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Efficacité et Harmonisation des Politiques Fiscales : Cas de la Zone UEMOA

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par

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Dédicace

À ma chère famille et spécialement, à ma sœur Ramata.

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Resumé

L'un des principaux objectifs de l'Union Economique et Monétaire Ouest Africaine (UEMOA) est l'harmonisation effective des législations fiscales des pays membres. La Commission de l'UEMOA, sous l'égide du Conseil des ministres de la Zone, a édicté d'importantes directives destinées à harmoniser la fiscalité des Pays membres. L'adoption de ces actes communautaires par les pays, à partir de réformes, peut affecter leur performance fiscale.

L'objectif de cette thèse est d'identifier les forces, les incohérences de ces actes communautaires et de déterminer les distorsions pouvant résulter de leur mise en application et comment tous ces facteurs affectent la mobilisation de recettes dans les pays membres. Nous procédons, d'abord, à une analyse qualitative de la législation communautaire. Ensuite, nous utilisons l'outil empirique pour mesurer la performance fiscale totale ou par type d'impôt, des pays de l'UEMOA. Dans le chapitre 2 nous mesurons l'effort fiscal total, l'effort fiscal des recettes non issues de l'exploitation des ressources naturelles et l'effort fiscal TVA pour un large échantillon de pays en développement comprenant les pays de l'UEMOA et en utilisant une méthodologie robuste. Nos résultats montrent que l'effort fiscal des pays en développement, notamment celui des pays à faible revenu, est élevé. S'agissant des pays de l'UEMOA, nous constatons que leurs indicateurs d'effort fiscal, notamment ceux de l'effort fiscal TVA, sont conséquents comparativement à ceux des pays appartenant aux autres ensembles d'intégration régionale en Afrique et à l'effort fiscal des autres pays de la CEDEAO. Dans le chapitre 3, nous effectuons une étude d'impact de l'harmonisation fiscale en zone UEMOA sur les plans qualitatif et quantitatif. Le modèle utilisé pour conduire l'analyse quantitative est celui du 'Synthetic Control'. Nous trouvons que l'harmonisation fiscale a un impact positif sur la mobilisation de recettes fiscales en zone UEMOA, particulièrement sur la mobilisation de recettes indirectes internes. Cependant, nous observons une disparité entre pays et nos résultats ne montrent pas un effet de l'harmonisation sur les recettes provenant de la fiscalité directe. Pour finir, dans le quatrième chapitre, nous calculons les indicateurs d'écart de recettes des systèmes de TVA 'VAT gaps' pour tous les 7 Etats membres de l'UEMOA ayant adopté la taxe sur la valeur ajoutée. Nos résultats montrent un écart moyen de recettes de TVA important pour les pays de l'UEMOA, cela étant dû essentiellement aux imperfections présentes dans la législation fiscale. À partir d'une analyse économétrique, nous identifions les déterminants des écarts de recettes calculés en analysant notamment l'impact de la numérisation et de la vulnérabilité aux flux financiers illicites passants par le canal du commerce. Nos résultats montrent que la

vulnérabilité aux flux financiers illicites passants par le canal des importations a un impact positif sur les écarts de recettes de TVA notamment, sur l'écart lié à la mise en application de la législation fiscale. Nous constatons que la numérisation permet de réduire l'écart de recettes de TVA lié à la performance de l'administration fiscale.

Mots clés :

UEMOA, Fiscalité, Potentiel fiscal, Effort fiscal, Taxe sur la valeur ajoutée, Recettes fiscales non issues de l'exploitation des ressources naturelles, Analyse de frontière stochastique, Inefficiency, Coordination fiscale/harmonisation, Réforme fiscale, Modèle du 'Synthetic Control', modèle 2SLS-IV, Ecart global de recettes de TVA, Ecart lié à la mise en application de la législation fiscale, Ecart de recettes lié à la performance de l'administration fiscale, Ecart de recettes lié à l'octroi des exonérations fiscales, Ecart lié à l'adoption de systèmes de TVA à taux multiples, Flux financiers illicites , Evasion fiscale, Fraude fiscale, Optimisation fiscale, Numérisation.

Codes JEL : C01, C02, C2, E61, F15, H2, K34.

Summary

One of the main objectives of the West African Economic and Monetary Union (WAEMU) is the effective harmonization of the tax legislations of the member states. In accordance with the Decisions of the Council of Ministers of the WAEMU countries, the Commission of the WAEMU issued Directives to coordinate taxation in the Union. The implementation of these community acts by countries through tax reforms may affect their tax performance.

The purpose of this thesis is to identify the strengths of these community acts, assessing the inconsistencies, identifying the distortions that may result from their implementation, and how these factors affect the revenue mobilization in the WAEMU member states. We proceed by conducting a qualitative analysis of the community tax legislation. Then, we use empirical tools to measure the WAEMU member states' tax performance for the different types of taxes and the total tax. Notably, Chapter 2 assesses independently the total tax effort, the non-resource tax effort and the value-added tax effort for a large sample of developing countries, including WAEMU member states, in using a robust methodology. Our results show that developing countries, especially low-income countries, make a significant effort to collect taxes. In particular, we observe that the tax effort indices of the WAEMU countries, especially the VAT effort indices, are substantial compared with those of the member states of other African Regional Economic Communities and the remaining ECOWAS countries. Chapter 3 evaluates the impact of the Directives, both in terms of coordination and revenue mobilization. It consists of a comparative case study using the synthetic control method. The main results are that the tax coordination has a positive impact on the revenue mobilization in the Union, especially for the indirect tax. However, the effect is different across countries and insignificant for the direct tax. Finally, Chapter 4 estimates the VAT gaps for all the WAEMU member states which have adopted VAT. Our calculations show substantial VAT gaps, for the WAEMU countries, which are mainly due to policy imperfections. We also conduct an econometric analysis to explain the impacts of vulnerability to illicit financial flows (IFFs) and digitalization on the estimated VAT gaps. We find that the vulnerability to IFFs through import has a significant and positive impact on the VAT gap, especially the Policy gap. As regards digitalization, we find that leads to a reduction of the Compliance Gap.

Keywords :

WAEMU, Tax, Tax potential, Tax effort, Value-added tax, Non-resource tax, Stochastic frontier analysis, Inefficiency, Tax coordination/harmonization, Tax reform, Synthetic control model, 2SLS-IV model, VAT gap, Policy gap, Compliance gap, Exemption gap, Rate gap, Illicit Financial Flows, Tax evasion, Tax fraud, Tax avoidance, Digitalization.

JEL codes : C01, C02, C2, E61, F15, H2, K34.

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Introduction générale

«L'Afrique est le continent d'avenir, donnons-lui des moyens pour y parvenir. L'intégration régionale et l'unité africaine feront de lui une puissance économique incontournable au monde» Aristide Brice Montsouka.

1.1 Introduction

L'intégration régionale, en Afrique, est considérée comme le moteur du développement économique. Depuis le lendemain des indépendances, elle est considérée comme un moyen de surmonter l'étroitesse des marchés et permettant de réduire, la vulnérabilité des économies face aux chocs extérieurs. Il s'agit de réaliser une unité Africaine et de créer une union Africaine. Le plan d'actions de Lagos d'Avril 1980 a instauré une dynamique d'intégration consistant pour les Etats de s'engager à créer au niveau national, sous régional et régional une économie Africaine dynamique et indépendante. L'acte final de Lagos a été à la base de la Communauté Economique Africaine (Traité d'Abuja entré en vigueur en Mai 1994).

Le processus d'intégration régionale dans la Zone UEMOA se distingue par son originalité. « L'intégration en Zone franc est marquée par une incontestable originalité du fait que les unions monétaires ont été créées il y a cinquante ans et ont précédé l'intégration commerciale et économique. Cette antériorité de l'intégration monétaire a facilité le processus d'intégration commerciale pour des raisons institutionnelles et économiques »¹. L'Union Monétaire Ouest-Africaine (UMOA) a été créée en 1962. Dans le souci d'approfondir leur intégration économique, les pays membres de l'UMOA ont créé l'Union Economique et Monétaire Ouest Africaine en 1994. Toujours animés par la volonté d'approfondir leur intégration, les 8 Etats membres de l'UEMOA se sont fixés comme objectif de créer un marché commun basé sur la libre circulation des biens, des personnes et des capitaux. Consciente, du fait que le fonctionnement du marché commun nécessite une harmonisation plus poussée des législations des Etats membres notamment du régime de la fiscalité, la Commission de l'UEMOA, sous l'égide du Conseil des ministres de la Zone, a édicté d'importantes directives destinées à harmoniser la fiscalité des Pays membres. Ces actes communautaires concernent à la fois les instruments de fiscalité indirecte intérieure, de fiscalité directe, la transition fiscale et le fonctionnement des administrations douanières et fiscales des Etats membres. Cette thèse, à partir

1. Geourjon A., Guérineau S., Guillaumont P. et al, (2013).

de ses différents chapitres, se fixe comme objectif d'évaluer la cohérence de ces actes communautaires en identifiant leurs impacts respectifs sur les nations concernées en termes de mobilisation de recettes, de structure des recettes fiscales mobilisées. Cela s'est fait notamment par le biais d'études qualitatives et quantitatives orientées vers des instruments de taxation en particulier ou considérant le système fiscal de chaque pays dans son ensemble.

Cette introduction générale a pour objectifs de : (i) définir l'intégration régionale, ses formes, ses effets ; (ii) décrire le processus d'intégration en zone UEMOA ; (iii) présenter les pays membres de l'UEMOA suivant leurs caractéristiques économiques, financières, sociales et institutionnelles ; (iv) situer le contexte de ce travail de thèse tout en précisant les objectifs et enjeux de l'étude ; (v) mettre en perspective les contributions des différents chapitres constituant cette thèse.

1.1.1 Généralités sur l'intégration régionale, formes et effets

L'intégration régionale est le processus qui consiste à surmonter, d'un commun accord, les obstacles politiques, physiques, économiques et sociaux qui séparent les pays de leurs voisins, et à collaborer à la gestion de ressources partagées et de biens communs régionaux.² Ainsi, elle se traduit par le développement de relations économiques, socioculturelles et politiques qui crée une interdépendance croissante entre les Etats. Si par le passé, elle se manifestait par les économies-mondes³ ou par les empires, la légitimation des Etats-nations a fait apparaître l'intégration régionale sous forme de :

- Zones d'intégration bilatérales ou multilatérales qui se traduisent par un ensemble de rapports, d'accords et de négociations qui concernent deux ou plusieurs Etats n'appartenant pas forcément à un même espace géographique.
- Zones d'intégration régionales qui se caractérisent par l'existence d'un espace économique unifié.

« L'intégration régionale connaît une approche passionnelle, créant des solidarités entre différentes nations d'un même espace géographique qui prennent part au processus, afin de réaliser un objectif commun »⁴. Selon Haas. E (1961), l'intégration politique se développe lorsque des Etats distincts transfèrent leurs loyautés, attentes et activités politiques vers un nouveau centre dont les institutions possèdent ou revendiquent des compétences supérieures à celles des Etat-nations préexistants. Ainsi, le processus ne peut fonctionner que par la création de nouvelles institutions dont l'autorité et la légitimité sont égales ou même supérieures à celles de leurs Etats membres.

« Une union régionale rassemble plusieurs pays qui souhaitent constituer un espace

2. Communication de la Commission au Conseil, au Parlement européen, au Comité économique et social européen et au Comité des régions du 1er octobre 2008 « Intégration régionale pour le développement des pays ACP » [COM (2008) 604 final Non publié au journal officiel].

3. Une économie-monde est un territoire dynamique polarisé par un centre économiquement autonome, qui se suffit à lui-même et qui exerce une domination ou une influence sur des périphéries et des marges (Carroué, 2004).

4. Ténier J. (2003).

économique dans lequel les obstacles aux échanges et les disparités politico-économiques se réduisent voire disparaissent ». (Ténier, 2003). On distingue plusieurs étapes d'intégration selon lesquelles, le degré d'institutionnalisation est plus ou moins poussé. Il s'agit entre autres de :

- L'Accord Commercial Préférentiel : il donne un accès préférentiel, au territoire national, aux pays partenaires sans élimination des instruments de protection.
- La Zone de libre-échange : dans la zone de libre-échange, les barrières aux échanges intra-zone sont abaissées ou supprimées et les pays membres sont libres dans l'adoption de leurs politiques commerciales vis-à-vis des pays tiers. Les accords de libre-échange sont fondés sur la réciprocité.
- L'Union Douanière : Outre le libre-échange entre les pays membres, il est prévu l'adoption d'un Tarif Extérieur Commun (TEC). L'union douanière exige ainsi des pays membres l'harmonisation de leurs politiques commerciales extérieures.
- Le Marché Commun : au-delà des dispositions habituelles de l'union douanière, il supprime les obstacles à la libre-circulation des personnes et des capitaux tout en éliminant les obstacles aux échanges intra-zone. Un marché commun est une union douanière étendue à la liberté de circulation des facteurs de production à savoir le travail et le capital financier et technique.
- Le Marché Unique : c'est un marché commun avec élimination des barrières invisibles et harmonisation des normes ou réglementations internes.
- L'Union Économique et Monétaire : elle peut se définir comme étant un marché unique dans lequel a été mise en place au moins, une politique monétaire commune. C'est la forme la plus poussée de l'intégration économique. L'union économique et monétaire nécessite une coordination officielle des politiques monétaires et budgétaires et met un accent sur le développement régional. L'adoption d'une monnaie unique conduit à la suppression des incertitudes liées aux taux de change et favorise les échanges.

Les accords d'intégration régionale ont des effets plus ou moins positifs qu'on peut scinder en effets classiques et effets non traditionnels sur les économies des pays signataires⁵. Parmi les effets traditionnels on distingue notamment :

- La création d'échanges : elle représente l'accroissement du commerce entre Etats membres dû à la réduction des obstacles tarifaires et non tarifaires. Il s'agit là, d'un courant commercial qui n'existait pas auparavant entre un pays membre et un pays tiers.
- Le marché commun permet une meilleure allocation des facteurs de production en fonction des avantages comparatifs des différents Etats membres.
- Le détournement d'échanges : il y a détournement d'échanges quand un pays membre, du fait de l'existence de l'accord, peut avoir intérêt à s'approvisionner auprès d'un de ses partenaires et à la défaveur d'un pays tiers seulement en raison de la suppression des avantages tarifaires et non tarifaires.
- Si les pays de l'accord sont suffisamment grands pour influencer les prix mondiaux,

5. Laporte B. (2013).

l'accroissement de leurs échanges intra-zone au détriment de leurs importations en provenance du reste du monde entrainera une baisse du prix international favorable à l'évolution de leurs termes de l'échange.

- Pour les petits pays, l'appartenance à un accord constitue un accroissement de la taille du marché ainsi, leurs entreprises pourraient réaliser des économies d'échelle.

Ces effets concernent pour l'essentiel l'impact de l'intégration sur le développement des échanges.

S'agissant de ses effets non traditionnels, l'intégration peut :

- Faciliter l'application de mesures de politique économique rationnelles, avec une réduction du pouvoir de pression des lobbies nationaux ;
- Constituer un signal pour les investisseurs d'un engagement en faveur d'une politique d'ouverture.

1.1.2 L'intégration régionale en zone UEMOA

En Afrique occidentale, six pays à savoir le Benin, le Burkina Faso, la Côte d'Ivoire, la Mauritanie, le Niger et le Sénégal ont créé, le 12 Mai 1962, l'Union Monétaire Ouest-Africaine à laquelle, le Mali n'a adhéré qu'en juin 1984 après avoir demandé la réintégration de la Zone Franc en 1967. En 1973, le traité de l'UMOA a été révisé, la Banque Centrale des Etats de l'Afrique Occidentale (BCEAO) a été dotée de nouveaux statuts, la Banque Ouest-Africaine de Développement (BOAD) a été créée et de nouveaux accords de coopération avec la France ont été signés.

Des mécanismes de régulation, garants de la cohésion et de la stabilité monétaire de l'Union, ont été introduits dans les nouveaux textes. Cette relative stabilité, instaurée par la monnaie commune a contribué, à la réalisation de meilleures performances économiques des pays membres de l'UMOA par rapport aux autres pays de l'Afrique sub-saharienne. Dans les années 80, deux chocs externes majeurs ont largement contribué à déstabiliser les économies de l'Union et à renverser la croissance économique : l'effondrement des prix des matières premières (qui sont des sources importantes de recettes pour ces économies), l'appréciation du Franc CFA sous l'effet combiné de la hausse du Franc Français et l'ajustement à la baisse des taux de change des pays voisins hors Zone Franc⁶. Les principaux indicateurs macro-économiques se sont détériorés rapidement, conduisant les Pays membres de l'UMOA dans la crise économique.

Face à la crise économique, les pays de l'UMOA ont, dès 1990, manifesté leur volonté d'approfondir leur intégration économique, en complément de l'union monétaire. Cela aboutit, à la signature le 10 Janvier 1994⁷, à Dakar, de l'Union Economique et Monétaire Ouest Africaine (UEMOA), son siège est à Ouagadougou au Burkina Faso. Les Etats membres de l'UEMOA font également partis de la Communauté économique des États de

6. Voir Geourjon et al (2013) pour plus de détails.

7. Le Traité de l'UEMOA a été modifié en 2003.

l'Afrique de l'Ouest (CEDEAO) ⁸.

A ce jour, l'UEMOA regroupe 8⁹ Etats à savoir : le Benin, le Burkina Faso, la Côte d'Ivoire, la Guinée Bissau, le Mali, le Niger, le Sénégal et le Togo avec une monnaie commune (franc de la Communauté financière africaine) et une population de 127 107 471 habitants en 2019 ¹⁰.

L'UEMOA s'est assigné 5 objectifs principaux :

1. Renforcer la compétitivité des activités économiques et financières des Etats membres dans le cadre d'un marché ouvert et concurrentiel et d'un environnement juridique rationalisé et harmonisé ;
2. Assurer la convergence des performances et des politiques économiques des Etats par l'institution d'une procédure de surveillance multilatérale ;
3. Créer entre les Etats membres un marché commun basé sur la libre circulation des personnes, des biens, des services, des capitaux et des droits d'établissement ainsi que sur l'application du TEC et d'une politique commerciale commune ;
4. Instituer une coordination des politiques sectorielles nationales par la mise en œuvre d'actions communes et éventuellement de politiques communes dans les principaux domaines de l'activité économique et
5. Harmoniser les législations (particulièrement le régime de la fiscalité) des Etats membres dans la mesure nécessaire au fonctionnement du marché commun ¹¹.

Les organes de l'UEMOA tels que définis dans le traité sont les suivants :

- la Conférence des Chefs d'Etat et de Gouvernement qui fixe les grandes orientations du processus d'intégration et nomme les dirigeants des principaux organes ;
- le Conseil des Ministres qui met en œuvre les orientations générales définies par les chefs d'Etat ;
- la Commission qui est l'organe de proposition et de suivi des actes de l'UEMOA, elle représente la cheville ouvrière de l'Union ;
- À ces trois principaux organes s'ajoutent le Parlement (chargé du contrôle démocratique des organes et institutions de l'Union), la Cour de Justice et la Cour des Comptes.

L'intégration régionale de la Zone UEMOA s'appuie également sur des Institutions Spécialisées autonomes telles que :

8. La CEDEAO a été créée le 28 Mai 1975 et regroupe à ce jour 15 pays de l'Afrique de l'Ouest (y compris ceux de la Zone UEMOA). Elle est principale structure destinée à coordonner les actions des pays de l'Afrique Occidentale cependant, le processus d'intégration y est moins avancé comparativement à l'espace UEMOA.

9. En 1972, l'UMOA a perdu la Mauritanie et la Guinée Bissau l'a intégré en 1997.

10. Ces chiffres représentent des moyennes arithmétiques, des indicateurs mondiaux de la gouvernance du Groupe de la Banque Mondiale, calculées à partir des données des 8 pays membres de l'UEMOA pour l'année 2019. Ces indicateurs varient de -2.5 (faible qualité de la gouvernance) à 2.5 (bonne gouvernance).

11. Traité modifié de l'UEMOA (2003).

- la Banque Centrale des Etats de l’Afrique Occidentale : elle définit et met en uvre la politique monétaire au sein de l’Union de manière à ce qu’elle soit cohérente avec les objectifs de croissance ;
- la Banque Ouest Africaine de Développement qui participe au développement par son concours au secteur privé. Elle contribue notamment au financement, sous des formes diverses, d’infrastructures de soutien au développement, de l’amélioration des conditions et moyens de production, de l’établissement de nouvelles activités.

1.1.3 Caractéristiques économiques, financières, sociales et institutionnelles des Etats membres de L’UEMOA

En 2019, le PIB total de l’UEMOA s’élève à environ de 137 milliards et 500 millions de dollars américains¹² dont 32% représente celui de la Côte d’Ivoire qui est le pays le plus riche de la zone. Le taux de croissance moyen de l’UEMOA est de 5,7% en 2019 et le taux d’inflation de 1,1% en 2018¹³. L’un des critères de convergence de premier rang de l’UEMOA est le maintien de l’encours de la dette intérieure et extérieure à 70% au plus du PIB nominal. Suivant le rapport de la surveillance multilatérale de la Commission de l’UEMOA, en 2018, seul le Togo (avec un ratio de 73,9) n’a pas respecté ce critère¹⁴. La zone UEMOA connaît l’instabilité politique et la violence. La moitié des pays de l’UEMOA dont le Burkina Faso, le Mali le Niger et la Guinée Bissau fait partie de la dernière liste des pays fragiles publiée par le Groupe de la Banque Mondiale¹⁵. S’agissant des autres dimensions de la gouvernance, les indicateurs d’efficacité des pouvoirs publics (-0,80), de qualité de la réglementation (-0,55) et de maîtrise de la corruption (-0,59) de l’UEMOA sont très faibles¹⁶. Le niveau de l’indice de capital humain de l’UEMOA en 2018 est également faible avec une valeur moyenne de 0,38 sur une échelle de 1. Tous ces facteurs affectent le climat des affaires et font que les pays de l’UEMOA arrivent en queue du classement mondial de la facilité de faire des affaires (2020). Le Togo classé 97ième sur 190 pays est le pays le mieux classé de l’espace UEMOA à l’opposé de la Guinée Bissau qui se retrouve en 174ième position. S’agissant de la facilité à payer les impôts et taxes, tous ces pays sont mal classés avec des rangs supérieurs à 110 sur 190.

Concernant la mobilisation de ressources domestiques, les recettes totales des pays de l’UEMOA s’élèvent à 20.2% du PIB en moyenne en 2015 et les recettes fiscales atteignent

12. Ce chiffre (137 496 164 246,07 de dollars US) correspond au PIB réel (année de base 2010) et provient de la base de données Indicateurs du développement dans le monde du Groupe de la Banque Mondiale (2020). Il représente respectivement 29% du PIB du Nigeria et 5% du PIB de la France sur la même période.

13. Les pays de l’UEMOA disposent d’un régime de change fixe et l’un des critères de convergence de premier rang de l’UEMOA est le fait que le taux d’inflation annuel moyen des pays membre ne doit pas dépasser 3%.

14. Le Tableau 1 en annexe fournit des informations économiques et financières extraites des derniers rapports pays (Article IV) du FMI sur les différents pays de l’UEMOA notamment concernant la valeur des soldes budgétaires.

15. <http://pubdocs.worldbank.org/en/888211594267968803/FCSList-FY21.pdf>.

16. Ces chiffres sont ceux des indicateurs mondiaux de la gouvernance du Groupe de la Banque Mondiale qui varient entre -2.5 (faible niveau de gouvernance) et 2.5 (bon niveau de gouvernance).

15.8% du PIB (soit 78% des recettes totales). Si les recettes fiscales des pays de l'UEMOA ont augmenté sur la période 1990-2015, le prélèvement fiscal moyen de la zone pour la période 2013-2015 s'établit à 15,4% du PIB contre 16.9% du PIB pour l'Afrique subsaharienne et 14% du PIB pour les pays à faible revenu (Tableau 3)¹⁷. Le Sénégal avec un niveau moyen de recettes fiscales de 18,7% du PIB a la performance fiscale la plus élevée à l'opposé de la Guinée Bissau dont le prélèvement fiscal représente 8.9% du PIB sur la période. S'agissant de la structure des recettes fiscales, elles sont issues essentiellement de la fiscalité indirecte interne. Le rendement moyen de la fiscalité indirecte interne de l'UEMOA (dont la taxe sur la valeur ajoutée) représente 51% des recettes fiscales totales en 2015 contre 27% pour la fiscalité directe (dont l'impôt sur les sociétés) et 19% pour les taxes sur le commerce international¹⁸ (Graphique 1¹⁹). Si à la fin des années 80 (1988-1990), la croissance économique n'était pas favorable à la mobilisation de recettes fiscales en Zone UEMOA, on constate que pour la période récente (2012-2015) l'élasticité des recettes fiscales à la croissance est significative et positive notamment pour le Benin, le Burkina Faso, le Niger, le Sénégal et le Togo (Tableau 4). Les recettes fiscales de la Côte d'Ivoire, de la Guinée Bissau et du Mali (dans les années récentes) sont peu dépendantes de la croissance économique.

1.1.4 Contexte de l'étude, Objectifs et Enjeux

L'Union Economique et Monétaire Ouest Africaine afin d'harmoniser les législations nationales de ses pays membres, a adopté des directives qui ont contribué à l'amélioration et à la modernisation des instruments de finances publiques en vigueur dans ses pays membres²⁰. « En droit communautaire, les Directives sont des instruments juridiques adoptés par le Parlement ou par la Commission seule, elles ont pour but l'harmonisation des législations des Etats membres » (Jourdain, 2007). En matière d'harmonisation des politiques fiscales de l'espace UEMOA, quatorze directives ont été élaborées. Elles concernent les instruments de taxation suivants : la Taxe sur la Valeur Ajoutée, les Droits d'accises, la Taxe sur les Produits Pétroliers, l'Impôt assis sur le Bénéfice des Personnes Morales et l'Impôt sur le Revenu des Personnes Physiques. Elles ont traité également au Programme de Transition Fiscale et à l'harmonisation des systèmes d'échange d'informations entre les administrations douanières et fiscales dans les Etats membres.

La réussite du processus d'harmonisation, ayant pour objectif de faciliter la convergence macro-économique des pays, dépend à la fois de la transposition des directives par les Etats et de la qualité de ces actes communautaires.

17. Ce niveau de prélèvement fiscal moyen est inférieur au niveau de taux de pression fiscale fixé par le critère de convergence de l'UEMOA qui doit être supérieur ou égal à 20%.

18. Le reste des recettes fiscales correspondant à 2% est catégorisé par la base GFS du FMI comme autres recettes.

19. Le Graphique 1 met également en exergue la transition en fiscale en Zone UEMOA où les recettes fiscales internes remplacent les recettes tarifaires à la fin des années 90.

20. Comme le soutiennent Mansour et Rota Graziosi (2013), la coordination fiscale apparaît nécessaire en zone UEMOA. Elle semble même vitale pour les États membres de l'UEMOA qui ont des besoins importants en ressources publiques.

Mansour et Rota-Graziosi (2013), ont réalisé une étude portant sur l'analyse du cadre d'harmonisation de la fiscalité au sein de la zone UEMOA. Les auteurs examinent les directives et leur état d'application par les pays et effectuent une brève analyse des recettes fiscales. De leur étude, il ressort globalement que les directives élaborées par la Commission de l'Union, si elles ont le mérite de définir un cadre commun créant une réelle coordination fiscale entre les Etats membres, sont bien souvent incomplètes ce qui peut compromettre l'objectif de coordination fiscale et donner l'opportunité aux pays de se faire de la concurrence fiscale. Quant à la question de la mise en uvre de ces actes par les pays, les pays qui ne transposent pas les directives se voient souvent bénéficier de leur extension les permettant ainsi de se conformer à la législation communautaire. Ces politiques nuisent à la crédibilité de l'institution supranationale. En termes de mobilisation de recettes, ils ont constaté que les recettes fiscales des pays de l'Union ont faiblement varié sur les trois dernières décennies. Cependant, comme le soutiennent les auteurs eux-mêmes, des travaux de recherche complémentaires sont indispensables pour appréhender correctement l'effet de la coordination fiscale sur le niveau et la structure des recettes des États membres.

La Banque Mondiale a récemment commandité une série d'analyse de la mobilisation des recettes fiscales en Afrique de l'Ouest (dont quatre pays membres de l'UEMOA). Cependant, ces études ont été effectuées de façon isolée, par pays²¹.

1.1.5 Contributions de la thèse

Ce travail de thèse, par le biais de méthodes qualitatives et empiriques, analyse l'état de l'harmonisation fiscale en zone UEMOA notamment son impact sur la mobilisation de ressources domestiques dans l'UEMOA de façon générale et les Etats membres de façon individuelle.

1.1.5.1 Analyse Qualitative

Une analyse qualitative des différents actes communautaires nous a permis d'identifier les faiblesses et les distorsions créées par ces Directives.

S'agissant de la Taxe sur la valeur Ajoutée, il ressort que les directives UEMOA limitent son assiette, en permettant l'exonération d'une liste élargie de biens et services, facteur qui a nui à la réussite du processus de transition fiscale de certains pays de L'UEMOA²². « Malgré sa bonne performance en termes de recettes, la TVA telle qu'elle est appliquée au sein de l'UEMOA s'est progressivement éloignée de sa conception la plus moderne (Ebrill et al, 2001) ». « La réussite des transitions fiscales suppose le plus souvent de mobiliser des recettes de TVA supplémentaires. À cet égard, il est essentiel de réduire les exonérations

21. Ces rapports ont été préparés en 2018 par Vellutini et Bousquet (ECOPA) pour le Bénin et le Togo et en 2019 par Brun et Chambas (avec l'appui de Diakitè) pour le Burkina Faso et la Côte d'Ivoire.

22. Dans la zone UEMOA, la Taxe sur la Valeur Ajoutée est employée en tant qu'instrument clé de la transition fiscale.

qui sont un facteur essentiel de faiblesse des recettes de TVA. » (Chambas, 2012).

Les directives portant sur les droits d'accises sont peu contraignantes et peuvent servir d'instruments de protection effective à certains pays à cause de l'introduction, dans la liste communautaire de l'UEMOA relative aux produits imposables aux droits d'accises, de biens produits par les Etats membres tels que l'or, la noix de cola, le café. En outre, les fourchettes de taux des droits d'accises sont importantes. « Dans les pays de l'UEMOA, l'ampleur des fourchettes de droits d'accises favorise le développement de flux frauduleux allant à l'encontre de l'intégration. Elle incite plusieurs pays côtiers à se servir des droits d'accises à taux réduits pour capter plus de recettes fiscales » (Geourjon et al, 2013).

Concernant la fiscalité directe en particulier l'Impôt sur le Revenu des Valeurs Mobilières, on constate une certaine incohérence entre les directives et les objectifs visés. « Alors que l'un des objectifs de la directive et plus généralement du Traité de l'UEMOA est de promouvoir l'investissement privé dans la région, les dividendes payés par les entreprises sont taxés à des taux plus élevés que les intérêts qu'elles versent, qui sont eux-mêmes taxés à des taux supérieurs à ceux qui s'appliquent aux bons des Trésors nationaux » (Mansour et Rota Graziosi, 2013).

L'existence de régimes dérogatoires dans les codes particuliers (code des investissements, code minier, code pétrolier et code forestier) peut donner l'effet inverse de celui recherché par le processus d'harmonisation fiscale dans la mesure où les pays se servent de ces codes pour attirer l'investissement étranger et donc peuvent se faire de la concurrence fiscale en contournant le système de droit commun institué par l'adoption des directives communautaires.

1.1.5.2 Analyse Empirique

L'analyse empirique concerne l'utilisation d'indicateurs reconnus et la proposition d'indicateurs alternatifs robustes pour mesurer la performance des différents instruments de taxation avant et suite à l'adoption des actes communautaires. Une comparaison des pays de l'UEMOA ou de l'Union dans son ensemble à d'autres pays Africains ou ensembles régionaux permet d'évaluer l'effort de coordination de l'UEMOA et son effet sur la capacité de mobilisation fiscale des pays membres.

Dans le second chapitre nous mesurons l'effort fiscal et le potentiel fiscal des pays de l'UEMOA à partir d'un large échantillon de pays en développement à partir du modèle de frontière stochastique de Kumbhakar, Lien et Hardaker 2014 (en prenant en compte les recommandations de Badunenko et Kumbhakar (2016)) que nous jugeons plus approprié au regard des modèles utilisés dans les études précédentes. Le potentiel fiscal représente le niveau maximal de recettes fiscales qu'un pays peut collecter compte tenu de ses caractéristiques structurelles. L'effort fiscal montre dans quelle mesure un pays exploite son potentiel de recettes fiscales. Nous estimons le potentiel fiscal et l'effort fiscal à court

terme et à long terme pour les recettes fiscales totales, les recettes fiscales non issues de l'exploitation des ressources naturelles et la taxe sur la valeur ajoutée.

Le troisième chapitre représente une étude d'impact de l'harmonisation fiscale en zone UEMOA à la fois sur les plans qualitatif et quantitatif. L'analyse empirique consiste à estimer l'impact de la coordination fiscale sur les recettes fiscales totales, la fiscalité indirecte interne, la fiscalité directe et les taxes sur le commerce international. Si les textes communautaires de l'UEMOA évoquent la nécessité de conduire des études d'impact de l'harmonisation fiscale, aucune étude empirique n'avait été conduite dans ce sens, au meilleur de notre connaissance. Notre étude d'impact est réalisée pour l'union dans son ensemble et pour les pays membres pris individuellement. Le modèle utilisé est celui du 'Synthetic Control' qui a été développé par Abadie et Gardeazabal (2003) et amélioré par Abadie, Diamond, et Hainmueller (2010–2015), Ferman et Pinto (2016–2017), Firpo et Possebom (2017).

Le dernier chapitre porte sur le calcul des indicateurs d'écart de recettes des systèmes de TVA 'VAT Gaps'. Ces indicateurs donnent une estimation à la fois de l'écart global de recettes de TVA 'Overall VAT Gap', l'écart de recettes lié à la performance de l'administration fiscale 'Compliance Gap' et les pertes de recettes potentielles liées à l'application de la législation fiscale 'Policy Gap'. Le 'Policy Gap' inclut l'écart de recettes lié à l'octroi des exonérations fiscales 'Exemption Gap' et l'écart lié à l'adoption de systèmes de TVA à taux multiples 'Rate Gap'. Ces indicateurs sont développés pour tous les 7 Etats membres de l'UEMOA ayant adopté la taxe sur la valeur ajoutée suivant la méthode du RA-GAP présentée par Hutton (2017) qui est celle utilisée par le Fonds Monétaire International au cours de ses missions d'assistance technique. Aucune étude précédente n'a déterminé ces indicateurs pour l'ensemble des pays de l'UEMOA ayant des régimes de TVA. En outre, nous expliquons les écarts de recettes calculés en analysant notamment l'impact de la numérisation de la vulnérabilité aux flux financiers illicites passants par le canal du commerce. L'étude économétrique annexe utilise un modèle à variables instrumentales (2SLS-IV).

Les résultats de ces recherches peuvent servir à différents organes de l'UEMOA tels que : la Commission pour l'élaboration et l'amélioration des directives communautaires concernant la politique fiscale, la Conférence des chefs d'Etats et le Conseil des Ministres en matière d'orientation des politiques économiques. Les bailleurs de fonds peuvent utiliser les résultats de l'étude afin d'évaluer les priorités en termes d'assistance technique. Les autres ensembles régionaux tels que la CEMAC et surtout la CEDEAO peuvent se servir des résultats de cette thèse pour tirer des enseignements de l'harmonisation fiscale en Zone UEMOA ou pour des perspectives de comparaison. Enfin, cette thèse contribue à la littérature empirique sur l'intégration régionale et la coordination politique fiscale.

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1.3 Annexe au chapitre 1

TABLE 1.1 – Indicateurs économiques, financiers et de gouvernance des pays de l’UEMOA (1)

Indicateur	Benin (2017)	Burkina Faso (2015)	Côte d’Ivoire (2017)	Guinée Bissau (2015)	Mali (2015)	Niger (2017)	Sénégal (2017)	Togo(a) (2016)
Taux de croissance du PIB à prix constants	5,8	3,9	7,8	6,1	6,0	4,9	7,2	5,6
Recettes totales (hors dons) en % du PIB	17,5	17,0	18,1	13,8	16,4	14,4	19,4	18,7
Solde primaire en % du PIB	-5,0		-1,2	-1,5			-1,0	-9,5
Déficit budgétaire global (dons compris) en % du PIB	-5,9	-2,2(b)	-4,2	-3,0	-1,8	-5,7	-2,9	-7,2
Dettes totales du secteur public en % du PIB	54,4	35,6	46,8(c)	52,8(d)	30,7	54,4	60,6	81,4
Recettes fiscales en % du PIB	13,2	15,1		10,1	14,0	13,1	15,3	16,8
Financement extérieur en % du PIB	3,3			1,4(e)	3,6	10,2		
PIB (milliards de francs CFA)	5382	6163	23510	6125	7748	4726	12278	2649

Notes : (a) Les données 2016 sur le Togo représentent des estimations. (b) Ce chiffre comprend les dons. (c) Ce chiffre correspond à la dette (brute) de l’administration centrale. (d) Ce chiffre correspond à la dette de l’administration centrale. (e) Ce chiffre est celui de 2016. Source : Rapports du Fonds Monétaire International (Articles IV).

TABLE 1.2 – Indicateurs économiques, financiers et de gouvernance des pays de l'UEMOA (2)

Indicateur	Benin	Burkina Faso	Côte d'Ivoire	Guinée Bissau	Mali	Niger	Sénégal	Togo
Inflation, prix à la consommation (% annuel) (2019)	-0,92	-3,23	-1,11		-1,66	-2,49	1,76	0,67
Indice du capital humain (échelle comprise entre 0 et 1) (2018)	0,40	0,38	0,37		0,32	0,32	0,42	0,42
Indice de développement humain (2018)	0,520	0,434	0,516	0,461	0,427	0,377	0,514	0,513
Maîtrise de la corruption (2019)	-0,32	-0,19	-0,53	-1,45	-0,70	-0,55	0,05	-0,75
Efficacité des pouvoirs publics (2019)	-0,44	-0,76	-0,48	-1,51	-1,06	-0,80	-0,06	-0,92
Stabilité politique et absence de violence (2019)	-0,35	-1,19	-0,96	-0,56	-2,15	-1,40	0,06	-0,81
La qualité de la réglementation (2019)	-0,38	-0,38	-0,24	-1,23	-0,57	-0,67	-0,11	-0,68
État de droit (2019)	-0,66	-0,43	-0,57	-1,26	-0,83	-0,53	-0,19	-0,59
Voix citoyenne et responsabilité (2019)	0,09	-0,18	-0,22	-0,46	-0,41	-0,57	0,26	-0,72
Classement mondial de la facilité de faire des affaires (2020)	149	151	110	174	148	132	123	97
Classement mondial - Paiement des taxes et impôts (2020)	171	154	114	155	173	169	166	174

Sources : Indicateurs du développement dans le monde, Indicateurs mondiaux de la gouvernance et Doing Business du Groupe de la Banque Mondiale ; Programme des Nations Unies pour le Développement.

TABLE 1.3 – Recettes fiscales des Pays de l'UEMOA : comparaisons internationales (% PIB)

Pays/Groupe	1980-1982	T	1990-1992	T	2000-2002	T	2010-2012	T	2013-2015	T
Benin	13,6	1	8,5	1	14,0	1	15,8	1	16,4	1
Burkina Faso	8,4	1	8,6	1	10,6	1	14,0	1	15,8	1
Côte d'Ivoire	22,1	1	17,1	1	14,3	1	14,7	1	15,7	1
Guinée Bissau	10,7	1	6,0	1	5,5	1	8,5	1	8,9	1
Mali	10,6	1	9,8	1	12,7	1	14,4	1	15,4	1
Niger	11,0	1	7,3	1	9,4	1	13,3	1	16,4	1
Sénégal	14,7	1	14,9	1	16,4	1	18,9	1	18,7	1
Togo	24,9	1	13,9	1	11,7	1	15,2	1	15,9	1
UEMOA	14,5	8	10,8	8	11,8	8	14,3	8	15,4	8
Afrique Sub-Saharienne	15,7	39	15,2	41	14,2	46	16,2	47	16,9	47
Amérique Latine et Caraïbes	17,2	20	14,9	23	15,3	32	18,2	32	19	26
Asie	12,9	19	12,1	28	12,5	46	14,1	47	14,4	46
Moyen Orient/Maghreb	20,4	6	14,7	9	15,9	11	14,4	12	13,9	11
Pays à Faible Revenu	11,8	24	10,8	24	10	26	13,4	28	14	28
Pays à Revenu Intermédiaire	16,9	48	16,3	64	15,9	96	17,5	102	18,2	93
Pays en Développement	15,2	72	14,8	88	14,6	122	16,7	130	17,2	121

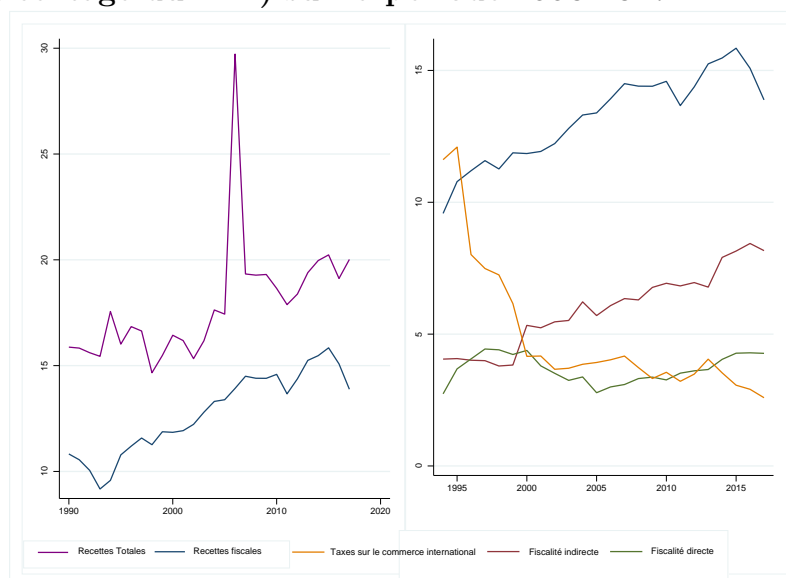
Notes : T : taille de l'échantillon. Les données présentées sont des moyennes arithmétiques calculées sur des périodes de trois ans. Sources : GFS (FMI), données nationales, base de données CERDI. Calculs effectués par l'auteur.

TABLE 1.4 — Elasticité des recettes fiscales à la croissance

Pays/Groupe	1980-1982	T	1988-1990	T	1996-1998	T	2003-2005	T	2010-2012	T	2013-2015	T
Benin	-0,04	1	-0,16***	1	0,03	1	-0,0	1	0,04*	1	0,07***	1
Burkina Faso	-0,13	1	-0,21**	1	0,07	1	-0,04	1	0,03	1	0,09***	1
Côte d'Ivoire	0,04**	1	0,04	1	0,01	1	0	1	0,00	1	0,02	1
Guinée Bissau	-0,08	1	-0,19***	1	-0,08	1	-0,18***	1	-0,04	1	0,03	1
Mali	-0,09	1	-0,14***	1	0,05	1	0,0	1	0,03	1	0,00	1
Niger	-0,08	1	-0,21***	1	0,02	1	-0,07	1	0,06	1	0,07***	1
Sénégal	-0,02	1	-0,04***	1	0,04	1	0,03	1	0,05***	1	0,14***	1
Togo	0,05	1	-0,04	1	0,05	1	0,00	1	0,06*	1	0,11***	1
UEMOA	0,1	8	-0,1	8	-0,4***	8	-0,1	8	-0,4***	8	-0,1	8
Afrique Sub-Saharienne	0,1*	28	-0,04	35	-0,01	39	-0,04	44	1,1***	44	0,03	44
Amérique Latine et Caraïbes	0,2*	13	0,4	12	-0,1	19	-0,1	25	4,3***	24	1,4***	9
Asie	-0,1	10	-0,8***	12	0,5***	21	0,6	32	0,2	33	0,5***	31
Moyen Orient/Maghreb	0,1	3	1,2*	5	0,2*	7	0,9***	10	0,03	10	-0,2***	10
Pays à Faible Revenu	0,2	18	0,1	23	1,9***	24	-0,01	26	0,14	26	0,6***	26
Pays à Revenu Intermédiaire	0,1	35	0,1	41	0,2***	64	-0,1**	94	0	98	0,02	79
Pays en Développement	0,1	53	-0,2***	64	-0,1	88	0,2***	120	0,1***	124	0,1*	105

Notes : T : taille de l'échantillon. Sources : GFS (FMI), WDI(BM), données nationales, base de données CERDI. Calculs effectués par l'auteur en utilisant le modèle de Hsiao (2014).

FIGURE 1.1 – Evolution et structure des Recettes de la Zone UEMOA (en pourcentage du PIB) sur la période 1990-2017



Tax Potential and Tax Effort : An Empirical Estimation for Total Tax, Non-resource Tax, and Value-added Tax

«When you can measure what you are speaking about, and express it in numbers, you know something about it. When you cannot express it in numbers, your knowledge is of a meagre and unsatisfactory kind» William Thomson.

2.1 Introduction

Domestic resources are the largest source of financing in developing countries. In 2017, in these countries, tax revenue was 69% of total government revenue including grants ¹.

One of the main resolutions adopted by the Third International Conference on Financing for Development was to mobilize resources to finance development post-2015 which requires raising public resources, especially tax revenue. "We commit to enhancing revenue administration through modernized, progressive tax systems, improved tax policy and more efficient tax collection. We will work to improve the fairness, transparency, efficiency and effectiveness of our tax systems, including by broadening the tax base and continuing efforts to integrate the informal sector into the formal economy in line with country circumstances" ².

In 2013, the World Bank estimated the annual infrastructure investment needs in developing countries for the next two decades, at about \$800 billion, in order to assure the welfare of populations, and to contribute to the smooth running of economic activities. Developing countries face important challenges concerning security, climate change, and pandemic situations which add to the structural financing requirement. The mobilization

1. Source : ICTD/UNU-WIDER Government Revenue Dataset (2018).

2. Report of the Third International Conference on Financing for Development, Addis Ababa, 13-16 July 2015, Resolutions Adopted by the Conference, A/CONF.227/20, United Nations, New York 2015.

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of significant resources is needed to finance at least a significant proportion of these expenditures. Recourse to various aspects of fiscal space including tax revenue must be optimized (the marginal costs of the various components of fiscal space must be equalized) (Chambas et al, 2006).

Taxation is a main component of countries' fiscal space, and governments delineate their tax system as a combination of different types of taxes, allowing them to have an adequate level of revenue. We can distinguish between direct tax and indirect tax, and in a more disaggregated way between corporate income tax, personal income tax, value-added tax (VAT), excise, etc. Benevolent governments try to make the least distortive combination of these taxes while raising revenues. Value-added tax is regarded as non-distortive in terms of trade and production, and it allows the generation of a significant amount of revenue. Its revenue-raising power justifies its choice by the majority of countries which start on a tax transition process.

The level of tax revenue differs between developed and developing countries. In 2017, the tax to GDP ratio of developing countries was 14.9% on average compared to 27.9% for developed countries. It is well documented that the level of development is correlated with countries' tax performance (Rodrik, 1999). However, the tax to GDP ratio varies among developing countries. Even if the average tax to GDP ratio in Sub-Saharan Africa (SSA) increased over the period 1991-2017 (Figure 1), its level is low compared with those of most of the developing regions. Despite the averages, total tax revenue and non-resource tax revenue of the member states of the West African Economic and Monetary Union (WAEMU) are lower than those of the average for SSA, the VAT to GDP ratio of the WAEMU is higher than that of average for SSA, East Asia & Pacific (EAP), and South Asia (SA). From Figure 1, we can observe that the tax performance of the resource-rich countries is lower than that of the non-Resource-rich countries³. The pattern is similar for the non-resource tax revenue and the value-added tax revenue.

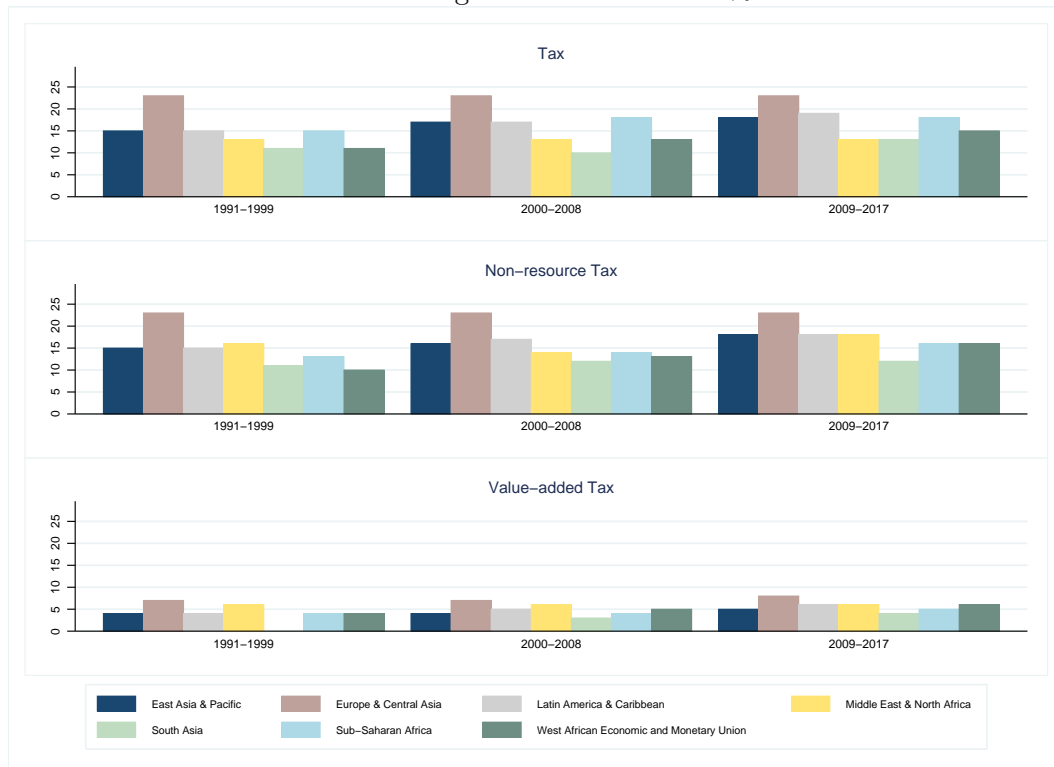
Governments set the tax rates and the tax bases according to the need in expenditure (fiscal revenue forecasting), or to achieve a goal set by the regional institution to which they belong⁴. However, the tax capacity differs between countries and it depends on structural factors. The tax potential determined by taking into account structural factors must be the reference for governments' revenue collection target, because it takes account of countries' characteristics to estimate the level of revenue which can be generated. The amount of revenue collection depends on the tax effort made by tax administrations under the rules of the tax legislation and the management system set up by governments.

3. Like IMF (2012) and Laporte et al (2016), we define a resource-rich country, a country for which the share in total export of export of natural resources (including petroleum, minerals, and metals) is more than 25%. We calculated the average share of export of natural resources by country using the export data of the World Development Indicators dataset for the period 2000/2017.

4. For example, to ensuring the convergence of tax structures and coordinating rates and bases for the major taxes, the WAEMU Treaty mandates the convergence of the tax to GDP ratio to 20% at least for the WAEMU member states.

A number of empirical studies of cross section or panel data have attempted to determine countries' tax potential or tax effort e.g. Lotz and Morss (1967), Bahl (1971), Stotsky and WoldeMariam (1997), Fenochietto and Pessino (2013), Brun, Chambas and Combes (2006). Few studies, such as Brun et al (2014) and Brun & Diakité (2016), have focused on the non-resource tax potential and the value-added tax potential. In a previous study (Brun & Diakité, 2016), we used different methodologies from those employed in most of the tax effort studies by proposing an alternative model, the stochastic frontier model of Kumbhakar, Lien and Hardaker (2014) (KLH) to better assess countries' non-resource tax potential and VAT potential independently. As well as combining both the standard regression analysis and a utility maximization process, the KLH model has the advantage of breaking down the total tax effort into a persistent tax effort (mainly related to the tax legislation) and a time-varying tax effort (mainly related to the efficiency of tax administrations). Following our study the same method has been employed in various studies, such as those of Nerudova and Dobranschi (2019), Mudiyansele et al (2020), and Caldeira et al (2020). In the present study, we use a more recent database, for the period 2000 to 2017, to determine independently the total tax effort, the non-resource tax effort, and the value-added tax effort. We also calculate the 3 ratios of the variance parameter of the 4 error components to assess the reliability of the estimated persistent and transient technical efficiencies, as recommended by Badunenko & Kumbhakar (2016).

FIGURE 2.1 – Changes in tax revenue as % of GDP



2.2 Literature review

2.2.1 Estimation of the total tax effort and the non-resource tax effort

Since the early 1900s, a number of studies have focused on measuring countries' tax potential and tax effort (ratio of actual to predicted tax revenue). In recent years there has been an increasing interest by researchers in robust assessment of countries' tax capacity.

Studies measuring countries' tax potential and tax effort can be classified into 4 categories according to the methodology used : analyzes of the trends in tax revenue to understand the tax effort, standard regression analyzes (OLS, G2SLS, IV2SL, ARDL, VAR, ECM), utility maximization processes, and stochastic frontier analyzes.

Early studies, such as those of Bastable (1903) and Clark (1945), assessed countries' tax effort by calculating the ratio of tax revenue to income.

Lotz and Morss (1967) attempted to provide a more robust indicator of countries' tax effort, and are regarded as the precursors of the use of the least squares estimator in the assessment of tax potential. Working on a large sample of developing and developed countries, Lotz and Morss (1967) used regression analysis and identified some of the determinants of governments' tax capacity thus allowing determination of the tax effort. Like Hinrichs (1965), Lotz and Morss found that income and trade openness are robust determinants of governments' tax capacity. Countries' tax effort ranking according to previous studies changed with this methodology. Bahl (1971) developed tax effort indices for 49 developing countries for the 3-year period 1966 to 1968. He regressed the ratio of tax revenues (excluding social security taxes) to Gross National Product on the structural factors used by his predecessors, then added agriculture share of GNP and resource revenue as additional structural variables, the latter proved to be significant. He found that countries with a high mining share of GNP have the lowest tax effort indices, and he identified the existence of a regional factor in the tax effort ranking. Chelliah et al (1975) determined countries' tax effort using the same variables as Bahl (1971) plus exports, and they analyzed countries' changes with reference to the previous IMF staff studies on 47 countries. They did not observe a significant change in countries' tax effort ranking for the period 1969 to 1971. They noted that countries with the highest tax efforts are those with the highest tax to GDP ratios. Tait et al (1979) did the same study for the period 1972 to 1976. They also noted no significant change in countries' tax effort during this period. Stotsky and WoldeMariam (1997) developed tax effort measures for 43 Sub-Saharan African countries for the period 1990 to 1995. Their strategy was based on a panel data fixed effects estimator, and their findings are similar to Bahl (1971) and Chelliah et al (1975). Martinez-Vazquez (2001), in studying the Mexican tax system, determined the tax effort of 32 developing countries for the period 1990 to 1996. He found, through a

panel data regression, that Mexico is among the bottom third of countries in terms of tax effort. Martinez-Vazquez (2007) saw no significant improvement in Pakistan tax effort, and he explained it by the large tax exemptions and low tax compliance in Pakistan. Brun, Chambas and Combes (2006) assessed the tax effort of a sample of 85 developing countries over the period 1980 to 2003 using 3-year averages to sort countries according to their geographic area. They used a random effects estimator and identified net exports of mineral and oil as a robust determinant of countries' tax potential. They found that the tax effort of these developing countries decreased during the period 2000 to 2003 compared to 1990 to 1994. In particular, Latin-American and Asian countries were characterized by a constant negative tax effort during all of the period. Bird, Martinez-Vazquez and Torgler (2008), and Botlhole (2010) showed that a country tax effort may be influenced by its institutional factors such as corruption, voice and accountability estimate. Botlhole (2010) employed a GMM estimator and a IV2SL estimator to assess 46 Sub-Saharan African countries' tax potential and tax effort. He found that African countries over the period 1990 to 2007 performed below their tax potential. Brun, Chambas and Mansour (2014) developed non-resource tax effort indices for a sample of 124 developing countries for the period 1980 to 2012 by using a random effects estimator. For Sub-Saharan African countries, they found a decrease in their tax effort until the early 2000s from when they improved their revenue mobilization due to the economic policy measures that they had introduced from the early 1990s. Latin American and Asian countries are characterized by a constant decreasing tax effort in this period. Cevik (2016) determined the short-run tax revenue elasticity of Pakistan using the IV method via the two-stage least squares (2SLS) approach, and also estimated the tax potential for Corporate Income Tax, Personal Income Tax and General Sales Tax/VAT. He derived long-run tax revenue elasticity using an error correction model. Bouselhami and Hamzaoui (2018) estimated the tax effort of Morocco using a panel data of 25 countries over a 26-year period. They employed a two-stage least squares regression model. Piancastelli and Thirlwall (2019) measured the tax effort of a sample of 59 developed and developing countries for the period 1995 to 2015 using pooled time series/cross section estimations. Oordt (2019) considered how geography, formal institutions, and informal institutions influence tax effort in a large cross section of developed countries. Amoh (2019) employed the OLS regression and a VAR model to compute taxable capacity, tax effort, and tax burden in Ghana. Al-Freijat and Adeinat (2020) measured the tax capacity and tax effort in Jordan using a two-stage least squares regression model for a panel of 59 countries for the period 2000 to 2017.

In the late 1990s, researchers were interested in the stochastic frontiers models which were originally based on the measurement of the productivity of firms. Jha et al (1999) attempted to determine the tax efficiency of 15 major Indian states by a stochastic frontier model. They found that the poorest states had the highest tax efforts. Alfirmán (2003) by using Aigner, Lovell, and Schmidt's (1977) model assessed the tax potential of Indonesian local governments and found that they did not achieve their tax potential. Barros (2005), employed a Cobb Douglas cost frontier model to measure the efficiency of tax offices in Portugal and found that it varies between offices and over time. Pessino and Fenochietto

(2010) developed a tax stochastic frontier analysis to determine the tax potential and the tax effort for a sample of 96 countries (developing and developed) for the period 1991 to 2006. They defined tax effort as the ratio of actual to potential tax collection. They used three specifications i.e. the stochastic frontier models of Battese and Coelli (1992, 1995) estimated by the maximum likelihood method, and added income inequality and public expenditure on education to the usual variables. They found that countries with higher levels of revenue (such as OECD countries) are near their tax capacity, but they found the opposite for countries with lower levels of revenue. However, there are some exceptions like Singapore and Hong Kong of the high-income countries, and Namibia and Kenya of the low-income countries. They explained the inefficiencies in countries' tax collection by corruption and the percentage change of consumer price index. In 2013, Pessino and Fenochietto employed the same analysis strategy and a Mundlack random effects model to determine the tax effort of a sample of 113 countries. They made a distinction between 17 resource-dependent countries (where revenue from natural resources represents more than 30% of total tax revenues) for which they used the non-resource tax revenues as a dependent variable, instead of the total tax revenues which was used for the 96 non-resource dependent countries. The estimation of tax effort was done for each subsample independently. They found some large inefficiency parameters in the order of 2.8 for non-resource dependent countries and 6.4 for resource dependent countries. Overall, they found that the average tax effort of high-income countries is higher than that of other countries, and it is higher for low-income countries than for middle-income countries. Cyan, Martinez Vazquez and Voluvic (2013) highlighted the economic logic behind the concept of tax effort as defined in the previous studies and they tried to link the tax effort to each country's financing requirement. Their study used a sample of 94 countries for the period 1970 to 2009. They compared the two approaches used to determine countries' tax effort (1. traditional regression approach by adding institutional factors, 2, stochastic frontier approach in two steps) to a new approach consisting of determining countries tax effort relative to their public expenditures⁵. They concluded that the level of public expenditure of a country may serve as an additional information measure to quantify its tax effort. Ndiaye and Korsu (2014) used a sub-sample of Sub-Saharan African countries to predict the tax effort of ECOWAS countries for the period 2000 to 2010 using the stochastic frontier model of Battese and Coelli. They estimated the direct tax effort, indirect tax effort, trade tax effort, total tax effort, and the non-resource tax effort. Garg et al (2017) used the stochastic frontier model of Battese and Coelli to measure the tax capacity and the tax effort of 14 major Indian states from 1991 to 1992 to 2010 to 2011. Langford and Ohlenburg (2016) quantified the total tax capacity for 85 non-resource-rich countries over a 27-year period by using the stochastic frontier model of Battese and Coelli (1995). They added MIT's economic complexity index, ethnic tension and private sector credit to the usual variables mobilized to assess tax capacity. They found a wide variation in

5. The authors added to traditional variables, population variables as Bird, Martinez-Vazquez and Torgler (2008), education, inflation, Gini index, corruption as Pessino and Fenochietto (2010), grants, the lagged government debt, production of crude oil, a measure of tax system's complexity, a globalization index, age dependency ratio, a politicization fractionalization index.

the estimated level of tax effort across the sample, on average the tax performance of the upper-middle-countries and high-income countries is higher than those of the low-income and lower-middle-income countries. In a previous study (Brun and Diakité (2016)), we used different methodologies from those used in most of the tax effort studies - a generalized two-stage least squares random-effects instrumental variables estimator, and the stochastic frontier model of Battese and Coelli (1992) in its truncated-normal and half-normal forms to measure the tax effort. Finally, we proposed an alternative model - the stochastic frontier model of Kumbhakar, Lien and Hardaker (2014) (KLH) to better assess countries' non-resource tax potential for the period 1980 to 2014 and VAT potential independently for the period 1995 to 2014. We found that the tax effort of low-income countries was high over the period, even if their tax effort declined at the end of period and the tax effort of resource-dependent countries increased. The resource-dependent countries characterized by low tax effort (compared to non-resource-dependent countries) have improved the efficiency of their system since 2010. The results also suggest that inefficiency in taxation depends more on policy decisions than tax administration performance. Following our study, Mudiyanse et al (2020) estimated the tax effort of Sri Lanka using a sample of lower-middle-income countries with the stochastic frontier models of Battese and Coelli (1995) and Kumbhakar, Lien and Hardaker (2014). Caldeira et al (2020) used the model of Kumbhakar et al (2014) to estimate the tax effort of 42 Sub-Saharan African countries for the period 1980 to 2015. Mawejje and Sebudde (2019) estimated the tax potential and the tax effort for a panel of 150 countries for the period 1996 to 2015. They used the Battese and Coelli (1992) procedure for estimating time varying inefficiency, and estimated additional models based on direct taxes, income taxes, individual taxes, corporate taxes, indirect taxes, taxes on goods, and services and trade taxes. Zárate-Marco and Vallés-Giménez (2019) estimated the regional tax effort in Spain for the period 2002 to 2012 using the stochastic frontier model (True Random Effects model) of Greene (2005). Kalloub et al (2020) used stochastic frontier analysis to estimate the tax effort and the tax capacity for a sample of 13 countries from the MENA region and Europe.

Dalamagas et al (2019) proposed a utility maximization process to estimate the optimal tax revenue from a sample of 30 countries.

2.2.2 Econometric Estimation of the Value-added tax effort

As mentioned above, we estimated the VAT effort using the stochastic frontier model of Kumbhakar, Lien and Hardaker. The KHL model allowed us to breakdown the VAT effort into a time-varying effort and the VAT persistent effort for a sample of 57 developing countries for the period 1995 to 2014. Following our study, Nerudova and Dobranschi (2019) used the inefficiency model of Battese and Coelli and the KLH model to determine the Value Added Tax gap for a panel data of 26 European countries for the period 2000 to 2015.

A number of studies have attempted to evaluate the VAT effort through the traditional re-

gression analysis. Cevik (2016) determined the short-run VAT revenue elasticity of Pakistan using the IV method via the two-stage least squares (2SLS) approach. He derived long-run tax revenue elasticity using an error correction model. Andoh (2017) estimated Ghana's VAT capacity and effort using the OLS regression and quarterly data from first quarter of 2000 to fourth quarter of 2014. Oordt (2018) estimated the VAT effort as the ratio of the VAT ratio (ratio of VAT revenue to total consumption expenditure of households and government) to the VAT capacity (predicted through the regression of the VAT ratio by VAT capacity factors) for a panel of 124 countries for the period 2004 to 2014. Konopczak (2019) used an ARDL model in the form of an error correction model to quantify the VAT gap in Poland for the period 2016 to 2018.

2.3 Empirical analysis

2.3.1 Variables and data

2.3.1.1 Variables

Measuring the tax potential (or tax capacity) consists of predicting the maximum level of revenue that a country can collect depending on its specific characteristics. In this sense, it is different from the tax performance which corresponds to the actual revenue collected. The tax performance can be influenced by factors such as the quality of bureaucracy and corruption. The higher a country's tax performance, the closer it is to its potential. To remain consistent with these definitions, we only use structural variables to predict the efficiency (i.e. the tax effort) and thereby the tax potential for the purpose of this study. As structural variables, we use : - **GDP per capita** - as stated above, a big national income supposes a wide tax base. In addition, demand for public goods increases with the level of development (Wagner's law), particularly because of social insurance requirements (Rodrik, 1999). The sign of GDP's coefficient is expected to be positive. **Agriculture value-added** - subsistence agriculture, common in sub-Saharan African countries, is informal. The majority of developing countries exempt the agriculture sector because it is said to be "hard to tax". A higher non-agriculture share of GDP should produce a higher tax ratio (Bird and Martinez Vasquez, 2008). The sign of agriculture value-added's coefficient is expected to be negative. **Imports** and **Exports** - as stated by Lotz and Morss (1967), the taxable capacity also increases with the size of the foreign trade sector for two reasons : first, it is administratively easier to tax trade inflows and outflows than domestic transactions ; second, the "degree of openness" in many countries, especially in early stages of development indicates the relative importance of cash crops and subsistence agriculture. Moreover, greater trade openness favors increased productivity and steadier growth (Frankel, 1999). The sign of the imports variable coefficient is expected to be positive due to the large share of tax revenue collected at the border, and that of the exports variable coefficient is expected to be negative, especially because of value-added tax which is refunded at the border. **Ratio of resource tax revenue to GDP** - early studies such as Chelliah et al and (1975) Tait et al, (1979) found a positive impact of mining on taxation, which can be explained by the taxa-

tion at export of oil and mining products. However, as Bahl (1971) found, countries with a higher mining share to Gross National Product have the lowest tax effort indices. Moreover, the shocks engendered by non-renewable resources are likely to have a negative effect on tax revenue (Tanzi, 1981). The development of *dutch disease* driven by the intensive use of revenue from mining can negatively affect other tradable sector tax bases, leading to a further reduction in the domestic tax effort (Brun et al 2014). In using the resource tax revenue to GDP ratio as a dependent variable, we expect to obtain a negative coefficient like Bornhorst et al (2009), Ossowski and Gonzales (2012), Thomas and Trevino (2013), Civilly and Gupta (2014), Brun et al (2014), and Brun and Diakit  (2016)⁶. **Inflation** - as measured by the consumer price index as a proxy of financial openness. The sign of the inflation is expected to be negative given that a higher inflation rate is assumed to reduce the domestic tax yield (Tanzi-Olivera effect). **Human Capital Index** - as a proxy of the level of education which is assumed to have a positive impact on tax collection⁷.

2.3.1.2 Data

We use a panel of 87 developing countries to estimate the total tax effort. The sample is reduced to 72 countries for the non-resource-tax effort and 60 countries for VAT due to data availability. The main sample is composed of 26 resource-rich countries and 61 non-resource-rich countries. The non-resource tax sample has 20 resource-rich countries, and the VAT sample has 16 resource-rich countries. As mentioned above, following IMF (2012) and Laporte et al (2016), we define a resource-rich country, a country for which the share in total exports of the export of natural resources (including petroleum, minerals, and metals) is higher than 25%. We calculate the average share of export of natural resources by country using the export data of the World Development Indicators dataset for the period 2000 to 2017. Although the sample includes developing countries from different regions and at different levels of development, the coefficients of variation for tax revenue, non-resource tax revenue, and VAT are low (< 0.5) indicating a relatively low variation and so a homogenous sample. The descriptive statistics are presented in Table 3 in the Appendix.

2.3.2 Estimation strategy

The Stochastic frontier analysis (SFA) was proposed first by Aigner, Lovell & Schmidt (1977) and Meeusen & van den Broeck (1977). It was initially used for modelling production and technical efficiency of firms. A production function predicts a maximum level of outputs that a firm can produce given a level of inputs. As stated by Kumbhakar et al (2015), all production processes are a transformation of inputs (for example, labor, capital, and raw materials) into outputs (which can be either in physical units or services). A production function simply describes this transformation relationship as a "black box" which transforms inputs into outputs. The difference between SFA and the other

6. Here, we use the resource tax instead of the total natural resource rent to predict the non-resource tax potential and the VAT potential, due to the endogeneity of the natural resource rent.

7. Definition and sources of all the variables employed in this study are in Table 2 in the Appendix.

techniques used in empirical research concerns the error term which in the SFA is divided in two or more parts. SFA combines both the standard regression analysis and the utility maximization process. From an econometric point of view, the estimation of frontiers is interesting given that the concept of maximality puts a bound on the dependent variable (or, in some models, at least on some components of the dependent variable) (Førsen, Lovell and Schmidt, 1980). Stochastic frontier models are estimated by the maximum likelihood method on panel data or by the corrected ordinary least squares on cross section data.

The first models proposed were the time invariant technical inefficiency models developed by Pitt and Lee (1981), Schmidt and Sickles (1984), and Battese and Coelli (1988). The time decay model of Battese and Coelli (1992), Cornwell, Schmidt and Sickles (1990), Kumbhakar (1990), and Lee-Schmidt (1993), belong to the second generation of the stochastic frontier models. The panel data model of Battese and Coelli (1992) is somewhat restrictive because it only allows inefficiency to change over time and exponentially. Furthermore, this model mixes firm effects with inefficiency (Kumbhakar et al 2014). Greene (2005) and Wang and Ho (2010) proposed some models which allow separation of individual heterogeneity. However, none of the above models distinguish between persistent efficiency and time-varying efficiency⁸. Identifying the magnitude of persistent inefficiency is important, especially for short-time period samples, because it reflects the effects of inputs like management (Mundlak, 1961) and other unobserved inputs which vary across firms but not over time⁹.

The stochastic frontier model introduced by Kumbhakar, Lien and Hardaker (2014), Colombi et al (2014), and Tsionas and Kumbhakar (2014), in addition to considering countries' heterogeneity apart from the technical efficiency, makes a distinction between the time-varying efficiency and the persistent inefficiency. In other words, the KLH model divides the error term into 4 components : random-country effects (heterogeneity) given that countries differ in culture and tax morale; persistent technical efficiency related to the tax legislation, the form of organization of inland revenue services (for instance dividing it into departments of big enterprises, small- and medium-sized enterprises, and municipality) and remains constant unless there is a tax reform or a change in organization such as digitalization that affects the management system; time-varying efficiency which depends mainly on the performance of tax officials; and noise. Thus, we can assess both the tax effort due to the policy decisions and that due to the tax officials' performance, and the total tax effort which is the product of the first two. This has an important policy implication by the fact that if the persistent inefficiency component is large a change in tax laws or a change in organization is required to increase the tax effort. Furthermore, a large time-varying inefficiency is a wake-up call for the tax administration to improve its performance and be more vigilant about evasion and fraud, which may lead to deeper issues like administrative corruption.

8. The model of Kumbhakar and Hesmati (1995) made this distinction, but it did not consider the country effects.

9. Kumbhakar, Wang and Horncastle (2015).

The model is of the form :

$$Y_{it} = \alpha + f(X_{it}; \beta) + \theta_i + v_{it} - \eta_i - \lambda_{it} \quad (2.1)$$

Y_{it} is the tax revenue (total tax/non-resource tax/value-added tax) for country i at time t ; α is the constant; X_{it} the vector X represents the set of determinants of the tax effort; β is the associated vector of parameters; θ_i is the latent country heterogeneity; v_{it} is the random noise; η_i is the persistent inefficiency; λ_{it} corresponds to the time-varying inefficiency.

The model is estimated in a 3-step procedure. For this purpose, we rewrite it as :

$$Y_{it} = a + f(X_{it}; \beta) + \omega_i + \varepsilon_{it} \quad (2.2)$$

Where :

$$a^* = a - E(\eta_i) - E(\lambda_{it}); \quad (2.3)$$

$$\omega_i = \theta - \eta_i + E(\eta_i); \quad (2.4)$$

$$\varepsilon_{it} = v_{it} - \lambda_{it} + E(\lambda_{it}). \quad (2.5)$$

Step 1 : $\hat{\beta}$ is estimated using the standard random effect panel regression ($Y_{it} = \alpha + f(X_{it}; \beta) + v_{it}$). By this procedure, we also obtain the predicted values of ω_i and ε_{it} respectively $\hat{\varepsilon}_{it}$ and $\hat{\omega}_i$.

Step 2 : the following assumptions are made : there is no difference between ε_{it} and $\hat{\varepsilon}_{it}$. λ_{it} is $N^+(0, \sigma_\lambda^2)$ and v_{it} is i.i.d $N(0, \sigma_v^2)$ so $E(\lambda_{it}) = \sqrt{\frac{2}{\pi\sigma_\lambda}}$. We estimate equation (5) by stochastic frontier technique, thus we obtain $\hat{\lambda}_{it}$. Time-varying Tax effort = $-\lambda_{it}$.

Step 3 : η_i is estimated following a similar procedure to Step 2, by assuming η_i is i.i.d $N^+(0, \sigma_\eta^2)$ and θ_i is i.i.d $N(0, \sigma_\theta^2)$ which means that $E(\eta_i) = \sqrt{\frac{2}{\pi\sigma_\eta}}$ so here we estimate equation (4) and obtain $\hat{\eta}_i$.

Persistent Tax Effort = $\exp(-\eta_i)$.

$\hat{\eta}_i$ and $\hat{\lambda}_{it}$ are the Jondrow *et al* (1982) estimators of η_i and λ_{it} .

Overall tax effort = Persistent Tax Effort x Time-varying Tax effort

2.4 Empirical findings

Table 1 below presents the standard random effect panel regressions. The signs of the coefficients are consistent with those assumed and all the variables are significant¹⁰. Thus, GDP per Capita, Imports and Human Capital Index affect positively tax revenue collec-

10. Except the Agriculture Value-added in the VAT Equation.

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tion. On the contrary, Exports, Agriculture Value-added, Inflation, and Resource Tax have a negative effect on tax revenue mobilization. Estimations of the predicted error component and the random effect (for predicting respectively the time-varying tax effort and the persistent tax effort) are available in Tables 4 and 5 in the Appendix. The coefficients of all the variables are significant ¹¹.

TABLE 2.1 – Random-effects Panel Regression

Variables	Total Tax	Non-resource Tax	Value-added Tax
GDP per Capita	0.184*** (0.0362)	0.187*** (0.0427)	0.133*** (0.0373)
Exports	-0.0449* (0.0246)	-0.00291*** (0.00100)	-0.00680*** (0.00103)
Imports	0.220*** (0.0247)	0.00875*** (0.000961)	0.0103*** (0.000929)
Agriculture Value-added	-0.0884*** (0.0317)	-0.00602*** (0.00226)	-0.00207 (0.00206)
Inflation	-0.0354*** (0.00586)	-0.0393*** (0.00672)	-0.0211*** (0.00679)
Human Capital Index	0.375*** (0.105)	0.276** (0.140)	0.188*** (0.0534)
Resource Tax		-0.0104*** (0.00314)	-0.0121*** (0.00306)
Constant	0.695** (0.302)	0.924*** (0.304)	0.0399 (0.260)
No. of observations	1,291	898	736
No. of countries	87	72	60

Note : Standard errors in parentheses (**p<0.01, **p<0.05, *p<0.1).The first model is a log-log model. For the non-resource tax equation and the VAT equation, the models are log-level; for these log-level models, among the explanative variables, only the GDP per capita and the inflation variable are employed in a logarithmic form due to the presence of observations with high values for these variables. We use the one period lagged GDP per capita in all the regressions to take account of the endogeneity of this variable.

2.5 Results of the estimates

The findings show that, in developing countries, from 2000 to 2016, the average Non-resource tax effort was higher than the average Total tax effort and higher than the average VAT effort, although we observe an increase of the VAT effort during the period (Figure 2 in the appendix). The Total tax effort, it decreased by 3% over the period 2000 to 2016 ¹².

11. For the 3 ratios of the variance parameter of the 4 error components attesting to the reliability of the estimates, for the total tax and the non-resource tax models, we observe that the upward bias is small according to the results of the Monte Carlo simulation study of Badunenko & Kumbhakar (2016). This means that the estimators tend to underestimate more than overestimate. The short-term technical efficiency is underestimated, however the size of underestimation is very small. For the VAT model, we find that the short-term efficiency and the overall efficiency tend to be underestimated and the persistent efficiency is overestimated, but, values of the ratios confirm that the predicted persistent efficiency of the VAT model is reliable.

12. The predicted tax potentials are displayed on the maps in Figures 3 to 5.

2.5.1 Total Tax Effort

A regional comparison shows that the tax effort of the Sub-Saharan Africa region is higher than that of the other developing regions (Table 6). However, the results demonstrate that the time-varying tax efforts of Latin American and South Asian countries are higher than that of SSA, this reflects a better performance of tax administrations in these countries. Like Fenchietto and Pessino (2013), we find that the tax effort of low-income countries is higher than that of middle-income countries (Table 7). Again, in line with the study of Fenchietto and Pessino (2013) we find that resource-rich countries make less effort to collect tax than non-resource-rich countries (Table 8). Concerning African Regional Economic Communities, we observe that East African Community countries and Southern African Customs Union countries have the highest tax effort, these countries are followed by those of ECOWAS/WAEMU (Tables 9 and 10). CEMAC/ECCAS countries are those making less effort to collect tax in SSA. The tax effort of UMA countries declined during the period. In the WAEMU Zone, Togo, Burkina Faso and Senegal have the highest tax effort indexes, even compared to non-WAEMU countries of ECOWAS countries such as Ghana and Nigeria (Table 11). Benin and Cote d'Ivoire (a resource-rich country) have the lowest tax effort indexes among WAEMU countries.

2.5.2 Non-resource Tax Effort

East and South Asian countries show a declining non-resource tax effort over the period 2000-2017 (Table 12). However, the effort appears to rise for the developing countries of South Asia at the end of the period, whereas it continues to decrease for East Asia & Pacific countries. Countries from Europe & Central Asia and Sub-Saharan Africa have the highest non-resource tax effort indexes. As for the total tax effort, we find that the non-resource tax effort of low-income countries is higher than those of the middle-income countries, as found by Brun, Chambas and Mansour (2014) (Table 13). The results show low tax effort indexes for resource-rich countries and fragile states (Table 14). The non-resource tax effort of WAEMU countries, especially the short-term tax effort, is high compared with those of EAC countries and CEMAC countries (Table 15). In the WAEMU Zone, Togo has the highest non-resource tax effort; and, we observe higher time-varying tax effort than long-term tax effort for all the WAEMU countries (Table 17).

2.5.3 Value-added Tax Effort

As for non-resource tax (including VAT) effort, the results show that countries from Europe & Central Asia and Sub-Saharan Africa have the highest tax effort indexes (Table 18). This result for SSA can be explained by the pertinence of tax reforms of both tax legislation and administration in SSA (in particular VAT), as stated by Brun, Chambas and Mansour (2014). Latin America & Caribbean, East Asia & Pacific, and Middle East & North Africa are characterized by a consistently declining tax effort. Here again, low-income countries have the highest tax effort (Table 19). The VAT effort of fragile states and that of those of the Franc Zone are especially high (Table 20). The VAT effort of the

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WAEMU/ECOWAS region is higher than that of the other African Regional Economic Communities (Tables 21 and 22). Cote d'Ivoire and Niger have the lowest VAT efforts of the WAEMU Zone (Table 23); the persistent VAT efforts of these countries, which are mainly related to VAT legislation, are low compared with those of the remaining WAEMU countries. The VAT efforts of Nigeria and Ghana of respectively 18.9 and 46.0 (for the period 2009-2011) are relatively low compared with the average WAEMU of 79.4.

2.6 Conclusion

This study is intended to provide more consistent Total tax, Non-resource tax, and VAT efforts and potentials for a large sample of developing countries. For this purpose, we use the stochastic frontier model of Kumbhakar, Lien and Hardaker (2014). This estimator has the advantage of breaking down the total effort into a persistent tax effort and a time-varying tax effort. This allows, for countries which introduce reforms, definition of priorities in focusing either on factors affecting short term efficiency (such as the performance of tax administrations) or factors affecting long-term efficiency (such as a significant change in the tax legislation).

Overall, we find that developing countries, even fragile states and especially LIC, EAC, and SSA countries make significant efforts to collect taxes, even if there are possible improvements for the resource-dependent countries which need to collect more tax to reduce their dependence on natural resource revenue. The results show that for resource-dependent countries their Non-resource tax effort is higher than that of the Total tax. This supports the argument that resource dependent countries make less effort to mobilize tax revenue. The average VAT effort increases during the study period reflecting the effort made by developed countries to mitigate the impact of liberalization (tax transition).

We also observe that the tax effort indices of WAEMU countries, particularly the VAT indices are significant compared with those of the other African Regional Economic Communities and the remaining ECOWAS countries. The average time-varying effort is higher than the average persistent effort. However, the results show there is a difference between WAEMU countries, although these countries started the coordination of their tax legislation at the end of 90s. This raises the question of the success of the tax harmonization which is addressed in the next chapter.

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2.8 Appendix to chapter 2

TABLE 2.2 – Definition and data sources for the Variables

Variable	Definition	Source
Tax	Total tax revenue, excluding social contributions	ICTD/UNU-WIDER Government Revenue Dataset (GRD), IMF GF, Mansour 2014, OECD,BDSM UEMOA
Non-resource Tax	Total non-resource tax revenue, excluding social contributions. Calculated as "Taxes excluding social contributions" minus "resource taxes".	ICTD/UNU-WIDER Government Revenue Dataset (GRD), IMF GF, Mansour 2014, OECD,BDSM UEMOA
Resource Tax	Component of reported tax revenue that is from natural resource sources, most often corporate taxation of resource firms.	ICTD/UNU-WIDER Government Revenue Dataset (GRD), IMF GF, Mansour 2014, OECD,BDSM UEMOA
Value-added Tax	Value-added tax, including VAT on domestic and imported goods and services.	ICTD/UNU-WIDER Government Revenue Dataset (GRD), IMF GF, Mansour 2014, OECD,BDSM UEMOA, Brun and Diakite (2015)
GDP per Capita	GDP per capita is gross domestic product divided by midyear population. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Data are in constant 2010 U.S. dollars.	World Development Indicators, World Bank Group
Export	Exports of goods and services represent the value of all goods and other market services provided to the rest of the world. They include the value of merchandise, freight, insurance, transport, travel, royalties, license fees, and other services, such as communication, construction, financial, information, business, personal, and government services. They exclude compensation of employees and investment income (formerly called factor services) and transfer payments.	World Development Indicators, World Bank Group
Import	Imports of goods and services represent the value of all goods and other market services received from the rest of the world. They include the value of merchandise, freight, insurance, transport, travel, royalties, license fees, and other services, such as communication, construction, financial, information, business, personal, and government services. They exclude compensation of employees and investment income (formerly called factor services) and transfer payments.	World Development Indicators, World Bank Group
Agriculture Value-added	Agriculture corresponds to ISIC divisions 1-5 and includes forestry, hunting, and fishing, as well as cultivation of crops and livestock production. Value added is the net output of a sector after adding up all outputs and subtracting intermediate inputs. It is calculated without making deductions for depreciation of fabricated assets or depletion and degradation of natural resources.	World Development Indicators, World Bank Group
Inflation	Inflation as measured by the consumer price index reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly.	World Development Indicators, World Bank Group
Human Capital Index	It provides an index of human capital per person, which is based on average years of schooling and the return to education	Penn World Table

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TABLE 2.3 – Descriptive Statistics

Variable	Mean	Standard Deviation	Min	Max	Coefficient of Variation
Tax	17.05	7.66	0.3	59	0.45
Non-resource Tax	15.61	6.72	0.0	59	0.43
Value-added Tax	5.54	2.56	0.1	19	0.46
Resource Tax	1.85	5.92	0.0	49	3.2
GDP per Capita	3436.48	3072.19	193.9	20334	0.89
Exports	34.46	18.37	0.1	120	0.53
Imports	45.05	21.82	0.1	236	0.48
Agriculture Value-added	16.61	12.06	0.9	79	0.73
Inflation	7.81	19	-18.1	514	2.43
Human Capital Index	2.16	0.59	1.1	4	0.27

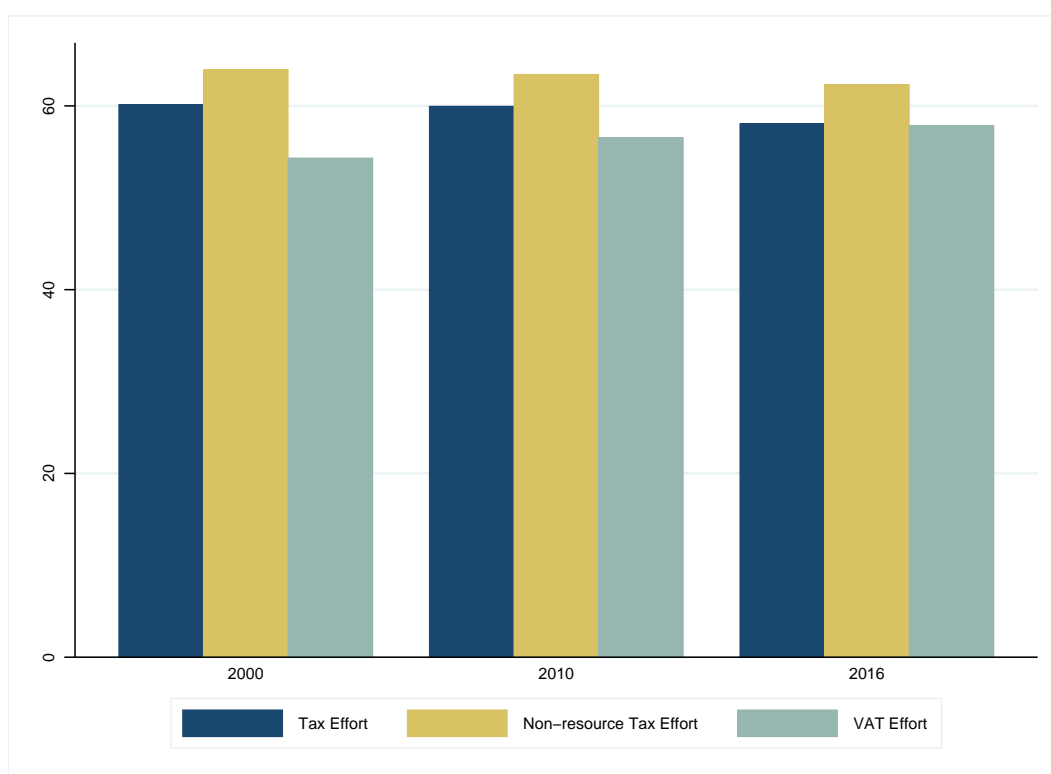
TABLE 2.4 – Estimation of the error component to predict the time-varying efficiency

Variables	Predicted error components		
	Total Tax Eq	Non-resource Tax Eq	Value-added Tax Eq
frontier onee	0.117*** (0.007)	0.115*** (0.008)	0.110*** (0.009)
usigmas cons	-3.783*** (0.118)	-3.811*** (0.122)	-3.939*** (0.155)
vsigmas cons	-4.315*** (0.070)	-4.515*** (0.082)	-4.880*** (0.125)
Standard errors in parentheses (***p<0.01, **p<0.05, *p<0.1)			

TABLE 2.5 – Estimation of the random effect to predict the persistent efficiency

Variables	Predicted random effects		
	Total Tax Eq	Non-resource Tax Eq	Value-added Tax Eq
frontier onee	0.434 (0.020)	-1.054 (0.080)	-2.434 (0.086)
usigmas <i>cons</i>	0.391 (0.019)	-1.355 (0.089)	-3.079 (0.123)
vsigmas <i>cons</i>	0.512 (0.008)	-1.114 (0.058)	-7.099 (0.530)
Standard errors in parentheses (***) $p < 0.01$, ** $p < 0.05$, * $p < 0.1$)			

FIGURE 2.2 – Predicted Efforts (sample average)



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TABLE 2.6 – Predicted Tax Effort by Region

Number of countries	Period	Group	Tax Effort	Time-varying Tax Effort	Persistent Tax Effort
11	2000-2002	East Asia & Pacific	52.6	86.6	60.7
11	2003-2005	East Asia & Pacific	55.1	88.0	62.6
11	2006-2008	East Asia & Pacific	57.2	91.4	62.4
11	2009-2011	East Asia & Pacific	56.8	90.9	62.4
11	2012-2014	East Asia & Pacific	56.7	90.2	62.9
11	2015-2017	East Asia & Pacific	54.9	87.1	63.3
12	2000-2002	Europe & Central Asia	61.6	91.1	67.7
12	2003-2005	Europe & Central Asia	61.6	90.5	68.1
12	2006-2008	Europe & Central Asia	62.1	90.5	68.6
12	2009-2011	Europe & Central Asia	60.1	88.9	67.6
12	2012-2014	Europe & Central Asia	59.5	87.0	68.2
12	2015-2017	Europe & Central Asia	60.8	87.9	69.2
16	2000-2002	Latin America & Caribbean	52.5	86.9	60.7
16	2003-2005	Latin America & Caribbean	53.6	88.5	60.5
16	2006-2008	Latin America & Caribbean	55.1	90.6	60.7
16	2009-2011	Latin America & Caribbean	53.8	89.8	59.8
16	2015-2017	Latin America & Caribbean	54.5	91.3	59.8
7	2000-2002	Middle East & North Africa	58.6	90.6	64.5
7	2003-2005	Middle East & North Africa	53.1	87.4	59.0
7	2006-2008	Middle East & North Africa	51.8	91.0	56.2
7	2009-2011	Middle East & North Africa	53.5	89.4	59.7
7	2012-2014	Middle East & North Africa	49.6	88.2	56.2
7	2015-2017	Middle East & North Africa	47.4	87.0	55.7
6	2000-2002	South Asia	58.7	88.9	66.2
6	2003-2005	South Asia	58.1	89.2	65.3
6	2006-2008	South Asia	55.6	88.5	62.8
6	2009-2011	South Asia	55.2	87.4	62.8
6	2012-2014	South Asia	56.4	89.7	62.8
6	2015-2017	South Asia	58.3	91.9	63.4
35	2000-2002	Sub-Saharan Africa	66.3	87.3	75.5
35	2003-2005	Sub-Saharan Africa	67.0	88.7	75.3
35	2006-2008	Sub-Saharan Africa	68.9	90.9	75.8
35	2009-2011	Sub-Saharan Africa	67.0	89.2	75.4
35	2012-2014	Sub-Saharan Africa	66.8	89.7	74.6
35	2015-2017	Sub-Saharan Africa	66.6	89.3	74.7

TABLE 2.7 – Predicted Tax Effort by Income Level

Number of countries	Period	Group	Tax Effort	Time-varying Tax Effort	Persistent Tax Effort
20	2000-2002	Low Income countries	62.9	84.3	74.1
20	2003-2005	Low Income countries	64.0	86.5	73.7
20	2006-2008	Low Income countries	62.9	84.3	74.1
20	2009-2011	Low Income countries	67.1	91.0	73.8
20	2012-2014	Low Income countries	66.1	91.3	72.4
20	2015-2017	Low Income countries	66.6	91.6	72.8
33	2000-2002	Lower Middle Income countries	63.0	87.9	71.5
33	2003-2005	Lower Middle Income countries	63.1	89.0	70.9
33	2006-2008	Lower Middle Income countries	65.5	91.3	71.6
33	2009-2011	Lower Middle Income countries	63.1	89.0	71.2
33	2012-2014	Lower Middle Income countries	63.3	90.0	70.5
33	2015-2017	Lower Middle Income countries	62.0	88.6	70.2
34	2000-2002	Upper Middle Income countries	55.5	90.5	61.2
34	2003-2005	Upper Middle Income countries	54.9	89.6	60.8
34	2006-2008	Upper Middle Income countries	54.1	90.3	59.7
34	2009-2011	Upper Middle Income countries	53.2	88.9	59.8
34	2012-2014	Upper Middle Income countries	52.0	88.1	59.1
34	2015-2017	Upper Middle Income countries	50.7	88.9	57.6

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TABLE 2.8 – Predicted Tax Effort for Specific Country Groups

Number of countries	Period	Group	Tax Effort	Time-varying Tax Effort	Persistent Tax Effort
26	2000-2002	Resource-rich countries	61.5	88.2	69.5
26	2003-2005	Resource-rich countries	60.0	88.0	67.5
26	2006-2008	Resource-rich countries	61.5	90.4	67.6
26	2009-2011	Resource-rich countries	58.8	89.0	66.3
26	2012-2014	Resource-rich countries	56.2	89.6	62.7
26	2015-2017	Resource-rich countries	50.6	88.5	58.0
61	2000-2002	Non-Resource-rich countries	59.5	88.1	67.5
61	2003-2005	Non-Resource-rich countries	60.3	89.1	67.6
61	2006-2008	Non-Resource-rich countries	61.6	90.8	67.8
61	2009-2011	Non-Resource-rich countries	60.5	89.6	67.6
61	2012-2014	Non-Resource-rich countries	59.9	89.4	67.1
61	2015-2017	Non-Resource-rich countries	60.7	89.5	67.9
11	2000-2002	Franc Zone countries	68.4	87.8	78.1
11	2003-2005	Franc Zone countries	69.5	88.8	78.3
11	2006-2008	Franc Zone countries	71.9	91.6	78.5
11	2009-2011	Franc Zone countries	70.4	89.7	78.5
11	2012-2014	Franc Zone countries	69.8	88.7	78.2
11	2015-2017	Franc Zone countries	69.2	87.8	78.8
13	2000-2002	Fragile / Conflict affected countries	57.4	82.2	68.9
13	2003-2005	Fragile / Conflict affected countries	56.2	85.3	64.6
13	2006-2008	Fragile / Conflict affected countries	59.3	90.8	65.0
13	2009-2011	Fragile / Conflict affected countries	59.4	90.9	65.6
13	2012-2014	Fragile / Conflict affected countries	55.0	90.2	61.0
13	2015-2017	Fragile / Conflict affected countries	51.8	91.0	57.3

TABLE 2.9 – Predicted Tax Effort for African Regional Economic Communities (1)

Number of countries	Period	Group	Tax Effort	Time-varying Tax Effort	Persistent Tax Effort
7	2000-2002	WAEMU	69.1	86.9	79.5
7	2003-2005	WAEMU	70.8	89.2	79.4
7	2006-2008	WAEMU	72.7	91.4	79.6
7	2009-2011	WAEMU	71.8	90.2	79.6
7	2012-2014	WAEMU	71.7	90.1	79.6
7	2015-2017	WAEMU	70.0	88.3	79.2
4	2000-2002	CEMAC	67.2	89.4	75.5
4	2003-2005	CEMAC	67.9	88.2	77.0
4	2006-2008	CEMAC	70.5	92.2	76.3
4	2009-2011	CEMAC	68.1	89.7	76.1
4	2012-2014	CEMAC	65.7	86.4	75.0
4	2015-2017	CEMAC	61.5	82.6	75.0
5	2000-2002	EAC	70.2	88.6	79.2
5	2003-2005	EAC	71.4	89.8	79.4
5	2006-2008	EAC	71.5	90.1	79.4
5	2009-2011	EAC	71.4	90.0	79.4
5	2012-2014	EAC	71.3	90.3	78.9
5	2015-2017	EAC	72.5	91.2	79.5
12	2000-2002	ECOWAS	68.8	87.3	78.7
12	2003-2005	ECOWAS	68.4	88.2	77.2
12	2006-2008	ECOWAS	70.8	90.9	77.8
12	2009-2011	ECOWAS	68.7	89.0	77.4
12	2012-2014	ECOWAS	68.7	90.8	75.7
12	2015-2017	ECOWAS	66.4	89.6	74.3
8	2000-2002	ECCAS	66.1	85.5	75.9
8	2003-2005	ECCAS	68.6	88.4	77.1
8	2006-2008	ECCAS	70.2	91.5	76.8
8	2009-2011	ECCAS	67.5	89.5	75.9
8	2012-2014	ECCAS	64.8	88.1	73.9
8	2015-2017	ECCAS	54.2	90.4	60.6
5	2000-2002	SACU	68.3	88.7	77.2
5	2003-2005	SACU	70.4	90.1	78.1
5	2006-2008	SACU	72.5	91.5	79.1
5	2009-2011	SACU	70.9	87.5	81.2
5	2012-2014	SACU	72.2	88.1	81.8
5	2015-2017	SACU	71.8	87.0	82.6

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TABLE 2.10 – Predicted Tax Effort for African Regional Economic Communities (2)

Number of countries	Period	Group	Tax Effort	Time-varying Tax Effort	Persistent Tax Effort
14	2000-2002	COMESA	61.4	86.4	70.5
14	2003-2005	COMESA	63.3	89.0	71.1
14	2006-2008	COMESA	64.3	90.6	71.1
14	2009-2011	COMESA	62.0	90.0	69.1
14	2012-2014	COMESA	62.2	90.8	68.6
14	2015-2017	COMESA	64.4	89.1	72.4
12	2000-2002	SADC	64.4	85.8	74.0
12	2003-2005	SADC	66.2	88.4	74.6
12	2006-2008	SADC	69.0	91.6	75.3
12	2009-2011	SADC	66.4	89.3	74.8
12	2012-2014	SADC	66.7	88.8	75.6
12	2015-2017	SADC	67.4	89.0	76.0
17	2000-2002	CEN-SAD	65.5	88.6	73.9
17	2003-2005	CEN-SAD	65.0	89.0	73.0
17	2006-2008	CEN-SAD	67.1	90.8	73.8
17	2009-2011	CEN-SAD	65.3	89.4	73.3
17	2012-2014	CEN-SAD	63.5	89.1	71.2
17	2015-2017	CEN-SAD	64.2	88.8	72.4
4	2000-2002	IGAD	57.6	87.8	65.5
4	2003-2005	IGAD	59.9	90.2	66.5
4	2006-2008	IGAD	59.8	89.7	66.5
4	2009-2011	IGAD	60.9	90.5	67.3
4	2012-2014	IGAD	62.4	90.6	68.9
4	2015-2017	IGAD	68.2	89.5	76.2
4	2000-2002	UMA	71.2	91.3	78.0
4	2003-2005	UMA	69.0	90.1	76.5
4	2006-2008	UMA	69.6	90.8	76.5
4	2009-2011	UMA	68.0	88.8	76.5
4	2012-2014	UMA	68.8	90.1	76.5
4	2015-2017	UMA	65.8	86.0	77.1

TABLE 2.11 – Predicted Tax Effort for WAEMU countries and their peers

Number of countries	Period	Group	Tax Effort	Time-varying Tax Effort	Persistent Tax Effort
1	2000-2002	Benin	70.6	89.6	78.8
1	2003-2005	Benin	72.0	91.4	78.8
1	2006-2008	Benin	73.6	93.4	78.8
1	2009-2011	Benin	72.2	91.6	78.8
1	2012-2014	Benin	69.2	87.8	78.8
1	2015-2017	Benin	62.0	78.6	78.8
1	2000-2002	Burkina Faso	69.6	86.0	80.9
1	2003-2005	Burkina Faso	70.8	87.5	80.9
1	2006-2008	Burkina Faso	70.5	87.1	80.9
1	2009-2011	Burkina Faso	72.4	89.5	80.9
1	2012-2014	Burkina Faso	76.3	94.3	80.9
1	2015-2017	Burkina Faso	75.1	92.8	80.9
1	2000-2002	Cote d'Ivoire	70.6	90.6	77.9
1	2003-2005	Cote d'Ivoire	70.4	90.4	77.9
1	2006-2008	Cote d'Ivoire	72.2	92.6	77.9
1	2009-2011	Cote d'Ivoire	69.6	89.3	77.9
1	2012-2014	Cote d'Ivoire	69.1	88.6	77.9
1	2015-2017	Cote d'Ivoire	67.8	87.0	77.9
1	2000-2002	Mali	73.9	91.3	81.0
1	2003-2005	Mali	76.1	94.0	81.0
1	2006-2008	Mali	73.8	91.2	81.0
1	2009-2011	Mali	71.9	88.8	81.0
1	2012-2014	Mali	69.5	85.8	81.0
1	2015-2017	Mali	71.1	87.9	81.0
1	2000-2002	Niger	67.8	85.0	79.7
1	2003-2005	Niger	67.5	84.8	79.7
1	2006-2008	Niger	72.4	90.9	79.7
1	2009-2011	Niger	72.1	90.6	79.7
1	2012-2014	Niger	74.7	93.8	79.7
1	2015-2017	Niger			
1	2000-2002	Senegal	71.1	88.9	79.9
1	2003-2005	Senegal	71.5	89.4	79.9
1	2006-2008	Senegal	73.1	91.5	79.9
1	2009-2011	Senegal	72.9	91.2	79.9
1	2012-2014	Senegal	71.3	89.2	79.9
1	2015-2017	Senegal	71.4	89.3	79.9
1	2000-2002	Togo	63.1	79.2	79.6
1	2003-2005	Togo	70.4	88.4	79.6
1	2006-2008	Togo	72.6	91.2	79.6
1	2009-2011	Togo	71.5	89.8	79.6
1	2012-2014	Togo	73.6	92.4	79.6
1	2015-2017	Togo	75.8	95.2	79.6
1	2000-2002	Ghana	59.2	85.4	69.3
1	2003-2005	Ghana	63.0	90.8	69.3
1	2006-2008	Ghana	62.9	90.7	69.3
1	2009-2011	Ghana	62.2	89.7	69.3
1	2012-2014	Ghana	62.9	90.8	69.3
1	2015-2017	Ghana	63.4	91.4	69.3
1	2000-2002	Nigeria	84.9	93.8	90.5
1	2003-2005	Nigeria	84.7	93.7	90.5
1	2006-2008	Nigeria	80.4	88.9	90.5
1	2009-2011	Nigeria	60.6	67.0	90.5
1	2012-2014	Nigeria			
1	2015-2017	Nigeria			

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TABLE 2.12 – Predicted Non-resource Tax (NRT) Effort by Region

Number of countries	Period	Group	NRT Effort	Time-varying NRT Effort	Persistent NRT Effort
8	2000-2002	East Asia & Pacific	54.8	88.9	61.7
8	2003-2005	East Asia & Pacific	55.4	87.3	63.5
8	2006-2008	East Asia & Pacific	55.3	89.3	61.6
8	2009-2011	East Asia & Pacific	51.9	87.9	58.3
8	2012-2014	East Asia & Pacific	54.9	91.7	60.0
8	2015-2017	East Asia & Pacific	52.7	90.9	58.2
12	2000-2002	Europe & Central Asia	66.7	92.2	72.3
12	2003-2005	Europe & Central Asia	66.3	90.9	72.9
12	2006-2008	Europe & Central Asia	66.3	89.5	74.1
12	2009-2011	Europe & Central Asia	63.9	88.4	72.3
12	2012-2014	Europe & Central Asia	64.8	87.4	74.1
12	2015-2017	Europe & Central Asia	67.1	88.1	76.2
14	2000-2002	Latin America & Caribbean	56.8	87.1	65.4
14	2003-2005	Latin America & Caribbean	56.9	88.8	64.0
14	2006-2008	Latin America & Caribbean	58.2	90.4	64.3
14	2009-2011	Latin America & Caribbean	57.0	90.0	63.3
14	2012-2014	Latin America & Caribbean	57.5	90.9	63.3
14	2015-2017	Latin America & Caribbean	60.2	91.5	65.9
3	2000-2002	Middle East & North Africa	67.3	93.8	71.7
3	2003-2005	Middle East & North Africa	45.2	84.2	49.5
3	2006-2008	Middle East & North Africa	35.3	90.4	40.2
3	2009-2011	Middle East & North Africa	58.8	89.3	65.9
3	2012-2014	Middle East & North Africa	58.3	88.5	65.9
3	2015-2017	Middle East & North Africa	65.1	90.9	71.7
3	2000-2002	South Asia	73.4	89.5	82.1
3	2003-2005	South Asia	72.2	90.3	79.9
3	2006-2008	South Asia	61.9	89.2	69.0
3	2009-2011	South Asia	57.5	86.2	66.1
3	2012-2014	South Asia	55.6	92.9	60.3
3	2015-2017	South Asia	68.1	92.8	73.4
32	2000-2002	Sub-Saharan Africa	67.5	87.1	77.2
32	2003-2005	Sub-Saharan Africa	69.1	89.4	77.2
32	2006-2008	Sub-Saharan Africa	70.7	90.4	78.2
32	2009-2011	Sub-Saharan Africa	69.7	90.6	77.1
32	2012-2014	Sub-Saharan Africa	69.2	92.6	74.9
32	2015-2017	Sub-Saharan Africa	67.2	90.4	74.4

TABLE 2.13 – Predicted Non-resource Tax (NRT) Effort by Income Level

Number of countries	Period	Group	NRT Effort	Time-varying NRT Effort	Persistent NRT Effort
17	2000-2002	Low Income countries	69.9	85.2	81.1
17	2003-2005	Low Income countries	71.8	88.1	81.2
17	2006-2008	Low Income countries	73.5	90.1	81.6
17	2009-2011	Low Income countries	72.6	91.0	80.0
17	2012-2014	Low Income countries	72.0	94.1	76.9
17	2015-2017	Low Income countries	73.8	93.6	79.1
26	2000-2002	Lower Middle Income countries	65.2	88.5	73.8
26	2003-2005	Lower Middle Income countries	65.2	89.0	73.2
26	2006-2008	Lower Middle Income countries	65.8	89.9	72.9
26	2009-2011	Lower Middle Income countries	64.1	89.1	71.7
26	2012-2014	Lower Middle Income countries	62.5	90.8	69.0
26	2015-2017	Lower Middle Income countries	60.3	91.2	66.1
29	2000-2002	Upper Middle Income countries	59.2	90.2	65.6
29	2003-2005	Upper Middle Income countries	57.9	89.8	63.9
29	2006-2008	Upper Middle Income countries	56.8	90.2	63.0
29	2009-2011	Upper Middle Income countries	56.8	89.1	63.7
29	2012-2014	Upper Middle Income countries	56.5	89.3	63.5
29	2015-2017	Upper Middle Income countries	58.8	88.6	66.7

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TABLE 2.14 – Predicted Non-resource Tax (NRT) Effort for Specific Country Groups

Number of countries	Period	Group	NRT Effort	Time-varying NRT Effort	Persistent NRT Effort
20	2000-2002	Resource-rich countries	62.3	89.4	69.8
20	2003-2005	Resource-rich countries	59.1	87.8	66.8
20	2006-2008	Resource-rich countries	58.9	88.5	66.4
20	2009-2011	Resource-rich countries	59.9	88.5	67.5
20	2012-2014	Resource-rich countries	61.8	92.6	66.8
20	2015-2017	Resource-rich countries	59.0	91.1	64.9
52	2000-2002	Non-Resource-rich countries	64.6	88.0	73.3
52	2003-2005	Non-Resource-rich countries	65.3	89.6	72.8
52	2006-2008	Non-Resource-rich countries	66.0	90.6	72.8
52	2009-2011	Non-Resource-rich countries	63.6	89.8	70.8
52	2012-2014	Non-Resource-rich countries	60.0	89.8	67.0
52	2015-2017	Non-Resource-rich countries	62.7	90.1	69.6
11	2000-2002	Franc Zone countries	69.3	88.8	78.2
11	2003-2005	Franc Zone countries	68.7	89.4	77.0
11	2006-2008	Franc Zone countries	70.3	90.0	78.0
11	2009-2011	Franc Zone countries	72.4	90.9	79.6
11	2012-2014	Franc Zone countries	79.3	92.9	85.4
11	2015-2017	Franc Zone countries	79.2	92.5	85.6
10	2000-2002	Fragile / Conflict affected countries	64.8	83.5	76.1
10	2003-2005	Fragile / Conflict affected countries	62.2	86.2	70.2
10	2006-2008	Fragile / Conflict affected countries	59.7	90.0	66.6
10	2009-2011	Fragile / Conflict affected countries	61.4	88.7	68.9
10	2012-2014	Fragile / Conflict affected countries	58.3	95.4	61.4
10	2015-2017	Fragile / Conflict affected countries	51.2	95.9	53.4

TABLE 2.15 – Predicted Non-resource Tax (NRT) Effort for African Regional Economic Communities (1)

Number of countries	Period	Group	NRT Effort	Time-varying NRT Effort	Persistent NRT Effort
7	2000-2002	WAEMU	75.0	87.5	85.7
7	2003-2005	WAEMU	76.6	89.4	85.8
7	2006-2008	WAEMU	77.7	90.6	85.7
7	2009-2011	WAEMU	77.7	90.8	85.6
7	2012-2014	WAEMU	79.3	92.9	85.4
7	2015-2017	WAEMU	79.2	92.5	85.6
4	2000-2002	CEMAC	59.4	90.9	65.2
4	2003-2005	CEMAC	57.0	89.4	64.0
4	2006-2008	CEMAC	56.9	88.8	63.9
4	2009-2011	CEMAC	57.4	90.4	63.5
4	2012-2014	CEMAC			
4	2015-2017	CEMAC			
5	2000-2002	EAC	76.3	88.6	86.0
5	2003-2005	EAC	77.8	90.2	86.2
5	2006-2008	EAC	77.7	90.3	86.2
5	2009-2011	EAC	77.0	89.6	86.0
5	2012-2014	EAC	77.3	90.6	85.3
5	2015-2017	EAC	76.9	90.2	85.3
11	2000-2002	ECOWAS	71.0	88.0	80.8
11	2003-2005	ECOWAS	71.6	89.8	79.9
11	2006-2008	ECOWAS	73.3	89.6	81.5
11	2009-2011	ECOWAS	75.3	91.0	82.7
11	2012-2014	ECOWAS	79.3	92.9	85.4
11	2015-2017	ECOWAS	79.2	92.5	85.6
8	2000-2002	ECCAS	60.4	85.5	69.4
8	2003-2005	ECCAS	63.1	89.1	70.4
8	2006-2008	ECCAS	62.7	89.7	70.1
8	2009-2011	ECCAS	61.7	90.4	68.7
8	2012-2014	ECCAS	64.5	94.1	69.1
8	2015-2017	ECCAS	64.3	93.9	69.1
5	2000-2002	SACU	64.8	83.3	77.9
5	2003-2005	SACU	70.6	89.8	78.8
5	2006-2008	SACU	74.7	92.3	80.8
5	2009-2011	SACU	72.6	89.2	81.7
5	2012-2014	SACU			
5	2015-2017	SACU			

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TABLE 2.16 – Predicted Non-resource Tax (NRT) Effort for African Regional Economic Communities (2)

Number of countries	Period	Group	NRT Effort	Time-varying NRT Effort	Persistent NRT Effort
12	2000-2002	COMESA	68.1	85.8	78.4
12	2003-2005	COMESA	70.7	89.1	79.1
12	2006-2008	COMESA	71.4	90.6	79.0
12	2009-2011	COMESA	67.2	90.2	74.8
12	2012-2014	COMESA	62.4	91.5	68.5
12	2015-2017	COMESA	64.9	90.2	72.0
12	2000-2002	SADC	63.7	83.7	75.2
12	2003-2005	SADC	67.1	88.5	75.7
12	2006-2008	SADC	70.5	91.8	76.8
12	2009-2011	SADC	63.4	91.0	70.1
12	2012-2014	SADC	52.2	93.7	55.8
12	2015-2017	SADC	51.7	90.5	57.2
13	2000-2002	CEN-SAD	70.5	89.0	79.4
13	2003-2005	CEN-SAD	70.6	89.9	78.6
13	2006-2008	CEN-SAD	71.8	89.3	80.1
13	2009-2011	CEN-SAD	73.1	90.6	80.6
13	2012-2014	CEN-SAD	73.9	91.3	80.8
13	2015-2017	CEN-SAD	74.5	91.9	81.0
3	2000-2002	IGAD	75.4	88.9	84.8
3	2003-2005	IGAD	75.6	90.4	83.5
3	2006-2008	IGAD	75.8	90.8	83.5
3	2009-2011	IGAD	75.8	90.8	83.5
3	2012-2014	IGAD	79.8	91.7	87.1
3	2015-2017	IGAD	78.6	90.3	87.1
1	2000-2002	UMA	67.3	93.8	71.7
1	2003-2005	UMA	65.8	91.8	71.7
1	2006-2008	UMA	62.0	86.4	71.7
1	2009-2011	UMA	63.6	88.7	71.7
1	2012-2014	UMA	63.2	88.2	71.7
1	2015-2017	UMA	65.1	90.9	71.7

TABLE 2.17 – Predicted Non-resource Tax (NRT) Effort for WAEMU countries and their peers

Number of countries	Period	Group	NRT Effort	Time-varying NRT Effort	Persistent NRT Effort
1	2000-2002	Benin	75.4	86.9	86.8
1	2003-2005	Benin	78.0	89.8	86.8
1	2006-2008	Benin	80.5	92.6	86.8
1	2009-2011	Benin	79.5	91.6	86.8
1	2012-2014	Benin			
1	2015-2017	Benin			
1	2000-2002	Burkina Faso	76.8	89.6	85.7
1	2003-2005	Burkina Faso	77.8	90.8	85.7
1	2006-2008	Burkina Faso	77.6	90.6	85.7
1	2009-2011	Burkina Faso	77.6	90.6	85.7
1	2012-2014	Burkina Faso	76.8	89.6	85.7
1	2015-2017	Burkina Faso			
1	2000-2002	Cote d'Ivoire	77.2	90.4	85.4
1	2003-2005	Cote d'Ivoire	76.3	89.3	85.4
1	2006-2008	Cote d'Ivoire	77.2	90.4	85.4
1	2009-2011	Cote d'Ivoire	78.1	91.4	85.4
1	2012-2014	Cote d'Ivoire			
1	2015-2017	Cote d'Ivoire			
1	2000-2002	Mali	79.0	91.6	86.3
1	2003-2005	Mali	81.4	94.3	86.3
1	2006-2008	Mali	76.5	88.7	86.3
1	2009-2011	Mali	75.9	88.0	86.3
1	2012-2014	Mali			
1	2015-2017	Mali			
1	2000-2002	Niger	75.0	88.7	84.5
1	2003-2005	Niger	72.3	85.6	84.5
1	2006-2008	Niger	74.2	87.8	84.5
1	2009-2011	Niger	76.4	90.5	84.5
1	2012-2014	Niger	80.5	95.3	84.5
1	2015-2017	Niger			
1	2000-2002	Senegal	76.3	89.1	85.6
1	2003-2005	Senegal	76.4	89.2	85.6
1	2006-2008	Senegal	78.5	91.6	85.6
1	2009-2011	Senegal	78.7	92.0	85.6
1	2012-2014	Senegal	76.6	89.4	85.6
1	2015-2017	Senegal	76.8	89.7	85.6
1	2000-2002	Togo	68.7	80.2	85.7
1	2003-2005	Togo	76.3	89.0	85.7
1	2006-2008	Togo	79.3	92.6	85.7
1	2009-2011	Togo	77.3	90.2	85.7
1	2012-2014	Togo	79.7	93.0	85.7
1	2015-2017	Togo	81.6	95.3	85.7
1	2000-2002	Ghana	63.3	86.0	73.6
1	2003-2005	Ghana	67.5	91.7	73.6
1	2006-2008	Ghana	67.6	91.9	73.6
1	2009-2011	Ghana	66.5	90.4	73.6
1	2012-2014	Ghana			
1	2015-2017	Ghana			
1	2000-2002	Nigeria	54.2	94.9	57.1
1	2003-2005	Nigeria	51.8	90.7	57.1
1	2006-2008	Nigeria	44.5	78.0	57.1
1	2009-2011	Nigeria	51.4	90.0	57.1
1	2012-2014	Nigeria			
1	2015-2017	Nigeria			

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TABLE 2.18 – Predicted Value-added Tax Effort by Region

Number of countries	Period	Group	VAT Effort	Time-varying VAT Effort	Persistent VAT Effort
6	2000-2002	East Asia & Pacific	46.6	88.0	53.0
6	2003-2005	East Asia & Pacific	52.6	89.7	58.3
6	2006-2008	East Asia & Pacific	49.2	89.5	54.7
6	2009-2011	East Asia & Pacific	41.3	86.3	47.7
6	2012-2014	East Asia & Pacific	45.0	90.8	50.0
6	2015-2017	East Asia & Pacific	42.4	89.6	48.1
12	2000-2002	Europe & Central Asia	58.2	90.0	65.1
12	2003-2005	Europe & Central Asia	60.4	90.6	66.9
12	2006-2008	Europe & Central Asia	64.0	91.7	69.6
12	2009-2011	Europe & Central Asia	59.9	89.1	66.8
12	2012-2014	Europe & Central Asia	61.1	88.2	69.0
12	2015-2017	Europe & Central Asia	63.9	88.6	72.0
14	2000-2002	Latin America & Caribbean	52.6	86.6	60.7
14	2003-2005	Latin America & Caribbean	53.7	89.4	60.0
14	2006-2008	Latin America & Caribbean	54.4	91.6	59.3
14	2009-2011	Latin America & Caribbean	54.1	90.4	59.9
14	2012-2014	Latin America & Caribbean	54.7	91.3	59.9
14	2015-2017	Latin America & Caribbean	49.6	92.3	54.1
2	2000-2002	Middle East & North Africa	62.0	94.0	65.9
2	2003-2005	Middle East & North Africa	60.7	92.1	65.9
2	2006-2008	Middle East & North Africa	59.1	89.6	65.9
2	2009-2011	Middle East & North Africa	59.0	89.5	65.9
2	2012-2014	Middle East & North Africa	58.6	88.9	65.9
2	2015-2017	Middle East & North Africa	37.7	87.4	43.3
26	2000-2002	Sub-Saharan Africa	56.7	86.5	66.3
26	2003-2005	Sub-Saharan Africa	57.9	90.5	64.1
26	2006-2008	Sub-Saharan Africa	59.4	91.1	65.0
26	2009-2011	Sub-Saharan Africa	61.8	90.1	68.2
26	2012-2014	Sub-Saharan Africa	65.1	89.9	71.9
26	2015-2017	Sub-Saharan Africa	63.7	92.1	69.0

TABLE 2.19 – Predicted Value-added Tax Effort by Income Level

Number of countries	Period	Group	VAT Effort	Time-varying VAT Effort	Persistent VAT Effort
13	2000-2002	Low Income countries	60.2	81.9	74.4
13	2003-2005	Low Income countries	66.4	90.4	73.9
13	2006-2008	Low Income countries	67.7	91.6	73.5
13	2009-2011	Low Income countries	68.2	90.9	74.8
13	2012-2014	Low Income countries	69.2	90.9	75.2
13	2015-2017	Low Income countries	65.1	93.9	69.2
22	2000-2002	Lower Middle Income countries	57.5	88.2	65.4
22	2003-2005	Lower Middle Income countries	57.3	89.1	64.3
22	2006-2008	Lower Middle Income countries	58.1	90.8	63.6
22	2009-2011	Lower Middle Income countries	57.6	90.1	63.7
22	2012-2014	Lower Middle Income countries	61.8	90.7	68.2
22	2015-2017	Lower Middle Income countries	56.7	91.2	62.3
25	2000-2002	Upper Middle Income countries	51.2	89.3	57.1
25	2003-2005	Upper Middle Income countries	53.1	91.0	58.3
25	2006-2008	Upper Middle Income countries	54.0	91.3	59.1
25	2009-2011	Upper Middle Income countries	52.7	89.3	59.0
25	2012-2014	Upper Middle Income countries	52.8	89.5	59.1
25	2015-2017	Upper Middle Income countries	52.0	89.3	58.6

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TABLE 2.20 – Predicted Value-added Tax Effort for Specific Country Groups

Number of countries	Period	Group	VAT Effort	Time-varying VAT Effort	Persistent VAT Effort
16	2000-2002	Resource-rich countries	52.5	88.7	59.9
16	2003-2005	Resource-rich countries	54.6	91.4	59.9
16	2006-2008	Resource-rich countries	54.8	90.2	60.4
16	2009-2011	Resource-rich countries	53.0	88.4	59.5
16	2012-2014	Resource-rich countries	56.6	90.4	62.2
16	2015-2017	Resource-rich countries	50.9	91.7	55.7
44	2000-2002	Non-Resource-rich countries	56.7	87.0	65.3
44	2003-2005	Non-Resource-rich countries	57.6	89.7	64.2
44	2006-2008	Non-Resource-rich countries	59.2	91.5	64.6
44	2009-2011	Non-Resource-rich countries	59.0	90.5	65.1
44	2012-2014	Non-Resource-rich countries	58.4	89.9	64.9
44	2015-2017	Non-Resource-rich countries	57.6	90.8	63.5
11	2000-2002	Franc Zone countries	67.3	85.5	79.5
11	2003-2005	Franc Zone countries	67.7	88.8	76.4
11	2006-2008	Franc Zone countries	71.5	91.3	78.2
11	2009-2011	Franc Zone countries	72.7	91.7	79.2
11	2012-2014	Franc Zone countries	77.6	92.3	83.9
11	2015-2017	Franc Zone countries	77.8	92.6	83.5
5	2000-2002	Fragile / Conflict affected countries	62.4	84.9	75.2
5	2003-2005	Fragile / Conflict affected countries	58.7	87.1	67.7
5	2006-2008	Fragile / Conflict affected countries	65.7	90.0	72.5
5	2009-2011	Fragile / Conflict affected countries	66.3	91.4	72.4
5	2012-2014	Fragile / Conflict affected countries	72.8	93.4	77.8
5	2015-2017	Fragile / Conflict affected countries	66.8	91.6	72.2

TABLE 2.21 – Predicted Value-added Tax Effort for African Regional Economic Communities (1)

Number of countries	Period	Group	VAT Effort	Time-varying VAT Effort	Persistent VAT Effort
7	2000-2002	WAEMU	72.5	84.1	86.8
7	2003-2005	WAEMU	75.2	87.7	85.7
7	2006-2008	WAEMU	80.2	91.9	87.2
7	2009-2011	WAEMU	79.4	91.9	86.4
7	2012-2014	WAEMU	77.6	92.3	83.9
7	2015-2017	WAEMU	77.8	92.6	83.5
4	2000-2002	CEMAC	52.7	90.0	58.6
4	2003-2005	CEMAC	53.8	90.6	59.4
4	2006-2008	CEMAC	49.6	89.4	55.3
4	2009-2011	CEMAC	48.9	90.8	53.8
4	2012-2014	CEMAC			
4	2015-2017	CEMAC			
4	2000-2002	EAC	57.2	87.5	65.4
4	2003-2005	EAC	60.6	93.3	64.9
4	2006-2008	EAC	60.2	92.7	64.9
4	2009-2011	EAC	56.9	88.9	64.0
4	2012-2014	EAC	58.9	88.6	66.4
4	2015-2017	EAC	59.5	90.2	65.9
9	2000-2002	ECOWAS	62.1	84.5	74.4
9	2003-2005	ECOWAS	62.2	88.2	70.7
9	2006-2008	ECOWAS	69.2	91.6	75.3
9	2009-2011	ECOWAS	71.7	91.3	78.0
9	2012-2014	ECOWAS	77.6	92.3	83.9
9	2015-2017	ECOWAS	77.8	92.6	83.5
5	2000-2002	ECCAS	51.9	84.9	61.5
5	2003-2005	ECCAS	56.4	91.5	61.7
5	2006-2008	ECCAS	53.5	90.6	58.8
5	2009-2011	ECCAS	53.5	89.9	59.6
5	2012-2014	ECCAS	62.2	91.8	67.8
5	2015-2017	ECCAS	62.5	92.2	67.8
4	2000-2002	SACU	62.1	90.2	68.8
4	2003-2005	SACU	55.4	89.9	61.6
4	2006-2008	SACU	55.2	91.3	60.4
4	2009-2011	SACU	52.6	88.7	59.3
4	2012-2014	SACU			
4	2015-2017	SACU			

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TABLE 2.22 – Predicted Value-added Tax Effort for African Regional Economic Communities (2)

Number of countries	Period	Group	VAT Effort	Time-varying VAT Effort	Persistent VAT Effort
10	2000-2002	COMESA	51.4	88.7	58.1
10	2003-2005	COMESA	55.8	93.1	59.9
10	2006-2008	COMESA	53.1	90.7	58.3
10	2009-2011	COMESA	54.7	88.4	61.8
10	2012-2014	COMESA	52.4	87.0	59.8
10	2015-2017	COMESA	50.5	91.2	55.6
9	2000-2002	SADC	47.6	89.0	53.6
9	2003-2005	SADC	51.9	91.6	56.7
9	2006-2008	SADC	50.1	90.2	55.3
9	2009-2011	SADC	52.9	89.4	59.2
9	2012-2014	SADC	52.3	90.4	57.9
9	2015-2017	SADC	52.1	90.0	57.9
12	2000-2002	CEN-SAD	62.2	85.6	73.5
12	2003-2005	CEN-SAD	62.2	88.8	70.2
12	2006-2008	CEN-SAD	67.5	91.2	73.6
12	2009-2011	CEN-SAD	68.9	91.2	75.1
12	2012-2014	CEN-SAD	74.0	91.5	80.6
12	2015-2017	CEN-SAD	69.6	91.5	75.4
3	2000-2002	IGAD	58.6	91.6	64.0
3	2003-2005	IGAD	59.1	93.1	63.5
3	2006-2008	IGAD	58.5	92.2	63.5
3	2009-2011	IGAD	53.0	87.8	60.2
3	2012-2014	IGAD	44.4	82.1	53.6
3	2015-2017	IGAD	47.5	92.5	51.7
1	2000-2002	UMA	62.0	94.0	65.9
1	2003-2005	UMA	60.7	92.1	65.9
1	2006-2008	UMA	59.1	89.6	65.9
1	2009-2011	UMA	59.0	89.5	65.9
1	2012-2014	UMA	58.6	88.9	65.9
1	2015-2017	UMA	56.6	85.9	65.9

TABLE 2.23 – Predicted Value-added Tax Effort for WAEMU countries and their peers

Number of countries	Period	Group	VAT Effort	Time-varying VAT Effort	Persistent VAT Effort
1	2000-2002	Benin	79.7	82.9	96.2
1	2003-2005	Benin	86.8	90.3	96.2
1	2006-2008	Benin	90.2	93.7	96.2
1	2009-2011	Benin	89.9	93.4	96.2
1	2012-2014	Benin	88.4	91.9	96.2
1	2015-2017	Benin			
1	2000-2002	Burkina Faso	77.1	80.5	95.8
1	2003-2005	Burkina Faso	80.7	84.3	95.8
1	2006-2008	Burkina Faso	82.5	86.2	95.8
1	2009-2011	Burkina Faso	88.5	92.4	95.8
1	2012-2014	Burkina Faso	92.2	96.3	95.8
1	2015-2017	Burkina Faso	91.9	95.9	95.8
1	2000-2002	Cote d'Ivoire	58.0	94.8	61.2
1	2003-2005	Cote d'Ivoire	51.8	84.5	61.2
1	2006-2008	Cote d'Ivoire	54.6	89.2	61.2
1	2009-2011	Cote d'Ivoire	55.6	90.8	61.2
1	2012-2014	Cote d'Ivoire	56.3	92.0	61.2
1	2015-2017	Cote d'Ivoire	54.6	89.2	61.2
1	2000-2002	Mali	80.9	88.5	91.4
1	2003-2005	Mali	87.4	95.6	91.4
1	2006-2008	Mali	82.7	90.6	91.4
1	2009-2011	Mali	81.4	89.1	91.4
1	2012-2014	Mali			
1	2015-2017	Mali			
1	2000-2002	Niger	62.8	82.5	76.1
1	2003-2005	Niger	71.4	93.9	76.1
1	2006-2008	Niger	72.3	95.0	76.1
1	2009-2011	Niger	69.4	91.2	76.1
1	2012-2014	Niger	66.5	87.4	76.1
1	2015-2017	Niger			
1	2000-2002	Senegal	88.1	89.6	98.4
1	2003-2005	Senegal	89.8	91.3	98.4
1	2006-2008	Senegal	90.9	92.4	98.4
1	2009-2011	Senegal	91.5	93.0	98.4
1	2012-2014	Senegal	86.4	87.8	98.4
1	2015-2017	Senegal	89.5	91.0	98.4
1	2000-2002	Togo	67.2	71.3	94.3
1	2003-2005	Togo	77.2	81.8	94.3
1	2006-2008	Togo	88.3	93.7	94.3
1	2009-2011	Togo	87.5	92.8	94.3
1	2012-2014	Togo	89.3	94.7	94.3
1	2015-2017	Togo	91.5	97.0	94.3
1	2000-2002	Ghana	37.8	78.0	48.4
1	2003-2005	Ghana	42.7	88.3	48.4
1	2006-2008	Ghana	46.1	95.2	48.4
1	2009-2011	Ghana	46.0	95.0	48.4
1	2012-2014	Ghana			
1	2015-2017	Ghana			
1	2000-2002	Nigeria	21.6	93.7	23.1
1	2003-2005	Nigeria	20.9	90.8	23.1
1	2006-2008	Nigeria	20.0	86.6	23.1
1	2009-2011	Nigeria	18.9	81.9	23.1
1	2012-2014	Nigeria			
1	2015-2017	Nigeria			

FIGURE 2.3 – Overview of the Tax Performance, Potential and Effort

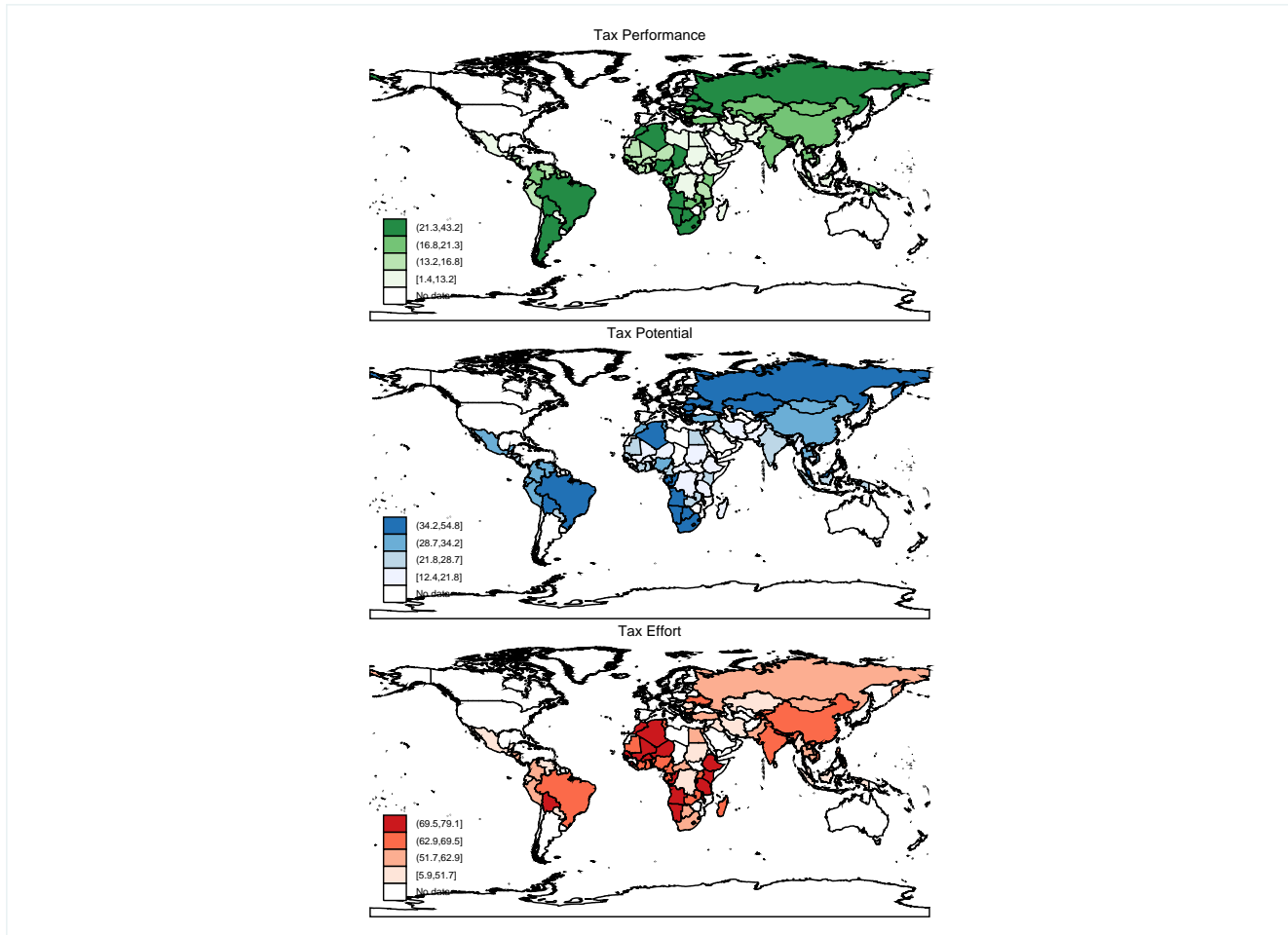


FIGURE 2.4 – Overview of the Non-resource Tax Performance, Potential and Effort

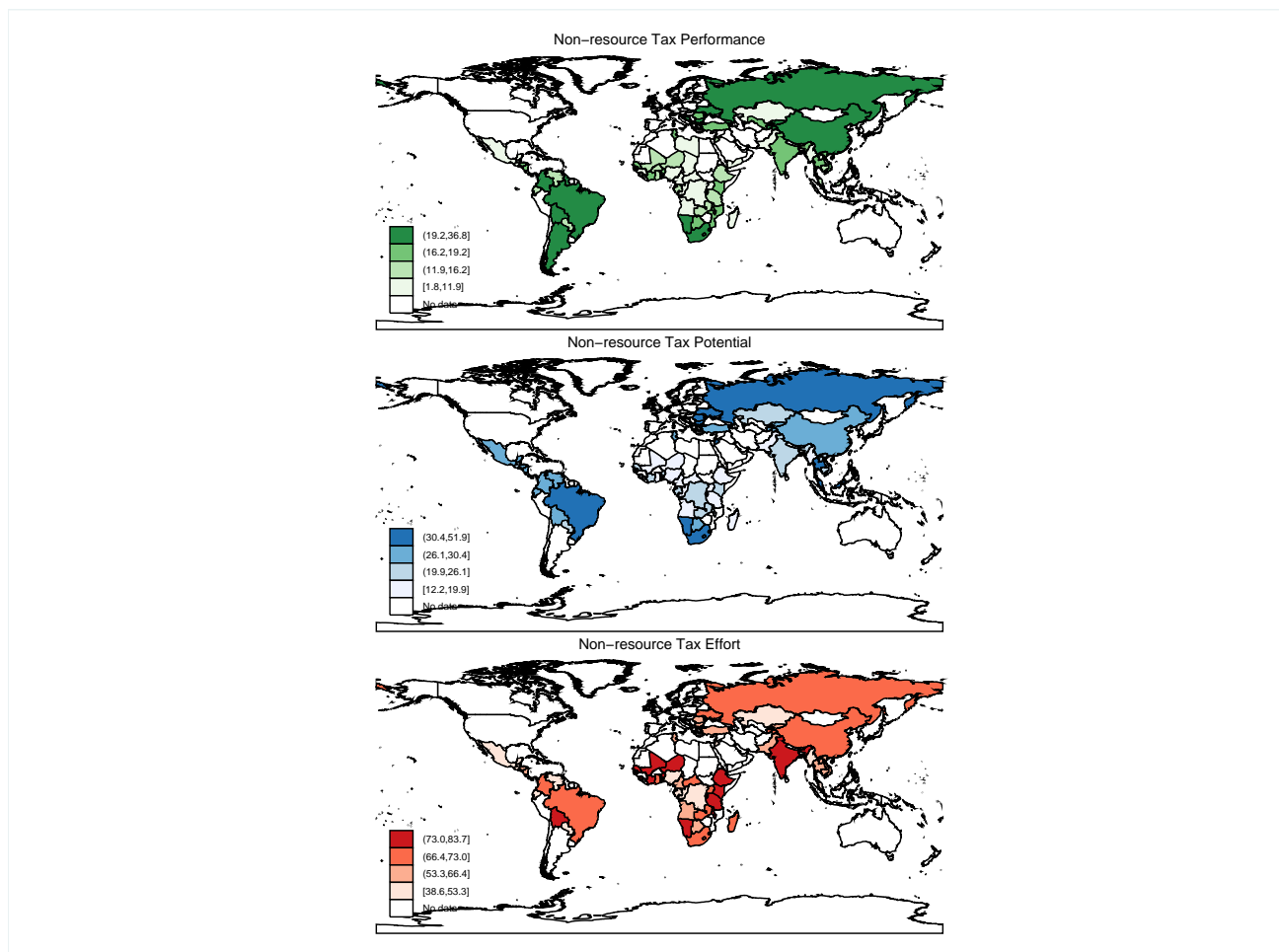
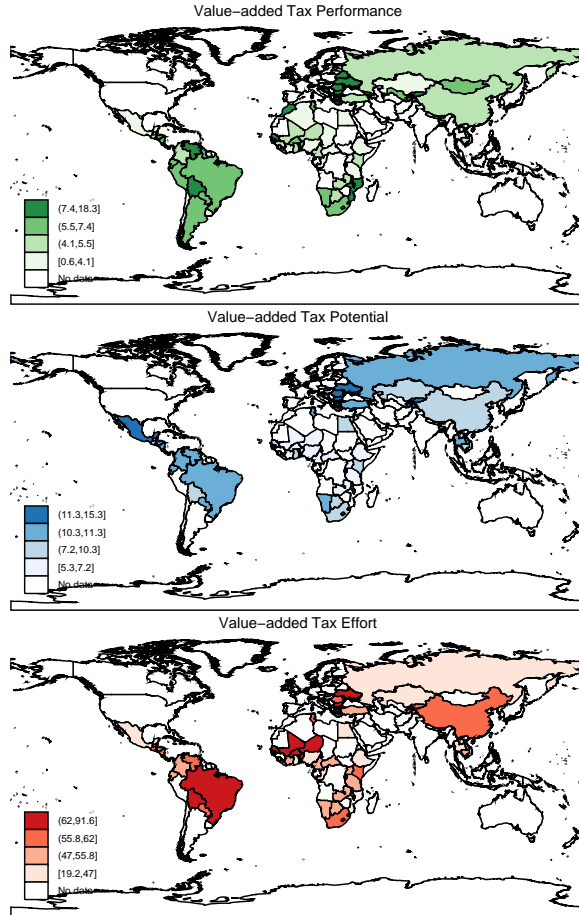


FIGURE 2.5 – Overview of the VAT Performance, Potential and Effort



The effects of tax coordination on tax revenue mobilization in the West African Economic and Monetary Union (WAEMU)

«Seul on va plus vite, ensemble on va plus loin» Proverbe Africain.

3.1 Introduction

At the end of the 1990s, the WAEMU member states undertook important reforms of customs tariffs. This started, in 1996, with the adoption of a transitional trade regime to regulate the intra-Union trade. In 2000 a Common External Tariff was formalised; from that point, the customs regime of the Union regulated exchanges.

A reduction in trade taxes was expected from these reforms and the Commission of the WAEMU issued Directives encouraging the collection of domestic revenue in the member states to face this challenge. This was formalized by the adoption of Decision n°10/2006/CM /UEMOA, the tax transition program of the Union. The main objectives of the program are to ensure better linkages between customs tariffs and domestic taxation in terms of legislation, tax collection and tax management; improving domestic tax revenue mobilization while decreasing the tax burden on capital and labor. Decision N°34/2009/CM/UEMOA proposed criteria and indicators for the tax transition. The principal criteria were that, the ratio of trade tax to total tax must be equal to or below 45%, the ratio of domestic tax to total tax must be equal to or above 55%, and the ratio of domestic tax to trade tax must be equal to or above 1.5¹. The indicators proposed were : performance indicators (to measure the impact of the tax transition on tax revenue mobilization) and monitoring indicators (to monitor the extent to which the specific objectives are delivered). In addition, Decision N°35/2009/CM/UEMOA adopted a monitoring system for the tax transition program².

1. It also proposed additional criteria such as the ratio of VAT plus excises to total tax.

2. It proposed the composition of a regional steering committee to ensure the implementation of the program and a national monitoring committee to supervise its implementation.

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The domestic tax coordination in the WAEMU is related to two other decisions which led to the elaboration of Directives and Regulations³. Decision N°01/98/CM/UEMOA concerns the harmonization of Domestic Indirect Taxation (i.e. Value-Added Tax (VAT) and excise regimes, and, excise regimes and, the taxation of petroleum products)⁴. Decision N°16/2006/CM /UEMOA, focuses on Direct tax coordination (i.e. the taxation of business profits and financial activities in the WAEMU)⁵. Regulation N°08/CM/UEMOA refers to the avoidance of the double taxation of income and technical assistance within the WAEMU.

A specific Directive⁶ was elaborated with regard to the harmonization and modernization of the information exchange systems between customs and domestic tax administrations inside the member states⁷.

The implementation of the Directives by countries through tax reforms may have an impact on their revenue performance. While the WAEMU legislation allows for the conduct of impact studies, this concerns very specific cases⁸. Mansour and Rota-Grasiosi (2013) attempted to fill this gap by providing a detailed description of the tax coordination process in the WAEMU and by assessing its strengths, weaknesses, and potential impact on intra-WAEMU distortions to trade, investment, and revenue mobilization. Regarding revenue mobilization, their study analyzes the evolution of the level and the structure of tax revenue for the Union as a whole and for each member state, since the adoption of the Treaty and the establishment of the Customs Union (2000), and comparisons are made

3. "Directives are binding, as to the result to be achieved, upon any or all of the Member States to whom they are addressed, but leave to the national authorities the choice of form and methods. Where Member states to whom they are addressed are stipulated they are binding only on them, and address situations specific to those Member States or persons. Regulations are of general application, binding in their entirety and directly applicable. They must be complied with fully by Member States to whom they apply". (European Union, 2017). Currently, 14 tax Directives and one Regulation are in effect in the WAEMU.

4. 3 Directives were elaborated to coordinate the VAT regimes : Directive N°02/98/CM/UEMOA, Directive N°06/2002/CM/ UEMOA and Directive N°02/2009/CM/UEMOA. Concerning the excises, 4 Directives were developed i.e. Directive N°03/98/CM/UEMOA and Directive N°03/2009/CM/UEMOA ; the other two Directives (Directive N°06/2001/CM/UEMOA and Directive N°01/2007/CM/UEMOA) focus on the taxation of petroleum products.

5. 3 Directives and 1 Regulation are related to the harmonization of business profit taxation : Directive N°07/2001/CM/UEMOA, Directive N°01/2008/CM/UEMOA, and, Directive N°08/2008/CM/UEMOA.

6. Directive N°02/2012/CM/UEMOA.

7. See Table 7 in the Appendix for further information about the WAEMU Legislation, we also provide information about the de jure implementation in 2010 and 2012 (given that these years are the first for which we found documentation regarding the implementation of Directives from the WAEMU Commission). This means that we consider that a country undertook the coordination process when it adopted legislation due to the fact we do not have information on the date of de facto implementation. Information about the de facto implementation are available in Mansour and Rota-Graziosi (2013).

8. The Annex to Decision N°10/2006/CM/UEMOA in its section I_1_315 requires an impact study of the adoption of a single rate VAT system. The Annex to Decision N°16/2006/CM/UEMOA in its section III_B_2 recommends the conducting of an impact analysis of a Corporate Tax Rate which lies between 25% and 40% in addition to a minimum tax rate.

with some selected sub-Saharan African regional trade groups. Diarra (2012) analyzes the impact of commodity price shocks on the tax transition process. Geourjon and Mansour (2013) discuss the effects of customs tariff reforms, notably the extension of the Customs Union to the ECOWAS area, on domestic tax revenue mobilization. Mansour et al (2013), conducted a qualitative analysis on the harmonization of direct taxation with an emphasis on the issue of tax expenditure⁹. Yohou et al (2016) examine the heterogeneous effects of foreign aid on tax revenue in WAEMU countries. However, to the best of our knowledge there is no study which estimates the quantitative impact of the harmonization process on tax revenue mobilization for the Union as a whole and for each member state.

Over 80% of the Union's member countries' tax (including tariff) revenues were derived from taxes which are subject to regional Directives or regulations, (Mansour and Rota-Grasiozi, 2013). The establishment of the Customs Union led to a decline in trade tax revenue. The share of trade taxes to the total tax revenue decreased by 25.4% between the 1990s and the post-reform period (2000-2010)¹⁰. Having anticipated this decline, the WAEMU policy makers, in July 1998, took the decision to coordinate the domestic indirect taxation with the goal of increasing tax productivity. The adoption of the tax transition program (Decision N°10/2006/CM/UEMOA) reaffirmed this commitment. There was a wish to improve the tax performance indicators notably the ratios Value-Added Tax (VAT) to GDP and excise taxes to GDP. Regarding direct taxation, the will to reconcile revenue mobilization with a business-friendly environment was expressed.

This chapter evaluates the impact of the Directives both in terms of coordination and revenue mobilization. It uses a comparative case study using the synthetic control method developed by Abadie and Gardeazabal (2003) and extended by Abadie, Diamond, and Hainmueller (2010 & 2015). The method takes into account both qualitative and quantitative approaches. The main results are that the tax coordination affected the revenue mobilization in the Union but the impact is different across countries and by type of tax.

3.2 Empirical analysis

A comparative case study allows the assessment of the impact of an event or policy intervention on an outcome. 1 (or more) unit(s) exposed to the event is (are) compared to 1 (or more) unexposed unit(s). This study uses the synthetic control method to analyse the effects of tax coordination in the WAEMU on revenue mobilization.

The synthetic control method is a comparative case methodology which uses a data-drive approach for estimating the effects of treatments. The counterfactual of the treated unit "the synthetic control" is defined as a convex combination of unexposed units. Because the weights can be restricted to be positive and sum to one, the synthetic

9. This study was conducted in the framework of the technical assistance of the International Monetary Fund at the request of WAEMU Commission.

10. Mansour (2014) dataset and authors' calculations.

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control method provides a safeguard against extrapolation. (Abadie et al, 2010). By carefully specifying how units are selected for the comparison group, the synthetic control method opens the door to the possibility of precise quantitative inference in comparative case studies, without precluding qualitative approaches to the same dataset. Moreover, in contrast to regression analysis techniques such as Mill's Method of Difference, the synthetic control method makes explicit the contribution of each comparison unit to the counterfactual of interest. This allows researchers to use quantitative and qualitative techniques to analyse similarities and differences between the unit or units representing the case of interest and the synthetic control. (Abadie et al, 2015).

However, the synthetic control method has limitations, it requires the use of a balanced dataset, the exclusion of units which have experienced a similar event, the restriction of the donor pool to units with characteristics similar to the treated unit (to avoid interpolation biases and overfitting), the inclusion of a sizeable number of pre-intervention periods and a sizeable number of post-intervention periods under certain conditions.

3.2.1 Literature Review

The synthetic control method (SCM) was developed by Abadie and Gardeazabal (2003). Abadie, Diamond and Hainmueller (2010 & 2015) and Cavallo et al (2013) extended the method¹¹.

Abadie and Gardeazabal (2003) presented and used the synthetic control method to assess the economic effects of conflict on income in the Basque Country. Abadie, Diamond and Hainmueller (2010) investigated the application of synthetic control methods to comparative case studies, provided new inferential methods, and applied the synthetic control method to estimate the effects of Proposition 99 (a large-scale tobacco control program that California implemented in 1988) on tobacco consumption. In a 2015 study, the same authors illustrated the ideas behind the synthetic control method and they assessed the economic impact of the 1990 German reunification on West Germany. Cavallo et al (2013) expanded the synthetic control method by allowing several units to experience treatment at different times, and did basic checks to see if the synthetic control serves as a valid counterfactual. They applied these extensions to treating the question of whether natural disasters affect economic growth.

Several studies have used the synthetic control method to assess the effects of different events. Montalvo (2011) analysed the electoral impact of terrorist attacks. Billmeier and Nannicini (2011 and 2013) assessed the impact of economic liberalization on growth. Hinrichs (2012) assessed the effects of affirmative action bans on college enrolment, educational attainment, and college demographic composition in the United States of America.

11. Abadie et al (2011) provided a R package to implement the synthetic control method for comparative case studies. Galiani and Quistorff (2016) extended the Stata package "synth" developed by Abadie et al (2011). This extension "synth_runner" automates the process of running multiple synthetic control estimations and includes the expansion of Cavallo et al (2013).

Abdallah and Lastrapes (2012) studied how a constitutional amendment relaxing severe restrictions on home equity lending affected household spending in Texas. Dorsett (2013) explored the effect of conflict on income in Northern Ireland. Bauhoff (2014) measured the impact of nutrition policy in improving adolescent dietary behaviour and reducing childhood obesity. Bohn, Lofstrom, and Raphael (2014) evaluated the effect of the 2007 Legal Arizona Workers Act on the state's unauthorized immigration. DeAngelo and Hansen (2014) used SCM to estimate the causal effect of police on crime. Smith (2015) measured the impact of major natural resource discoveries since 1950 on growth. Liu (2015) evaluated the short- and long-run effects of universities on geographic clustering of economic activity, labor market composition, and local productivity. Sills et al (2015) applied SCM to tropical deforestation by estimating the impacts of a local policy innovation. Adhikari and Alm (2016) evaluated the effect of a tax reform. The authors analyzed the impact of flat tax reform on income for 8 Eastern and Central European countries which adopted flat tax systems. They also used SCM to estimate the causal effect of flat tax on the investment and employment recognized in standard economy as the possible mechanisms through which flat tax reforms affect economic performance. Peri and Yasenov (2017) used the synthetic control method to re-examine the labor market effects of the Mariel Boatlift.

3.2.2 Empirical Strategy

3.2.2.1 Single Unit (Individual Country) Treatment

Following Abadie et al (2010 & 2015), let's assume that the sample includes $C + 1$ units (units correspond to countries in this case). Without loss of generality, we regard $c = 1$ as the treated country and $c = 2$ to $c = C + 1$ are potential comparisons in the donor pool (some non-WAEMU sub-Saharan African countries). We assume that all the countries are observed for the same years $y = 1, \dots, Y$. The sample includes a positive number of pre-reform years Y_0 and a positive number of post-reform years Y_1 , then $Y = Y_0 + Y_1$. Assume a WAEMU member state has implemented the reform during years $Y_0 + 1, \dots, Y$ and its revenue mobilization has not been affected during the pre-reform years $1, \dots, Y_0$.

A synthetic control being a weighted average of the units in the donor pool, it can be represented by a $(C * 1)$ vector of weights $W = (w_2, \dots, w_{C+1})'$ and $0 \leq w_c \leq 1$. $c = 2 \dots C$ and $w_2 + \dots + w_C + 1 = 1$. Each value of W is a synthetic control. Like in the difference-and-difference method, the synthetic control method selects the value of W such that the characteristics of the treated unit are best represented by the characteristics of the synthetic control (Abadie et al, 2015). Let X_1 be a $(k * 1)$ vector composed of the values of the pre-reform characteristics of the treated country which must be matched as closely as possible, and let X_0 be the $(k * Y)$ matrix containing the values of the same variables for countries in the donor pool; X_1 and X_0 should include pre-reform values of the outcome (tax revenue). Thus, the vector $X_1 - X_0W$ corresponds to the difference between the pre-reform characteristics of the treated country and a synthetic control. The synthetic control W^* which minimizes the size of this difference is selected. This can be operationalized in this way : for $m = 1, \dots, k$ let X_{1m} be the value of the m-th variable for the treated country

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and let X_{0m} be a $1 * C$ vector which includes the values of the m -th variable for the countries in the donor pool. W^* is defined by Abadie and Gardeazabal (2003) and Abadie, Diamond and Hainmueller (2010 & 2015) as the value of W which minimizes :

$$\sum_{m=1}^k v_m (X_{1m} - X_{0m}W)^2 \quad (3.1)$$

v_m is a weight reflecting the relative importance we assign to the m -th variable when the discrepancy between X_1 and X_0W is measured. In this study, a cross-validation method is applied to choose v_m .

Let T_{it} be the outcome (tax revenue) of unit c at year y : let T_1 be a $(Y_1 * 1)$ vector which contains the post-reform values of the tax revenue for the treated country, then $T_1 = (T_{1Y_0+1}, \dots, T_{1Y})$. Similarly, let T_0 be a matrix where column c includes the post-reform values of the tax revenue for country $c + 1$.

$T_1 - T_0W^*$, the synthetic control estimator of the effect is obtained by the comparison of the post-reform tax revenue of a treated country which has implemented the reform and the synthetic control. For a post-reform period (with $y \geq Y_0$), the synthetic control estimator of the impact of the reform is given by the comparison between the tax revenue for the treated country and the tax revenue for the synthetic control for the same period.

$$T_{1y} - \sum_{c=2}^{C+1} W_c^* T_{cy} \quad (3.2)$$

The matching variables in X_0 and X_1 are regarded as the predictors of post-reform tax revenue. The latter are not affected by the reform. Once it has been established that the unit representing the unit of interest and the synthetic control unit have similar behaviour over extended periods of time prior to the intervention, a discrepancy in the outcome variable following the intervention is interpreted as being produced by the intervention itself¹². Let T_{cy}^C be the tax revenue that would be raised by the country c in year y if this country didn't implement the reform, and let T_{cy}^1 be the tax revenue that would be raised the country c if it implemented the reform in years $Y_0 + 1$ to Y . If $T_{cy}^C \neq T_{cy}^1$, this means that the reform affected the mobilization of tax revenue. Thus, the effect (α_{cy}) will be :

$$\alpha_{cy} = T_{cy}^1 - T_{cy}^C \quad (3.3)$$

3.2.2.2 Multiple Units (Whole Union) Treatment

As mentioned above, Cavallo et al (2013) extended the synthetic control method by allowing several units to experience treatment at different times. This allows the measurement of the effects of tax reforms for the Union as a whole. We proceed to this treatment as follows :

12. (Abadie et al, 2015).

Let us consider equation (3) above, we can note :

$$T_{cy}^1 = T_{cy}^C + \alpha_{cy} \quad (3.4)$$

Let D_{cy} be a dummy that takes the value 1 if country c implemented the reform in year y and 0 otherwise. The observed tax revenue for country c in year y is :

$$T_{cy} = T_{cy}^C + \alpha_{cy} D_{cy} \quad (3.5)$$

Given that only the first country implemented the reform and only after year Y_0 (with $1 \leq Y_0 \leq Y$), we have :

$$D_{cy} = \begin{cases} 1 & \text{if } c=1 \text{ and } y \geq Y_0 \\ 0 & \text{otherwise} \end{cases} \quad (3.6)$$

The parameters of interest are $(\alpha_1 Y_0 + 1, \dots, \alpha_1 Y)$; the lead specific impact of the reform on the tax revenue for $y > Y_0$,

$$\alpha_{1y} = T_{1y}^1 - T_{1y}^N = T_{1y} - T_{1y}^N \quad (3.7)$$

T_{1y}^1 being observed, to estimate α_{1y} we need only to come up with an estimate for T_{1y}^N . Let's consider a $(C+1)$ vector of weights $W = (w_2, \dots, w_{C+1})'$ such that $w_c \geq 0$ for $c = 2, \dots, C+1$ and $w_2 + w_3 + \dots + w_{C+1} = 1$. Each value of the vector W represents a potential synthetic control, which is a particular weighted average of control countries in the donor pool. Let Z_c be a $(r+1)$ vector of observed predictors of tax revenue (not affected by the reform). Suppose that there exists a set of weights $(w_2^*, \dots, w_{C+1}^*)$ which satisfies the equality $\sum_{c=2}^{C+1} w_c^* = 1$ such that :

$$\sum_{c=2}^{C+1} w_c^* T_{c1} = T_{1,1} \quad (3.8)$$

$$\sum_{c=2}^{C+1} w_c^* T_{c1} = T_{1,Y_0} \quad (3.9)$$

$$\sum_{c=2}^{C+1} w_c^* Z_c = Z_1 \quad (3.10)$$

Following Abadie et al (2010), let us use $\hat{\alpha}_{1y} = T_{1y} - \sum_{c=2}^{C+1} w_c^* T_{cy}$ as an estimator of α_{1y} . The systems of equations in (8) (9) and (10) can hold exactly only if $(T_{1,1}, \dots, T_{1,Y_0}; Z_1')$ belongs to the convex hull of $[(T_{2,1}, \dots, T_{2,Y_0}; Z_2'), \dots, (T_{C+1,1}, \dots, T_{C+1,Y_0}; Z_{C+1}')]$.

3.2.2.3 Inference

Statistical Inference in synthetic control methods consists of conducting "placebo studies". There are "in time placebo tests" which test if the synthetic control method also estimates large effects when applied to dates when the intervention did not occur (Heckman and Hotz 1989). There are also "in-space placebos", as used in the studies of Abadie and Gardeazabal (2003), Abadie et al (2010 & 2015). This is a non-parametric method which tests if the distribution of placebo effects gives many effects as large as the

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main estimate, then it is likely that the estimated effect was observed by chance (Galiani and Quistorff, 2016).

Cavallo et al (2013), following the same idea, compared the treated country main effect to the distribution of placebo effects in computing a lead-specific significance level (two-sided p-value) for the event.

$$p - value = Pr(|\hat{\alpha}_{1y}^{PL}| \geq |\alpha_{1y}|) = \frac{\sum_{C \neq 1} 1(|\alpha_{cy}| \geq |\alpha_{1y}|)}{C} \quad (3.11)$$

Recall that α_{1y} is the estimated effect for the post-reform period; $\hat{\alpha}_{1y}^{PL} = \alpha_{1y}$ is the distribution of corresponding in-place placebos.

We can determine the one-sided p-value for positive effect as follows :

$$p - value = Pr(\hat{\alpha}_{1y}^{PL} \geq \alpha_{1y}) \quad (3.12)$$

3.2.2.4 Data and sample

Variables : The sample includes Sub-Saharan African countries (for whom we obtained data on tax revenue and that we deem appropriate)¹³ to reduce interpolation biases. The impact analysis is done for the Union as a whole¹⁴ and for the member states independently¹⁵. We assess the effects of the tax reforms, for the **total tax revenue**¹⁶ and for **indirect tax**, **direct tax**, and **trade tax** independently. In addition the total tax revenue, each type of tax is used as the outcome variable¹⁷. All these revenues are expressed as % GDP. As predictors, we use : **GDP per capita** - and **Broad Money** - given that a big income supposes a wide tax base, on the other hand, the level of development is favourable to tax performance due to its positive correlation with education and thus to the performance of tax collectors, the level of development may also act on tax compliance since it is known that demand for public infrastructure increases with the level of development ; **Openness** - due to the fact that it is easier to tax trade than domestic transactions, and it may act positively on the productivity of domestic producers and so it may increase the tax base ; **Agriculture value added** - the agriculture revenue is hard to tax in developing countries where informal subsistence agriculture remains widespread, we employ it as a proxy for the shadow economy, and which negatively affects tax collection ; **Resource tax** - is regarded as a determinant of non-resource revenue mobilization, due to the fact

13. The list of countries is available in the appendix (Table 2).

14. We did not include Benin for this treatment, find further information below about dataset completion.

15. The treatment has been conducted also for Benin.

16. This concerns only the non-resource tax revenue. We excluded the resource tax revenue due the exogeneity of such revenue. As stated by Brun, Chambas and Mansour (2014), the government resource revenue is largely exogenous, as it depends primarily on the existence of natural resources and on changes in the price of these resources which except for large producers are external to the country. Nevertheless, the latter is used as a predictor given its size may affect non-resource revenue mobilization.

17. The source of data is available in the appendix.

that in general resource dependent countries put less effort into tax collection because they rely on the revenue generated by the exploitation of natural resources; **Aid per capita** - this variable may affect revenue mobilization in two ways : first the dependence to Aid may negatively affect the intention of countries to mobilize domestic resources, however Aid provided in the form of technical assistance may be favourable to countries' tax administrations and thereby tax performance; **Gini Index** - inequality may influence tax compliance in the country and create social unrest unfavourable to revenue collection; **Debt service** - a higher debt service payment may encourage countries to mobilize resource given that they must refund the debt and the interest; **Population growth** - this variable is a proxy of the need for public infrastructure in a country, thus it should act positively on revenue mobilization. **Corruption** - this phenomenon may negatively affect tax performance : firstly due to the embezzlement of public funds, secondly because it may prompt tax agents to delay the processing of the payments of the good taxpayers, thirdly it may act on tax compliance. **Internal Conflict** - is an assessment of political violence (e.g. civil war, coup threat, terrorism, political violence, and civil disorder) in the country, and its actual or potential impact on governance. It has an ambiguous effect on tax performance given that it may encourage governments to mobilize resources to buy arms, on the other hand the unrest that it causes may be harmful to tax performance. We include the average first half trend of the outcome in addition to the set of covariates¹⁸.

Dataset completion : The use of the synthetic control method requires a balanced dataset, so we make efforts to balance the dataset. We completed the data on Openness for Ethiopia from 1992 to 2010 with the dataset of UNCTAD¹⁹ and we used the value of 1992 for the years 1990-1991. The data on Aid per capita were not available for South Africa for the years 1990-1992 and those on Debt service for the years 1990-1993, here again we only report the data available for the most recent year namely 1993 and 1994. Data on Corruption and Internal Conflict were not available for some countries such as Benin, Burundi, Cabo Verde, Comoros, Lesotho, Mauritius, Rwanda and Swaziland. We excluded these countries from the sample for treatments on the Union as a whole, and those of the individual member states except for Benin²⁰.

Period : Estimations were done for the period 1990-2010. The pre-reform and post-reform periods are different by type of tax and they have been chosen according to the issuing of Directives by the Commission of WAEMU²¹.

18. With such a restriction on the outcome lags, other covariates with predictive power for explaining the dependent variable receive positive weights in order to build the-now differently weighted-synthetic control unit (Kaul et al, 2016).

19. United Nations Conference on Trade and Development.

20. We assess the effects of Tax reforms in Benin without adding corruption and internal conflict to the set of predictors. Table (3) and Table (4) in the appendix present the descriptive statistics respectively for the whole sample including Benin and those of the restrained sample.

21. We are aware that it would be more relevant to define the reform period as the year in which countries implemented the law at least de jure. The real dates of reforms are unknown even if we know the statement of the adoption by countries in 2012 as explained earlier. This is the main limit of the study.

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For the domestic indirect tax, we define the first reform date as the year following the issuing of the first Value-added tax and excises Directives, 1999. In this way, the pre-reform period is 1990-1998 and the post-reform period is 1999-2010. Following Cavallo et al (2013) and Kaul et al (2016), we did not include the entire pre-reform path of the outcome variable as economic predictors to allow the synthetic control to replicate the counterfactual trajectory²². We include the period 1990-1994.

We define the year 1996 (knowing that it corresponds to the adoption of a transitional trade regime regulating the intra-community trade) as the starting of customs tariff coordination in the WAEMU. So, the pre-reform period for this tax is 1990-1995 and the post-reform period 1996-2010; we use the period 1990-1992 outcome trend to match the affected country with the control countries.

For direct tax, we identify the year 2009 (the year after the issuing of the first direct tax coordination Directive in 2008). The pre-reform period for this tax is 1990-2008 and the post-reform period 2009-2010; we use the period 1999-2008 outcome trend to match the affected country with the control countries.

Lastly, for the total tax, we define the reform period as that following the adoption of the first domestic tax Directive. In this way, it corresponds to that of the indirect tax. So, as for the domestic indirect tax, we use the period 1990-1994 outcome's trend to match the affected country with the control countries.

3.3 Results

3.3.1 Fiscal Impact of the Tax Coordination in the WAEMU

As explained in the previous section, we assess the effects of the tax coordination in the WAEMU for the Union as a whole and for each member state independently. The results are presented for the total tax revenue and for the different types of taxes. Overall, we find a significant impact of the harmonization process on revenue mobilization.

3.3.1.1 Impact of the Tax Coordination on the total tax revenue mobilization

As shown in Figure 1 below, the tax revenue mobilization in the Union was affected by the reforms undertaken by the member states. The predicted p-values (expressing the significance level of the tax reforms) are significant for the years 1999, 2000, 2005, 2006, 2007, and 2010²³. This means that the estimated effects for these years were not observed by chance, at least at the 10% significance level. Concerning the statistical significance (expressed by one-sided p-values) for the positive effects of the tax coordination, we do not find a positive effect, even if the average level of the non-resource taxes to GDP increased

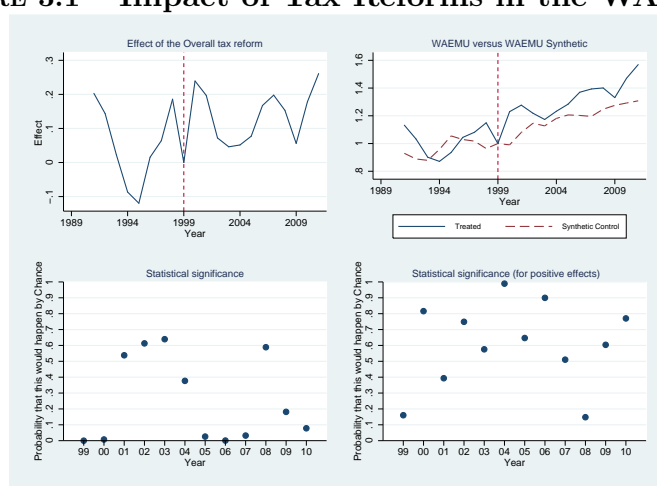
22. Kaul et al (2016) show that including all pre-intervention values of the outcome as economic predictors implies that only the pre-treatment fit with respect to the variable of interest is optimized.

23. We recall that the restrained sample includes all WAEMU member states excepted Benin for whom the ICTD dataset doesn't provide indicators of corruption and internal conflict.

from 10.34% GDP to 12.88% GDP before and during the reform period²⁴. This result is not surprising, due to the fact that the WAEMU countries undertook a tax transition with the purpose of reducing the share in revenue collection of the trade taxes, and moving toward less distortive taxes, namely domestic taxation more favourable to trade. In this way, one can argue that the main challenge for WAEMU countries was to stabilize the level of tax revenue. A deeper analysis by type of tax is more relevant to assess the impact of the tax reforms.

For the quality of the treatment itself, we obtained a $e(\text{avg-pre-rmspe-p})$ ²⁵ of 0.05 representing the proportion of placebos that have a pre-treatment Root Mean Squared Predictive Error (RMSPE) at least as large as the average of the treated unit. 0.05 is too low, and this explains the lack of fit between the path of the total tax outcome for the Union and its synthetic counterfactual in the pre-treatment period.

FIGURE 3.1 – Impact of Tax Reforms in the WAEMU*



Note : WAEMU* = WAEMU without Benin.

Source : Authors' Calculations

3.3.1.2 Impact of the Tax Coordination on Domestic Indirect tax mobilization

We find a positive significant impact of the coordination for the first 5 post-reform years (1999-2003) and for the years 2006-2007²⁶. The lack of significance for the year 2008 may result from the measures (subsidies and exemptions) undertaken by some countries in response to the food and energy price crisis of 2006-2008 to head off and contain social unrest, and the presence of multiple rate VAT systems approved by the VAT Directives. A per country analysis allows a clear and accurate view of the situation. Even if the do-

24. See Figure 5 in the appendix.

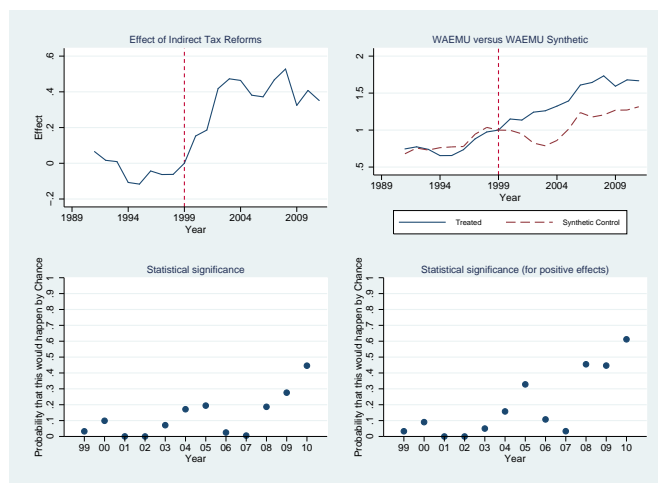
25. These statistics are available in Table 5 in the appendix.

26. See Figure 2.

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mestic indirect tax coordination in the WAEMU is criticised, some of its member states are known to have a good VAT productivity. Brun and Diakité (2016) found a high value-added tax effort in the WAEMU compared to some other developing country areas. The quality of the treatment is better than those of the total tax with a $e(\text{avg-pre-rmspe-p})$ of 0.79.

FIGURE 3.2 – Impact of Domestic Indirect Tax Reforms in the WAEMU*

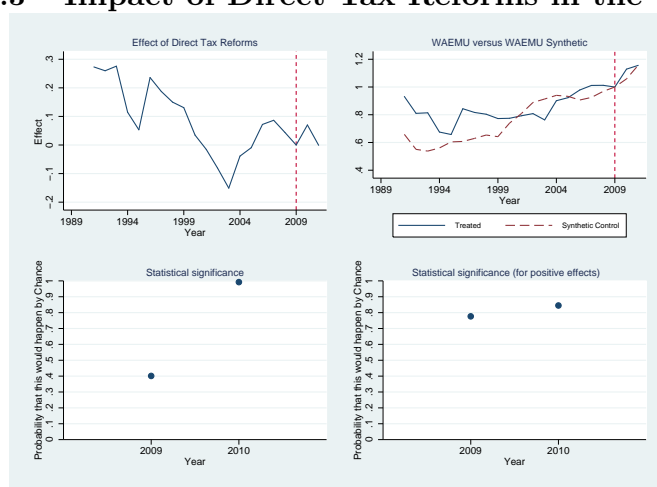


Source : Authors' Calculations

3.3.1.3 Impact of Tax Coordination on Direct taxes mobilization

The direct taxes coordination in the WAEMU started in the year 2008 with Directive N°01/2008/CM/UEMOA which defined a common corporate tax base. It does not seem to have affected the revenue mobilization (Figure 3). This is not surprising, given that the direct taxes Directives have not resolved the crucial problem of the tax incentives granted by countries to attract foreign direct investments. As stated above, the WAEMU direct taxes Directives allow countries to adopt sectoral tax codes (mining, petroleum, etc) which could be used as tax competition instruments, and so they are harmful to the coordination. The tax coordination framework may have had the unintended effect of contributing to the fragmentation of policies at the national level by providing countries with the incentive to enact special tax regimes outside their main tax laws. This is particularly the case for investment incentives, where the framework allows unfettered tax competition as long as it is done outside countries' main tax laws. This, in turn, has made tax systems opaque, increased their complexity, and contributed to a culture of "tax negotiation" (Mansour and Rota-Graziosi, 2013). Also, there are gaps and loopholes in the legislation such as the lack of thin-capitalization rules, and the legislation is not adapted to the digital economy.

FIGURE 3.3 – Impact of Direct Tax Reforms in the WAEMU*



Source : Authors' Calculations

3.3.1.4 Impact of Tax Coordination on Trade tax mobilization

Customs tariff reforms in the WAEMU had a significant effect on trade tax mobilization only for the first post-reform years. This result is not surprising, it might be expected that the tariff reforms through liberalization led to a fall in the tariff revenues, but these revenues only changed on average from 3.41% GDP in the pre-reform period to 3.12% GDP in the post-reform period. This may be explained by different factors like the low share of intra-regional trade in the WAEMU²⁷. The tariff reforms coincided with an improvement of the customs procedures and the risk management. In addition, the taxation of natural resource exports (such as the single export tax on cocoa (DUS) by the Cote d'Ivoire) allows collection of a large tariff revenue in periods of increasing price and demand. Here again, the proportion of placebos which have a pretreatment Root Mean Squared Predictive Error (RMSPE) at least as big as the average of the treated unit is high (97%) which is reassuring for the quality of the treatment.

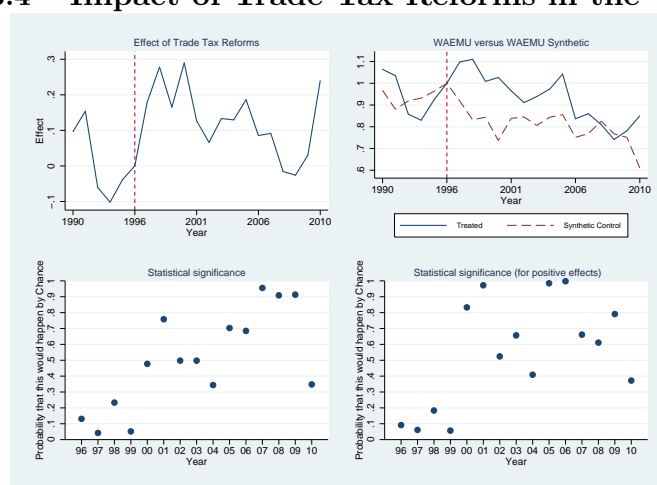
3.3.2 Individual Impacts of Tax Coordination in the WAEMU

The WAEMU Treaty mandates the convergence of the ratio of tax revenue-to-GDP to a threshold of 20%²⁸ and the convergence of tax revenue structures. However, as shown in Table 1 below (figures represent the average tax revenue for each member state after the adoption of the tax transition program), the tax coordination in the WAEMU may have had different effects on member states' tax performance. First, because the level of coordination de jure and de facto is different from one country to another. Second, due to the fact that the countries differ in economic structure, natural endowment and

27. Goretti and Weisfeld (2008) showed that the share of intraregional trade in the WAEMU was relatively stable at about 11% of total trade from 2000 to 2006.

28. Additional Act N°01/2015/CCEG/UEMOA.

FIGURE 3.4 – Impact of Trade Tax Reforms in the WAEMU*



Source : Authors' Calculations

in efficiency to mobilize revenue. So, an individual assessment of the effect of the tax coordination by country may be useful.

TABLE 3.1 – Average WAEMU member state ratio of tax revenue to GDP (2007-2010)

Country	Direct Tax	Trade Tax	Indirect Tax	Non-resource Tax	Resource Tax
Benin	3.76	5.06	7.98	16.80	0
Burkina Faso	3.07	2.10	6.89	12.27	0
Cote d'Ivoire	5.23	4.11	5.59	16.51	1.20
Guinea-Bissau	2.16	1.77	2.47	6.84	0
Mali	2.68	1.91	6.34	12.30	2.41
Niger	2.78	2.20	5.39	11.18	2.52
Senegal	4.62	3.05	9.88	18.32	0
Togo	3.69	3.81	7.31	15.54	0

Source : Mansour (2014) and authors' calculations.

3.3.2.1 Impact of the Tax Coordination in Benin

As shown in the results displayed in Figure 6 in the appendix, the tax reforms have not affected the total tax revenue mobilization in Benin. However, it appears that the reform had significant positive effects on the domestic indirect tax collection from 2001 to 2003. As for the Union as a whole, there is no effect observed on the direct tax revenue. An important point highlighted by the findings is that we observe an impact of the reforms on

the trade tax collection in Benin only for the first post-reform year. This is probably due to the proximity of Benin to Nigeria. Benin has capitalized on its strategic geographical location with respect to Nigeria to improve its tariff revenue through re-exports. It is the only country where this source of revenue increased significantly after 1995 along with an increase in VAT revenue (Mansour and Rota-Graziosi, 2013).

The domestic indirect taxes- synthetic Benin corresponds to the convex combination of Uganda (59%), Guinea (30.10%), Botswana (10.6%) and Cabo Verde (0.3%).

3.3.2.2 Impact of the Tax Coordination in Burkina Faso

According to our estimates, there was no significant impact of the reforms on the total tax collection in Burkina Faso. We obtained positive effects from 2001 to 2008 but they are not significant²⁹. However, we obtain significant effects for the domestic indirect tax reforms for 2002 and 2004, and the effect is positive for 2002. The low significance of the domestic indirect tax reforms in Burkina Faso may be related to its VAT performance. Brun and Diakit  (2015) studying the VAT gaps for a large sample of African countries, found that the VAT base of Burkina Faso is narrow due to the exemptions granted by the country. The share of exempted goods was 64.16% for the year 2011. We do not find any significant impact of the tariff and direct tax reforms.

The domestic indirect taxes- synthetic Burkina Faso is the convex combination of Uganda (48.3%), Botswana (40.2%), Ethiopia (5.9%) and Sierra Leone (5.6%).

3.3.2.3 Impact of the Tax Coordination in Cote d'Ivoire

As for Benin and Burkina Faso, we do not observe an impact of the tax reforms on Cote d'Ivoire's total tax mobilization³⁰. For the domestic indirect tax revenue, we find a significant impact only for the year 2005. The same is true for the direct taxes. The lack of significance for Cote d'Ivoire may be due both to the de facto application of the Directives and to the misperformance of the country in terms of revenue mobilization. With the highest tax potential in the Union³¹, Cote d'Ivoire, like some other resource dependent countries, puts less effort into collecting tax, especially VAT. The low VAT revenue productivity in Cote d'Ivoire is partly due to its high export share in GDP (oil, cocoa, and coffee)³². The customs tariff reforms had significant effects on revenue mobilization during the post-reform period. The effects are positive for the years 1997 and 2004. The positive impact in 1997 may be related to the increase in cocoa prices that year given that the Cote d'Ivoire taxes the cocoa exports.

The domestic indirect taxes- synthetic Cote d'Ivoire corresponds to the convex combination of South Africa (68.1%) and Gambia (31.9%).

29. See Figure 7 in the appendix.

30. See Figure 8 in the appendix.

31. Brun and Diakit  (2016) estimated the non-resource potential of Cote d'Ivoire at 23.34% of GDP for 2010.

32. Mansour and Rota-Grasiozi (2013).

3.3.2.4 Impact of the Tax Coordination in Guinea Bissau

Guinea Bissau has not undertaken the WAEMU tax reforms to a large extent. It is the only country in the Union which has not adopted a VAT regime during the period. The reforms that we are confident this country has met, are the customs tariff reforms to conform with the Customs Union requirements. We do not find any significant effect of the trade tax reforms. With similar Direct tax systems to the other WAEMU member states, no significant impact for the period following the reforms is observed³³.

The trade taxes- synthetic Guinea Bissau corresponds to the convex combination of Ethiopia (37%), Nigeria (30.4%), Sierra Leone (25.6%), Tanzania (4.7%) and Kenya (2.3%).

3.3.2.5 Impact of the Tax Coordination in Mali

In Mali, no significant impact of the reforms on the total tax collection is found³⁴. The domestic indirect tax reforms affected positively the revenue collection from 2002 to 2004. Following that period, we observe a relative decrease of the indirect taxes to GDP ratio, and the same occurs for the total tax revenue given that the indirect taxes were 43% of the total tax revenue. The lack of significance in this post-reform period may be related to this fall in revenue collection. The latter is due to the measures (tax exemptions) undertaken by Mali in response to the food and energy price crisis of 2006-08. To contain the food price crisis, the government of Mali, in July 2007 granted VAT exemptions for powdered milk and edible oil for a two month period. Also, in 2008, Mali exempted rice imports from VAT and trade taxes (Diarra, 2013). The reforms did not affect the direct tax and tariffs revenue collection.

The domestic indirect taxes- synthetic Mali corresponds to the convex combination of Ethiopia (34.1%), Zambia (23.3%), Ghana (19.9%), Gambia (18.9%) and Nigeria (3.9%).

3.3.2.6 Impact of the Tax Coordination in Niger

In Niger no effects of the tax reforms on its tax revenue mobilization even for the domestic indirect tax reforms³⁵ were observed. This is not surprising, given that like Cote d'ivoire, Niger has the least productive VAT in the Union. Brun and Diakit  (2015) found an effective VAT rate³⁶ of 8.42% for Niger which is very low given its standard VAT rate of 19% for the year 2011. The exemption gap of Niger was very large. The decrease in trade tax mobilization and the misperformance of Niger in terms of indirect tax collection demonstrate the need for an improvement of the tax administration in Niger to achieve the tax transition.

The total tax- synthetic Niger is the convex combination of Nigeria (41.5%), Ethiopia (35.2%), Gambia (15.4%) and Guinea (7.9%).

33. See Figure 9 in the appendix.

34. Figure 10 in the appendix.

35. See Figure 11 in the appendix.

36. It is the total burden of VAT expressed as a percentage of total final consumption (Borselli et al, 2012).

3.3.2.7 Impact of the Tax Coordination in Senegal

According to the observed results, the tax reforms affected the revenue collection in Senegal only for the domestic indirect taxes³⁷. We find a statistical significance of the domestic indirect reforms during most of the post-reform period (2000-2010). The effects are positive for the periods (2001-2003, and 2005-2009). Senegal is known to have a productive tax system. Since 2004, it has met the convergence criteria mandated by the WAEMU Commission for the tax revenue-to-GDP ratio which must be at least 17%³⁸, so one can conclude that the country has succeeded in its tax transition. Senegal's revenue performance is impressive and almost entirely linked to the VAT and excises, which account for over 50% of tax revenue. Senegal seems to have progressed best in transiting from tariffs to domestic tax revenue (Mansour and Rota-Graziosi, 2013).

The domestic indirect taxes- synthetic Senegal corresponds to the convex combination of Uganda (52.6%), Madagascar (15%), Mozambique (13.3%), South Africa (8%), Sierra Leone (6.8%) and Zambia (4.3%).

3.3.2.8 Impact of the Tax Coordination in Togo

As for the majority of WAEMU member states, we find a significant impact of the domestic indirect tax reforms on revenue mobilization in Togo³⁹. However, there is a significant effect only for the year 2007. Until 2010, Togo had not reached the convergence criteria of the WAEMU with a ratio of tax-revenue to GDP of 15.68 which is well below its non-resource tax potential predicted for the same year (20.62)⁴⁰. For the direct tax reform effects, Togo is the same as the other WAEMU member states, the reforms have not affected the direct tax revenue mobilization. Tariff reforms affected significantly the revenue collection in Togo during the periods 1997-1998 and 2002-2004.

The domestic indirect taxes- synthetic Togo corresponds to the convex combination of Nigeria (54.9%), Botswana (36.7%) and Ethiopia (8.4%).

3.4 Robustness check

To check the robustness of our results about the significant impact of WAEMU tax reforms on revenue mobilization, we conducted an additional analysis. We included in the donor pool only the Semi-Autonomous Revenue Authority (SARA) system. The idea behind this is to compare WAEMU countries with the countries which have implemented SARAs knowing that SARA is implemented by countries for revenue performance improvement purposes. The analysis was conducted for total tax reform and domestic indirect tax reform separately given that the latter has proved successful according to the above results. We include countries where the law on SARA implementation was passed before the start of the domestic indirect tax reforms in the WAEMU. In this way, the control units are Ethiopia,

37. Figure 12 in the appendix.

38. The 2015 Additional Act N°01/2015/CCEG/UEMOA increased this ratio to 20%.

39. Figure 13 in the appendix.

40. Calculations of Brun and Diakit  (2016).

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Kenya, Rwanda, South Africa, Tanzania, Uganda and Zambia⁴¹. These countries have no borders with the WAEMU member states, so this allows the limitation of the spatial spillover effects which occur when countries adopt the good practices of their neighbors and cause interpolation biases.

As shown in Figure 14 in the appendix, for the SARA sample, we find a positive significant effect of the total tax reform in the WAEMU for the year 2003. This significant positive effect is found in the results for Benin, Burkina Faso, Senegal, and Togo. For the domestic indirect tax reforms, these additional estimations attest to their positive effects on revenue mobilization (Figure 15). In fact, we find significant positive effects of the reform for most of the post-reform period (2000-2010) for the Union as a whole, and it is the same for Senegal. The impact of the reform is significant for the other member states except Burkina Faso. Overall, the significant impact of tax reforms in the WAEMU, namely the domestic indirect tax reforms, was confirmed by these additional analyses.

41. We found information on SARA implementation in the study of Sarr (2016). This information is available in Table 7 in the appendix.

3.5 Conclusion

The purpose of this study was to evaluate the impact of the Directives, both in terms of coordination and revenue mobilization. This has been done through a study of the community legislation and a comparative case study using the synthetic control method. We estimated the impact of the harmonization on the total tax productivity and for the different types of tax. These results have been estimated for the Union as a whole and for each member state. We find that the harmonization of tax legislation affected the revenue mobilization in the WAEMU. However, the effects are significant mainly for the domestic indirect tax reforms. We find that, the domestic indirect tax revenue mobilization (even if it has been impacted by the granting of exemptions authorized by the regional legislation) has been positively affected by the reforms in the first years following the 1998 reforms in a number of WAEMU member states namely Benin, Burkina Faso, Cote d'Ivoire, Mali, Senegal and Togo. This is mainly related to the focusing of the tax transition process on VAT which is relatively easy to collect compared to other taxes, and which has a large taxable base; also international tax competition tends to focus more on direct taxes. The impact of trade tax reforms is not obvious due to the low share of intra-regional trade in the Union, the taxation of commodities exports and, the improvement of the customs procedures and the risk management. The direct tax coordination does not seem to have affected the revenue mobilization. This lack of significance is mainly due the tax incentives granted by countries in the sectoral tax codes (approved by the Union's legislation) which aim to attract foreign direct investments. Furthermore, the absence of prescribed thin-capitalization rules and transfer pricing methods is also a limit of the direct tax legislation in the WAEMU. In addition, the legislation is not adapted to the digital economy. Thus, a revision of the Union's legislation to reinforce the convergence between national tax legislation, and limit tax expenditures is required to allow the member states to mobilize resources for financing development.

The WAEMU tax harmonization aims to strengthen the convergence of national legislations. An efficient regional policy may enhance tax collection by reducing the pressure from lobbies and limiting the discretionary tax arrangements. It may also limit regional tax competition and increase international tax cooperation to fight transnational tax evasion. However, that requires coherent, properly-defined, updated, and uniformly implemented Union wide legislation. Monitoring must to be mandatory, which demands a regional institution which has a strong bargaining position.

The results of this chapter highlight the importance of the indirect tax, especially VAT, for the WAEMU member states. This raises questions about the efficiency of VAT regimes in WAEMU. The next chapter tries to give responses to this question.

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3.7 Appendix to chapter 3

TABLE 3.2 – Sample

Benin	Guinea	Rwanda
Botswana	Guinea-Bissau	Senegal
Burkina Faso	Kenya	Sierra Leone
Burundi	Lesotho	South Africa
Cabo Verde	Madagascar	Swaziland
Comoros	Mali	Tanzania
Cote d'Ivoire	Mauritius	Togo
Ethiopia	Mozambique	Uganda
Gambia	Niger	Zambia
Ghana	Nigeria	

TABLE 3.3 – Descriptive Statistics (WAEMU)

	Observation	Mean	Standard deviation	Min	Max
Non-resource taxes to GDP	609.00	13.72	7.16	2.22	59.36
Resource taxes to GDP	609.00	1.64	5.29	0.00	32.30
Indirect taxes to GDP	609.00	4.98	2.39	0.03	11.50
Direct taxes to GDP	609.00	3.85	2.51	0.42	15.03
Trade taxes to GDP	609.00	4.33	4.94	0.30	40.30
Gini net	609.00	42.90	7.47	28.38	61.84
GDP per capita	609.00	1292.37	1648.62	160.32	8000.38
Openness/GDP	609.00	66.12	32.75	16.77	209.89
Agriculture value added/GDP	609.00	29.04	14.71	2.03	65.97
Aid per capita	609.00	76.55	80.11	-16.67	693.34
Debt service/GDP	609.00	0.03	0.04	0.00	0.68
Population growth rate	609.00	2.51	1.11	-6.34	7.99
Money(M2)/GDP	609.00	29.32	17.22	2.07	102.21
Corruption	441.00	2.55	0.93	0.00	5.00
Internal Conflict	441.00	8.22	2.06	0.25	12.00

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TABLE 3.4 – Descriptive Statistics (WAEMU*)

	Observation	Mean	Standard deviation	Min	Max
Non-resource taxes to GDP	441.00	11.78	4.28	2.22	25.24
Resource taxes to GDP	441.00	2.25	6.10	0.00	32.30
Indirect taxes to GDP	441.00	4.81	2.31	0.48	10.77
Direct taxes to GDP	441.00	3.52	2.48	0.42	15.03
Trade taxes to GDP	441.00	2.91	1.68	0.30	9.44
Gini net	441.00	41.99	6.69	28.38	60.08
GDP per capita	441.00	1129.42	1556.63	160.32	7504.97
Openness/GDP	441.00	58.04	18.36	16.77	131.49
Agriculture value added/GDP	441.00	30.92	13.77	2.03	65.97
Aid per capita	441.00	62.05	42.22	1.83	365.00
Debt service/GDP	441.00	0.03	0.04	0.00	0.68
Population growth rate	441.00	2.72	0.73	-0.91	5.86
Money(M2)/GDP	441.00	26.26	12.44	2.07	84.83
Corruption	441.00	2.55	0.93	0.00	5.00
Internal Conflict	441.00	8.22	2.06	0.25	12.00

TABLE 3.5 – Results

Area	Tax	e(n-pl)	e(n-pl-used)	e(pval-joint-post)	e(pval-joint-post-std)	e(avg-pre-rmspe-p)
WAEMU*	OT	77907648	1000000	0.04	0.98	0.05
	DIT	5597956	1000000	0.23	0.26	0.79
	DT	90892256	1000000	0.85	0.96	0.22
	TT	105413504	1000000	0.68	0.16	0.97
Benin	OT	21	21	1	0.95	.67
	DIT	21	21	0.29	0.38	0.24
	DT	21	21	0.33	0.19	0.67
	TT	21	21	0.52	0.95	0.14
Burkina Faso	OT	14	14	0.79	.071	1
	DIT	14	14	0.36	0.14	0.79
	DT	14	14	0.57	0.29	0.64
	TT	14	14	0.79	0.64	0.93
Cote d'ivoire	OT	14	14	1	0.5	1
	DIT	14	14	0.43	0.57	0.36
	DT	14	14	0.93	0.93	0.5
	TT	14	14	0.14	0.07	0.21
Guinea Bissau	DT	14	14	0.57	0.71	0.21
	TT	14	14	0.57	0.36	0.57
Mali	OT	14	14	0.86	1	0.21
	DIT	14	14	0.14	0.21	0.5
	DT	14	14	0.36	0.07	0.86
	TT	14	14	1	1	0.57
Niger	OT	14	14	1	1	0.79
	DIT	14	14	1	1	0.5
	DT	14	14	0.79	0.79	0.5
	TT	14	14	0.79	0.64	0.86
Senegal	OT	14	14	1	1	0.79
	DIT	14	14	0	0	0.36
	DT	14	14	0.64	0.21	0.86
	TT	14	14	0.71	0.86	0.36
Togo	OT	14	14	0.86	1	0.14
	DIT	14	14	0.36	0.79	0.14
	DT	14	14	0.64	0.79	0.21
	TT	14	14	0.29	0.86	0.14
Robustness check						
WAEMU*	OT	46656	46656	0.90	0.59	0.97
	DIT	46656	46656	0	0	0.63
Benin	OT	7	7	0.57	0.43	1
	DIT	7	7	0.29	0.86	0
Burkina Faso	OT	6	6	0.83	0.33	1
	DIT	6	6	0.83	1	0.33
Cote d'ivoire	OT	6	6	0.67	0.17	1
	DIT	6	6	0	0.33	0.33
Mali	OT	6	6	0.67	1	0.33
	DIT	6	6	0.5	0.17	0.83
Niger	OT	6	6	0.67	0.67	0.33
	DIT	6	6	0.33	0.5	0.17
Senegal	OT	6	6	0.5	0.17	1
	DIT	6	6	0	0	0.83
Togo	OT	6	6	0.33	0.67	0
	DIT	6	6	0.33	0.83	0

Source : Authors' Calculations

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TABLE 3.6 – Adoption of Semi-Autonomous Revenue Authorities

Country	Year the Law was passed
Ethiopia	1997
Kenya	1995
Rwanda	1997
South Africa	1997
Tanzania	1996
Uganda	1991
Zambia	1994

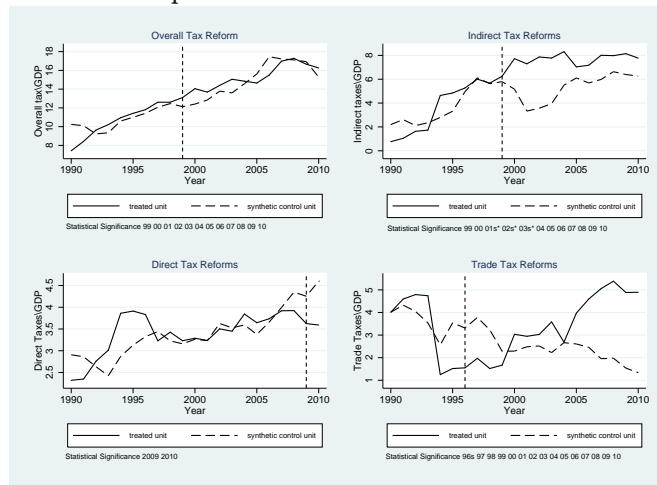
Source : Sarr (2016)

FIGURE 3.5 – Tax revenue in the WAEMU before and during tax coordination



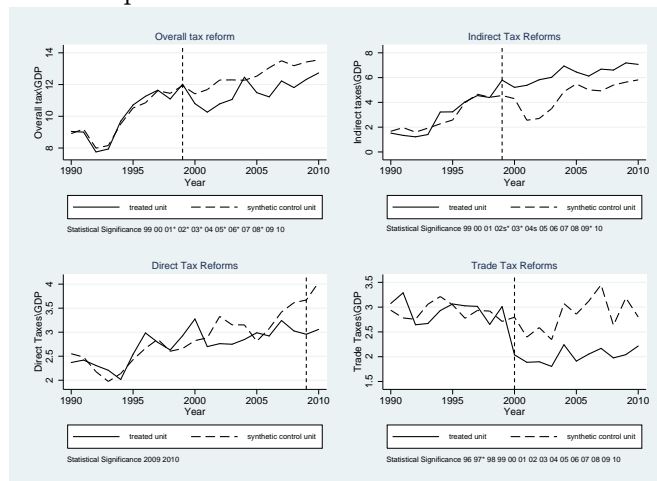
Source : Authors' Calculations

FIGURE 3.6 – Impact of the WAEMU Tax Reforms in Benin



Source : Authors' Calculations

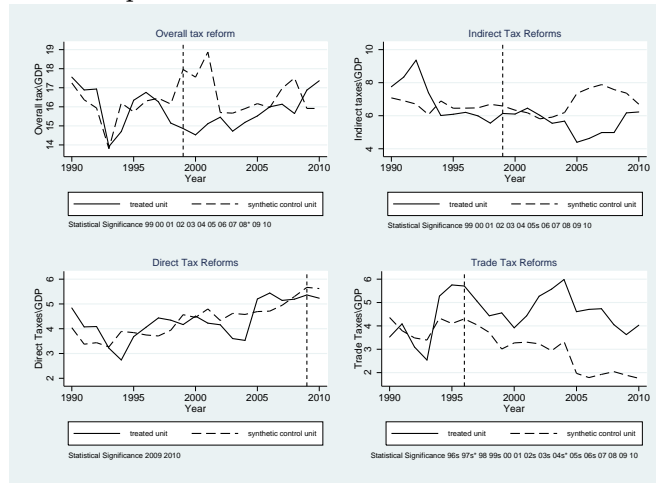
FIGURE 3.7 – Impact of the WAEMU Tax Reforms in Burkina Faso



Source : Authors' Calculations

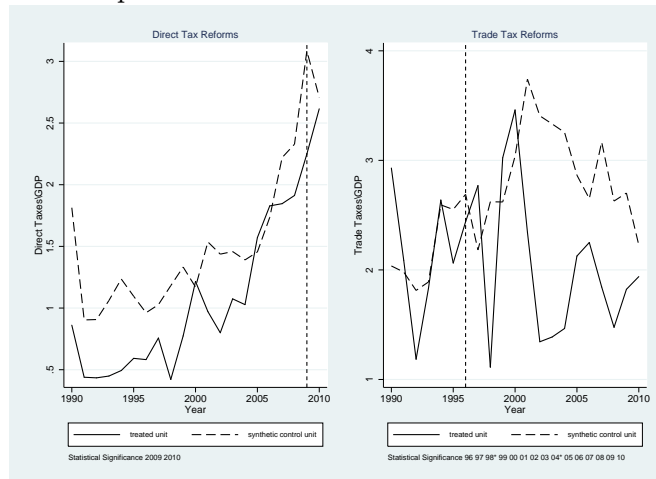
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FIGURE 3.8 – Impact of the WAEMU Tax Reforms in Cote d’Ivoire



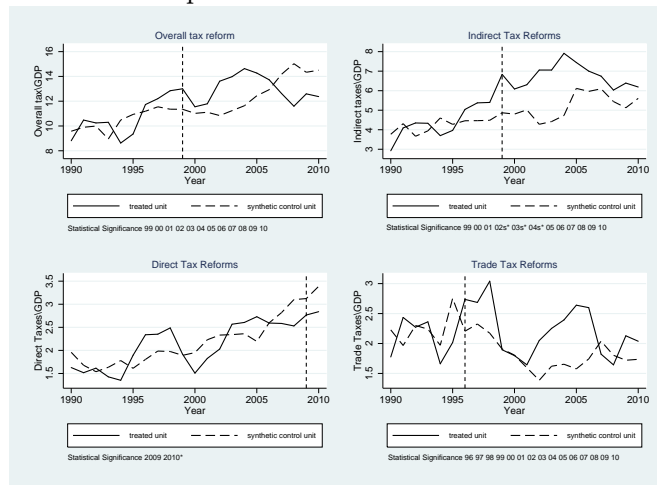
Source : Authors' Calculations

FIGURE 3.9 – Impact of the WAEMU Tax Reforms in Guinea Bissau



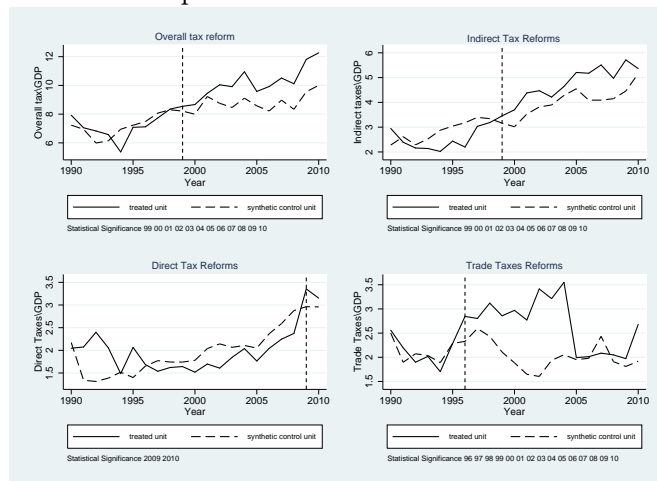
Source : Authors' Calculations

FIGURE 3.10 – Impact of the WAEMU Tax Reforms in Mali



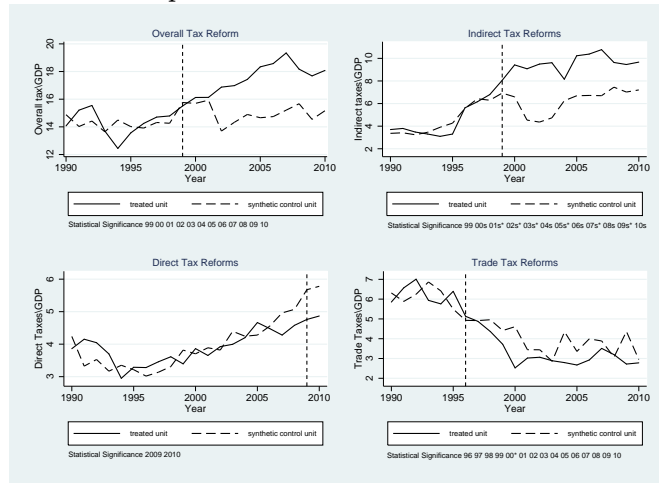
Source : Authors' Calculations

FIGURE 3.11 – Impact of the WAEMU Tax Reforms in Niger



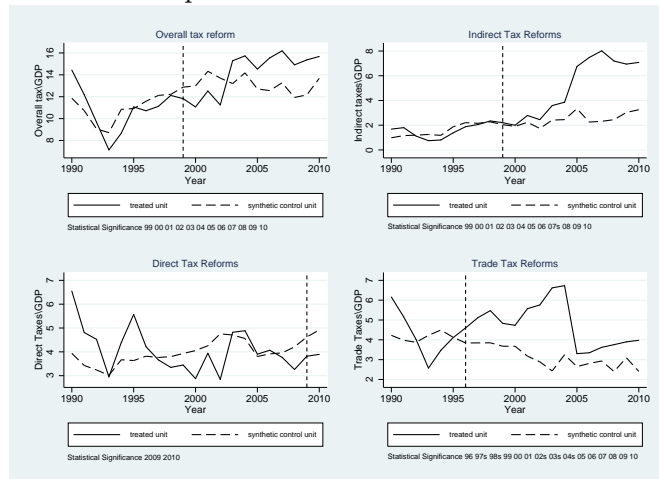
Source : Authors' Calculations

FIGURE 3.12 – Impact of the WAEMU Tax Reforms in Senegal



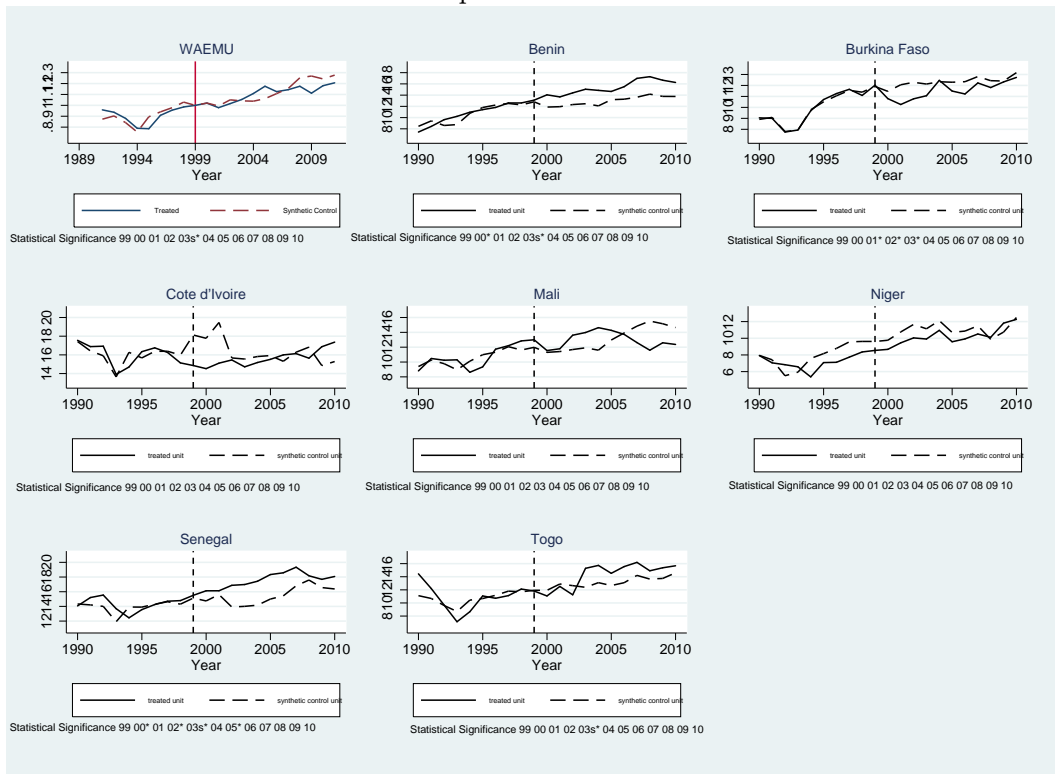
Source : Authors' Calculations

FIGURE 3.13 – Impact of the WAEMU Tax Reforms in Togo



Source : Authors' Calculations

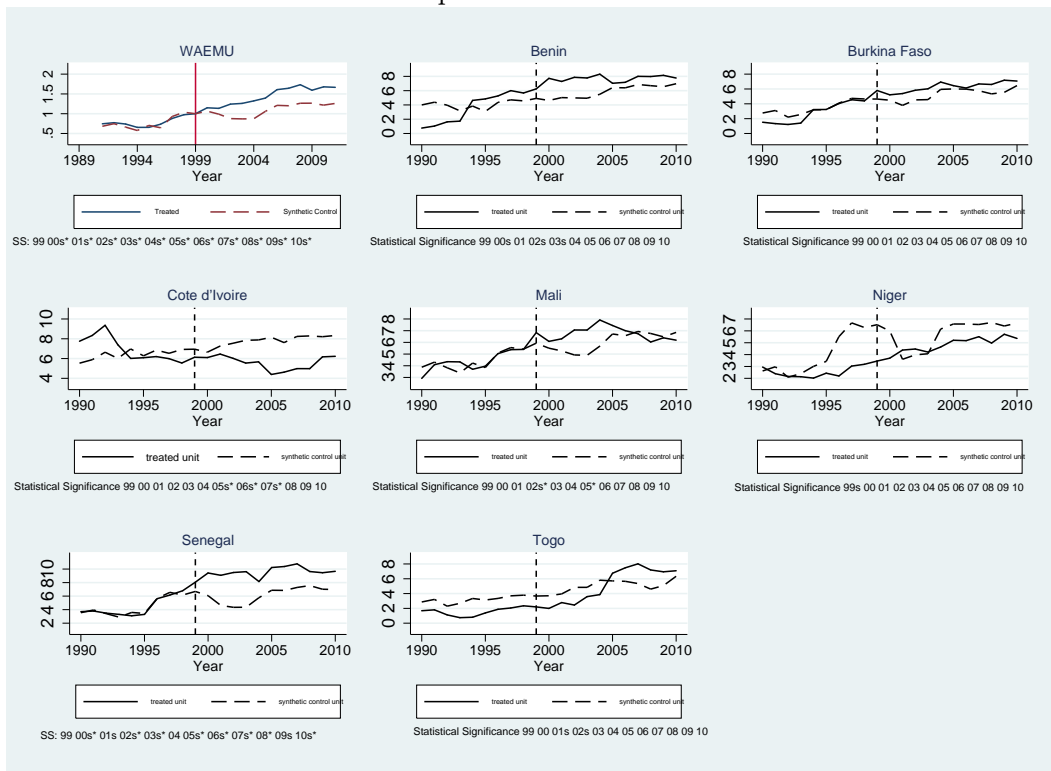
FIGURE 3.14 – Impact of the Total Tax Reform



Source : Authors' Calculations

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FIGURE 3.15 – Impact of the Indirect Tax Reforms



Source : Authors' Calculations

TABLE 3.7 – Framework of the Domestic Tax Coordination in the WAEMU

Community Acts	Key elements	Implementation
Directives concerning the Value-added tax(a)	<ul style="list-style-type: none"> — The registration threshold is fixed between XOF 30M(b) and 100M for the supply of goods and XOF 15M to 50M for the supply of services. — The standard VAT rate must range from 15% to 20% and the reduced VAT rate from 5% to 10%. — A comprehensive list of taxable goods and services at the reduced rate is provided(c). — The exempted supplies are related to health care(d), education, non-processed food or most basic foods, the social block for water and electricity and domestic gas. Exemptions are granted on the activities of development agencies. — The refunding of VAT credits depends on a minimum threshold fixed by countries. The limit set for refunding is 15 days. — Persons liable to VAT cannot deduct the tax on reception charges, accommodation, catering, event charges, purchasing of company cars(e). — The substitution of the previous sales tax systems to a value-added system is recommended by the Directives. 	<p>In 2010, all the WAEMU member states had implemented the Directives except Bissau Guinea which was the only country in the Union which has not adopted a value-added tax regime. However, none of them refunded VAT credits according to the Union legislation(f).</p>

Notes : (a) Directive N°02/1998/CM/UEMOA, Directive N°06/2002/CM/UEMOA, and Directive N°02/2009/CM/UEMOA. (b) M corresponds to Million. (c) Hardware, agricultural equipment, industrial equipment used to produce the solar energy, processed milk, sugar, oil pasta, accommodation and catering provided by hotels and, services delivered by tourist agencies. (d) A list of exempted medicines, pharmaceuticals and medical equipment has been provided. (e) Countries could enlarge this list. (f) There is no specific sanction for countries which do not implement the legislation. However, during their annual conference, the Heads of state and government are called to order by their peers.

Community Acts	Key elements	Implementation
Directives regarding the Excises(a)	<ul style="list-style-type: none"> — Limiting the list of goods taxable by excises in the Union to alcohol beverages, soft drinks, fruit and vegetable juices (excepted water), tobacco, gums and ammunition, wheat flour, oils and fats, tea, coffee, perfumery and cosmetics, plastic bags, marble, gold bullion, precious stones and cars (with a horsepower equal or greater than 13). However, the member states set tax for at most 6 of the above products. — A maximum rate and a minimum rate are defined by product. The highest rate that can be applied (50%) concerns the alcohol beverages and the lowest (0%) is related to soft drinks, fruit and vegetable juices. In regard to the taxation of the petroleum products. — A list defined the products concerned namely aviation gasoline, premium fuel, regular gasoline, jet fuel, kerosene, gas oil, domestic fuel oil, fuel oil and butane. — The types of tax applicable to these products are restricted to tariffs, specific tax and value-added tax. About consolidated excises, the member states levy a specific tax on a liter or a kilogram protecting them from price fluctuations. — Countries could fix the amount of the tax through the legislative authority. However, the gap between taxes per product has been limited to XOF 200 and must decrease over time in a proportion of XOF 20 per annum then the gap will be closed in ten years. — About subsidies, only direct grants, through companies, undistorting competition, are allowed. The suppression of the other types of subsidies within a period of 7 years is advocated. — The allocation of the revenue mobilized to the general government budget is recommended. 	<p>All the WAEMU countries transposed the general legislation to a large extent except Guinea Bissau. Nevertheless, no country complies with the list of taxable goods in 2012. For the directive relating to the taxation of the petroleum products, in 2010, Benin was the only country which implemented the Directive. However, in 2012 Burkina Faso, Mali and Niger implemented the Union legislation. Nevertheless, the mentioned countries meet difficulties in terms of monthly price readjustments.</p>

Note : (a) Directive N°03/1998/CM/UEMOA, Directive N°03/2009/CM/UEMOA and, Directive N°01/2007/CM/UEMOA.

Community Acts	Key elements	Implementation
Directives concerning the Direct Tax(a)	<ul style="list-style-type: none"> — Determining the taxable profit namely profit on commercial, industrial, handicraft, forestry, mining and agricultural activities. — The income tax rate should range from 25% to 30%. — Exemptions : capital gains on business assets if the total proceed from selling the assets is reinvested within a 3-year period in the WAEMU, inter-corporate dividends under certain conditions : if the holding company and the payer company are WAEMU residents, the former must control at least 10% of the shares in the latter if not, at least 40% of inter-corporate dividends should be taxable. Moreover, the exemption granted in the national sectoral codes are permitted. — For the deductible charges from the tax base, the following can be observed : all types of overhead expenses(b) ; fees on transfers of business licenses, patents, trademark agreements, manufacturing processes and formulas, other similar rights and technical assistance fees ; tax imposed and paid during the budget year except the CIT and the minimum tax rate(c) ; linear depreciation ; loss and charge provisions ; interest paid to associates on the additional funds they provide besides capital share on condition that the interest rate is lower than the discount rate of the Central Bank increased by three points and the share of capital shall be fully paid up ; grants ; employer's contribution and additional funding for issuing or purchasing mutual fund shares whether the fund is located inside the Union ; insurance premium paid to companies located in the WAEMU covering risks which could reduce the net assets of companies ; deficit of a previous financial year ; headquarters expenses ; research and prospecting costs of creation of a permanent establishment inside the Union, operating costs of the latter are deductible within the three first budget years ; accelerated depreciation, digressive depreciation and depreciation lease-financed assets are deductible under certain conditions ; the member state could reinstate the charges on transfers between subsidiaries and parent companies. — The implementation of a tax prepayment system is possible nevertheless the rate of the prepayment cannot exceed 3%(d). — Tax credits are carried forward or refunded according to the national legislation. — For the multilateral Tax Treaty, the principle of territoriality is applied. 	<p>In 2010, all the member states implemented the tax prepayment system excepted Togo. In 2012, the harmonization of the taxable profit and that of the CIT rate were effective in all the WAEMU member states.</p>

Notes : (a) Directive N°07/2001/CM/UEMOA, Directive N°01/2008/CM/UEMOA, Directive N°08/2008/CM/UEMOA and, Regulation N°08/CM/UEMOA. (b) Member states should fix a maximum amount deductible for staff expenses. (c) The member states could exclude other taxes. (d) However, it should be set to 5% for companies which are not registered for tax purposes.

Community Acts	Key elements	Implementation
Directives regarding the taxation of financial activities(a)	<ul style="list-style-type: none"> — Banks and other financial institutions can deduct allowance for bad debts from the corporate tax base according to the Central Bank prudential regulations. — Doubtful debt and litigious claims provisions saved by banks and financial institutions are also concerned by the deduction in accordance with banking regulation and reserves for reported claims, reserves for premium cancellation saved by life insurance holding companies as defined by the Code of the Inter African Insurance Market Conference. — Countries should fix the duration of the forward carrying of losses with respect of a three year's minimum duration. — Withholding tax rates are : 10% to 15% for dividends; 2% to 7% for dividends payed by companies listed on a stock exchange approved by the "Conseil Régional de l'Epargne Publique et des Marchés Financiers (CREPMF)"; 6% for interests(b). — Interest on government bonds, those of public entities and their dismemberments, are taxed at 3% if the term of the bond ranges from 5 years to 10 years; the rate tax is 0% for the long-term bonds (with a duration higher than 10 years). — Capital gains on equities cannot be taxed at a rate exceeding 7%, and capital gains on obligations cannot be taxed at a rate higher than 5%. — Capital gains and other incomes distributed by the Undertakings for Collective Investment in Transferable Securities and other collective investment funds registered at the CREPMF are exempted(c). — The double taxation of the income and capital gains of the investment funds is prohibited within the Union. — Qualifying Closed-end investment companies "Sociétés d'Investissements à Capital Fixe" are exempt from CIT and withholding taxes, however, the duration of the exemption cannot exceed 15 years. — Income deriving from the activities of venture capital companies "Sociétés de Capital-Risque" are exempt from CIT, withholding taxes and capital gains under the condition that such income is deriving from an investment with a maturity of at least three years(d). — Acquisition of a stake in another company by qualifying venture capital companies is exempt. 	<p>Niger and Togo were the only countries to have transposed the Directive intended to coordinate the tax rules applicable to securities in 2012(e).</p>

Notes : (a) Directive N°05/2008/CM/UEMOA, Directive N°02/2010/CM/UEMOA and, Directive N°02/2011/CM/UEMOA. (b) The rate can be lower than 6% under certain conditions. (c) Activities operated by the qualifying financial intermediaries registered at the CREPMF are considered as exports with regard to VAT. (d) Reinvested capital gains within a duration of twelve months are exempt regardless of the date on which the securities were acquired. (e) Here, we only found information about the implementation of this Directive.

Determinants of VAT GAPS in WAEMU

«La réussite des transitions fiscales suppose le plus souvent de mobiliser des recettes de TVA supplémentaires. A cet égard, il est essentiel de réduire les exonérations qui sont un facteur essentiel de faiblesse des recettes de TVA» Gérard Chambas.

4.1 Introduction

Value-added tax (VAT) was introduced first in France in 1954, and has rapidly spread across the world, to date it has been adopted by more than 160 countries¹. VAT has a good capacity to raise tax revenue, but the increasing popularity of the tax is also related to its neutrality and ease of administration. The neutrality of value-added tax arises from its following characteristics : On the contrary to trade tax, VAT does not create distortions by encouraging local production to the disfavour of imported goods ; Similar goods are taxed at the same rate regardless to their origin, so focusing on VAT is a positive sign by which a country proves to its current and future trade partners, its trade openness commitment ; VAT does not affect the competitiveness of local producers insofar as exports are taxed at zero-rate thus, exporters can benefit from refund of the VAT charged on the production of exported goods ; VAT does not increase a company's cost of production given that the company may deduct VAT on inputs from the VAT charged on outputs, so it can be said that VAT is more favourable to economic growth than corporate income tax ; Unlike some systems of sales tax, VAT is neutral vis-a-vis the degree of integration of production i.e. the number of companies which contribute to the production of a good.

The Commission of West African Economic and Monetary Union (WAEMU) adopted a tax transition program in 2006 which designated VAT as the main instrument for revenue collection². In 2015, the average VAT to GDP ratio of WAEMU countries was 6.2% compared to 5.3% for Sub-Saharan Africa, and 6.9% for OECD³. The average VAT shares in tax

1. Figure 4 in the appendix shows the spread of VAT around the world.

2. A shortfall of trade taxes was expected from tariff reforms, to face this challenge, the Commission of WAEMU adopted a tax transition program in fostering the collection of domestic revenue by the member states (See Diakité et al (2017) for further details on the tax reforms in WAEMU).

3. Sources : ICTD/UNU-WIDER Government Revenue 2018 Dataset (including data from IMF GFS, IMF Country Reports, IMF Regional Economic Outlooks, IMF Articles IV, OECD Tax Statistics, ECLAC, CEPALSTAT), BDSM UEMOA 2018, data collected with some African Tax Authorities, and author's calculations.

revenue was 37.2% and in total government revenue was 30.7% in WAEMU. These figures show the importance of this source of funding for these developing countries where there is a pressing need for expenditure, the issue of value-added tax productivity is decisive. This raises questions about the efficiency of VAT regimes in WAEMU. What characterizes an efficient VAT system? Are the VAT regimes of WAEMU member states efficient? What are the determinants of VAT gaps in WAEMU? This study seeks to answer these questions.

Value added tax performance depends on the effort made by the revenue authority to mobilize revenue, and its capacity to prevent fraud and tax evasion. However, another determinant of VAT revenue collection is the tax legislation. The efficiency of a VAT regime on the revenue and neutrality sides lies in the similarity with a theoretical "pure" VAT regime⁴. Since the inception of VAT, academics, international organizations, and tax officials have shown great interest in measuring the performance of VAT regimes. From the econometric analysis, we find that the vulnerability caused by Illicit Financial Flows (IFFs) due to import has a significant impact on VAT gaps, especially the VAT Policy gaps.

The first attempts to assess tax jurisdictions' VAT efficiency consisted of analysing the changes in tax revenues and in the ratios of VAT revenue to total tax revenue and tax revenue to government total revenue. These basic measures of VAT productivity have been employed in a number of studies, such as those of Stockfish et al (1985), and Nellor (1987). Agha and Haughton (1996) developed a VAT effort index. Initially, they constructed a measure of potential VAT revenue in multiplying each VAT rate by the related tax base and determined the compliance index by the ratio of actual to potential VAT revenue.

The "efficiency ratio", namely the ratio of VAT revenue (in %GDP) to the standard rate was used by Ebrill et al (2001). They also employed "c-efficiency" which is the ratio of value-added tax revenue (in share of private consumption) to the standard rate. The "efficiency ratio" and the "c-efficiency" are the most popular summary measures used to assess the performance of VAT regimes. In 2008, the OECD developed the VAT Revenue Ratio (VRR) which is similar to the "c-efficiency ratio". However, the OECD removes the actual VAT revenue from the denominator to better define the theoretical tax base, and the final consumption expenditure used includes both private and public consumption. Other econometric tool can be used to estimate the efficiency of VAT regimes (see Brun et Diakité (2016) for further details).

If previous VAT performance measures allow determination of the revenue productivity, they cannot explain the factors which influence the performance, and thereby the difference in efficiency across jurisdictions. Determining VAT gap indicators makes it possible to deal with this challenge in refining the calculations to identify the "policy gap" (combination of the "exemption gap" and the "rate gap"), and the compliance gap related to the

4. From an optimal tax perspective, all commodities must be taxed at the same rate (Ebrill et al, 2001). The tax administration cost incurred by government and taxpayers must be as low as possible.

tax administration's efficiency. The policy gap highlights the impact of exemptions and multiple VAT rates.

VAT gap estimations can be developed following either the bottom-up or top-down approach. The bottom-up approach uses micro-data on tax compliance from the dataset of tax administrations, tax administrations' audit reports, and surveys. The top-down approach, which is used more often, uses macro data on production and final consumption.

Indicators like this were developed by Trigueros et al (2012) for Latin American countries, and Reckon (2009), Keen (2013), Barbone et al (2013 to 2015) and Poniatowski et al (2016 to 2020) for European Union countries. Case by case studies have been conducted on some African countries, such as South Africa, Uganda, Zambia, Benin, and Burkina, but to the best of our knowledge, there is no study of these measures for a large sample of African countries⁵.

Illicit Financial Flows (IFF) are defined as money which is illegally earned, transferred, or utilized⁶. They include proceeds of crime, corruption, tax evasion, and aggressive tax planning. IFFs may occur through different channels i.e. trade, investment, and bank funds and flows. Estimates suggest that as much as USD 50 billion is lost annually through illicit financial flows, in Africa (Mbeki Report, 2015). Thus, IFFs undermine the tax performance of African countries. Most VAT-related illicit financial flows go through the trade channel. In general, trade-based illicit financial flows arise from false invoicing. This is the practice of falsely declaring the value of goods imported or exported to evade customs duties and taxes, circumvent quotas, or launder money (Hearson, 2014). According to Global Financial Integrity, more than 80% of IFFs are accompanied by trade mis-invoicing⁷. Countries are exposed to IFFs, through manipulation of the price, and quality of goods at the border, which undermines revenue collection. For example, Fisman and Wei (2004) in using data on trade between China and Hong Kong found that a 1% increase in the tariff and VAT on imports led to a 2% to 3% increase in tax evasion. We regard vulnerability to IFFs as a potential determinant of VAT gaps.

Digitalization of the tax administration is considered to be an effective way to fight corruption, notably by limiting the risk of bribery. It reduces the cost and time spent on tax collection through electronic filings by the use of mobile telephone or electronic payments and brings greater transparency. Digitalization improves information exchange between the national revenue management entities, and international exchange of information with foreign revenue authorities. Using digital tools facilitates tracking of illegal operations and makes tax collection efficiency and effectiveness. The digitalization of the global economy

5. Houssa et al (2017) developed VAT indicators for a small sample of WAEMU countries including Benin and Burkina Faso. Combey (2020) estimated VAT gaps for Togo.

6. United Nations Economic Commission for Africa and African Union, Report of the High-Level Panel on Illicit Financial Flows from Africa 'Mbeki Report' (2015).

7. Choi et al (2018).

is creating new challenges for tax administrations about what is taxable and how the value is defined. The internet has become a platform for international trade which is favourable to the growth of economies, but taxable operations such as social network advertising and cross-border purchasing of goods may escape taxation, especially in sub-Saharan African countries due to the gaps and loopholes in the tax legislation and the low capacity of the tax administrations⁸. In this regard, digitalization of both tax administrations and the global economy can impact VAT gaps.

This study estimates VAT gap indicators for all the WAEMU member states which have adopted VAT⁹.

This is done through the use of national accounts data extracted from countries' Social Accounting Matrixes (SAM) of 2007 provided by the Commission of WAEMU¹⁰ which were updated by Bayalé et al (2019) for 2015. These SAMs include disaggregated sectorial data on output, intermediate consumption, imports, exports, and VAT. The methodology used is the one developed by Hutton (2017) and currently used by the IMF in its Revenue Administration Gap Analysis Program (RA-GAP). It consists of a top-down approach to estimating the VAT policy gap and the VAT compliance gap. The calculation of the VAT gaps requires the collection of information on the jurisdiction's VAT legislation to determine as accurately as possible the potential VAT revenue. Then we use a two stage least squares instrumental variables instrumental model (2SLS) to explain the estimated gaps notably by assessing the impacts of vulnerability to IFFs and digitalization. Our findings show substantial VAT gaps for the WAEMU countries. Gaps which are mainly due to policy imperfections. The estimated policy gaps are higher than the estimated compliance gaps. We do not find a significant effect of the vulnerability through the export channel on VAT gaps. As regards digitalization, for the regressions which have either the overall VAT gap or the Policy gap as dependent variable, we find a positive impact on VAT gaps. However, we find that digitalization leads to a reduction of the compliance gap.

4.2 Literature Review

In general, studies estimating the VAT gaps are conducted at the request of decision makers (e.g. national governments¹¹, and regional or international organisations) by statistical offices, revenue authorities, consultancy firms, and sometimes by academics. These initiatives are often taken in view of tax reforms or for revenue forecasting purposes.

8. UNCTAD estimated that global e-commerce sales grew to USD 29 trillion in 2017(UNCTAD, 2019 : <https://unctad.org/press-material/global-e-commerce-sales-surged-29-trillion>).

9. We include all the WAEMU member states in the sample except Guinea Bissau which has not adopted VAT.

10. The Social Accounting Matrixes were created under the auspices of the Commission of WAEMU with the contribution of the World Bank Group in Burkina Faso Mission.

11. These estimations are generally done by OECD countries such as United Kingdom, Denmark, Italia, Germany, Romania, Austria, Slovak Republic and Estonia.

Among the first publications on VAT gaps, is Aguirre and Shome (1988) who developed a methodology for constructing the VAT base on a sectorial basis by using Mexican national accounts and input-output tables. Serra (1991) applied the same methodology for Chile. Mackenzie (1992) and Zee and Howell (1995) put forward formulae for determining the base of a VAT regime with exemptions based on the top-down approach. Pellechio and Hill (1996) estimated the Zambian VAT base for the year 1995 following the formula proposed by Mackenzie (1992). Parsche, Nam and Gebauer (2003) evaluated hypothetical VAT revenues for EU countries. They determined the extent of VAT evasion in these countries through the top-down approach. Reckon (2009) quantified the VAT gaps of EU member states for the period 2000-2006¹² using national data published by Eurostat. Borselli, Chiri and Romagnano (2012) estimated statutory and effective VAT to determine the rate gap and the exemption gap for EU countries and presented VAT erosion by category of consumption. Keen (2013) proposed a method of breaking down c-efficiency to derive VAT gaps. Keen provided an illustrative example by using the weighted average VAT rates on final household consumption from Mathis (2004) and the rate on taxed and exempted sales from Borselli, Chiri and Romagnano (2012) to estimate the rate gap and subsequently the exemption gap, policy gap, and compliance gap. Trigueros et al (2012) estimated VAT noncompliance indicators for Latin American countries using the bottom-up approach. They calculated : a registration gap (by comparing the registered taxpayers with some proxy of the potential universe of taxpayers that the economy should show); an assessment gap (by comparing the number of taxpayer non-submitters in VAT returns with the number of registered taxpayers); a payment gap (corresponding to the ratio of the tax not paid on time and the tax determined voluntarily as reported by taxpayers,); and a veracity gap (which is the ratio between the unreported tax and the tax that should be reported). Alexeev (2016) estimated VAT gaps for Zambia for the period 2009-2011 using a top-down approach. Hutton (2017) defines the VAT gap, how it is measured under the IMF Revenue Administration Gap Analysis Program¹³, and how it can be used to improve tax compliance. This method has been employed by the IMF in at least 25 countries since 2013. Godin et al (2017) estimated VAT gap indicators for Bolivia using information from national accounts. Houssa et al (2017) calculated VAT gaps for Burkina Faso and Benin for the period 2007 to 2014 for Burkina Faso, and 1999 to 2013 for Benin. They found that Burkina Faso, unlike Benin, has higher a policy gap in comparison with the compliance gap. Following Reckon (2009), Barbone et al (2013 to 2015)¹⁴ and Poniatowski et al (2016 to 2020) calculated the VAT gaps for EU countries on an annual basis, and the estimates are revised backwards every year (8 reports have been published from 2013 to 2020). Combey (2020) estimated VAT gaps for Togo for the period 2007 to 2015.

12. 25 Countries were concerned by the final report.

13. The International Monetary Fund has published some technical assistance reports where VAT gaps have been calculated for countries such as Denmark, South Africa, Uganda, and Zambia.

14. While the studies of Barbone et al (2013 to 2017) used the top-down approach like that of Reckon (2009), there are notable difference - the choice of data, computation of the VTL from the gross fixed capital formation, and higher use of estimates from direct communications (Barbone et al (2013)). In addition, the studies of Barbone et al (2013 to 2017) include countries excluded from the report of Reckon (2009) i.e. Cyprus, Romania and Bulgaria.

4.3 Limitations of VAT gap indicators and the other indicators used to measure VAT performance

A main criticism of the efficiency ratio relates to its change with the share of consumption in GDP. It can be observed that for 2 countries with similar VAT revenue and level of consumption, the productivity ratio will be higher for the country with the higher consumption share in GDP. Moreover, the use of GDP to calculate the efficiency ratio is done with the purpose of estimating the extent to which the VAT bears uniformly on a broad base (Ebrill et al, 2001). However, the Gross National Disposal Income (GNDI) seems to be more appropriate given it includes all types of income inflows¹⁵. This is relevant when looking at the role of remittances in leading to an increase in tax revenues through private consumption (Ebeke, 2011). On the other hand, the use of consumption data appears to be more suitable in defining the scope of VAT. This is the case with the c-efficiency ratio, but c-efficiency is also criticized. Indeed, using the overall aggregated data on final consumption leads to an underestimation of the ratio insofar as VAT charged on final consumption is included in these data. This error is corrected when determining the VAT Revenue Ratio for which the actual VAT revenue is removed from consumption data before the calculation. Also, the results of estimations of VAT gaps using econometric tools are sensitive to the selection of determinants and assumptions used in the model (Hutton, 2017). Furthermore, all these previously mentioned ratios assess the efficiency of VAT, but they do not explain the sources of mis-performance which can be done by the tax gap estimations.

Tax gap indicators are also criticised. The main limitations of these indicators, which apply also to the previous measures, are related to the reliability of data and the ignoring of behavioral impacts of VAT legislation on consumption which could be large in some cases (Gemmell and Hassesldine, 2012).

The reliability of data is a crucial problem in constructing indicators especially for Sub-Saharan African countries. Indeed, these nations, are known to have deficiencies in the collection of statistical data¹⁶. Particularly for data problems inherent in estimating VAT gaps, a lack of disaggregated data leads researchers to overestimate or underestimate the VAT performance¹⁷.

For VAT revenue, some factors may lead to its overestimation giving an increase of the value of indicators. Cut-off rules may prevent VAT creditors being refunded when the amount does not reach a set limit. Some countries, even when the amount is large, employ excess credit carry-forward mechanisms according to which VAT credit is refunded during

15. See Cappeli and Vaggi (2013) for further information on the GNDI.

16. An example is Ghana where the GDP in 2011 has increased from GH 25.6 to GH 44.8. Thus, it increased by 60%.

17. Majesty's Revenue and Customs (2015) provides further information on the errors in tax gap estimations.

the next tax periods. VAT revenues rise when there is restriction on the right to deduct in respect of business purchases such as purchases of vehicles, reception fees, accommodation, and restaurant meals in WAEMU¹⁸. Moreover, sometimes, certain producers, specifically farmers, banks, and insurance agencies cannot claim a credit on the VAT charged on intermediate goods. In addition, VAT charged on purchases by non-residents may be not refunded¹⁹.

These limitations do not call into question the usefulness of these indicators in assessing VAT performance; however, they show that the results must be interpreted with caution.

4.4 Methodology

4.4.1 The potential VAT revenue model

This study determines VAT gaps using the potential revenue model developed by Hutton (2017). The potential revenue model uses national accounts data to estimate the taxable value-added across all sectors of the economy in accordance with the current policy framework. It consists of estimating the potential amount of tax on imports by a sector, plus the tax applicable to the output of a sector, minus the amount of input tax credit due to the sector (Thackray et al, 2015). Then this potential VAT revenue allows the determination of the overall VAT gap (potential VAT revenue minus actual VAT collection), and thereby the Policy gap and the Compliance gap.

The potential VAT revenue is assessed as follows :

$$P_{VAT} = \sum_s (P_{VAT}M^s + P_{VAT}O^s - P_{VAT}I^s) \quad (4.1)$$

P_{VAT} is the potential VAT revenue; $P_{VAT}M^s$ corresponds to the potential VAT on to the imports of sector s ; $P_{VAT}O^s$ is the potential VAT on the output of sector s and $P_{VAT}I^s$ is the potential VAT creditable on the inputs of sector s .

The potential VAT on the imports of sector s is determined as follows :

$$P_{VAT}M^s = \sum_c (M_c^s * t_c) \quad (4.2)$$

M_c^s represents the imports of commodity c by sector s and t_c is the VAT rate that applies to commodity c . t_c is zero when commodity c is exempted or zero-rated.

18. Article 34, Directive N°02/98/CM/UEMOA, WAEMU Community Legislation on taxation.

19. This is why small island economies, often with strong tourism sectors, tend, all things being equal, to have high C-efficiency (Keen, 2013).

The potential VAT on the output of sector s is :

$$P_{VAT}O^s = \sum_c (O_c^s - X_c^s) * t_c * \omega^s \quad (4.3)$$

O_c^s corresponds to the output of commodity c by sector s ; X_c^s represents exports by sector s of commodity c ; and ω^s is the proportion of value-added in sector s that is produced by entities registered for value-added tax²¹, it allows consideration of the existence of VAT thresholds.

Finally, the potential VAT creditable on the inputs of sector s is determined as follows :

$$P_{VAT}I^s = \sum_c (Z_c^s + F_c^s) * t_c * \omega^s * (1 - \varepsilon^s) * \delta_c^s \quad (4.4)$$

Z_c^s is the intermediate consumption by sector s of commodity c ; F_c^s is the gross fixed capital formation of commodity c by sector s and δ_c^s is the proportion of a purchase allowed to be claimed.

The variable ε^s is the proportion of output for a sector which is exempt output, it is endogenously determined in the model as follows :

$$\varepsilon^s = \sum_c (O_c^s * \phi_c) / \sum_c (O_c^s) \quad (4.5)$$

Where $\phi_c = 1$ if commodity c is exempt and 0 otherwise.

4.4.2 Estimation of the VAT gaps

The overall VAT gap is potential VAT revenue minus net accrued VAT collection. The net accrued VAT collection is determined as follows :

$$A_{VAT} = \sum_{t \in s} (V_M^T + Vap^T + Vac^T + Vc^T) \quad (4.6)$$

A_{VAT} is the net accrued VAT collection for sector s ; V_M^T is the VAT on imports for taxpayer T ; Vap^T is the actual VAT payments received from taxpayer T for the period; Vac^T is the excess credits of taxpayer T used to reduce a positive VAT liability and Vc^T represents domestic net VAT credits for taxpayers in a credit position²².

20. This is a representation of destination-based VAT which is commonly implemented by jurisdictions.

21. ω^s could be constructed using other sources, such as business survey data, or other tax declaration data (Hutton, 2017). Here we assume that ω^s is 0.95 for output, input, exports, and intermediate consumption for all the member states of the WAEMU.

22. There is an assumption here that the Net accrued VAT collection is similar to the annual VAT revenue data published by the WAEMU member states. Indeed, the Community Legislation of WAEMU demands the refunding of VAT credits, nevertheless until recently the member states failed to respect this requirement. Substantial VAT credits were either not refunded or refunded in difficult circumstances in WAEMU and such a situation is harmful to the competitiveness of local producers. One can cite as an example Côte d'Ivoire which reimplemented a measure exempting the

The overall gap is determined as follows :

$$VATgap = \frac{P_{VAT} - A_{VAT}}{R_{VAT}} \quad (4.7)$$

Where R_{VAT} is the potential VAT estimated using the reference policy framework. The reference policy structure employed by IMF's RA-GAP is the current standard rate applied to all final consumption (Hutton, 2017).

The Policy gap is expressed by :

$$Policygap = \frac{R_{VAT} - P_{VAT}}{R_{VAT}} \quad (4.8)$$

As mentioned above the Policy gap highlights the impact of the range of exemptions and multiple VAT rates applied in countries. Thus, for countries which have adopted a single rate VAT system, such as the member states of WAEMU in 2007, the Policy gap represents mainly the exemption gap.

The Compliance gap is determined as follows :

$$Compliancegap = \frac{P_{VAT} - A_{VAT}}{P_{VAT}} \quad (4.9)$$

4.4.3 National Accounts Data and VAT legislation in WAEMU

We extracted disaggregated sectorial data on the output, intermediate consumption, imports, exports, and VAT²³ from countries' SAMs to estimating the potential VAT revenue using the current and the reference policies framework by sector. These harmonized matrixes have 19 sectors presented in Table 1 below.

Moreover, we collected information on VAT legislation in force during the periods 2007 and 2015 to determine the scope of VAT (the list of taxable commodities, exemptions, and relief schemes), tax rate, restrictions on the right to deduct. Information was extracted from tax codes, finance acts, and tax procedure handbooks for each member state of the WAEMU, and other official revenue authority reports²⁴.

intermediate consumption of exporters from VAT due the problems experienced in refunding VAT credits, this disposition was repealed in January 2013 (Chambas, 2014). In 2015, the government of Cote d'Ivoire created an escrow account for VAT collected on import/purchases for refunding VAT Creditors. In 2018, Burkina Faso voted a law relative to the creation of an escrow account that will be used to refund VAT credits.

23. Disaggregated VAT data are available in the SAM for only a few countries such Mali in 2007 for which we can estimate the sectorial gaps.

24. We also collected information from private organizations such as Ernst and Young and PwC which provide annually updated information on countries' VAT legislation.

TABLE 4.1 – Sectors of Social Accounting Matrixes of the member states of the WAEMU

1. Subsistence farming/food agriculture	11. Construction activities
2. Industrial farming	12. Trade
3. Livestock farming and hunting	13. Restaurants and hotels
4. Forestry, logging and ancillary services	14. Transport and Communication
5. Fishing	15. Financial activities
6. Extractive activities	16. Activities of public entities
7. Food industry	17. Education
8. Textile manufacturing, clothing and leatherworking	18. Health and social action
9. Other manufacturing activities	19. Other services
10. Electricity, water, and gas	

4.4.4 VAT Legislation in WAEMU

VAT taxation in WAEMU is harmonized according to the WAEMU Community Legislation. Key elements of the VAT law in force in WAEMU in 2007 are : the adoption of a single VAT rate (between 15% and 20%) by countries; the exemption, in general, of health care, education, non-processed food and most basic foods, social consumption of electricity, water and gas, sales made by artists of the products of their art, financial services, transfer of real estate, petroleum products, transport, sales of second-hand goods, extractive activities, non-furnished accommodation, gambling, newspapers, magazines and books, sales or transfers by public administrations, project-aid ; restrictions on the right to deduct VAT in respect to business purchases of vehicles, reception fees, accommodation, and restaurant meals. In 2015, some countries adopted multiple VAT rates (with reduced rates varying from 5% to 10%) as allowed by the Community Legislation. The enlarged list of exempted goods and service deliveries mainly includes housing construction, agricultural equipment, and Information Technology (IT) equipment except consumables.

4.5 The results of the VAT gap estimates

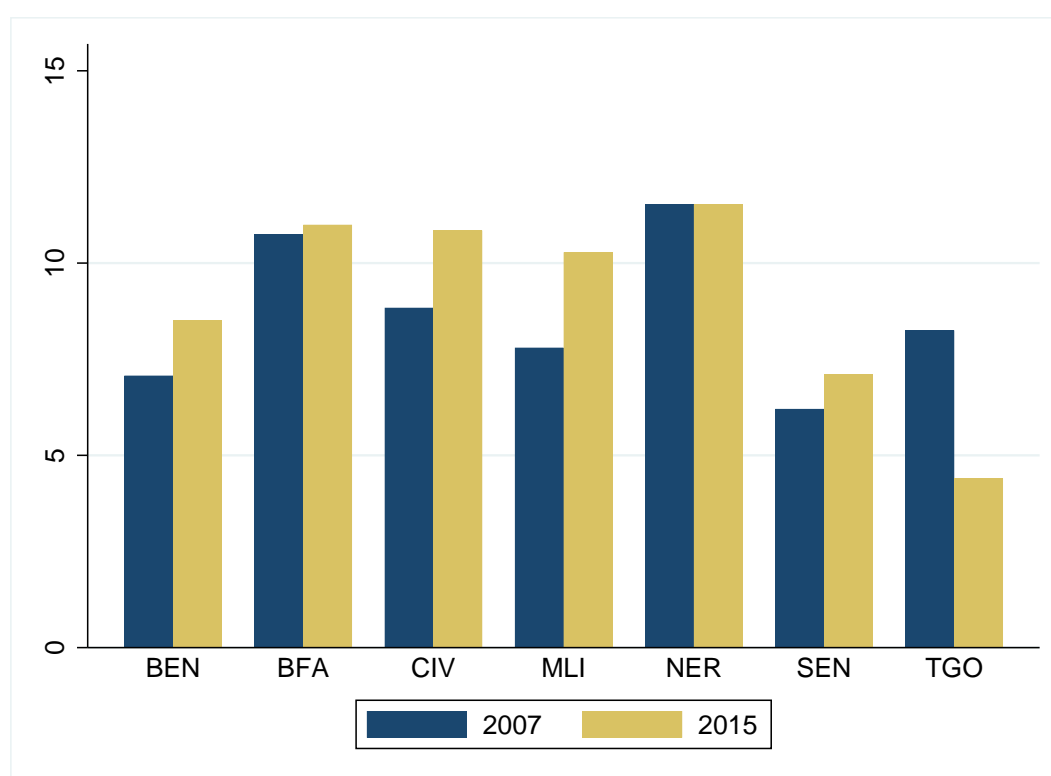
We find a substantial average VAT gap in WAEMU countries ranging between 8.6% of GDP in 2007 and 9.1% of GDP in 2015 (Figure 1). These gap estimates represent 148% of the actual average annual VAT revenue of the Union in 2007, and 147% in 2015²⁵. The size of the gap is mainly affected by policy imperfections. The estimated policy gaps are higher than the estimated compliance gaps²⁶. The average policy gaps were 7% in 2007 and 8.2% in 2015 compared to the respective average compliance gaps of 1.6% and 0.9% respectively. The significant policy gaps reflect the difference between the reference VAT

25. In 2007, the average vat revenue ratio to GDP in WAEMU was 5.8%.

26. The 2015 report of the Revenue Administration Gap Analysis Program of the IMF shows that the same case occurs with South Africa.

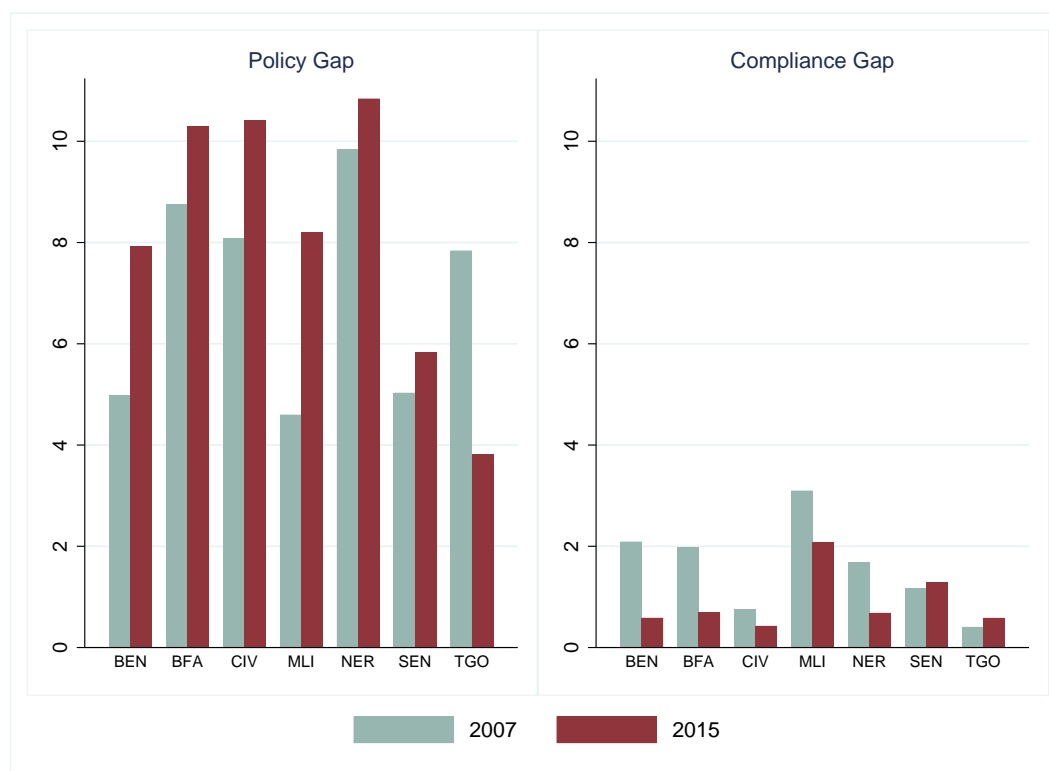
revenue (from a ‘pure VAT system’) and the potential VAT revenue that can be collected in implementing the legislation in force. This highlights the impact of the broader set of exemptions included in jurisdictions’ VAT legislation. Such exemptions reduce the scope of VAT and create distortions and complexity in the administration. Their fiscal impact is also unfavourable for the exempt businesses which bear VAT definitively. The increase in the Policy Gap from 2007 to 2015 is related to both exemptions and the adoption of multiple VAT rates. In 2015, some WAEMU states such as Cote d’Ivoire and Niger increased the number of exempted goods and services compared to 2007. For example, in Cote d’Ivoire the acquisition of agricultural equipment and machinery (including acquisition by leasing), and the activities of agro-industrial enterprises operating in the cotton, cashew nut and shea sectors were exempted from VAT. Also, compared to 2007, the legislation in force in 2015 in Mali included a reduced rate on purchases of renewable energy equipment and IT equipment. In 2015, Niger had adopted a reduced VAT rate for cooking oil and sugar and Senegal for accommodation and catering services provided by tourist agencies.

FIGURE 4.1 – Estimated VAT gaps in WAEMU in % of GDP



A per country analysis shows that Niger has the biggest Policy gaps, and so the biggest VAT gaps in 2007 and 2015. In considering Niger’s VAT legislation, it can be noted that Niger has the highest standard rate over time, however it also has an enlarged list of exempted goods. As well as exemptions, the mis-performance of Niger in terms of VAT

FIGURE 4.2 – Estimated Policy gaps and Compliance gaps in WAEMU in % of GDP



revenue mobilisation is related to the consumption by producers of the goods they produce, the large share of the informal sector, and compliance problems (Chambas, 2005). The policy gaps of the other WAEMU member states, such as Burkina Faso and Cote d'Ivoire, are also high, although the significant Cote d'Ivoire gap in 2007 is largely due to provisional measures such as the exemption of investment by businesses, which had been affected by the crisis, to revive the economy. Senegal and Togo have respectively the lowest VAT gaps in 2007 and 2015. However, Senegal and Mali have high compliance gaps in 2015²⁷. Benin and Togo have the lowest compliance gaps in 2015²⁸. The VAT gap of Togo decreased by 47% from 2007 to 2015. The decrease is mainly related to that of the Policy gap which reduced from 7.8% of GDP to 3.8% of GDP from 2007 to 2015.

27. Breaking down the gap to determine the sectorial gap would be more helpful in understanding non-compliance.

28. The compliance gap is probably underestimated for Benin which capitalizes on its strategic geographical location with respect to re-export of goods, which leads to an increase in the tax revenue.

4.6 Econometric Analysis of the estimated gaps

4.6.1 Literature Review

Previous studies, such as those of Barbone et al (2013), Zídková (2014), Lenik et al (2018), Poniatowski et al (2018, 2019 and 2020), Szczypinska (2019), Carfora et al (2020), and Cevik et al (2019) attempted to explain VAT gaps using econometric tools. Poniatowski et al (2020)²⁹ used many co-variates notably variables for tax policy characteristics, macroeconomic variables, variables describing the sectorial and company structure of the economy, and proxies of tax fraud to identify the determinants of Vat gaps for European Union members. They found that GDP growth, general government surplus, IT expenditure, trade at risk, and the shares of the agriculture, communication services, and financial sectors are significant explanatory variables for the VAT gaps. Cevik et al (2019) analysed the impact of structural transformation on VAT gaps using a dataset drawing on the results of the IMF RA-Gap Analysis Program which covers 24 countries for the period 2004-2016. The authors employed a large set of macroeconomic, economic structure, and institutional variables as control variables. Their results show that an increase of the share of services in aggregate value-added leads to an increase in the VAT gap, due to a rise of non-tradable services, which contribute to a narrowing of the VAT base.

4.6.2 Empirical Strategy

The econometric analysis we present in this study consists of identifying the determinants of the predicted VAT gaps, notably the effects of the vulnerability to IFFs and digitalisation using a 2SLS instrumental variable model. We explain independently the VAT Gap, the Policy Gap and the Compliance Gap. Our variables of interest are the import vulnerability score (which measures illicit financial flow vulnerability at import), and the export vulnerability score (which measures the vulnerability of export transactions to IFFs). These scores were developed by the Tax Justice Network (TJN)³⁰. Previous studies on IFFs were based on estimates of the magnitude of IFFs (Ndikumana Boyce (2008), Combes et al (2020)). However, these estimates are subject to data problems, due to large error margins (Reuter/World Bank (2012), Cobham Janský (2020), Murphy (2019)). The TJN vulnerability indexes are proxies of countries' vulnerability to illicit financial flows, and are calculated by combining bilateral data on trade, investments, and banking funds and flows with measures of financial secrecy³¹ in the partner jurisdiction. Here vulnerability refers to the degree of risk faced in a given channel of cross-border economic or financial activity (Abugre et al, 2019). Our study focuses on countries' vulnerability to IFFs through the trade channel (imports and exports) through which most of VAT related illicit financial flows go. We are also interested in estimating the impact of digitalization

29. The study of Poniatowski et al (2020) is an extension of those of Barbone et al (2013), Zídková (2014), Lenik et al (2018), Poniatowski et al (2018 and 2019), Szczypinska (2019,) and Carfora et al (2020).

30. See Abugre et al (2019) and Lépiessier and Cobham (2019).

31. Financial secrecy measures correspond to the secrecy score of the Financial Secrecy Index : <https://fsi.taxjustice.net/en/> .

on VAT gaps. For this purpose, we employ mobile/cellular telephone subscriptions per 100 inhabitants as proxy for digitalisation. GDP per capita, human capital index, services value added as share of GDP, and public sector corruption are used as control variables. GDP per capita³² and human capital index are proxies of the level of development and the capacity of the tax officials and the tax collectors. Service value added as share of GDP is a proxy of structural transformation. Public sector corruption assesses the impact of corruption on VAT gaps, it measures the extent to which public sector employees grant favours in exchange for bribes, kickbacks, or other material inducements, and how often they steal, embezzle, or misappropriate public funds or other state resources for personal or family use (Coppedge et al (2020))³³.

The model is of the form :

$$Y_{it} = \alpha + \varpi_i + V_{it} + \Gamma D_{it} + \beta'_x X_{it} + \eta_{it} \quad (4.10)$$

Where Y = VAT gap/Policy Gap/Compliance Gap of country i at time t; V = Import/Export Vulnerability; D = level of digitalization; X_{it} = set of control variables; η_{it} = unobserved error term; α constant; ϖ_i = country specific effect; Γ , and β'_x = coefficients.

We suspect the Import/Export Vulnerability scores are endogenous. If vulnerability to IFFs may undermine tax revenue collection, gaps and loopholes in the tax legislation also expose countries to IFF risk (see Cobham et al (2019)). To address the potential endogeneity of this variable, we use two instrumental variables - the number of double tax treaties, and the global terrorism index. Double Tax Treaties (DTTs) are signed for reasons such as preventing no taxation or double taxation of the same income by two jurisdictions which have a trade or investment relationship³⁴. However, the signature of double tax treaties encourages tax avoidance through treaty shopping which typically involves the attempt by a person to indirectly access the benefits of a tax agreement between two jurisdictions without being a resident of one of those jurisdictions (OECD-BEPS, 2020). Thus, DTTs may affect VAT gaps indirectly through the vulnerability to IFFs³⁵. The global terrorism index measures the impact of terrorism attacks. As stated below, IFFs include proceeds of crime such as terrorism. Terrorism financing increases the vulnerability to IFFs which in turn can affect VAT performance.

4.6.3 Vulnerability of WAEMU countries to IFFs through trade

As shown by Figure 3 below, Cote d'Ivoire and Benin are the most vulnerable to illicit financial flows through imports. The imports IFF risk of Mali and Burkina Faso are the lowest. This means that the trade partners of Cote d'Ivoire and Benin are more likely to

32. We use the one period lagged GDP per capita in all the regressions to consider the endogeneity of this variable as Brun et al (2014), Brun and Diakite (2016), Cevik et al (2019).

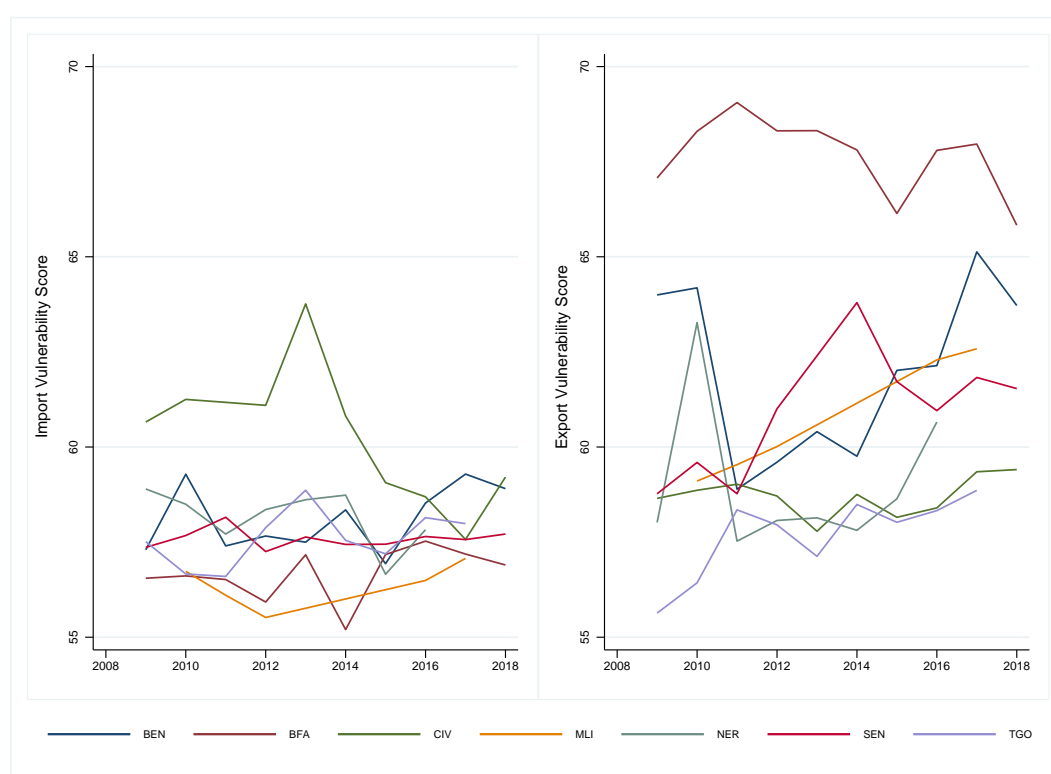
33. Descriptive statistics and data sources are available in Tables 4 and 5 in the Appendix.

34. See Millán-Narotzky et al (2020) for further information.

35. DTTs' clauses concern mainly withholding taxes on dividends, interest and royalties

expose them to risk of illicit financial flows. Concerning the export channel, Burkina Faso is the most vulnerable to IFFs, this can be explained by the high secrecy level in its partner jurisdictions notably Switzerland³⁶ which is the key hub for commodity trading. Compared with the Sub-Saharan Africa average, the average import vulnerability score of WAEMU is low although it is higher than that of ECOWAS (Figure 5 in the Appendix). However, more IFFs may occur from WAEMU (in comparison with SSA and ECOWAS averages) through the export transactions which mainly concern natural resources.

FIGURE 4.3 – Vulnerability of WAEMU member states to IFFs through the Import and Export channels



36. 70.8% of Burkina Faso's vulnerability to export is related to its transactions with Switzerland.

4.6.4 Results

Our results³⁷ show that the vulnerability to IFFs through imports has a strong impact on VAT gaps (statistically significant at 5% level) (Table 2)³⁸. This relationship is significant for the overall VAT Gap and the Policy Gap but not for the Compliance Gap. This means that WAEMU countries are more vulnerable to IFFs through the gaps and loopholes in the tax law, especially the lack of adequate legislation for taxing digital services. This assumption is confirmed by the significance of the coefficients of the digital services which are positive for the two first estimations. Our digitalization variable concerns mobile/cellular telephone subscriptions and captures essentially mobile payments, purchases, and advertising through social networks which escape taxation in many Sub-Saharan African countries. However, we find that digitalization leads to a reduction of the compliance gap. This result reflects the positive impact of digitalization on the tax administration notably the facilitation of the payment of taxes through electronic payments. As stated above, digitalization also contributes to the fight against corruption by limiting the risk of bribery. We also find that public sector corruption affects negatively the performance of VAT systems. The higher the level of human capital, the lower the VAT gaps. Like Cevik et al (2019), we find a negative impact of the GDP per capita and a positive impact of the share of services in aggregate value-added on VAT gaps. For the regressions with the export vulnerability as variable of interest, we do not find a significant effect on VAT gaps (Table 3). This may be due to the fact that illicit motivations behind export related IFFs are more oriented towards the evasion of direct taxes. The remaining control variables (including the digitalization variable) are significant and the sign of their coefficients are similar to those obtained with the first regressions.

37. We are aware that the number of observations, for this study conducted on 7 countries over a two-year period, is small. However, given that the results are consistent with our assumptions and with those of the previous studies on VAT gaps, we preferred to include them. This preliminary version will be improved in increasing the number of observations when we receive more national data from the Commission of WAEMU which funded this study through the WAEMU Research Fellowship Program.

38. Concerning the quality of the estimations, according to the p-values of the Sargan-Hansen statistics, we can attest that at least one of our instrumental variables is exogenous.

TABLE 4.2 – Impact of the Import Vulnerability to IFFs and Digitalization on VAT Gaps

Dependent Variable :	VAT Gap	Policy Gap	Compliance Gap
GDP per capita	-3.525*** (0.993)	-4.820*** (1.429)	1.294 (1.012)
Human Capital Index	-6.483*** (0.985)	-5.139*** (1.418)	-1.977* (1.038)
Services, value added	6.752*** (1.199)	7.585*** (1.726)	-0.375 (1.164)
Public sector corruption	3.683** (1.586)	3.002 (2.282)	1.095 (1.746)
Digitalization	0.0409*** (0.00816)	0.0550*** (0.0117)	-0.0618* (0.0358)
Import Vulnerability	0.597** (0.297)	0.927** (0.427)	-0.298 (0.337)
Constant	-24.18* (13.13)	-41.05** (18.89)	13.52 (14.84)
No. of observations	14	14	14
Number of countries	7	7	7
R-squared within	0.8530	0.7775	0.3352
R-squared between	0.9915	0.9993	0.8208
R-squared overall	0.9651	0.9335	0.5136
Sargan-Hansen statistic (p-value)	0.71(0.40)	0.42(0.52)	0.23(0.63)

Note : Standard errors in parentheses (**p<0.01, **p<0.05, *p<0.1)

TABLE 4.3 – Impact of the Export Vulnerability to IFFs and Digitalization on VAT Gaps

Dependent Variable :	VAT Gap	Policy Gap	Compliance Gap
GDP per capita	-0.187 (0.160)	-0.348* (0.184)	0.355 (0.755)
Human Capital Index	-1.403*** (0.358)	-1.160*** (0.276)	-0.813 (1.131)
Services, value added	0.992*** (0.245)	0.0308*** (0.00700)	-0.00899 (0.0243)
Public sector corruption	0.545*** (0.183)	0.693*** (0.210)	-0.382 (1.156)
Digitalization	0.137** (0.0649)	0.245*** (0.0745)	-0.0477* (0.0287)
Export Vulnerability	-0.760 (0.903)	-1.655 (1.041)	0.0860 (0.0868)
Constant	2.780 (3.672)	10.54** (4.296)	-4.181 (5.410)
No. of observations	14	14	14
Number of countries	7	7	7
R-squared within	0.7724	0.7937	0.6091
R-squared between	0.9640	0.9803	0.8173
R-squared overall	0.9128	0.9157	0.6588
Sargan-Hansen statistic (p-value)	0.18(0.67)	0.29(0.59)	0.86(0.35)

Note : Standard errors in parentheses (**p<0.01, **p<0.05, *p<0.1)

4.7 Conclusion

This study attempts to assess the VAT gaps of the West African Economic and Monetary Union member states and to conduct a preliminary identification of the determinants of the predicted gaps. We estimate the Overall VAT Gaps, the Policy Gaps, and the Compliance Gaps for each member state of the Union in relative and nominal terms for the years 2007 and 2015 using the IMF RA-GAP methodology. We also assess the impacts of vulnerability to illicit financial flows and digitalization on the VAT Gaps using a 2SLS Instrumental Variable model.

If the results require cautious interpretation, as for any study measuring VAT gaps, our findings provide useful information on the WAEMU countries' VAT performance. Our calculations show substantial VAT gaps, for the WAEMU countries, which are mainly due to policy imperfections. The estimated policy gaps are higher than the estimated compliance gaps. These Policy Gaps generally increased from 2007 to 2015 due to both the enlargement of the list of exempted goods and adoptions of multiple VAT rates as allowed by the Directive N°02/2009/CM/ UEMOA. A per country analysis shows that Niger has the highest VAT Gaps, and Togo and Senegal the lowest.

From the econometric analysis, we find that the vulnerability to IFFs through import has a strong impact on VAT Gaps, especially the Policy Gaps. This can be explained by the presence of gaps and loopholes in the tax law, especially the lack of adequate legislation for taxing digital services. We do not find a significant effect of the vulnerability through the export channel on VAT Gaps. This may be due to the fact that illicit motivations behind export related IFFs are more oriented towards the evasion of direct taxes. As regards digitalization, for the regressions having either the overall VAT Gap or the Policy Gap as dependent variable, we find a positive impact on VAT Gaps. This can be interpreted by the increase of mobile payments, purchases, and advertising through social networks which escape taxation in many Sub-Saharan African countries. However, digitalization leads to a reduction of the Compliance Gap. This can be explained by the positive impact of digitalization on the tax administration and its contribution to the reduction of corruption by limiting the risk of bribery.

Improving WAEMU member states' VAT performance requires removal of most of the tax exemptions. The issue of tax exemptions is of genuine concern given their impact on VAT neutrality, administration, and revenue mobilization. Impact studies should be conducted to assess the impact of social exemptions on the welfare of the poor. Evaluating the tax expenditures and including them in the financial information provided to decision makers would give a concrete idea of the losses of potential revenue. A reduction of income tax on the lowest wages may mitigate the effects of removing some exemptions, and the additional tax revenue collected could finance social infrastructure. Taxation of ODA-financed projects is also an alternative to increase the domestic revenue and is advisable given that this can limit the proliferation of tax exemptions. Also, it can be justified by the fact that donors

themselves promote the increase of domestic revenue mobilisation in developing countries. There is a need for the WAEMU countries to adopt adequate legislation for taxing digital services. Modernisation of the tax administration through the use of digital tools is also useful to limit revenue losses and counteract trans-national fraud challenges. Increasing information exchange between the different revenue agencies (customs and inland revenue authorities), as recommended by the Directive n°02/2012/CM/UEMOA of the Community Legislation, would also contribute to tracking illegal activities. International exchange of information notably using mirror data may also contribute to facing the new challenges caused by digitalization.

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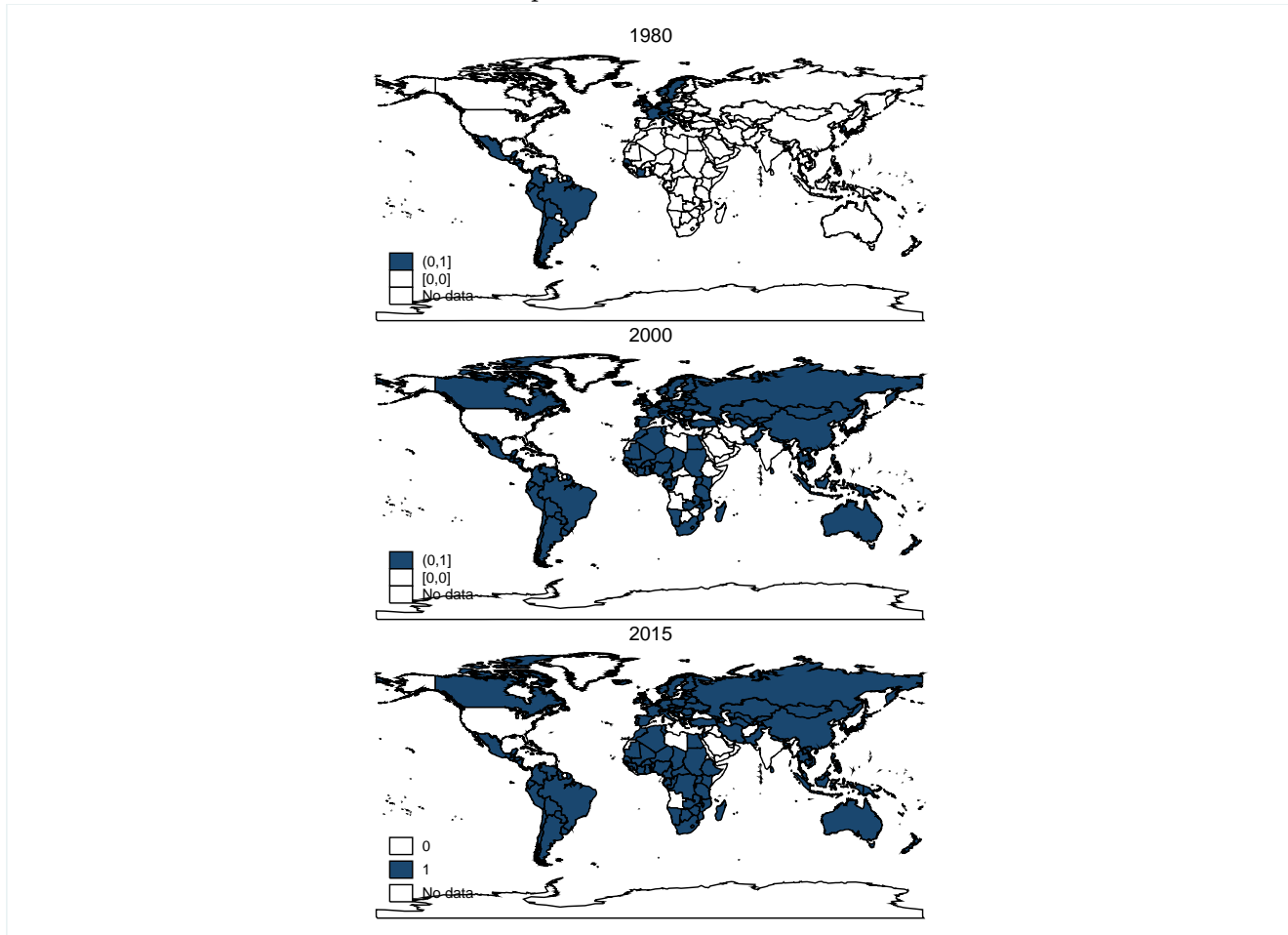
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4.9 Appendix to chapter 4

FIGURE 4.4 – Spread of VAT



Source : Ebrill et al (2001), OECD(2016), WMD(Blue Marble Geographics) and Authors' Calculations.

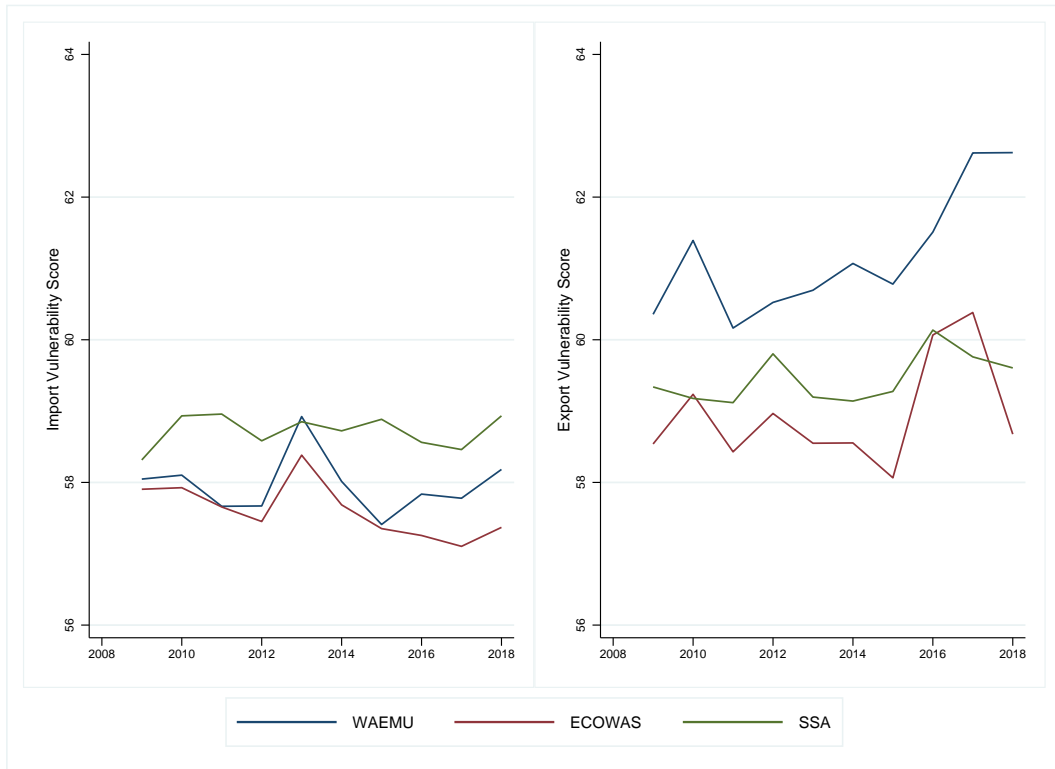
TABLE 4.4 – Descriptive Statistics

Variable	No. of observations	Mean	Standard Deviation	Min	Max
VAT gap	14	8.86	2.20	4.40	11.53
Policy gap	14	7.61	2.37	3.82	10.84
Compliance gap	14	1.25	0.82	0.41	3.1
GDP per capita	14	804.60	365.78	330.65	1469.73
Human Capital Index	14	1.44	0.24	1.14	1.78
Services, value added	14	45.08	8.71	27.42	55.47
Public sector corruption	14	0.67	0.13	0.40	0.85
Import Vulnerability	14	57.73	1.20	56.55	60.66
Export Vulnerability	14	60.57	3.60	55.63	67.07
Instrumental Variables					
Number of Tax Treaties	14	8.36	6.88	1	23
Global Terrorism Index	14	1.41	1.97	0	5.73
Proxy of Digitalization					
Mobile phone subscriptions	14	55.23	40.47	6.13	130.16

Notes : Data on import and export vulnerability for the year 2007 correspond to those of 2009 given that these scores have been determined by the authors from 2009 to 2018. Also, these data do not change significantly from year-to-year.

Variable	Source
VAT gap	WAEMU Commission (2010), Bayalé et al (2019), Official documents of WAEMU Member States (Tax Codes, Finance Acts, Reports of the Revenue Authorities), Ramde F. B. (2010), Ernst and Young (2020), PwC (2007) and author's calculations.
Policy gap	WAEMU Commission (2010), Official documents of WAEMU Member States (Tax Codes, Finance Acts, Reports of the Revenue Authorities), Bayalé et al (2019), Ramde F. B. (2010), Ernst and Young (2020), PwC (2007) and author's calculations.
Compliance gap	WAEMU Commission (2010), Official documents of WAEMU Member States (Tax Codes, Finance Acts, Reports of the Revenue Authorities), Bayalé et al (2019), Ramde F. B. (2010), Ernst and Young (2020), PwC (2007) and author's calculations.
GDP per capita	World Development Indicators- World Bank Group (2019).
Human Capital Index	Penn World Table 9.1.
Services, value added	World Development Indicators- World Bank Group (2019).
Public sector corruption	V-dem dataset V10 Coppedge et al (2020) and Pemstein et al (2020).
Import Vulnerability	Tax Justice Network (2020) Abugre et al (2019)
Export Vulnerability	Tax Justice Network (2020) Abugre et al (2019)
Number of Tax Treaties	Source Index dataset - International Centre for Tax and Development (2020) forthcoming dataset.
Global Terrorism Index	Institute for Economics & Peace (2020).
Mobile/cellular phone subscriptions per 100 inhabitants	International Telecommunication Union World Telecommunication/ICT Indicators (WTI) Database (2019).

FIGURE 4.5 – Vulnerability of Sub-Saharan African countries to IFFs



Conclusions générales

L'Union Economique et Monétaire Ouest-Africaine, dans l'objectif d'harmoniser les régimes fiscaux de ses Etats membres pour assurer le fonctionnement du marché commun, a édicté des actes communautaires concernant à la fois les instruments de fiscalité indirecte interne, de fiscalité directe, la transition fiscale et le fonctionnement des administrations douanières et fiscales. Les chapitres constituant cette thèse évaluent la cohérence de ces actes communautaires en identifiant leurs impacts respectifs sur les nations concernées et l'union dans son ensemble en termes de mobilisation de recettes et de structure des recettes fiscales mobilisées.

Dans le chapitre 2 nous avons cherché à mesurer avec robustesse l'effort fiscal et le potentiel fiscal des pays de l'UEMOA à partir d'un large échantillon de pays en développement. Plus précisément, nous avons estimé le potentiel fiscal et l'effort fiscal à court terme et à long terme pour les recettes fiscales totales, les recettes fiscales non issues de l'exploitation des ressources naturelles et la taxe sur la valeur ajoutée. Nos résultats montrent que l'effort fiscal de la zone UEMOA (notamment pour les recettes fiscales non issues de l'exploitation des ressources naturelles et la taxe sur la valeur ajoutée) est conséquent comparativement à celui des autres ensembles d'intégration régionale en Afrique. L'effort fiscal à court terme de l'UEMOA est plus élevé que l'effort à long terme, ce qui traduit une amélioration dans le processus de collecte de l'impôt par les administrations financières. Cependant, une analyse au niveau national met en exergue une disparité entre les pays membres de l'UEMOA. Nous observons que le Burkina Faso, le Sénégal et le Togo, compte tenu de leurs caractéristiques structurelles, sont les pays de la zone UEMOA qui fournissent plus d'effort pour collecter les recettes de TVA à l'opposé de la Côte d'Ivoire et du Niger.

Dans le chapitre 3, nous avons effectué une étude d'impact de l'harmonisation fiscale en zone UEMOA sur les plans qualitatif et quantitatif. L'analyse qualitative a consisté à étudier les textes de la Législation communautaire de l'UEMOA afin de recenser les éléments clés et d'identifier les forces, les incohérences et les distorsions; nous avons également procédé à une collecte d'informations sur l'état d'application des actes communautaires par les pays auprès de la Commission de l'UEMOA. En termes d'analyse empirique, nous avons étudié l'impact de la coordination fiscale sur les recettes fiscales totales, la fiscalité indirecte interne, la fiscalité directe et les taxes sur le commerce international. Nous avons trouvé que l'harmonisation fiscale a eu un impact positif sur la mobilisation de ressources fiscales en zone UEMOA, particulièrement sur la mobilisation de recettes indirectes internes. Au niveau individuel, le Sénégal est le pays ayant le plus bénéficié de l'effet positif des reformes sur ses recettes indirectes internes. Ces résultats, pour la

fiscalité indirecte interne, s'expliquent par la concentration de l'effort de collecte sur la TVA qui a une large base et est plus facile à collecter comparativement à l'impôt direct. La coordination de la fiscalité directe, quant à elle, n'a pas vraiment impacté le niveau des recettes fiscales. L'existence de régimes dérogatoires dans les codes nationaux particuliers (code des investissements, code minier, code pétrolier et code forestier) et de lacunes et vides juridiques dans la législation sont des facteurs explicatifs de ce résultat. L'impact des réformes portant sur les taxes sur le commerce international est peu apparent dû au faible niveau des échanges intracommunautaires combiné à une amélioration des procédures de dédouanement et de gestion du risque.

Dans le chapitre 4, nous avons calculé les indicateurs d'écart de recettes des systèmes de TVA 'VAT Gaps' pour tous les 7 Etats membres de l'UEMOA ayant adopté la taxe sur la valeur ajoutée. Ces indicateurs nous ont permis d'estimer à la fois l'écart global de recettes de TVA 'Overall VAT Gap', l'écart de recettes lié à la performance de l'administration fiscale 'Compliance Gap' et les pertes de recettes potentielles liées à l'application de la législation fiscale 'Policy Gap'. Le 'Policy Gap' inclut l'écart de recettes lié à l'octroi des exonérations fiscales et l'écart lié à l'adoption de systèmes de TVA à taux multiples. En outre, nous avons expliqué les écarts de recettes calculés en analysant notamment l'impact de la numérisation et de la vulnérabilité aux flux financiers illicites passants par le canal du commerce. Nos résultats montrent un écart moyen de recettes de TVA important pour les pays de l'UEMOA, cela étant dû essentiellement aux imperfections présentes dans la législation fiscale. En effet, les pertes de recettes potentielles liées à l'application de la législation fiscale sont bien plus élevées que les pertes relatives à la performance de l'administration fiscale. Une analyse au niveau national montre que le Niger a les Gaps les plus élevés de la zone UEMOA sur la période à l'opposé du Sénégal et du Togo. S'agissant de l'analyse empirique annexe, nous avons obtenu que la vulnérabilité aux flux financiers illicites passants par le canal des importations a un impact positif sur les écarts de recettes fiscales notamment, sur l'écart global et l'écart lié à l'application de la législation fiscale. Nos résultats montrent que la numérisation agit positivement sur le Policy gap, ce qui s'explique par la non-adaptation des systèmes fiscaux à l'économie numérique. Par ailleurs, nous observons que la numérisation affecte négativement l'écart relatif à la performance de l'administration fiscale ; cela peut refléter la réduction du temps et du coût de collecte de l'impôt (par exemple, par le paiement des impôts à partir des nouvelles technologies de l'information et de la communication).

La réussite du processus d'harmonisation dépend significativement de la qualité de la législation communautaire. Au regard de l'analyse effectuée, nous observons que la Commission de l'UEMOA, en désignant la TVA comme instrument clé du programme de la transition fiscale, a contribué positivement à la mobilisation des recettes des pays membres. Aussi, en encourageant les Etats membres à évaluer les dépenses fiscales, la Commission concourt à la limitation des pertes de recettes potentielles liées aux incitations fiscales. Cependant, il ressort clairement de l'analyse que les incitations fiscales en outre des lacunes et vides juridiques dans la législation limitent la performance fiscale des pays

de l'UEMOA.

Les incitations fiscales sont octroyées dans le but d'attirer l'investissement étranger qui pourra générer de l'emploi et contribuer à la croissance de l'économie. Les pays accordent les exonérations fiscales pour des raisons de justice sociale et en situation de crise (comme l'ont fait le Burkina Faso et le Mali dans le cas de l'épidémie de la COVID-19). Cependant, ces incitations créent des distorsions, encouragent le 'round-tripping' (le retour du même capital pour être réinvesti sous forme d'IDE et sous une nouvelle appellation pour bénéficier à nouveau de congés fiscaux à durée limitée), favorisent l'évitement et l'optimisation fiscales, sont nuisibles à la mobilisation fiscale et de ce fait à la capacité des Etats d'intervenir dans le domaine socio-économique, accroissent les coût d'administration de l'impôt, et attirent surtout les investissements dits 'footloose investment' dont le délai de récupération du capital investi est court et qui ne nécessitent pas d'installations lourdes. En outre, comme le montrent les résultats de notre étude portant sur la comparaison des incitations fiscales octroyées par les juridictions (Meinzer et al, 2019), les pays Africains comme ceux de l'UEMOA ont tendance à octroyer beaucoup plus d'incitations basées sur le profit (dont les réduction de taux d'impôt sur le sociétés) qui bénéficient à des investissements déjà rentables au lieu d'accorder des incitations basées sur coût (dont l'amortissement accéléré) qui incitent plus les entreprises à faire de nouveaux investissements.

S'agissant des vides et lacunes juridiques et des règles anti-évitement, la non-adaptation de la législation à l'économie numérique entraine des pertes de recettes potentielles. L'absence de règles de sous-capitalisation favorise le transfert de bénéfices par une augmentation des charges de l'entreprise. La permission de reporter indéfiniment les pertes fiscales et l'absence de règles fiscales des entreprises étrangères contrôlées facilitent l'optimisation fiscale. Par ailleurs, la signature, par les Etats membres de conventions bilatérales de non double imposition avec d'autres Etats partenaires, entraine des pertes de recettes potentielles en termes de retenues à la source sur les paiements de dividendes, d'intérêts et de redevances et expose les pays au chalandage des traités.

Par conséquent, une réforme de la législation communautaire est envisageable afin d'assurer la réussite de l'harmonisation fiscale tout en favorisant la mobilisation de ressources domestiques et par là le respect des critères de convergence par les pays. A cet effet, nous recommandons :

La suppression de la majorité des exonérations de TVA et d'IS En outre de l'évaluation des dépenses fiscales, des études d'impact devraient être effectuées afin d'analyser l'effet des exonérations fiscales sur le bien être des plus vulnérables sachant que les résultats obtenus par certains pays comme l'Afrique du Sud montrent que les exonérations de TVA profitent souvent plus aux personnes nanties. De ce fait, des politiques de lutte contre la pauvreté ciblant directement les plus pauvres pourraient être plus efficaces et financées par les recettes additionnelles collectées. L'exonération des biens et services nécessaires à la réalisation des marchés ou projets partiellement ou totalement

financés ou par les aides extérieures n'est pas fondée dans la mesure où, la gestion de l'aide génère des coûts non négligeables pour les Etats et que les pertes de recettes vont à l'encontre de l'amélioration de la performance fiscale des pays qui est préconisée par les bailleurs de fonds. Les exonérations des activités extractives par les pays n'ont plus lieu d'être sachant que suivant l'exemple de la Côte d'Ivoire et du Burkina Faso, les autres pays de l'UEMOA peuvent créer un compte séquestre pour domicilier les recettes de TVA collectées à l'importation et qui serviront à rembourser les crédits TVA.

S'agissant des exonérations relatives à l'impôt sur les sociétés, notamment les régimes dérogatoires présents dans les codes d'investissement, leur suppression pourrait générer des revenus supplémentaires pouvant financer des infrastructures pour créer un environnement favorable aux affaires. En plus, d'autres facteurs tels que la stabilité politique et la facilité de s'implanter et de payer ses impôts sont beaucoup plus importants pour les investisseurs comparativement aux incitations fiscales. Une autre alternative serait de prioriser les incitations basées sur le coût lors de l'élaboration de la législation.

L'adaptation des législations à l'économie numérique et l'adoption de règles anti-évitement fiscal L'imposition de l'économie numérique notamment la répartition du droit d'imposition entre pays est un défi majeur à la fois pour les pays développés et les pays en développement. Les travaux de recherche tels que ceux du FMI (2019) ont démontré que des textes fiscaux basés sur l'approche de la fiscalité unitaire consistant à taxer les revenus à la source sont plus favorables aux pays en développement tels que ceux de l'UEMOA. S'agissant de la collecte de la TVA sur les opérations numériques, la Commission de l'UEMOA pourrait s'inspirer de la législation de l'Afrique du Sud qui exige que les fournisseurs étrangers, qui procèdent à des ventes aux résidents Sudafricains, s'identifient à la TVA si la valeur des services numériques atteint un certain montant ; Toute opération remplissant deux des critères suivants est imposable : l'acquéreur doit être un résident, il doit avoir une adresse en Afrique du Sud et le paiement doit être effectué à partir d'un compte bancaire local. Concernant les règles anti-évitement, la mise en œuvre des mesures élaborées par l'OCDE contre l'érosion de la base d'imposition et le transfert de bénéfices 'BEPS', notamment en s'appuyant sur les outils développés par le cadre inclusif pour faciliter l'application des normes complexes pour les pays en développement, est une bonne alternative. Concernant les conventions fiscales bilatérales, les autres pays de l'UEMOA à l'instar du Burkina Faso, de la Côte d'Ivoire et du Sénégal pourraient adhérer à Convention multilatérale sur la coopération fiscale qui a pour objectif d'introduire les avancées obtenues lors des travaux du projet BEPS dans les conventions bilatérales en vigueur afin de lutter contre la fraude fiscale et l'évasion fiscale. Cependant, la renégociation voire l'annulation par les pays de certaines conventions fiscales, comme ça a été le cas de la convention fiscale signée entre le Sénégal et l'Ile Maurice, est nécessaire pour se protéger contre l'optimisation fiscale à partir du chalandage des traités. Notre étude (Millan-Narotzky et al, 2020), sur les conventions fiscales bilatérales signées par les pays Africains, identifie pour chaque pays les conventions fiscales à renégocier ou annuler en priorité.

De futurs travaux de recherche pourraient creuser davantage les questions de l'imposition de l'économie numérique et de l'optimisation fiscale agressive qui posent des défis à la fois pour les pays développés et les pays en développement comme ceux de l'UEMOA.

