jenkins et al. (2006) establish that the tax system is progressive.

These analyses use partial equilibrium approaches and therefore miss potentially important indirect effects on prices due to tax changes. An attempt to incorporate some of the indirect effects on prices was implemented by using the Input-Output Matrix coefficients to assess the cascading effect of taxes. In this way, Munoz and Cho (2004), for Ethiopia, found that VAT is progressive in its incidence. Newhouse and Zakharova (2007) used the same methodology but to assess the effect of a tax reform in the Philippines which consisted in increasing the VAT rate from 10% to 12% and a broadening of its base and found that it was progressive. Engel et al. (1999) established a slightly regressive effect of VAT in Chile. Even though these studies benefit from a rich insight on the distributional effect of taxes, since they incorporate thousands of households, they do not entirely capture the indirect effects of taxes on prices. Devarajan et al. (1980) ascertain the magnitude and direction of the change caused by allowing general equilibrium interrelationships.

To fully assess the social incidence of taxes, general equilibrium effects of tax reforms need to be considered for three main reasons. Firstly, consistent evaluation of the tax burden that affects each household requires to also track second and higher order effects of tax policies. Secondly, the multiple interactions between the sectors of the economy need to be considered and included in the analysis. Lastly, computable general equilibrium models are more suitable for accounting for the interconnectedness of sources and uses of income of various agents.

Such a CGE framework was used by Devarajan and Hossain (1998) who found that the incidence of indirect taxes in Philippines is broadly neutral, because of general equilibrium effects. Rutherford et al. (2002) found that value added and excise taxes represent efficient and equitable sources of public revenue in both the short- and long-run in Colombia.

Nevertheless, the major drawback of CGE models is that they measure impact for the representative agents of each group and do not quantify the within-group changes. Linking a general equilibrium model to a microsimulation model therefore permits to deal with both heterogeneity and general equilibrium effects (Essama-Nssah, 2008).

We will in this study combine the two approaches previously detailed in a macro-micro modelling to benefit from their complementary advantages. A CGE model is mixed with microsimulation and thus permits to take into account the within-group distributional effects and to enhance the ability of the resulting framework to deal with both heterogeneity and general equilibrium effects. Within linked macro-micro studies, there are two main possibilities. Firstly, integrated multi-household approaches are CGE analysis where all the thousands of households of the survey are integrated into the CGE model (for examples of this methodology, see Tarp Jensen and Tarp, 2005; and Cororaton and Cockburn, 2007). Secondly, the sequential approaches distinguish two modules, one micro and one macro, and make links between them. Sequential approaches can be either "bottom-up", "top-down" or "top-down-bottom-up". In "top-down" analyses, the linking aggregate variables, such as price levels or wages, are obtained from the CGE and used as inputs for the micro analysis (see for instance, Vos and De Jong, 2003 or Chen and Ravallion, 2004). In the opposite approach, the "bottom-up" one, microeconomic data are used to calibrate the CGE model (see for example Cogneau and Robilliard, 2007). The "top-down-bottom-up" approach links in a bi-directionally way the macro and micro models and uses iteration until the micro and macro models converge (more details about this methodology can be found in Savard, 2003; Bourguignon and Savard, 2008 or Peichl, 2009). At our knowledge, no study relying on this macro-micro methodology assessed whether the tax system in a country was progressive or regressive. A notable exception, even though they focus on only one tax instrument, is Boccanfuso et al. (2011), whose aim is to examine the social incidence of different VAT structures in Niger.

Building on these recent developments in linked macro-micro models, we will assess indirect taxes incidence in a sequential "top-down" approach by using the 2008 Social Accounting Matrix for Burkina Faso and the Nationally Representative Households' Survey of 2003.

5.3. Overview of tax policy in Burkina Faso

Since 2000, tax policy in Burkina Faso has been mainly consisting in the implementation of the tax regulations which are set by the West African Economic and Monetary Union. High tariff barriers were, in the 1990s, the main instrument of trade policy imposed to protect domestic products and industries; and were contributing significantly to the government receipts. On January 1st 2000, Burkina Faso has implemented the WAEMU's Common External Tariff leading to a huge decrease and uniformization in import tariffs. Tariff lines are now lying in four broad categories: key products (zero); essential commodities, including basic raw materials, equipment goods and specific inputs (5 percent); inputs and intermediate products (10 percent) and final consumption goods (20 percent). Burkina Faso grants exemption to the import duties on products originating from WAEMU and this preferential treatment has been extended to goods originating from ECOWAS since January 1st, 2004. Two additional duties are levied, one communitarian tax of 1 to 0.5 percent and a statistical tax of 1 percent ad valorem. Because of these reforms, the simple average Most Favored Nation (MFN) customs duties applied by Burkina Faso has been reduced from 32.1 percent in 1997 to 14.6 percent in 2003. However, Burkina Faso continues to practice high protection on agricultural products, which reduces purchasing power of households. The maximum rate effectively applied accordingly to the additional imposition of Regressive Protection Tax of 5 percent on imports not originating from WAEMU is 27.5 percent. These products are essentially refined vegetal oils, sugar, cigarettes, matches, polypropylene bags and batteries.

To counter the loss of tariff revenue, from 28 percent of government revenue in 1996 to 17 percent in 2008, the government of Burkina Faso implemented several reforms to develop domestic indirect taxation. The value-added tax, with a rate of 18%, was introduced in 1993. Exports are imposed at a rate of 0% and several activities are exempted from VAT, notably agriculture, livestock farming, fishing, insurance, medical care, rail transport, social housing construction and education. Domestic indirect taxes (value added taxes and excises) were

representing 37 percent of tax revenue in 1996 whereas in 2005 they were accounting for more than 50 percent of total government revenue, excluding grants. Efforts were made in the tax administration in order to collect more efficiently tax revenues and to broaden the taxation base.

The effective rates of trade taxes and consumption taxes for the three sectors of activities calculated from the Social Accounting Matrix are presented in Table 5.1. For import duties, the effective rates are about 11% for the average agricultural and industrial products whereas the highest effective rate only stands at 6.3% on average for consumption taxes in industries and is close to zero in agriculture.

Table 5.1. Effective average rates for the three sectors of activities (in %)

	Trade taxes	Consumption taxes
Agriculture	10.6	0.4
Industry	11	6.3
Services	0.1	1.5

Source: author's calculations

5.4. Simulation methodology

Our approach uses a CGE model and microsimulation in a sequential "top-down" way. We carry the simulation-induced price changes from the CGE model to the level of all the households in the national survey.

The macroeconomic model uses the 2008 Social Accounting Matrix (SAM) of Burkina Faso which comprises 28 sectors of activity as shown in Table 5.2. Nine production sectors are agricultural, eight are industrial and eleven belongs to services.

Table 5.2. Description of Burkina Faso SAM Accounts for 2008

Activities	
Agriculture (9)	Cereals, Fruit and legumes, Other Livestock, Cotton, Other rent products, Bovine, Other breeding products, Forestry, Fish
Industries (8)	Extractive industry, Beverage and modern tobacco, Textiles, Electricity gas and water, Other modern manufactured industry, Informal manufactured industry, Modern construction, Informal construction
Services (11)	Modern trade, Informal trade, Modern transport, Informal transport, Post and telecommunication, Financial services, Hotel, Other modern tradable services, Other informal tradable services, Private and parapublic non tradable services, Non tradable public services
Institutions	
Households (8)	Public wage earners, Formal private wage earners, Non formal private wage earners, Cotton farmers, Livestock farmers, Breeders, Non agricultural employers, Inactive
Others (2)	Government, Rest of the World
Factors of production	
Labor (2)	Skilled and unskilled labor
Capital (1)	Capital

The simulations are obtained from a single country computable general equilibrium model built on the EXTER model of Decaluwé et al. (2001) where the economy is considered as small and open. The production technology of firms is represented by a production function with constant returns to scale, quasi-concave, strictly increasing and twice differentiable in its arguments. It takes the form of nested function with several levels. Sectoral production combines value added and total intermediate consumption according to a fixed proportionality, also known as Leontief function. An imperfect substitute relationship, CES, combines composite labor and capital in sectoral value added. In all sectors, composite labor is a CES of skilled and unskilled labor. Each activity produces one product which is allocated between domestic consumption and exports through a constant elasticity transformation (CET) function. We suppose that local exporters face to an exogenous international demand. The export demand and

supply balance through an appropriate adjustment in the export FOB price. The export prices are equal to the FOB price converted to domestic prices by the exchange rate and adjusted by the export duties. Imports are modelled according to the Armington's specification where imports and domestic goods are imperfect substitutes. The elasticity values retained are presented in Appendix 5.1 and follow the values used by Balma et al. (2010) for their analysis of the Burkina Faso economy and are also consistent with the values chosen for their CGE analysis of the UEMOA customs union by Decaluwé et al. (2004).[32]

The import prices are equal to the international fixed price converted to domestic prices by the exchange rate and adjusted by the import duties.

Households' consumption is represented with a Linear Demand System (LES). Their disposable income is the sum of the wages they earn (from qualified and non qualified labor), of their capital revenue and of transfers from government, other households and the rest of the world. Four types of taxes are modelled, namely import tariffs, domestic consumption taxes, production taxes and income taxes.

The model is static with fixed real investment. Total domestic savings adjust to finance investment through household marginal propensity to save. Total demand equals total supply in all commodities and zero profits are made in all industries. Demand for unskilled labor, skilled labor and capital is equal to the supply of these factors, through adjustments in specific factor prices. All factors are nationally mobile between sectors but internationally immobile. Government transfers to household and government spending are fixed in real terms. The model closes with fixed foreign savings and a fixed exchange rate acting as the numeraire. The domestic price index is endogenous.

[32] We have performed sensitivity analysis with the trade elasticities and results were robust to reasonable parameter ranges.

We do not attempt to model non-standard aspects of indirect taxation such as tax avoidance or corruption but we rely on effective tax rates and therefore take implicitly into account the tax avoidance.

To infer what are the direct and indirect impacts of taxes on prices and therefore measure the amount of the final consumer price which is due to the existence of taxes, we simulate a removal of the taxes to obtain the prices that would be the final consumer price if there were no taxes. The difference between the original price and the simulated price without taxes corresponds to the amount of taxes that is embedded in the existing final consumer price and paid by each consumer in his expenditures.

We implement therefore first a simulation of the removal of consumption taxes to derive the prices without these taxes and then the removal of import tariffs to derive the prices that would exist in the economy without any import duties.

When we simulate a removal of the consumption taxes, the three largest price changes are observed for beverages and modern tobacco, construction, and electricity, gas and water. On the contrary, the prices of post and telecommunications and trade services are experiencing the lowest changes. With regards to the simulation of tariff rates equal to zero, the largest price changes occur for beverage and modern tobacco and constructions as well and for other modern manufactured products. The three lowest changes are observed for post and telecommunications, trade services and non-tradable services.

In a second step, we rely on micro data from the 2003 QUIBB nationally representative households' survey which covers 8500 households from all regions of Burkina Faso. The simulated new prices without taxes for the 28 products in the SAM are affected to the 77 products consumed by the households and detailed in the expenditure survey (40 food and 37 non food products). We then compute for each household the amount of taxes paid in their expenditures by substracting the simulated price without taxes from the initial final consumer price.

To assess the incidence of both domestic consumption taxes and import tariffs, we use households' expenditures as our measure of welfare. Indeed, if households base their spending plans on their expected lifetime income, then consumption provides a more accurate measure of lifetime resources than does annual income (Poterba, 1989). Moreover, in household surveys, expenditures suffer less than income from the under-reporting problem. The progressivity or regressivity of a particular tax is therefore evaluated by comparing the Lorenz curve for expenditures to the concentration curve of the tax. On the one hand, the Lorenz curve aligns households from the poorest to the richest along the horizontal axis and plots the proportion of their cumulative expenditures along the vertical axis. On the second hand, the concentration curve plots the cumulative proportion of taxes paid by the households along the vertical axis. If the concentration curve is above the Lorenz curve, it means that poorer households bear a larger share of taxes on their expenditures than richer households do. The tax is therefore regressive. On the contrary, if the concentration curve lies below the Lorenz curve, the tax can be considered as progressive.

A visual determination to see whether one curve is above another gives a first impression of whether there is dominance but is not sufficient to conclude whether or not dominance is statistically significant. To make inferences about dominance, the standard errors of the concentration and Lorenz curve ordinates must be computed in addition to their point estimates. We rely on the test procedures for comparing Lorenz and associated concentration curves proposed by Bishop et al. (1994) and Davidson and Duclos (1997) that accounts for the dependency between the distribution of the Lorenz and the concentration curve.[33] If we fail to reject the null hypothesis of equality of the vectors of Lorenz and concentration ordinates then we conclude that the distributions are the same and we cannot conclude that any curve is dominating the other. If we find that each of the concentration ordinates is significantly smaller (greater) than its corresponding Lorenz estimate, then we conclude that the concentration curve is below (above) the Lorenz curve. To make a comparison of the incidence of two different taxes,

[33] We use the stata routine "dominance" developed by O'Donnell et al. (2008) to perform this test.

we compare the concentration curves of both taxes. Indeed, to test whether a tax T1 is more progressive than a tax T2, we need to check whether the concentration curve of T2 dominates the concentration of T1 (Davidson and Duclos, 1997).

5.5. Results

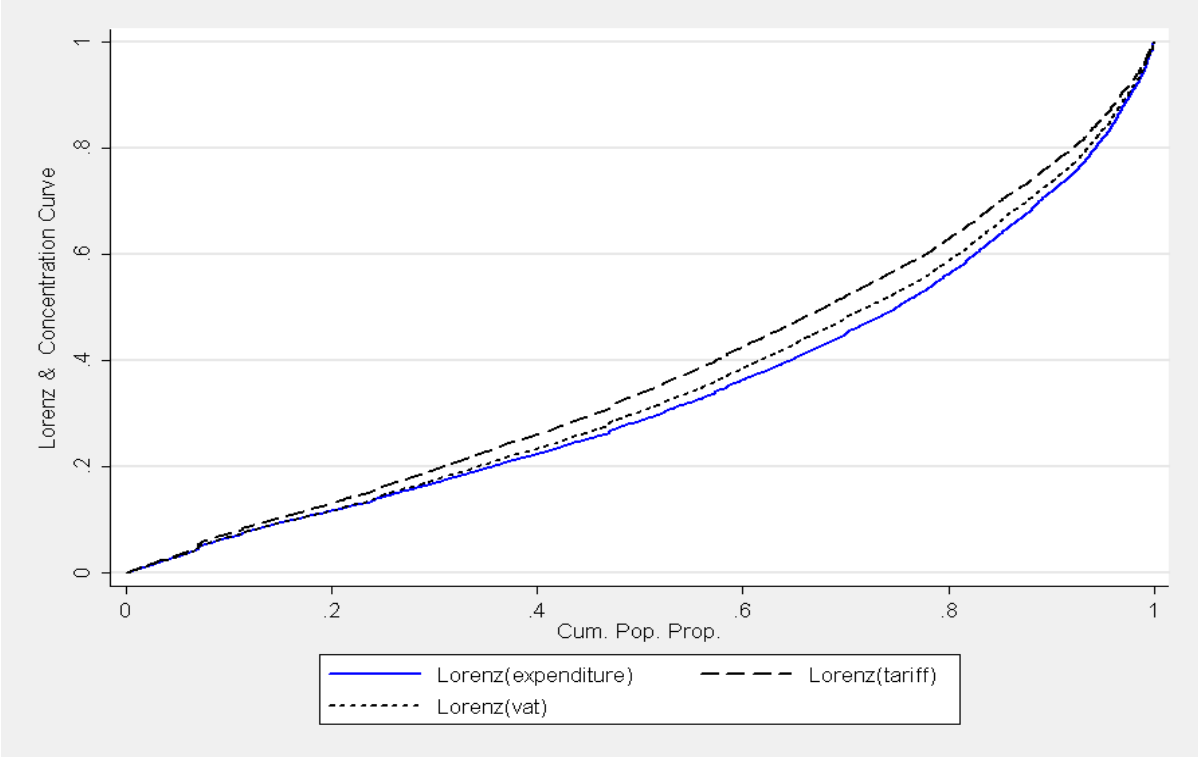
In this section, we present the tax incidence in Burkina Faso of two types of indirect taxes, namely import tariffs and domestic indirect taxes. Further investigating, we distinguish the tax incidence for food and non food products and distinguish between rural and urban households.

5.5.1. Progressivity of taxes

We are interested in the comparative incidence of the consumption taxes, VAT and excises, and of the import tariffs that are prevalent in Burkina Faso.

The Lorenz curve for expenditures and the concentration curves for both domestic consumption taxes and import tariffs are computed and depicted in Figure 5.1. We notice that the concentration curve for both domestic consumption taxes and tariffs are lying above the Lorenz curve which means that poor people are bearing a relatively larger share of the indirect tax burden than rich households. The dominance tests presented in Appendix 5.2, confirm that the VAT curve and the tariffs curve dominate the Lorenz curve and therefore that domestic consumption taxes and tariffs are regressive taxes.

Figure 5.1: Comparative Lorenz and concentration curve for VAT and tariffs



Note: "Lorenz(expenditure)" corresponds to the Lorenz curve for expenditures, "Lorenz(tariff)" to the concentration curve for tariffs and "Lorenz(VAT) to the concentration curve for domestic taxes.

However, we can also compare the degree of regressivity of VAT with the extent of regressivity of import tariffs since domestic consumption taxes were partly increased in order to replace import tariffs. The concentration curve of tariffs appears to be above the VAT concentration curve and the dominance test (Appendix 5.2) indicates that the tariffs concentration curve lies statistically significantly dominates the concentration curve for VAT. Tariffs on imports are thus more regressive than domestic consumption taxes.

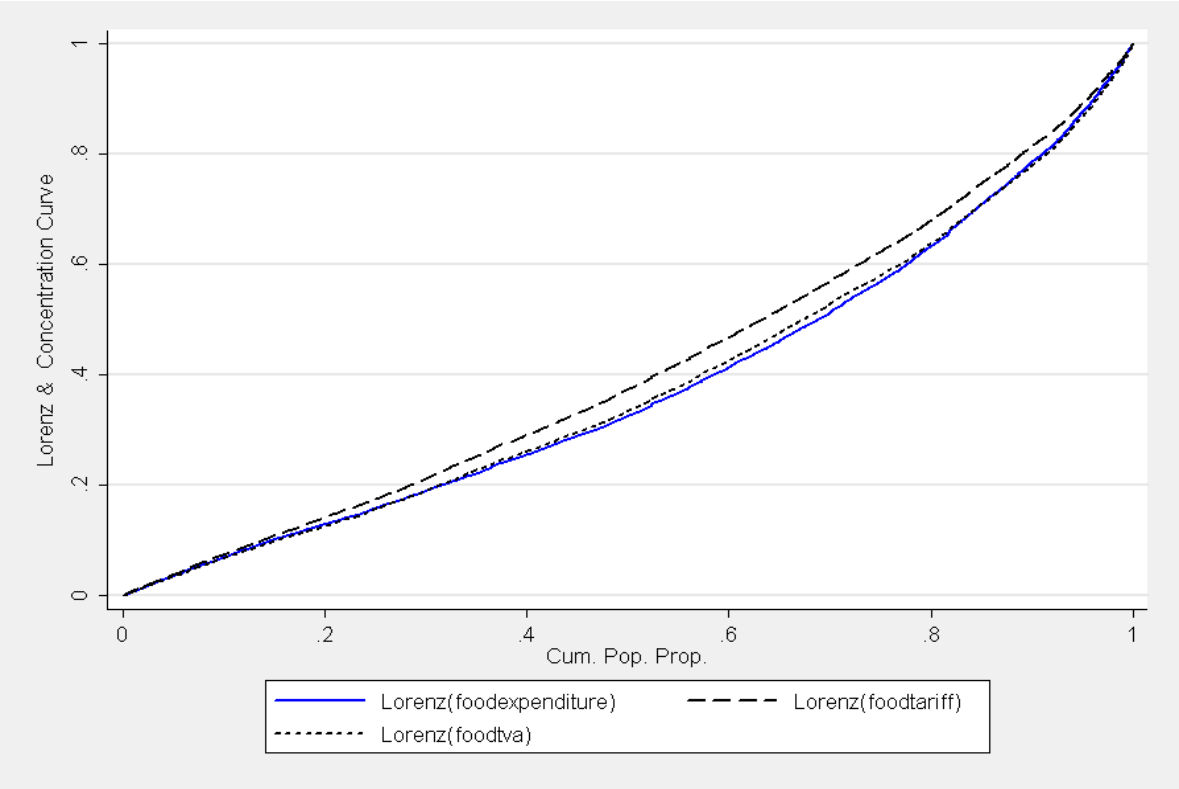
Given that both taxes are regressive we will investigate which aspect of taxation is generating this regressivity. We will first distinguish between food and non-food expenditures and then distinguish between rural and urban households.

5.5.2. Food versus non food products

In the expenditure survey, there are 40 food products and 37 non food products so that we can assess if it is rather the taxation on food or on non food products which render the taxes regressive.

As far as food products are concerned, in Figure 5.2, the concentration curve for domestic consumption taxes is not above the Lorenz curve since the dominance test fails (see Appendix 5.3).

Figure 5.2: Lorenz and concentration curves of VAT and tariffs for food



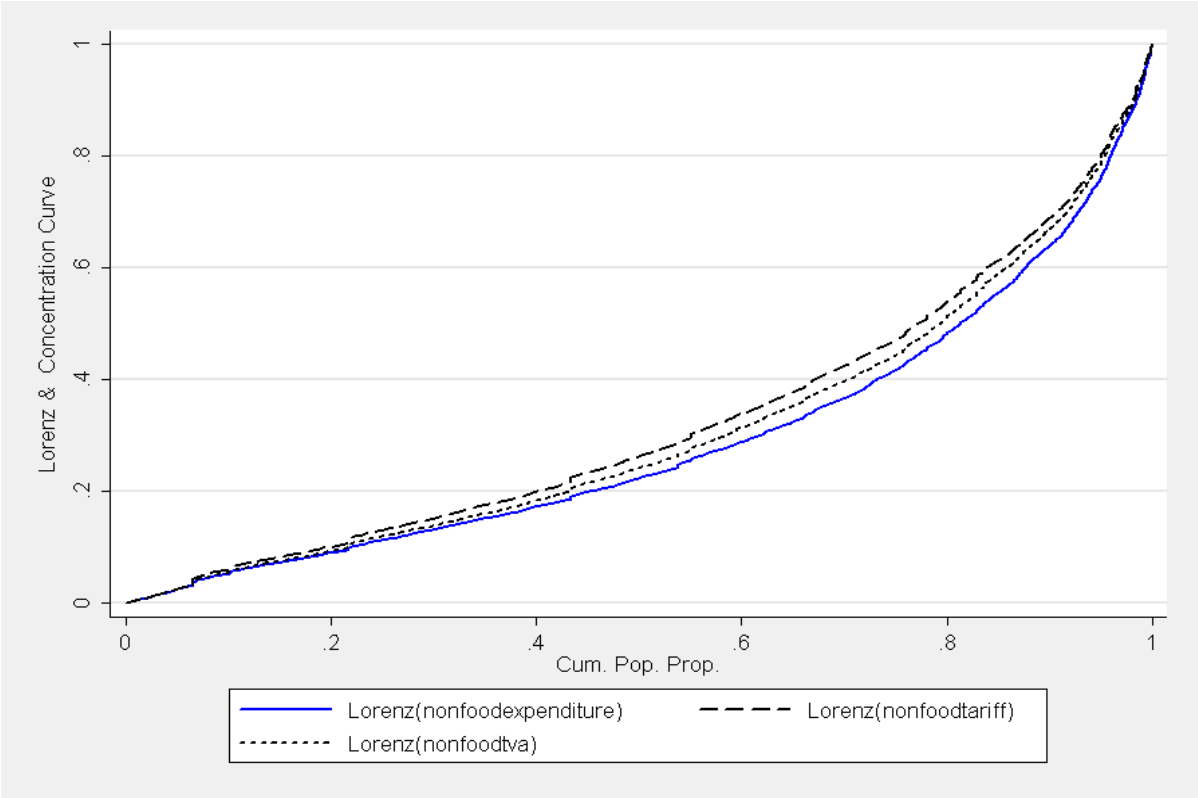
Note: "Lorenz(expenditure)" corresponds to the Lorenz curve for expenditures, "Lorenz(tariff)" to the concentration curve for tariffs and "Lorenz(VAT) to the concentration curve for domestic taxes.

Domestic consumption taxes can therefore not be considered as regressive for food products, on contrary to tariffs, whose concentration curve clearly lies above the Lorenz curve. This neutrality of domestic consumption taxes might be explained by the fact that several basic food products, which are in proportion of income more consumed by the poor than the rich, are

exempted of value-added taxes.[34] These exemptions seem therefore to reduce the regressivity of domestic consumption taxes and permit to achieve a tax system for food products where consumption taxes are less regressive than import tariffs.

The regressivity of domestic consumption taxes finds its sources in the taxation of non food products since Figure 5.3 and Appendix 5.4 show that the concentration curve for VAT dominates the Lorenz curve when only non-food products are considered. From Figure 5.3 and Appendix 5.4, one can also conclude that tariffs are regressive as well for non food products and even more regressive than domestic consumption taxes.

Figure 5.3: Lorenz and concentration curves of vat and tariffs for non food products



Note: "Lorenz(expenditure)" corresponds to the Lorenz curve for expenditures, "Lorenz(tariff)" to the concentration curve for tariffs and "Lorenz(VAT) to the concentration curve for domestic taxes.

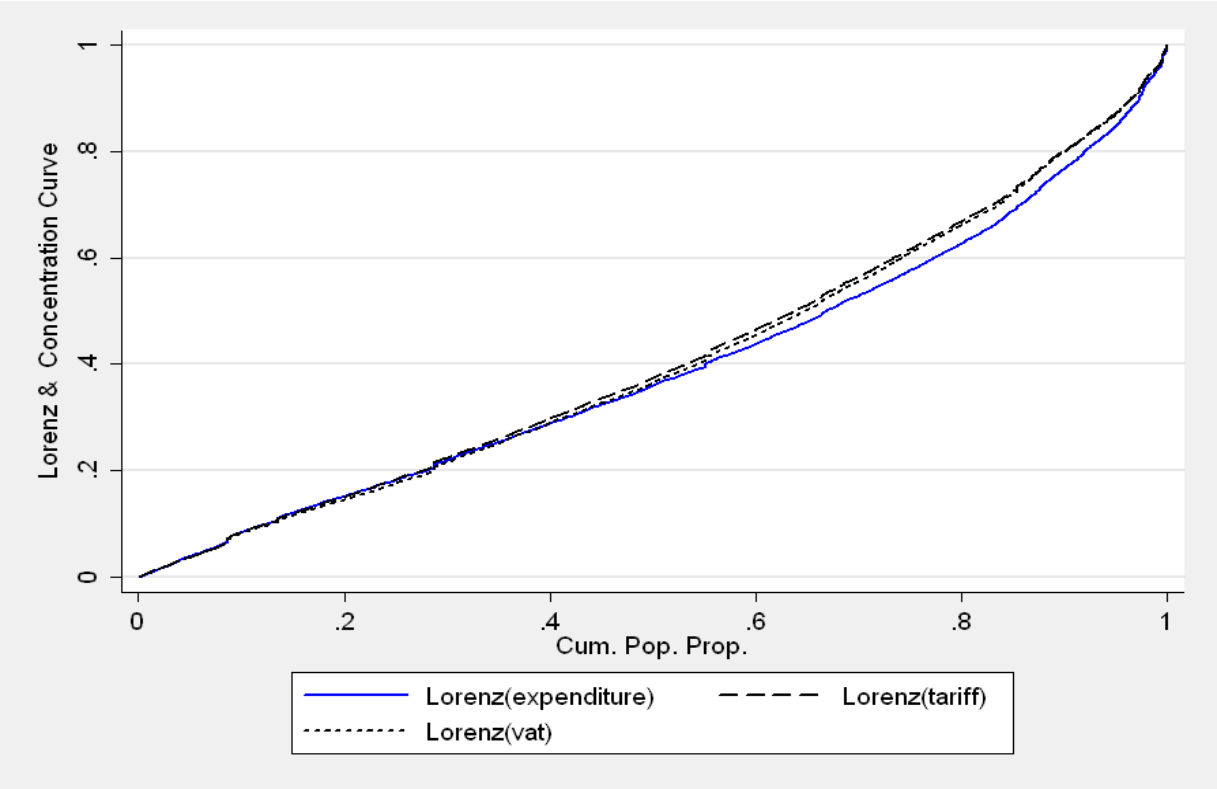
[34] Even though we do not model explicitly the tax exemptions of specific goods, the analysis takes into account the presence of exempt goods in the households' expenditures because we rely on effective tax rates. Indeed, for several necessity products, there are no consumption tax revenues in the Social Accounting Matrix, indicating that there might be exempt goods and the effective tax rate on these product is considered to be zero.

5.5.3. Rural versus urban households

Having established on which kind of products the two considered taxes are mostly regressive, we will assess whether there is a distinctive tax incidence between rural and urban households. In the national survey of 8500 households, 31% are urban and 69% rural. By considering the two samples aside and plotting their concentration and Lorenz curves we obtain the tax incidence for each of these households groups.

In rural areas, both tariffs imports and domestic consumption taxes are regressive (see Figure 5.4 and Appendix 5.5) but for these households one cannot conclude that tariffs are more regressive than domestic indirect taxes since the dominance test fails.

Figure 5.4: Lorenz and concentration curves for VAT and tariffs in rural areas

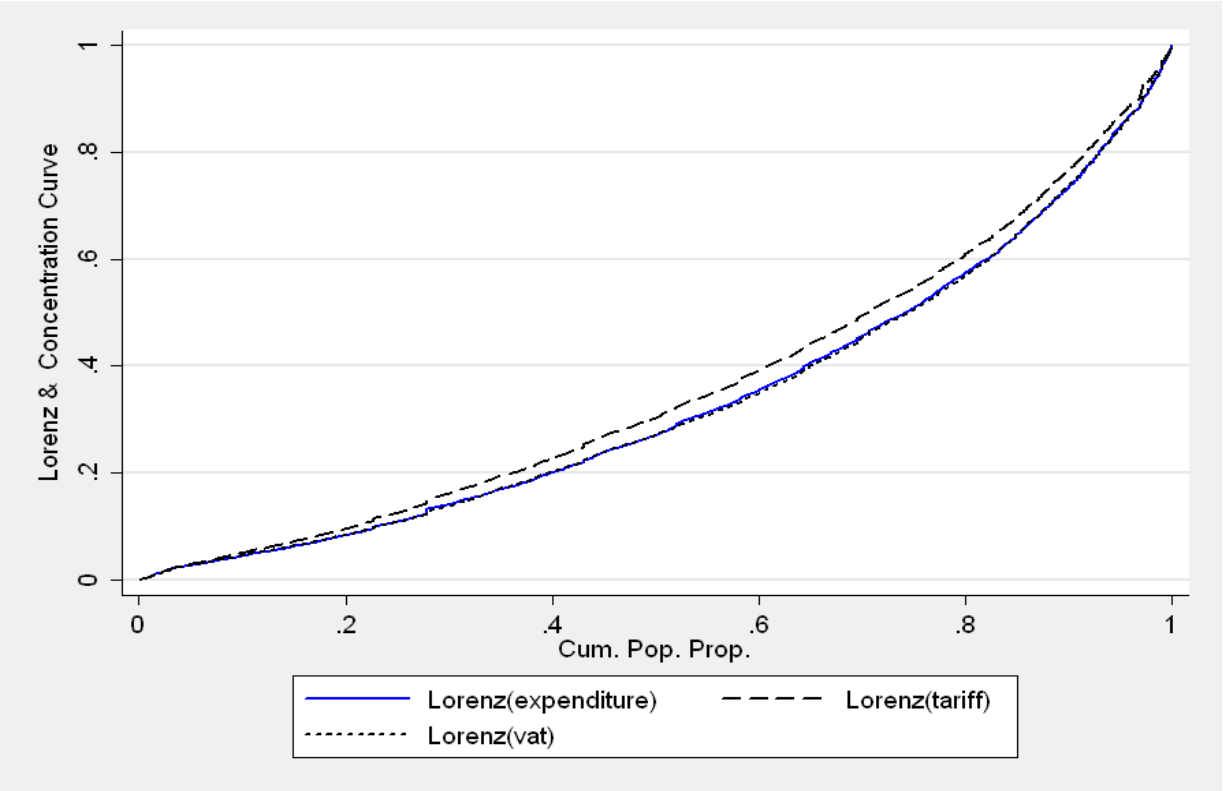


Note: "Lorenz(expenditure)" corresponds to the Lorenz curve for expenditures, "Lorenz(tariff)" to the concentration curve for tariffs and "Lorenz(VAT) to the concentration curve for domestic taxes.

One reason can be that imported goods, on which tariffs rely, are mostly consumed by urban households who spend a higher share of their expenditures on imported goods than rural households do.

For urban households, according to Figure 5.5 and tests of dominance in Appendix 5.6, tariffs on imports dominate both expenditures and domestic consumption taxes but one cannot conclude that VAT is regressive in urban areas.

Figure 5.5: Lorenz and concentration curves for VAT and tariffs in urban areas



Note: "Lorenz(expenditure)" corresponds to the Lorenz curve for expenditures, "Lorenz(tariff)" to the concentration curve for tariffs and "Lorenz(VAT) to the concentration curve for domestic taxes.

5.6. Concluding remarks

In this paper, to assess the social incidence of indirect taxes in Burkina Faso, we used a linked macro-micro model where a computable general equilibrium was mixed with microsimulation permitting to deal with both heterogeneity in the within-group distributional effects and general equilibrium effects on prices of taxes. We looked at the progressivity of these two tax instruments to assess the fairness of these taxes on the basis of households' ability to pay. We found that both consumption taxes and import tariffs are regressive taxes but established that import tariffs are even more regressive than consumption taxes.

By disaggregating the results for food and non-food products and for urban and rural households we get interesting insights on the origins of the regressivity of these taxes. Firstly, domestic consumption taxes are globally regressive but this is mostly because of taxation on non-food products because for food products this tax is neutral. Secondly, tariffs on imports are globally more regressive than domestic consumption taxes except in rural areas where both kinds of taxes are about equally regressive.

With regard to these results, the ongoing reforms aiming at decreasing tariff rates and replacing revenue by enhanced consumption tax collection occurring in Burkina Faso and in WAEMU countries in general, can be seen as welfare enhancing. However, all the indirect taxes in Burkina Faso appear regressive and this issue should be addressed. This result calls for instance for the implementation of social expenditure targeted on the poor in order to render the fiscal policy in a whole progressive.

5.8. Appendix

Appendix 5.1 – Values of elasticities

Sigma_m	Elasticity of substitution between imports and domestically produced goods in Armington's specification	1.85
Tau_e	Elasticity of transformation between domestic and export markets	2.84
Sigma_kl	Labor / Capital elasticity in value-added	1.1

Appendix 5.2 – Results of the dominance test

	VAT	**Tariffs**
Expenditures	VAT dominates	Tariffs dominates
VAT		Tariffs dominates
Tariffs		

Appendix 5.3 – Results of the dominance test for food

	VAT on food	**Tariffs on food**
Expenditures on food	Non Dominance	Tariffs dominates
VAT on food		Tariffs dominates
Tariffs on food		

Appendix 5.4 – Results of the dominance test for non food products

	VAT on non food products	**Tariffs on non food products**
Expenditures on non food products	VAT dominates	Tariffs dominates
VAT on non food products		Tariffs dominates
Tariffs on non food products		

Appendix 5.5 – Results for the dominance test for rural households

	VAT	**Tariffs**
Expenditures	VAT dominates	Tariffs dominates
VAT		Non dominance
Tariffs		

Appendix 5.6 – Results for the dominance test for urban households

	VAT	**Tariffs**
Expenditures	Non Dominance	Tariffs dominates
VAT		Tariffs dominates
Tariffs		

Conclusion générale

Cette thèse a contribué à l'analyse des tenants et aboutissants de la composition des recettes fiscales des pays en développement, composition qui a été profondément modifiée au cours des 30 dernières années au gré de multiples réformes dans les composantes fiscales que nous avons détaillées.

La première partie a ainsi considéré les déterminants de la composition des recettes fiscales sous l'angle de l'économie politique, étudiant l'impact de la multiplication des élections et de la montée de la démocratie sur les composantes fiscales.

Le chapitre 1 a montré que les élections sont à l'origine de cycles dans la composition des recettes fiscales avec une baisse des recettes issues des taxes indirectes juste avant les élections. Les recettes issues des taxes indirectes sont inférieures de 0,3 point de pourcentage pendant les années électorales par rapport aux autres années, tandis que les recettes des taxes directes restent inchangées. Cette baisse ne semble pas suivie d'une hausse compensatrice l'année suivant l'élection et indique ainsi un effet légèrement négatif pour la mobilisation de recettes fiscales indirectes. L'effet est cependant d'ampleur moindre dans les pays où la démocratie est établie depuis plusieurs années que dans ceux où la démocratie est naissante ou absente.

Le second chapitre souligne que l'existence d'institutions plus démocratiques permet d'améliorer les performances de collectes de recettes fiscales intérieures (taxes sur la consommation et taxes directes) dans les pays en développement. En particulier, c'est l'existence de contraintes fortes sur l'exécutif, assurant un certain équilibre des pouvoirs, qui permet d'accroître la performance de fiscalité intérieure, limitant sans doute la propension des gouvernements à satisfaire des intérêts spéciaux. Ces effets bénéfiques sont particulièrement

nécessaires dans les pays riches en ressources naturelles où l'existence d'un régime politique démocratique avec des contre-pouvoirs forts permet de rendre positive, pour la collecte fiscale, la présence de fortes rentes de ressources naturelles.

La deuxième partie a estimé les conséquences, peu étudiées, de la modification dans la composition des recettes fiscales, survenue depuis les années 1980, sur deux variables qui constituent des enjeux importants dans les PED, à savoir l'instabilité des recettes fiscales et la pauvreté.

Le chapitre 3 a traité de l'instabilité des recettes fiscales dans les pays d'Afrique sub-saharienne et démontre qu'elle induit une instabilité à la fois de la consommation publique et de l'investissement public. De plus, cette instabilité de l'investissement public, induite par la volatilité des recettes fiscales, a un impact négatif sur le niveau de l'investissement public. Nous avons dès lors analysé si une composition particulière des recettes fiscales permettait de limiter cette instabilité des recettes fiscales. La composition des recettes fiscales a ainsi été identifiée comme ayant un rôle clé à jouer puisqu'une plus grande contribution des taxes sur la consommation aux recettes fiscales du pays permet d'atténuer l'instabilité de ces recettes fiscales. Le processus en cours dans les pays en développement de transition fiscale des taxes sur le commerce international vers les taxes sur la consommation pourrait par conséquent contribuer à la stabilisation des recettes fiscales. Cet effet stabilisateur de la dépendance accrue aux taxes sur la consommation apparaît renforcé depuis le milieu des années 1990, ce qui coïncide avec la période de forte propagation de la TVA. Dans le chapitre 4, nous avons donc testé si cet outil spécifique pour prélever des taxes sur la consommation qu'est la TVA a particulièrement permis de stabiliser les recettes fiscales dans les pays l'ayant adopté. Les résultats montrent qu'en effet, l'adoption de la TVA a contribué significativement à la réduction de l'instabilité. En moyenne, les pays avec une TVA ont une instabilité de leurs recettes fiscales

inférieure de 40 à 50% à celle des pays n'ayant pas de TVA. Cet effet est d'autant plus fort que les pays sont peu développés et peu ouverts sur l'extérieur.

Finalement, le chapitre 5 a adopté une approche macro-micro en combinant un modèle d'équilibre général calculable et des données d'enquête ménages dans un pays africain enclavé relativement représentatif, le Burkina Faso, pour comparer l'incidence des taxes sur la consommation par rapport à l'incidence des tarifs douaniers sur les importations. Les résultats montrent que la charge fiscale est supportée relativement plus largement par les ménages pauvres que par les ménages riches aussi bien pour les taxes sur la consommation que pour les tarifs douaniers. La regressivité des tarifs est cependant plus forte que celle des taxes sur la consommation au Burkina Faso. Les tarifs pèsent plus largement sur les dépenses des ménages pauvres à la fois pour les produits alimentaires et non-alimentaires tandis que les taxes sur la consommation n'apparaissent régressives que pour les produits non alimentaires. Dans les zones rurales, les tarifs et taxes sur la consommation ont une régressivité d'ampleur équivalente mais dans les zones urbaines, les taxes sur le commerce international ont une incidence sociale négative plus accentuée.

Implications de politique économique

Un défi d'envergure pour les gouvernements des pays en développement est l'amélioration de leur collecte fiscale afin de financer les biens publics essentiels à leur développement, tout en reposant sur des composantes fiscales optimales qui respectent les critères d'efficacité et d'équité et maximisent le bien-être social. L'analyse des déterminants et des conséquences de la composition des recettes fiscales réalisée dans cette thèse permet de formuler des recommandations de politique économique pouvant être utiles aux pays en développement.

Des deux chapitres qui ont considéré des facteurs d'économie politique pour expliquer la composition des recettes fiscales des pays en développement, il ressort trois implications principales de politique économique.

Tout d'abord, l'identification des interventions électoralistes qui affectent négativement les taxes indirectes souligne l'importance d'une discipline budgétaire accrue qui permettrait de limiter l'ampleur de ces manipulations par les gouvernements visant une réélection. Cet aspect est un enjeu d'autant plus crucial que l'on assiste à une multiplication des élections dans les PED. En outre, le renforcement des processus démocratiques, au-delà de la simple tenue d'élections, apparaît comme étant à encourager puisqu'il permet de limiter l'ampleur des manipulations électorales.

Deuxièmement, la transition vers des institutions politiques plus démocratiques et une gouvernance améliorée, avec des contraintes sur l'exécutif fortes, apparaît également souhaitable pour permettre la mobilisation accrue de recettes intérieures et ainsi contribuer favorablement à la réussite de la transition fiscale. La mise en place de réformes fiscales visant une mobilisation accrue de recettes intérieures pourrait également être facilitée grâce à une bonne communication qui expliquerait les conséquences des réformes aux citoyens et réduirait ainsi l'incertitude pour les agents économiques qui est à l'origine des situations de statu quo. L'augmentation des recettes fiscales intérieures peut également être recherchée à travers la réalisation d'analyses des dépenses fiscales, qui sont des pertes de recettes résultant des dérogations fiscales. Ces analyses essentiellement utilisées dans les pays de l'OCDE et dans les pays d'Amérique Latine[35], pourraient être utilement étendues à d'autres pays en développement afin que leurs gouvernements puissent identifier les dépenses fiscales qui représentent souvent des sommes importantes et ne sont pas efficaces économiquement.

Troisièmement, dans les pays abondamment dotés de ressources naturelles, nous avons montré que la mobilisation fiscale est plus faible en raison de l'existence de rentes élevées. La transition vers des institutions plus démocratiques est nécessaire dans ces pays afin que les

[35] Le Maroc a été le précurseur de ces études sur le continent africain en 2005 (Brun et al., 2007).

ressources naturelles contribuent favorablement à la collecte de recettes fiscales intérieures. Une initiative complémentaire proposée par Devarajan et al. (2011), pour les pays pétroliers, vise à instaurer un cercle vertueux pour améliorer la qualité des dépenses publiques à travers la redistribution puis la taxation d'une partie de la rente pétrolière aux citoyens. L'existence de cette partie taxée inciterait les citoyens à participer à la vie politique afin de s'assurer et d'exiger que l'argent versé sous forme de taxes soit utilisé à bon escient pour la provision de biens publics de qualité. Une redevabilité accrue du gouvernement auprès des citoyens serait donc atteinte et engendrerait une amélioration de la fourniture des biens publics dans les pays pétroliers.

De l'analyse des conséquences engendrées par la modification de la composition des recettes fiscales, il ressort que la contribution accrue des taxes sur la consommation aux recettes fiscales dans les PED est à encourager, du moins pour l'aspect stabilisateur des recettes fiscales qu'elle induit. De même, les résultats trouvés indiquant un aspect stabilisateur de la TVA soutiennent les recommandations de politiques économiques à l'origine de la vague d'adoption de la TVA. En particulier, les gouvernements des pays faiblement développés, peuvent tirer un bénéfice substantiel de l'adoption de la TVA en termes de stabilisation de leurs recettes. Cette dimension de stabilisation peut donc être considérée par les gouvernements, en sus de la dimension traditionnelle d'augmentation de la performance de collecte fiscale associée à la TVA (Keen, 2007), pour juger si l'adoption de la TVA apparaît appropriée ou non. Des recettes fiscales plus stables d'une année sur l'autre sont cruciales pour aider les gouvernements à faire des prévisions plus fiables de leurs recettes à venir. Avec un budget plus réaliste et plus proche des réalisations, la nécessité de couper, par manque de recettes, des dépenses qui étaient programmées sera réduite d'autant. Il convient de souligner cependant que, dans la mise en œuvre de la TVA, certaines pratiques des Etats, telles que le non-remboursement des crédits de TVA, engendrent des distorsions qu'il conviendrait de limiter afin de s'assurer que la TVA ne soit pas plus distordante que les taxes qu'elle remplace.

Par ailleurs, un aspect supplémentaire à considérer lors de la modification de la structure des recettes fiscales est l'incidence sociale qu'ont les différentes taxes. De ce point de vue, les réformes en cours qui consistent en la baisse des tarifs douaniers et en l'accentuation des taxes sur la consommation sont recommandables, les tarifs douaniers ayant été estimés comme plus régressifs que les taxes sur la consommation dans le chapitre 5. Cependant, lorsque les taxes indirectes sont régressives, les gouvernements doivent veiller à la mise en place de dépenses sociales en faveur des ménages les plus pauvres afin de rendre progressif le système budgétaire dans son ensemble.

Si cette thèse s'est concentrée sur les recettes fiscales, il convient de souligner que leur impact sur le développement économique dépend fondamentalement de l'efficacité des dépenses publiques qui seront financées par ces ressources. Des analyses de la qualité de la provision de services publics («Public Expenditure Tracking Surveys») ont été mises en place dans plusieurs pays en développement depuis le milieu des années 1990 et permettent de suivre les flux de ressources, de leur origine à leur destination et d'identifier les éventuels abus dans l'utilisation de l'argent public afin d'y remédier (Dehn et al., 2003). En retour, le degré d'acceptation de l'impôt par les citoyens et leur civisme fiscal sont d'autant plus élevés qu'ils perçoivent que les dépenses publiques financées par leurs impôts sont de qualité et contribuent à l'amélioration de leur niveau de vie.

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RESUME : Cette thèse s'intéresse à la composition des recettes fiscales dans les pays en développement et étudie ses déterminants et ses conséquences. La première partie analyse les facteurs d'économie politique qui influent sur la composition des recettes fiscales, en considérant l'impact de la multiplication des élections et de la démocratisation, tandis que la deuxième partie examine les conséquences des choix de composition des recettes fiscales en termes de stabilisation des recettes fiscales et de bien-être social. Plusieurs résultats émergent. Les élections ont une influence significative sur la composition des recettes fiscales puisque les recettes issues des taxes indirectes connaissent une baisse juste avant les élections (Chapitre 1). Ces manipulations visant à favoriser les réélections apparaissent plus modérées dans les pays où la démocratie est établie de plus longue date. De plus, le Chapitre 2 a établit que l'existence d'un régime politique plus démocratique, avec des contraintes sur l'exécutif fortes, permet d'accroître les recettes de fiscalité intérieure qui sont nécessaires pour pallier la baisse des recettes tarifaires. La seconde partie de la thèse révèle des résultats intéressants sur les effets de la composition des recettes fiscales sur la stabilisation des recettes fiscales et sur ses conséquences sociales. Le Chapitre 3 a souligné l'importance de la lutte contre l'instabilité des recettes fiscales dans la mesure où elle induit de l'instabilité des dépenses publiques ce qui affaiblit le niveau de l'investissement public. La contribution plus accrue des taxes sur la consommation aux recettes fiscales a été identifiée comme stabilisant les recettes fiscales. En outre, le chapitre 4 a démontré que la taxe sur la valeur ajoutée permet de réduire significativement l'instabilité des recettes fiscales dans les pays en développement l'ayant adoptée. L'incidence sociale des taxes sur la consommation a été comparée à celle des tarifs douaniers dans le Chapitre 5 et il apparaît que les tarifs douaniers sont plus régressifs que les taxes sur la consommation au Burkina Faso.

Mots clés : Fiscalité, élections, démocratie, instabilité des recettes fiscales, TVA, incidence sociale, données de panel, EGC, pays en développement.

ABSTRACT: This thesis focuses on the composition of tax revenue in developing countries and analyses its determinants and consequences. The first part examines the political economy factors shaping tax revenue composition, by considering the impact of elections and democratization, while the second part deals with the consequences of specific tax revenue compositions in terms of tax revenue stabilization and social welfare. Several results emerge. Elections have a significant influence on tax revenue composition since indirect tax revenues are decreased in election times (Chapter 1). These electoral manipulations are less strong in countries where democracy is well-established. Moreover, Chapter 2 found that a more democratic political regime, with strong constraints on the executive, helps to enhance domestic tax revenues that are necessary to replace the lost revenues from trade liberalization. The second part of the thesis reveals interesting results on the effects of tax revenue composition on the stabilization of tax revenue and on its social incidence. Chapter 3 highlighted the importance of finding remedies to tax revenue instability since it induces public spending instability which in turn decreases the level of public investment. A higher reliance on domestic indirect taxes in total tax revenues has been found to lead to the stabilization of tax revenue. In addition, the results of Chapter 4 showed that the value-added tax significantly reduces tax revenue instability in the developing countries where it was adopted. The social incidence of domestic indirect taxes was compared to the social incidence of tariffs in Chapter 5 and it was established that tariffs are more regressive than taxes on consumption in Burkina Faso.

Keywords: Tax revenue, elections, democracy, tax revenue instability, VAT, social incidence, panel data, CGE, micro simulation, developing countries.