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MOBILISATION FISCALE, DETTE ET FINANCEMENT : AVANTAGES ET CONTRAINTES DE L'APPARTENANCE A L'UEMOA

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Dédicace

*A mes chers parents.
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Executive Summary

Developing countries, in particular those in the WAEMU Zone, are in dire need for financial resources to meet their rising infrastructure requirements in order to strengthen their production capacities and to implement the new multi-objective development plans. Concomitantly, they are structurally experiencing real difficulties in mobilizing domestic tax revenues, and most of these countries remain vulnerable to public debt crises. It is therefore necessary for these countries to resort to financing strategies that can make it possible to maintain the public debt on a sustainable path. Thus, this thesis focuses on the tryptic: *tax revenues mobilization - public debt - and financing of the economy*, in order to propose financing mechanisms that these countries can use, to both maintain their economic growth on a sustainable path as well as to keep their public debt sustainable. The research in my thesis resulted in five (05) chapters divided into two main (02) complementary parts.

The first part consists of three (03) chapters with objectives to demonstrate that countries have sufficient fiscal capacities to mobilize tax resources and to provide some structural elements on which they can build to improve the efficiency of their tax revenues in the future. Chapter 2 examines the existence of a fiscal space in the WAEMU member States. The objective is to show that countries have the fiscal margin to mobilise additional tax resources to ensure

the financing of the economy and development, without compromising the sustainability of their financial position or the stability of their economies. To do this, we rely on an optimal taxation approach. The optimal taxation theory allows to model the taxation system that minimizes economic distortions and inefficiencies (the loss of collective well-being) under the exogenous fiscal constraints of the State, and defines optimal tax rates that maximize collective well-being for a given level of tax revenue. In this chapter, we have used non-stationary heterogeneous panel estimation techniques. Thus, based on a [Scully](#)'s optimization model and a quadratic model, we confirm, on the basis of empirical evidence, the existence of an untapped fiscal space in the Union. The results provide clear evidence of the inverted U-shaped relationship between taxation and growth. Moreover, the results imply that since 1980, the fiscal performance of the WAEMU countries has been sub-optimal. The optimal level of taxation that maximizes growth over the period 1980 – 2017 is 20.6% of GDP. Compared to the average tax rate of 12.6% of GDP over the period of study, there would be, an additional tax revenue not collected by tax administrations around 8.0 percent of GDP. It is therefore clear that States can mobilise more tax revenues without any prejudice to economic activity, in order to finance productive investment expenditures, and thus simulate growth by having less recourse to debt.

Chapter 3 focuses on the investigation of the causes of the low mobilization of tax revenues in the WAEMU countries. The aim is to emphasise the role of institutional factors in explaining the inadequacy of the mobilization of tax revenues, alongside the structural determinants. First, we cross-reference different definitions of “institution” in order to properly control the multiple channels through which it can influence the collection of taxes by the public authorities. While in the common sense, an institution designates the organized and stable systems around which social activities are organized. In

classical thinking it favours the study of formal and codified systems, so that legal institutions can be distinguished, political, economic, religious or social. However, we examine the effect of institutional factors on the collection of tax resources by using different institutional measures including the constraint on the executive, good governance measures including the quality of the bureaucracy, rule of law and corruption, or indicators related to political institutions such as political regime indexes, and distinguishing democratic and authoritarian regimes. Some other factors such as civil and political liberties as well as ethnic tensions reflecting the state of social institutions are also introduced into the analysis. The analysis shows that the low mobilization of tax revenues in the WAEMU is symptomatic of the regular political and socio-economic conflicts that persist in the region. In fact, tax revenues are increasing because strong institutions and democratization place greater constraints on the executive, better bureaucracy and good governance, increase respect for the rule of law, reduce corruption, establish a fiscal social contract between taxpayers and governments, in a context of greater political freedom and ethnic consolidation. Thus, this chapter highlights the need to strengthen democracy and to set up strong institutions in order to mobilize more tax resources.

Chapter 4 focuses on the analysis of the efficiency of the VAT system in WAEMU countries. VAT plays an important role in the mobilisation of government resources, and it seems useful to examine its effectiveness. Theoretically, the performance of a VAT system is linked to the effectiveness of the measures of application and control of VAT obligations by the tax authorities and their ability to define an optimal tax policy. Otherwise, this creates a shortfall, which can be measured by the VAT gap. VAT gap, which corresponds to the difference between the theoretical (or potential) VAT revenue and the amount of VAT actually collected, is a key indicator which enables

measures to be taken to improve tax resources and combat tax evasion, as well as non-compliance with VAT obligations. Concretely, we first estimated the VAT gap for the Union countries, using a so-called “top-down approach”, then conducted an econometric analysis to understand the nature and causes of the VAT gap, and identify country-specific determinants explaining the different levels of VAT performance. The results show that only half of potential VAT revenues are collected each year within the Union. This poor performance reflects, among other things, the functioning of tax administration (compliance gap) and tax policy choices (policy gap). VAT therefore constitutes a potential source of tax resources to be exploited. However, this chapter draws the attention of the policy makers to equip tax administrations with adequate means to deal with non-compliance with VAT rules, and to align tax policies with WAEMU directives on VAT policies.

The second part of the thesis, which contains two (02) chapters, is therefore concerned with questions relating to the financing of the economy and the sustainability of the public debt. Thus, Chapter 5 shows that there is a strong interest for countries to rely on public-private partnerships (PPPs) as a financing tool for the economy, especially in a context of budgetary constraints. The WAEMU countries, like all developing countries, are facing an unresolved infrastructure and financing challenges, characterized by significant needs for economic and social infrastructure, real difficulties in mobilizing tax resources and high level of debt. This raises the question to consider alternative sources of funding. The analysis answers the following question: do PPPs consider an alternative source of funding for public infrastructure? Using simple theoretical modelling and game theory, we compare the effects of public infrastructure financing through PPPs investments to pure public investment financing. Then the model is tested and validated empirically. Indeed, PPPs are more advantageous because they enable the sharing and man-

agement of associated risks, improve the quality and reduce the costs of providing public goods and services. Empirical evidence shows that the impact of PPP investments is significantly higher than that of pure public investments. It also shows that the positive impact of PPP investments strengthens economic growth, but that this effect remains conditioned by the level of debt.

Finally, Chapter 6 highlights different strategies for financing the economy compatible with the sustainability of public debt. In particular, it involves simulating several financing mechanisms aimed at increasing public investment while keeping public debt on a sustainable path. To this end, the analysis mobilises new macroeconomic modelling techniques applied to the analysis of the regularities of real cycles, the identification of the nature of shocks and the evaluation of policies: the stochastic dynamic models of general equilibrium (DSGE). It can be expected that the sustainability of sovereign debt is intrinsically linked to the structure of this debt as well as to the configuration of different strategies for financing public investments. The aim is to draw lessons for the WAEMU countries in terms of the financing schemes they can use, and to enable them to maintain their debt levels at a sustainable level. Several sources of financing were examined, such as an increase in consumption taxes and in natural resource revenues, as well as different types of public debt, including concessional loans and grants, external commercial debt and domestic debt. Simulations suggest that, in the case of natural resource revenues, scaling-up public investment is feasible using concessional borrowing only, or alternatively additional external commercial or domestic borrowings while keeping debt sustainable. Otherwise, external commercial borrowing appears more risky.

keywords: WAEMU . Fiscal space . Tax mobilization . Optimal taxation . Political regimes Institutions . Economic growth . VAT efficiency . Financing

development . Public-Private Partnerships (PPP) . Public debt . Fiscal fatigue
. Debt structure . Debt sustainability . DSGE

Resumé Exécutif

Au sein de l'UEMOA, les pays sont confronté à des besoins importants de ressources devant leur permettre de financer leurs déficits infrastructurels, de renforcer leurs capacités de production et de réaliser les nouveaux plans de développement à objectifs multiples. Par ailleurs, ils éprouvent structurellement de réelles difficultés dans la mobilisation des recettes fiscales domestiques, et la plupart de ces pays demeurent vulnérables face aux crises d'endettement public. Le recours à des stratégies de financement pouvant permettre de maintenir la dette publique sur un sentier soutenable s'impose à ces pays. C'est ainsi que cette thèse se penche sur le triptyque: - *mobilisation fiscale - dette publique - et financement de l'économie* -, afin de proposer des mécanismes de financement dont ces pays pourront faire recours, pour à la fois maintenir leur croissance économique sur un sentier durable et rendre leur dette publique soutenable. Les travaux de recherches ont donné lieu à cinq (05) chapitres réparties en deux (02) parties complémentaires.

La première partie se compose de trois (03) chapitres, dont l'objectif consiste à démontrer que les pays ont suffisamment de marge de manoeuvre en matière de mobilisation de ressources fiscales et de donner quelques éléments sur lesquels ils pourront s'appuyer pour améliorer l'efficacité des recettes fiscales. Le chapitre 1 propose dans un premier temps, une synthèse théorique

des modes de financement des dépenses publiques et pose ensuite un diagnostic du financement des économies de l'UEMOA sur la base des faits stylisés, tout en faisant ressortir les différentes contraintes d'accès au financement imposées par les principes d'une intégration économique et monétaire. D'une part, la synthèse révèle que les modes de financement des dépenses publiques passent par l'arbitrage classique entre impôts et dette, et des sources de financement complémentaires dont le financement monétaire, les apports dons APD, les financements privés (interne et externe) ainsi que le financement sous forme de partenariats public-privés. D'autre part, l'analyse des instruments de financement dans le contexte de l'UEMOA relève un certain nombre de contraintes. La surveillance multilatérale des budgets qui s'impose aux pays de l'UEMOA au motif du partage d'une monnaie commune, constitue de réelles contraintes pour les Etats à faire recours aux modes de financement classiques tels que la monnaie et le budget pour mettre en oeuvre des politiques économiques de relance nécessaire au développement. Dans la pratique, la BCEAO a opté pour une cible d'inflation de 2% comme principal objectif de la politique monétaire de l'UEMOA. Cet objectif semble contraindre la BCEAO dans ses apports au financement des économies de l'Union, et impose *de facto* une surveillance multilatérale des budgets nationaux via les règles budgétaires encadrées par le pacte de convergence. En plus, la BCEAO demeure contraint en matière de financement externe du fait de la défense de la parité du système de change fixe (parité fixe FCFA/Euro) et de la libre circulation des capitaux, l'obligeant à renoncer à l'autonomie de sa politique monétaire conformément aux enseignements du triangle d'incompatibilité de Mundell. Par ailleurs, les Etats membres de l'UEMOA connaissent structurellement une faible mobilisation des recettes liée aux fondamentaux de leurs économies, ainsi qu'à l'harmonisation fiscale et douanière au nom de l'intégration régionale, qui limitent les marges de manoeuvre en matière de politique fiscale.

Ce chapitre nous enseigne qu'il est plus que jamais opportun, dans le contexte des pays de l'UEMOA, de trouver la configuration optimale des stratégies de financement compatibles avec la structure et les fondamentaux des économies de l'Union, sans pour autant compromettre les positions budgétaires des Etats, ni se retrouver dans une situation d'insoutenabilité de la dette publique.

Le chapitre 2 interroge sur l'existence d'un espace budgétaire dans les Etats membres de l'UEMOA. L'objectif est d'évaluer si les Etats disposent d'une marge de manoeuvre budgétaire qui leur permet de mobiliser des ressources fiscales additionnelles pour assurer le financement de l'économie et du développement, sans pour autant mettre en danger la durabilité de leur position financière, ni la stabilité de leurs économies. Pour se faire, nous nous basons sur une approche de taxation optimale. La théorie de taxation optimale permet de modéliser le système de taxation qui minimise les distorsions et les inefficacités économiques sous la contrainte budgétaire exogène de l'Etat, et permet de définir les taux de taxation optimaux maximisant le bien-être collectif pour un niveau de recettes fiscales donné. Dans ce chapitre, nous mobilisons les techniques d'estimation de panels hétérogènes non stationnaires. Ainsi, à partir d'un modèle d'optimisation de Scully (1996) et d'un modèle quadratique, nous confirmons sur la base de preuves empiriques, l'existence d'un espace budgétaire inexploité au sein de l'Union. Les résultats fournissent une preuve de la relation en U inversé entre la fiscalité et la croissance. Par ailleurs, les résultats montrent que depuis 1980, les performances fiscales enregistrées par les pays de l'UEMOA sont sous-optimales. Le niveau optimal d'imposition qui maximise la croissance sur la période 1980-2017 est de 20,6% du PIB. Comparé au taux d'imposition moyen de 12,6% du PIB sur la période étudiée, il existerait donc un supplément de recettes fiscales non perçues par les administrations fiscales à hauteur de 8,0% du PIB. Il est donc clair que les Etats peuvent mobiliser davantage de recettes fiscales sans préjudice sur l'activité

économique, afin de financer des dépenses d'investissement productives, et ainsi simuler la croissance en ayant moins recours à l'endettement.

Le chapitre 3 porte sur la recherche des causes de la faible mobilisation des recettes fiscales dans les pays l'UEMOA. Il s'agit de mettre l'accent sur le rôle des facteurs institutionnels dans l'explication de l'insuffisance de la mobilisation des recettes fiscales, aux côtés des déterminants structurels. Dans un premier temps, nous croisons différentes définitions d'une "institution" en vue de bien contrôler les multiples canaux par lesquels celle-ci peut influencer la collecte des taxes par les pouvoirs publics. Si au sens courant, une institution désigne les systèmes organisés et stables autour desquels s'organisent les activités sociales, dans la pensée classique, elle privilégie l'étude des systèmes formels et codifiés, de sorte que l'on peut distinguer des institutions juridiques, politiques, économiques, religieuses ou sociales. Ainsi, nous examinons l'effet des facteurs institutionnels sur la collecte des ressources fiscales en utilisant différentes mesures institutionnelles dont la contrainte sur l'exécutif, des mesures de bonne gouvernance notamment la qualité de la bureaucratie, l'état de droit et la corruption, ou encore des indicateurs relatifs aux institutions politiques tels que les indices de régime politique, distinguant les régimes démocratiques et autoritaires. Certains autres facteurs comme les libertés civiles et politiques ainsi que les tensions ethniques reflétant l'état des institutions sociales sont également introduits dans l'analyse. L'analyse montre que la faible mobilisation des recettes fiscales dans l'UEMOA est symptomatique des réguliers conflits politiques et socio-économiques qui persistent dans la région. De fait, les recettes fiscales augmentent parce que des institutions fortes et la démocratisation exercent davantage de contraintes sur le pouvoir exécutif, une meilleure bureaucratie et une bonne gouvernance augmentent le respect de l'état de droit, réduisent la corruption, établissent un contrat social fiscal entre les contribuables et les gouvernements, dans un contexte de liberté

politique plus grande et de consolidation ethnique. Ainsi, ce chapitre alerte sur la nécessité de renforcer la démocratie et de mettre en place des institutions fortes afin de mobiliser davantage de ressources fiscales.

Le chapitre 4 s'intéresse à l'analyse de l'efficacité du système de TVA dans les pays de l'UEMOA. La TVA occupe une place importante dans la mobilisation des ressources de l'État, et il nous paraît utile de s'interroger sur son efficacité. Théoriquement, la performance d'un système de TVA est liée à l'efficacité des mesures d'application et de contrôle des obligations de TVA par l'administration fiscale, et à la capacité des autorités à définir une politique fiscale optimale. A défaut, cela crée un manque à gagner, que l'écart de TVA permet de mesurer. L'écart de TVA ou la "VAT gap", qui correspond à la différence entre les recettes théoriques (ou potentielle) de TVA et le montant de TVA effectivement perçue, constitue un indicateur clé qui permet de prendre des mesures visant l'amélioration des ressources fiscales et de lutter contre la fraude fiscale, de même que le non-respect des obligations de TVA. Concrètement, nous avons tout d'abord estimé les écarts de TVA pour les pays de l'Union, en utilisant une approche dite "descendante" et ensuite conduit une analyse économétrique en vue de comprendre la nature et les causes de l'écart de TVA, et identifier les facteurs spécifiques aux pays expliquant les différents niveaux de performance en matière de TVA. Les résultats montrent que seule la moitié des recettes potentielles de TVA est collectée chaque année au sein de l'Union. Cette mauvaise performance est entre autre le reflet du fonctionnement des administrations fiscales (écart de conformité) et des choix de politiques fiscales (écart de politique). La TVA constitue dès lors un potentiel de ressources fiscales à exploiter. Cependant, ce chapitre attire l'attention des décideurs politiques de doter les administrations fiscales de moyens adéquats pour faire face à la non-conformité aux règles de TVA, et d'aligner les politiques fiscales sur les directives de l'UEMOA en matière de

politiques de TVA.

La deuxième partie de la thèse qui contient deux (02) chapitres, s'intéresse aux questions relatives au financement de l'économie et à la soutenabilité de la dette publique. Ainsi, le chapitre 5 montre qu'il existe un intérêt pour les pays à s'appuyer sur les partenariats public-privés (PPP) comme outil de financement de l'économie, surtout dans un contexte de contraintes budgétaires. Les pays l'UEMOA comme tous les pays en développement d'ailleurs, font face à un défi non résolu en matière d'infrastructures et de financement, caractérisé par d'importants besoins en infrastructures économiques et sociales, de réelles difficultés de mobilisation de ressources fiscales et un niveau d'endettement élevé. Ce constat interpelle sur la nécessité de réfléchir à des sources alternatives de financement. L'analyse permet de répondre à la question suivante: les PPPs constituent-ils une source alternative de financement des infrastructures publiques? A l'aide d'une modélisation théorique simple et de la théorie des jeux, nous comparons les effets du financement des infrastructures publiques par des investissements en PPPs au cas où elles sont financés par les investissements publics purs. Ensuite, le modèle est testé et validé empiriquement. En effet, les PPPs sont d'autant plus avantageux qu'ils permettent de partager et de gérer les risques associés, d'améliorer la qualité et de réduire les coûts de la fourniture de biens et services publics. Nous montrons que les PPPs renforcent la croissance économique, mais que cet effet reste conditionné par le niveau de la dette.

Enfin le chapitre 6 met en évidence les stratégies de financement de l'économie compatibles avec la soutenabilité de la dette publique. Particulièrement, il s'agit de simuler plusieurs mécanismes de financement visant à intensifier les investissements publics tout en maintenant la dette publique sur une trajectoire soutenable. A cet effet, l'analyse mobilise les nouvelles techniques de modélisation macroéconomique appliquée à l'analyse des régularités des cycles

réels, d'identification de la nature des chocs et d'évaluation des politiques: les modèles dynamiques stochastiques d'équilibre général (DSGE). On peut anticiper que la soutenabilité de la dette souveraine est intrinsèquement liée à la structure de cet endettement ainsi qu'à la configuration des différentes stratégies de financement des investissements publics. Le but étant de tirer des enseignements pour les pays de l'UEMOA, en matière des stratégies de financement dont ils pourront faire recours, et pouvant permettre de maintenir leur endettement à un niveau soutenable. Plusieurs sources de financement ont été examinées telles qu'une augmentation des taxes sur la consommation, et des taxes sur la rente des ressources naturelles ainsi que différents types de dette publique y compris les prêts concessionnels et les subventions, la dette commerciale extérieure et la dette intérieure. Les simulations suggèrent que, lorsque le pays est doté de ressources naturelles, il est possible d'accroître l'investissement public en faisant recours aux emprunts concessionnels uniquement, ou en les combinant avec des emprunts additionnels (extérieur commercial ou domestique) tout en maintenant la viabilité de la dette de long terme. Dans le cas contraire, le recours aux emprunts commerciaux extérieurs apparaît plus risqué.

keywords: UEMOA . Espace budgétaire . Taxation optimale . Mobilisation fiscale . Régimes politiques. Institutions . Croissance économique . Efficacité de la TVA . Partenariats Public-Privés (PPP) . Financement du développement . Dette publique . Contraintes budgétaires . Structure de la dette . Soutenabilité de la dette . DSGE

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Chapter 1

Financement des Dépenses Publiques : Cadre d'Analyse et Contexte de l'UEMOA

1.1 Introduction

Les récentes évolutions des principaux indicateurs macroéconomiques dans les pays en développement, en particulier ceux d'Afrique Subsaharienne, nous amènent à des réflexions profondes sur les mécanismes de transmission et surtout sur les sources de financements de ces économies. Plus précisément, il est question à notre avis de s'interroger sur les liens qui peuvent interconnecter le triptyque *-mobilisation fiscale – dette publique – et le financement des économies -* sur la base d'un certain nombre de faits stylisés. Ce regard porté à la fois sur les thématiques de mobilisation des recettes fiscales, ainsi que sur la dette publique, positionne cette thèse dans la littérature économique mettant en avant le rôle des finances publiques en matière de financement du développement.

Cependant, afin d'aborder cette question, le mieux est de se référer à la *Théorie des finances publiques* de Musgrave (1959) dans laquelle il construit une théorie normative de l'action par les dépenses et les recettes publiques, définissant ainsi les champs où l'intervention de l'Etat est nécessaire, en fournissant à cette occasion une synthèse remarquable sur les fondements micro et macroéconomiques de la politique économique. Ces fondements seront organisés en trois fonctions à savoir l'allocation des ressources, la distribution, et la stabilisation.

A travers les politiques économiques, les décideurs poursuivent des objectifs socio-économiques, visant au final une amélioration du bien être commun de la population par la création de richesses. Cependant, lorsque les comportements ou les décisions des différents acteurs du marché viennent entravé cette création de richesses, l'Etat intervient ainsi pour corriger ces défaillances, pour stabiliser l'activité économique en cas de surchauffes ou l'optimiser en cas de récession. Ainsi, l'Etat agit ponctuellement par des politiques économiques conjoncturelles, mais aussi sur la structure de l'économie

par des politiques structurelles afin d'améliorer les conditions de réalisation du potentiel de croissance.

Factuellement, le gouvernement poursuit les objectifs économiques par le biais des objectifs macroéconomiques dont les principaux sont la croissance économique, le plein emploi, la stabilité des prix et les équilibres commerciaux, et des objectifs sociaux tels que la réduction des inégalités de revenus, la lutte contre la pauvreté, l'accroissement du taux d'alphabétisation, l'augmentation de l'espérance de vie, la promotion d'un environnement saint et durable, etc. Une vision normative en économie publique consiste à chercher à rendre *maximum* le bien-être social. Par exemple, dans les théories *holistes* ou *organicistes*, l'Etat est considéré comme une réalité en soi, supérieure aux individus composant le groupe social et totalement distincte d'eux. Si p_i désigne les objectifs sociaux-économiques poursuivis par l'Etat, la fonction de préférence de l'Etat U_E s'écrit:

$$U_E = U(p_1, p_2, p_3, \dots) \quad (1.1)$$

Toutefois, étant donné que l'Etat poursuit ces objectifs sociaux-économiques à travers des instruments de politiques économiques θ_j , tout changement qui intervient dans l'utilisation de ces instruments est susceptible d'impacter les objectifs désirés et donc la préférence de l'Etat U_E . Par conséquent, c'est la mise en oeuvre de ces instruments qui permettent à l'Etat de maximiser le bien-être social de sorte que $p_i = f(\theta_1, \theta_2, \theta_3, \dots)$. Le bien-être social W dépend uniquement de la fonction de préférence de l'Etat, U_E sur les modes sociaux de consommation des biens k par les n individus de la société:

$$W = W[U_E(x_{11}, \dots, x_{1k}, x_{21}, \dots, x_{2k}, \dots, x_{n1}, \dots, x_{nk})] \quad (1.2)$$

Ainsi, il convient de noter que le budget et la monnaie sont les princi-

paux instruments qu'utilisent les gouvernements dans la poursuite des objectifs socio-économiques à travers les politiques budgétaire (ou fiscale) et monétaire.

Le présent chapitre propose dans un premier temps, une synthèse théorique des modes de financement des dépenses publiques. Ensuite, il pose un diagnostic du financement des économies au sein de l'UEMOA sur la base des faits stylisés et des différentes contraintes d'accès au financement imposées par les principes d'intégration économique et monétaire. Enfin, il définit les principaux objectifs, présente les questions de recherche, ainsi que les contributions de la thèse.

1.2 Le financement des dépenses publiques : le cadre d'analyse

La politique budgétaire de relance est actionnée par les dépenses et les recettes de l'État. Elle consiste à utiliser le budget de l'État pour agir sur la conjoncture et englobe l'ensemble des mesures qui ont des conséquences sur les ressources et les dépenses de l'État visant à atteindre certains objectifs de politique conjoncturelle. Par principes, dans la conception de sa politique budgétaire et fiscale, tout gouvernement adopte une position d'équilibre budgétaire, avec une probabilité plus forte d'être en excédent qu'en déficit. Malheureusement, plusieurs raisons relatives à la mise en oeuvre de la politique, ramènent les gouvernements à des situations de déficits budgétaires (dont l'accumulation sur plusieurs années crée la dette) posant ainsi un autre challenge aux gouvernements, qui est celui du financement du déficit.

1.2.1 Arbitrage classique entre impôt et dette

Le déficit public survient lorsqu'au cours d'une année donnée, l'Etat dépense plus que ses recettes. C'est un solde négatif des recettes et dépenses de l'Etat hors remboursement d'emprunt. Ainsi, une accumulation de déficits sur plusieurs années constitue le stock de la dette que l'Etat se doit de rembourser.

1.2.1.1 D'où vient le déficit?

Au niveau macroéconomique, l'ensemble des ressources en biens et services dont disposent les agents économiques au cours d'une période (la production domestique plus les importations) correspond à la demande globale qui est la somme de la consommation privée, de l'investissement privé, des dépenses de l'État et des exportations réalisées au cours de la période. A cet effet, toute variation des dépenses publiques se répercute sur la production domestique. Cependant, pour accroître les créations d'emplois, il suffit de stimuler la production domestique par une hausse des dépenses de l'État. En pratique, cela revient à accepter de la part de l'État un déficit budgétaire, qui a priori sera temporaire, car la création de richesses supplémentaires permettra de le résorber rapidement par une augmentation des recettes fiscales. Par exemple, lorsque la conjoncture économique se dégrade fortement ou en période de crise, les pouvoirs publics peuvent décider d'intervenir directement et de mettre en œuvre des mesures spécifiques en termes de dépenses, d'impôts ou de transferts sociaux afin d'influer volontairement la conjoncture.

Les pouvoirs publics prévoient un montant de dépenses publiques supérieures aux ressources prélevées sur les agents économiques. L'État peut augmenter certaines dépenses publiques comme la rémunération des fonctionnaires, les aides aux entreprises, les dépenses d'investissement dans les in-

frastructures, etc., ou diminuer certaines recettes (réduction de l'impôt sur le revenu pour les ménages, remises d'impôts pour les entreprises, etc.) en vue d'accorder un pouvoir d'achat supplémentaire et ainsi relancer la consommation et l'investissement, donc l'emploi.

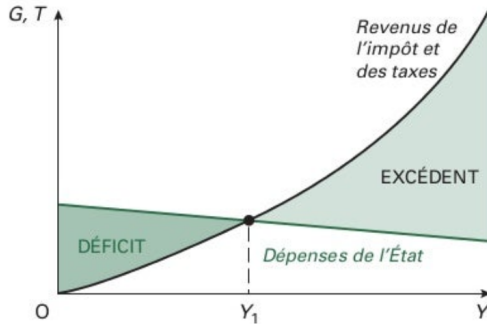
Il est possible de faire un parallèle entre la demande globale et le déficit budgétaire. Ainsi par exemple, si au cours d'une année à l'autre, le déficit se réduit, cela peut être le résultat d'une hausse des impôts (T) ou d'une baisse des dépenses publiques (G). On assiste par conséquent à une baisse de la demande globale dans les deux cas, toutes choses égales par ailleurs.

En revanche, le déficit ou excédent budgétaires ne sont pas que des conséquences des décisions prises par les gouvernements. Ils proviennent plutôt surtout des fluctuations de l'activité économique. En période de forte croissance, les revenus des ménages et des entreprises, ainsi que le nombre de contribuables augmentent, et l'Etat collecte davantage de recettes fiscales, donc les recettes T augmente. Dans une économie en pleine croissance, les dépenses publiques en faveur des chômeurs baissent au fur et à mesure que le nombre de chômeurs se réduit. Cela est également considéré comme une augmentation de T . Mais, inversement, dans une phase de récession ou de ralentissement de l'activité, les recettes publiques diminuent, le déficit se creuse plus rapidement.

La figure ci-après décrit la relation qui existe entre le déficit/excédent et le niveau de revenu national Y d'un pays. Les revenus des impôts étant liés à l'activité économique, la taille du déficit public varie automatiquement en fonction du niveau de revenu national. La pente de la courbe dépend du taux d'imposition. La relation négative entre les dépenses de l'Etat et le revenu national Y signifie que les charges sont moindres dans une économie croissante. Pour un revenu national (ou PIB) égal à Y_1 , le budget est équilibré ($T = G$). Mais pour un PIB plus élevé, il y a un excédent ($T > G$) alors que, pour un

PIB plus faible, se creuse un déficit budgétaire ($T < G$).

Figure 1.1: Evolution du déficit/excédent budgétaire en fonction du revenu national



1.2.1.2 Comment finance-t-on le déficit?

Dans la littérature économique, on distingue trois sources de financement du déficit budgétaire de l'Etat notamment le financement monétaire, le financement par impôt et enfin, le financement par emprunt.

1.2.1.3 Financement par impôt

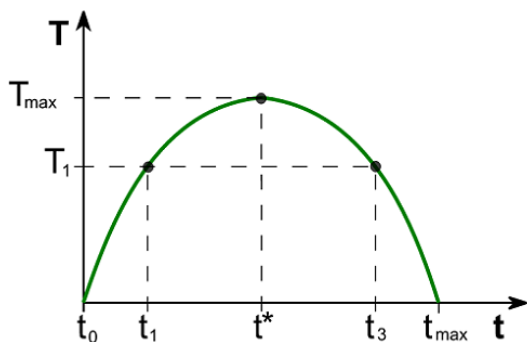
Les gouvernements peuvent aussi augmenter les impôts pour financer le déficit public, soit réduire les dépenses. Mais ce dernier choix est plus difficile à opérer étant donné le caractère structurel de certaines dépenses publiques (par exemple le paiement des salaires aux fonctionnaires) et donc incompressibles à court terme. Pour cela, il est plus raisonnable de s'orienter vers une augmentation des impôts pour résorber le déficit public. En l'occurrence, un accroissement des impôts se traduit quasi-instantanément par une hausse des

recettes fiscales. Dès lors, pour un niveau de dépenses constantes, le supplément de recettes peut venir combler le déficit.

Par contre, un tel raisonnement n'est en fait valable qu'à court terme. Cependant, il est nécessaire de prendre en compte les répercussions à moyen et long terme d'une hausse des impôts. En réalité, les entreprises et les ménages sont très sensibles aux hausses d'impôts. Ils adaptent leurs comportements en conséquence, ce qui affecte les recettes fiscales.

On peut par exemple se référer à la fameuse formule d'Arthur Laffer, selon laquelle "trop d'impôts tue l'impôt". Il s'agit d'une idée figurée par une courbe en cloche appelée **courbe de Laffer**, qui met en relation le taux d'imposition total et le montant des recettes fiscales que l'Etat peut en attendre (voir Figure 1.2). Cette courbe illustre l'idée selon laquelle il existe un niveau maximal de taxation au delà duquel le produit de l'impôt diminue. Avant t^* , une augmentation de la pression fiscale engendre une hausse des recettes pour l'État. Au delà de ce point, l'effet désincitatif sur l'offre de travail l'emporte sur les recettes attendues.

Figure 1.2: La Courbe de Laffer



Par conséquent, augmenter les impôts pour réduire les déficits revient finalement à s'interroger sur le ou les impôts que le gouvernement devrait augmenter pour améliorer le solde budgétaire. En effet, tous les impôts ne touchant pas les mêmes catégories d'agents économiques ou les mêmes opérations, leur modification doit logiquement avoir des résultats contrastés sur les déficits. Il convient donc d'étudier les effets d'une hausse des différents impôts, que l'on classe ordinairement en impôts directs et indirects.

Par ailleurs, il est également possible de réduire les dépenses pour diminuer les déficits. Mais, face aux besoins grandissants de dépenses publiques dans certains pays et surtout à cause de certaines dépenses qui sont structurelles, les réduire pour financer le déficit n'est pas un recours envisageable. Toutefois, cette option présente deux intérêts. D'abord, celui de ne pas augmenter les impôts, ce qui est à la fois politiquement impopulaire et néfaste pour la consommation intérieure et la compétitivité des entreprises. Et ensuite, celui d'inciter l'Etat à effectuer des arbitrages budgétaires l'obligeant à redéfinir ses priorités et à abandonner les dépenses secondaires ou superflues. Une telle modification structurelle des dépenses traduit ou traduirait la volonté de l'Etat d'adopter une politique budgétaire plus vertueuse.

1.2.1.4 Financement par emprunt

Pour financer le déficit budgétaire, l'Etat peut également avoir recours à l'emprunt, soit auprès des particuliers par l'émission des bons du Trésor sur formes d'emprunts à moyen ou long terme, soit auprès d'organismes financiers, notamment les banques. En effet, lorsqu'il existe une épargne constituée, en période de crise comme c'est souvent le cas, l'emprunt public peut mobiliser cette épargne pour le financement des investissements qui favorisent la reprise économique, et créer ainsi des emplois. Au contraire, en période d'expansion, et à plus forte raison d'inflation, les besoins financiers des en-

treprises et des ménages sont importants, et un emprunt public risque de ne pas trouver suffisamment de ressources disponibles. Dans ce cas, le déficit sera, au moins en partie, financé soit par une augmentation des impôts au risque d'éviction de la demande privé ou par une création de monnaie qui accentuera les tendances inflationnistes.

Toutefois, il convient de noter que le financement par emprunt du déficit public augmente la dette publique et pose un problème de soutenabilité de celle-ci. Supposons que chaque année, l'Etat effectue des prélèvements obligatoires sous forme d'impôts, de cotisations et taxes (T_t) et les utilise pour financer ses dépenses courantes ainsi que les transferts (G_t), de même que pour payer les intérêts de la dette (rB_{t-1}), la contrainte budgétaire inter-temporelle de l'Etat peut être définie comme suit:

$$B_t - B_{t-1} = G_t + rB_{t-1} - T_t \quad (1.3)$$

B_t représente l'encours de dette publique; G_t correspond aux dépenses publiques hors intérêt de l'année t ; T_t le montant des recettes fiscales; et r le taux d'intérêt réel.

La variation de la dette est représentée par la différence entre la dette publique de l'année en cours t et de l'année $t - 1$. Il y a donc déficit public D_t , lorsque $B_t - B_{t-1} > 0$. Ainsi, l'équation 1.3 est réécrite comme suit:

$$D_t = (G_t - T_t) + rB_{t-1} \quad (1.4)$$

Ce déficit public ou déficit budgétaire se décompose comme la somme du déficit primaire ($G - T$) et de la charge d'intérêts dus sur l'encours de la dette (B). Le déficit budgétaire peut donc être considéré comme une sorte de ressource qui s'ajoute aux ressources de l'Etat. Ainsi, en faisant recours à l'emprunt pour financer son déficit budgétaire, l'Etat risque de tomber dans

un infini cercle vicieux consistant à emprunter pour payer les dettes passées.

La dette publique est un stock constitué par le cumul des déficits passés. A chaque année, la dette publique s'accroît du déficit budgétaire (déficit primaire et les intérêts de la dette). Les Etats font donc face à une contrainte budgétaire instantanée qui doit être satisfaite *ex post*, et qui rend compte de la dynamique de la dette. En reprenant l'équation (1.3), nous pouvons écrire la dynamique de la dette:

$$B_t = (G_t - T_t) + (1 + r)B_{t-1} \quad (1.5)$$

Cette équation montre que dans le long terme, le respect des de, la contrainte budgétaire impose une maîtrise du déficit primaire c'est-à-dire un ajustement des dépenses et des recettes. Par exemple, un accroissement du déficit budgétaire conduit à une augmentation des taux d'intérêt car une hausse dans l'offre de titres publics entraîne une baisse des prix et oblige l'Etat à offrir des taux supérieurs. Mais cette hausse des taux évince l'investissement privé étant donné que la rémunération de l'investissement public est plus attractive. De la même manière, l'augmentation de la dette publique entraîne une augmentation de la charge de la dette, réduisant par là, les marges de manœuvres de la politique budgétaire future et sa capacité de relance à court terme. Ainsi donc, à court terme, le déficit budgétaire permet de soutenir une demande faible, ce qui entraîne une augmentation du niveau de production par l'effet multiplicateur Keynésien. Mais dans le long terme, la dette publique lorsqu'elle est élevée, a tendance à réduire l'accumulation du capital et la valeur de la production. Par conséquent, si l'Etat peut faire recours aux déficits budgétaires en période de récession, il est tenu de dégager des excédents budgétaires en période d'expansion afin d'assurer une stabilisation de l'évolution de la dette et le PIB de long terme.

En exprimant l'évolution de la dette sous forme de ratio de la dette sur

PIB, on peut en déduire les conditions de stabilisation à long terme:

$$\frac{B_t}{Y_t} - \frac{B_{t-1}}{Y_{t-1}} = \frac{G_t - T_t}{Y_{t-1}} + (r - g) \frac{B_{t-1}}{Y_{t-1}} \quad (1.6)$$

L'équation 1.6 montre que la variation du ratio de la dette publique dépend à la fois du ratio initial de la dette, du ratio de déficit primaire, et de la différence entre le taux d'intérêt réel et le taux de croissance. Cependant, on note qu'en dehors de tout effort budgétaire, les périodes de forte croissance conduisent à une réduction du ratio d'endettement public. Autrement dit, la dette publique croît tant que la croissance n'a pas atteint son sentier de croissance mais se stabilise dès lors que le taux de croissance retrouve son niveau naturel.

Le financement du déficit par emprunt exerce un effet cumulatif sur la dette. Si le taux de croissance du PIB excède le taux d'intérêt réel des emprunts publics ($r < g$), l'Etat peut stabiliser le ratio de la dette sur PIB tout en ayant des déficits primaires, et donc *a fortiori* des déficits budgétaires. Dans ce cas, l'effet boule de neige n'existe pas. Au contraire, si le taux de croissance est inférieur au taux d'intérêt réel ($r > g$), la stabilisation de la dette exige un excédent primaire. Dans le cas où il n'y a pas d'excédents budgétaires, l'effet boule de neige joue à plein, explosant le ratio d'endettement. En outre, la seule croissance de la dette pousse les taux d'intérêt à la hausse, ce qui aggrave encore la situation, créant ainsi un cercle vicieux de la dette et pose le problème de la soutenabilité des finances publiques.

1.2.2 Financements complémentaires

Les sources de financement complémentaires regroupent le financement monétaire, les apports dons de l'Aide Publique au Développement (APD) et le financement privé. Une nouvelle forme de financement qui émerge de plus

en plus est le financement par les contrats de Partenariat Public-Privé (PPP).

1.2.2.1 Le financement monétaire

Le financement monétaire des déficits publics ou la monétisation de la dette publique, est une pratique autorisant la banque centrale à financer directement le budget de l'Etat. Il faut noter que cette mesure se traduit par une hausse du taux d'inflation. Mais, certains auteurs préfèrent ce mode au financement par impôt en soutenant qu'il permettrait d'amoindrir les tensions sur les taux d'intérêt et éviter par la même occasion, l'éviction de la demande privée (consommation et investissement) que provoquerait un financement budgétaire. Par exemple, [Tobin and Buiter \(1974\)](#), en comparant les multiplicateurs Keynésiens d'un déficit public dans le cas du financement par la création monétaire et par impôt, trouvent que le multiplicateur est bien plus important en cas de financement monétaire. Dans l'article 36 de son statut selon lequel *"la Banque Centrale ne peut accorder des financements monétaires aux trésors publics, aux collectivités locales ou à tous autres organismes publics des Etats membres"*, la BCEAO interdit le financement monétaire du déficit public. La BCEAO n'est donc autorisée à faire des avances aux trésors publics des pays membres de l'Union, ni à détenir des bons du trésor émis pour financer les déficits publics.

1.2.2.2 Le financement par les dons APD

L'aide publique au développement (APD) désigne l'ensemble des financements apportés par les acteurs publics des pays les plus favorisés pour améliorer les conditions de vie dans les pays moins favorisés. Ce sont des dons et prêts à conditions très favorables (nets des remboursements en capital) accordés par des organismes publics aux pays et aux territoires figurant sur la liste des bénéficiaires du Comité d'Aide au Développement (CAD) de

l'organisation de Coopération et de Développement Economique (OCDE). [Charnoz and Severino \(2010\)](#) désignent les APD par un système international de transferts de ressources publiques qui met en relation des pays “donateurs” et des pays “bénéficiaires”. Cela constitue une source de financement complémentaire aux ressources internes dont bénéficient les Etats africains depuis les années 1960, période charnière des indépendances africaines. Ils visent essentiellement à financer des programmes d'amélioration de l'accès à l'eau potable, aux soins, à l'électricité, à l'école, à des logements décents, ou encore à un environnement préservé. Cette aide peut porter sur des petits projets locaux ou de très vastes politiques à l'échelle d'un pays sur le long terme. Pour leur part, les prêts ne sont systématiquement pas comptabilisés dans les APD. Il doivent être basés sur certaines conditions financières dites avantageuses c'est-à-dire avec un degré de concessionnalité, comme par exemple, être constitué d'au moins 25% d'élément don, avant d'être comptabiliser dans les APD.

L'APD se présente sous différentes formes. Elle est dite bilatérale lorsqu'elle va directement du pays donateur au pays bénéficiaire, ou alors dite multilatérale lorsqu'elle prend la forme de contributions des États au fonctionnement et aux programmes des organismes internationaux (comme l'UNICEF ou la Banque mondiale). Les ressources transférées vers les pays en développement peuvent être classées en deux catégories notamment les dons et les prêts. A l'inverse des prêts, les dons sont des transferts en espèces ou en nature derrière lesquels il n'y a aucune obligation de remboursement.

Aux côtés des pays du CAD de l'OCDE, ont émergés de nouveaux acteurs entrés dans le club des donateurs qui entrent dans la catégorie des “donateurs émergents” créée par l'OCDE. Au sein de cet ensemble se trouve la Chine qui devient un acteur clé dans le financement international du développement. L'émergence de l'aide étrangère de la Chine au cours de ces dernières années, a des répercussions importantes sur l'architecture internationale de

l'aide du fait qu'elle repose sur des principes qui divergent des standards des pays donateurs traditionnels du CAD, notamment en termes de principes tels que la non-ingérence, les avantages mutuels et l'inconditionnalité. Elle repose surtout sur un ensemble de coopération commerciale, économique et d'accords d'investissement.

L'Aide chinoise, passe essentiellement par des canaux bilatéraux. Afin de répondre le plus efficacement possible aux besoins des pays en développement, la Chine réalise des études économiques rigoureuses qui lui permettent d'évaluer la faisabilité des projets d'aide proposés par les pays destinataires avant d'accorder des fonds (voir [M. Huang & Ren, 2012](#) et les rapports [SSB-PRC, 1999-2019](#)). Toutefois, la Chine fournit aussi de l'aide au travers d'institutions multilatérales (peut-être dans de proportion moindre), étant membre de la Banque mondiale, du Fonds Monétaire International (FMI), de la Banque asiatique de développement et de la Banque africaine de développement, et participe depuis de longue date à plusieurs programmes des Nations-Unies tels que le Programme des Nations-Unies pour le développement (PNUD), l'Organisation des Nations-Unies pour l'Alimentation et l'Agriculture (FAO), le Programme Alimentaire Mondial (PAM) ou encore l'Organisation Mondiale de la Santé (OMS).

Les projets d'aide sont orientés vers l'agriculture, l'industrie, les infrastructures économiques, les équipements publics, l'éducation et les soins médicaux. Ces projets sont sélectionnés dans le but d'améliorer la productivité industrielle et agricole des pays destinataires, d'édifier une fondation solide pour le développement économique et social et d'améliorer l'éducation et les soins médicaux de base. Mais durant ces dernières années, la lutte contre le changement climatique constitue un nouvel enjeux de l'aide chinoise.

En réalité, l'aide publique au développement n'est qu'une part de ce qu'on appelle la "finance pour le développement" qui englobe l'ensemble des fi-

nancements publics et privés, nationaux et internationaux, disponibles pour les pays en développement dont les investissements privés, les actions des fondations et des ONG, les transferts d'argent des citoyens expatriés vers leurs pays d'origine. L'aide au développement constitue en soi un moyen pour venir en aide aux pays en développement. Même si elle a été pendant longtemps, une source de financement des grands projets d'infrastructures de transport, de communication et d'électricité etc., son efficacité fait l'objet de débat ces dernières décennies entre les partenaires (pays donateurs et bénéficiaires) de l'aide.

Cependant, il faut noter que l'efficacité de l'aide à l'égard des pays en développement est d'autant plus complexe à identifier que la complexité de l'aide entre ses instruments (les prêts, dons et remises de dettes) et ses objets (l'aide projet, l'aide humanitaire ou encore l'aide budgétaire). Depuis les années 1980, l'APD a été très marquée par la crise de la dette et s'est consacrée, au moins en partie, à son refinancement. Dans ce contexte, une controverse majeure opposant les dons et les prêts s'est développée depuis le début des années 2000 et soulève à cet effet la question de l'efficacité de l'endettement international (Jacquet & Severino, 2004). Néanmoins, on peut tout de même admettre que les apports dons APD jouent un rôle majeur dans le financement du développement dans les pays bénéficiaires. La plupart¹ de

¹La majorité des membres du CAD fournissent une APD uniquement sous forme de dons. Par conséquent, le niveau bas des taux d'intérêt conjugué à des contraintes budgétaires a entraîné au cours de la dernière décennie une augmentation de la part de prêts concessionnels, qui est passée de 10% de l'APD bilatérale brute en 2005 à 16% en 2015. Alors que le don est resté la forme d'APD privilégiée de la majorité des membres du CAD, pour certains fournisseurs, les prêts concessionnels représentaient un tiers, voire plus, de l'APD bilatérale brute en 2015 selon les statistiques du CAD. Par exemple, la France fait partie des quelques pays (avec l'Allemagne, la Corée du Sud et le Japon) dont l'aide extérieure repose à la fois sur les dons et sur les prêts à taux avantageux. Les autres pays (États-Unis, Russie, Suède), ne font, pour l'essentiel, que des dons. Les prêts sont surtout l'apanage des banques dites "multilatérales", comme la Banque Mondiale. S'agissant de la Chine, qui est aussi un des donateurs importants aux bénéficiaires des pays africains, a réduit ses apports dons et accordé moins de prêts sans intérêt au profit de prêts à des condi-

l'APD prend la forme de dons inconditionnels. Les dons sont principalement utilisés pour aider les pays destinataires à construire des hôpitaux, des écoles et des logements à des coûts faibles, pour promouvoir le forage de puits ou des installations d'approvisionnement en eau potable et pour financer d'autres projets de petite et moyenne envergure destinés à améliorer le bien-être social. Par ailleurs, les dons financent la coopération pour le développement des ressources humaines, la coopération technique, la fourniture de marchandises et de matériaux ainsi que l'aide humanitaire d'urgence. Les prêts sans intérêt visent la construction d'équipements publics et le lancement de projets devant améliorer les conditions de vie, et sont généralement accordés aux pays en développement à des conditions relativement avantageuses. Les prêts à des conditions de faveur, quant à eux, sont destinés à des projets d'infrastructure de moyenne ou de grande taille (61% d'entre eux servent à construire des infrastructures de transport, de communication et d'électricité) ou à la fourniture de services dans plusieurs domaines tels que l'industrie, la mécanique, l'électricité ou autres services matériels et techniques.

1.2.2.3 Les financements privés

La question du rôle du secteur privé dans le financement du développement, bien qu'importante, n'a pas été reconnue comme telle depuis la montée en puissance de l'aide publique au développement au moment des indépendances dans les années 1960. Or, le financement privé jouent sans aucun doute un rôle crucial dans le financement du développement. On peut distinguer de façon classique les flux privés de sources interne (investissement privé intérieur) et

tions favorables (concessional loans) à partir des années 1980 surtout après la réforme de l'aide étrangère en 1995. Elle a réussi à mettre en œuvre une combinaison d'aide publique, de commerce et d'investissements en utilisant les fonds gouvernementaux comme levier pour mobiliser le financement et les investissements du secteur privé chinois dans les pays en développement. Cela a amplifié l'aide étrangère de la Chine et joué un rôle non négligeable dans la croissance des pays en développement et, par là, une amélioration des conditions de vie des populations.

externe (investissement directs étranger reçu).

Dans toute économie, le secteur privé est indispensable pour la croissance économique et le développement. Les entreprises privées et les institutions financières représentent l'un des principaux moteurs de croissance dans les pays en développement et émergents. Elles participent activement à la création d'emplois et de revenus y compris fiscaux pour les États, et contribuent ainsi à l'amélioration des conditions de vie des populations en investissant dans la production des biens et des services dont le transport, les logements, l'énergie, etc.

Théoriquement, l'investissement privé peut avoir des liens ambigus avec l'investissement public. D'une part, lorsque l'Etat est en concurrence avec les entreprises privées dans l'accès au financement, il y a un effet d'éviction. Cet effet peut être substantiel lorsque l'économie est proche de son potentiel ou de court terme lorsque les sources de financement deviennent rares. D'autre part, il peut y avoir un effet d'entraînement. En effet, à court terme une relance budgétaire par l'investissement public peut conduire à améliorer la conjoncture et relancer la demande globale. Ainsi, si le capital privé et le capital public sont des facteurs complémentaires, la productivité du capital privé se voit renforcée par la croissance du stock de capital public.

Cependant, il est admis que l'accumulation de capital est l'un des plus importants accessoires pour une croissance saine et durable et la principale source d'accumulation de capital est l'investissement. Le secteur privé occupe une place essentielle et importante dans la croissance fondée sur l'investissement et la production. Dans la pensée économique contemporaine, le développement de l'investissement privé contribue à améliorer les possibilités d'emploi, l'accumulation de capital, l'amélioration de la production, et donc le développement économique dans son ensemble. Ainsi, l'investissement privé domestique consitute une composante du financement

privé du développement, complémentaire à l'investissement privé externe notamment les investissements directs étrangers (IDE)².

L'influence des IDE sur les investissements privés nationaux peut varier en fonction de l'environnement d'investissement national du pays d'accueil. Les IDE évincent les investisseurs privés nationaux qui ne sont pas capables de concurrencer les multinationales de avec des technologies plus efficaces. Autrement, les IDE drainent plutôt les investissements privés nationaux en générant des retombées par la diffusion de nouvelles technologies et des liens de production en amont ou en aval. Toutefois, l'effet inverse peut aussi exister entre l'investissement intérieur et les IDE. Il y a plusieurs raisons pour lesquelles les investissements privés nationaux peuvent catalyser les flux d'IDE dans les pays en développement. Les investisseurs nationaux ont tendance à avoir une meilleure connaissance du climat d'investissement et leur action constitue donc un signal aux investisseurs étrangers sur l'état de l'économie domestique. Par conséquent, dans un environnement où il existe une asymétrie d'information entre les investisseurs nationaux et étrangers, l'investissement privé national stimulera l'investissement étranger.

Au contraire, lorsque les pays ne sont pas capables d'engager certains investissements sans les apports en IDE, par conséquent, fournir des incitations et construire des institutions pour attirer l'investissement direct étranger ciblé devrait être un point essentiel d'une politique et d'une stratégie d'investissement nationale. Les incitations et les aides accordées à l'IDE ne doivent pas faire disparaître l'investissement privé national.

²L'OCDE définit les IDEs comme une activité par laquelle un investisseur résidant dans un pays obtient un intérêt durable et une influence significative dans la gestion d'une entité résidant dans un autre pays. Cette opération peut consister à créer une entreprise entièrement nouvelle (investissement de création) ou, plus généralement, à modifier le statut de propriété des entreprises existantes (par le biais de fusions et d'acquisitions). Sont également définis comme des investissements directs étrangers d'autres types de transactions financières entre des entreprises apparentées, notamment le réinvestissement des bénéfices de l'entreprise ayant obtenu l'IDE, ou d'autres transferts en capital.

Les flux financiers d'IDE sont souvent considérés comme un complément à l'épargne domestique, qui faciliterait le financement de projets locaux d'investissement. Du moment où les IDE peuvent s'additionner directement au stock de capital disponible, on peut admettre que cela puisse également influencer la structure du capital lui-même. Les investisseurs domestiques peuvent ainsi réagir à l'entrée des investisseurs étrangers, pouvant conduire à un phénomène de substitution ou de complémentarité. Deux canaux d'interaction peuvent être identifier entre l'IDE et l'investissement privé domestique. D'un coté, on note une interaction sur le marché des biens et services, où l'entrée des IDE impacte positivement la demande adressée aux entreprises locale par le canal d'approvisionnement local, ou négativement par le biais de la concurrence. De l'autre, les apports de fonds en IDE entraînent un accroissement de liquidités disponibles dans l'économie et assouplissent les contraintes financières pesant sur les entreprises nationales.

Ainsi les IDE constituent indéniablement l'une des sources indispensables pour le financement du développement comme l'ont souligné [Selaya and Sunesen \(2012\)](#) et la plupart des pays développés ont eu recours aux investissements directs étrangers dans les phases rapides de leur croissance économique ([Chang-Soo, 2002](#)). De plus, les IDE ont toujours été considérés comme une source de financement complémentaire essentielle aux efforts de financement public du développement.

Il existe également un autre canal par lequel le secteur privé participe au financement du développement qui prend la forme d'un partenariat entre le secteur public et les opérateurs privés. Certaines autorités publiques sont confrontées à des difficultés budgétaires qui les obligent à faire face à des contraintes de liquidité ou à augmenter leurs coûts de financement au point où le financement privé des infrastructures apparaît comme l'option la moins chère ou la seule réalisable. Cela limite les options des planificateurs publics, qui

pourraient devoir choisir entre une infrastructure financée par le secteur privé et aucune infrastructure : c'est ainsi que les naissent les contractualisations en partenariats public-privés.

1.2.2.4 Le financement par les partenariats public-privé

Lorsque les gouvernements sont confrontés à d'importants besoins en infrastructures et aussi en matière de financement, alors même qu'ils ont besoin de services plus efficaces, un partenariat avec le secteur privé peut favoriser de nouvelles solutions et apporter des financements. Les partenariats public-privé (PPP) sont un mécanisme qui permet au gouvernement d'acquérir et de mettre en œuvre des infrastructures et/ou des services publics en utilisant les ressources et l'expertise du secteur privé. Ce sont des ententes à long terme entre le gouvernement et un opérateur privé en vertu desquelles ce dernier fournit et finance des services publics en utilisant une immobilisation, en partageant les risques associés. Ainsi, les PPPs peuvent fournir des services publics à la fois en ce qui concerne les infrastructures (tels que les ponts, les routes) et les services sociaux (tels que les hôpitaux, les services publics, ou encore les prisons, etc.).

Les PPPs ont pour avantages de combiner les compétences et les ressources des secteurs public et privé par le partage des risques et des responsabilités. Cela permet aux gouvernements de bénéficier de l'expertise du secteur privé et de se concentrer plutôt sur les politiques, la planification et la réglementation en déléguant les activités quotidiennes. Les acteurs privés peuvent contribuer aux financements des infrastructures de service public par le biais d'une contractualisation PPP par l'État, en devenant concessionnaire d'une infrastructure pour le compte de l'État, avec pour mission d'en assurer la gestion, l'entretien et la modernisation. En cela, les PPPs restent un des outils que les autorités publiques et les décideurs utilisent pour encourager

l'accroissement des investissements dans les infrastructures en vue de faire face aux contraintes budgétaires.

De plus, il convient de noter que la fourniture d'une infrastructure via les contrats de type PPP peut être plus rapide, avec un coût inférieur au coût de production par l'Etat, et fournit un service public de qualité supérieure, même si la mise en œuvre satisfaisante des PPPs demande beaucoup de temps et de ressources. Face aux contraintes budgétaires et fiscales, surtout dans les pays en développement, les gouvernements doivent chercher à réorienter l'épargne de long terme vers l'économie réelle en suppléant les acteurs privés à l'utilisation des ressources publiques. Dans les contrats PPPs, les acteurs agissent souvent de concert pour mutualiser leurs ressources afin de faire aboutir les projets auxquels les seules ressources publiques ne peuvent plus subvenir.

Ainsi donc, les Etats peuvent faire recours aux PPPs afin de combler le gap de financement des infrastructures en offrant aux acteurs privés des opportunités d'investissement de long terme. Dans les pays en développement, l'intérêt pour les PPPs s'est accru ces dernières années et la nécessité de restrictions budgétaires dans la plupart de ces pays devrait encore accroître leur utilisation. Cela présente aux décideurs des défis particuliers qu'il convient de relever avec des réponses institutionnelles prudentes à défaut desquelles les effets escomptés seront loin d'être manifestes. Pour que les PPPs soient couronnés de succès, le cadre juridique et institutionnel du pays doit également soutenir ce nouveau modèle de prestation de services et fournir des mécanismes efficaces de gouvernance et de suivi des PPPs. Une entente de PPP bien rédigée pour le projet devrait clairement répartir les risques et les responsabilités entre les différentes parties prenantes.

En matière de financement du développement, les PPPs peuvent être très utiles d'autant plus qu'ils permettent une réallocation des fonds privés vers

le financement des infrastructures publiques et la provision de services sociaux assurés par le partenaire privé en contrepartie d'une redevance acceptable payée par les usagers. Mais au même moment, il faut noter qu'il s'agit d'un instrument à double tranchant. Si les PPPs permettent de réduire les dépenses publiques de même que le recours à l'endettement par les Etats en allant chercher les capitaux privés pour le financement des infrastructures et services publics, ils ne permettent cependant pas d'éviter le surendettement à long terme car le coût du financement dans le cadre du partenariat est supérieur au financement public classique. Généralement, l'Etat a la possibilité d'emprunter à des taux d'intérêts plus avantageux que ceux auxquels les entreprises privées empruntent. De là, on peut donc soutenir l'idée que la contrainte budgétaire ne devrait pas être la seule raison pour justifier le recours à des partenariats entre les acteurs public et privé. Dans certains cas, les subventions versées par l'entité publique au partenaire privé est du même ordre de grandeur que le cumul des intérêts à payer en cas d'emprunts. Aussi, les PPPs sont loin d'être le meilleur recours face aux difficultés budgétaires.

Par ailleurs, il y a lieu de noter que les PPPs passent par des contractualisations de long terme qui interviennent dans un environnement asymétrique. Par exemple, l'Etat peut disposer d'une information complète qu'il ne partage pas avec le partenaire privé, susceptible de favoriser l'incertitude qui modifie la rationalité des deux parties, et créant ainsi de nouvelles conditions dans lesquelles sont effectués la construction des infrastructures ainsi que la fourniture des services. Les contrats PPPs sont cependant sujettes à des coûts de transactions liés au transfert et au partage des informations entre les parties prenantes. Par conséquent, chaque partie a intérêt à défendre clairement et optimiser ses gains lors des négociations dans un contexte d'information asymétrique et sans révéler aucun goût pour l'opportunisme. Toutefois, l'utilisation des PPPs pour assurer le financement des infrastruc-

tures publiques ainsi que la provision des services, peut constituer une source alternative fiable de financement du développement dès lors que les gains associés sont supérieurs par rapport aux autres modalités de provision.

Le choix par les autorités publiques entre une offre publique et une offre privée doit être fondé sur une analyse coûts-avantages tenant compte de tous les modes de fourniture alternatifs, de l'ensemble du système de fourniture d'infrastructures, de même que des coûts-avantages financiers et non financiers prévus sur le cycle de vie du projet. La participation des opérateurs privés a son principal avantage par rapport aux projets publics lorsqu'il est possible de tirer parti des gains d'efficacité opérationnelle et administrative des opérateurs privés (comme l'expertise technique et les compétences de gestion des opérateurs commerciaux), une concurrence accrue et des services améliorés aux consommateurs finaux. Même lorsque le secteur public, dépendant des notations de crédit, a accès à un financement moins cher que les entreprises privées, les gains d'efficacité de la participation du secteur privé peuvent l'emporter sur les coûts de financement supplémentaires.

Toutefois, les conditions de contractualisation, en présence des coûts de transaction par exemple, nécessitant des clauses incitatives peuvent conduire à des risques de surendettement des Etats du fait des coûts de financements des projets PPPs plus importants. Le fait d'entreprendre des projets d'infrastructures financés par des fonds privés comme moyen d'acquérir des actifs supplémentaires sans tenir dûment compte des conséquences économiques, financières et sociales à long terme entraîne presque invariablement des problèmes.

Les modes de financement des dépenses publiques sont énormes et multiformes. Ils passent par l'arbitrage classique entre impôts et emprunts, avec des sources de financement complémentaires dont le financement monétaire, les apports dons APD, les financements privés (interne et externe) ainsi que le

co-financement par les acteurs public et privé sous forme de partenariats dits public-privés (PPP). Aucun de ces modes de financement n'est sans inconvénients à moyen ou long termes sur le potentiel de croissance économique des pays. Par voie de conséquence, il convient à chaque pays de trouver la configuration optimale des stratégies de financement compatibles avec la structure de l'économie et en fonction de ses fondamentaux pour assurer le financement des dépenses publiques sans pour autant contraindre sa position budgétaire ou se retrouver dans une situation d'impossible viabilité de la dette publique.

1.3 Le financement des dépenses publiques : le contexte de l'UEMOA

Cette section présente un certain nombre de faits stylisés relatifs au financement public dans la Zone UEMOA³, notamment sur le prélèvement obligatoire ainsi que sur la dette publique. Nous posons ensuite le diagnostic de financement dans l'Union, en mettant en évidence les contraintes qui pèsent sur les économies de l'UEMOA relativement à la configuration actuelle qui encadre les instruments de financement des dépenses publiques.

³L'UEMOA est une zone d'intégration économique et régionale dont les pays ont en commun l'utilisation d'une monnaie commune, le F.CFA dont l'émission est confiée à la BCEAO. Elle a pour objectif, l'unification des espaces économiques nationaux, pour transformer l'Union en un marché porteur et attractif pour les investisseurs, et la consolidation du cadre macro-économique des États membres, à travers l'harmonisation de leurs politiques économiques, notamment budgétaires, ainsi que par le renforcement de leur monnaie commune. En pratique, le Conseil des Ministres définit la politique monétaire et de crédit de l'Union afin d'assurer la sauvegarde de la valeur de la monnaie commune et de pourvoir au financement de l'activité et du développement économique des États membres.

1.3.1 Quelques faits stylisés

Les pays de la l'UEMOA font face à des déficits budgétaires de façon récurrente les rendant vulnérables face aux crises de la dette. Cela traduit l'incapacité des Etats à mobiliser les recettes suffisantes pour financer leurs dépenses. Or, les Nations Unies suggèrent de privilégier la mobilisation des ressources intérieures pour le financement du développement. C'est dans cette perspectives que les pays ont adopté des réformes fiscales, depuis les années 90, en vue d'améliorer la mobilisation des recettes fiscales. Nonobstant, force est de constater que malgré les réformes fiscales entreprises par ces pays, la mobilisation des recette demeure faible au sein de la zone (inférieure au 20% minimum requis dans le cadre de la surveillance multilatérale des pays de l'UEMOA).

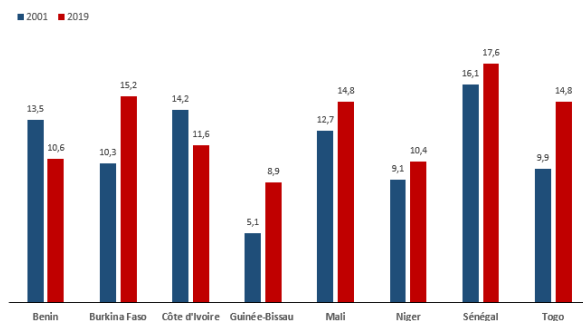
A priori, face aux besoins grandissants de financement des dépenses de consommation et d'investissement publics, les pays de l'UEMOA n'ont d'autre choix que de se tourner vers la mobilisation des ressources fiscales intérieures pour assurer un financement adéquat de leurs ambitions de développement. Malheureusement, ces pays font face à d'énormes difficultés de mobilisation des ressources fiscales.

1.3.1.1 Faits stylisés sur le prélèvement des impôts

Une analyse de la situation fiscale montre que le niveau de mobilisation des ressources fiscales est structurellement faible dans la Zone UEMOA. La Figure 1.3 illustre bien que le niveau de mobilisation des recettes fiscales demeurent encore faible dans la Zone et est en deçà du minimum de 20% fixés par les critères de convergence. Néanmoins, une analyse globale du niveau de recettes fiscales collectées dans l'UEMOA montre que la majorité des pays a fait des efforts considérables pour accroître leur niveau de mobilisation de

ressources fiscales entre 2001 et 2017.

Figure 1.3: Performances fiscales dans les pays de l'UEMOA



Source: Sur la base des données de la BCEAO

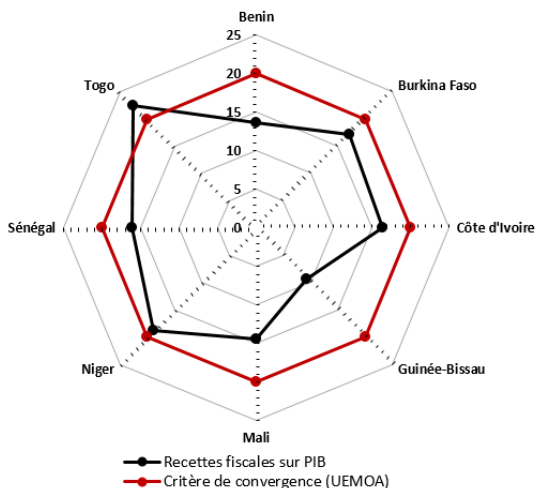
Toutefois, on peut noter quelques disparités entre les pays. Par exemple, si nous comparons les niveaux de recettes (en pourcent du PIB) en 2017, le Togo est le seul pays à respecter le critère de convergence de l'UEMOA fixant le ratio recettes fiscales sur PIB à un minimum de 20%. Le reste des pays malgré les efforts consentis est resté en deçà du niveau minimum de recettes fiscales requis, allant de 9,3% en Guinée-Bissau à 18,8% au Niger (voir Figure 1.4).

Le faible niveau des recettes fiscales peut éventuellement s'expliquer, à la fois par les fraudes fiscales, et par la prédominance des activités informelles. Selon une définition du FMI⁴, le secteur informel englobe les entreprises familiales qui produisent une certaine valeur marchande sans être enregistrées et plus largement, la production souterraine résultant d'activités productives qui sont le fait d'entreprises enregistrées, mais peuvent ne pas être déclarées aux autorités en vue d'échapper à la réglementation ou à l'impôt, ou parce

⁴«Afrique: le secteur informel fait sa révolution», par Viviane Forson (2017) dans Le Point, Economie.

qu'elles sont simplement illégales.

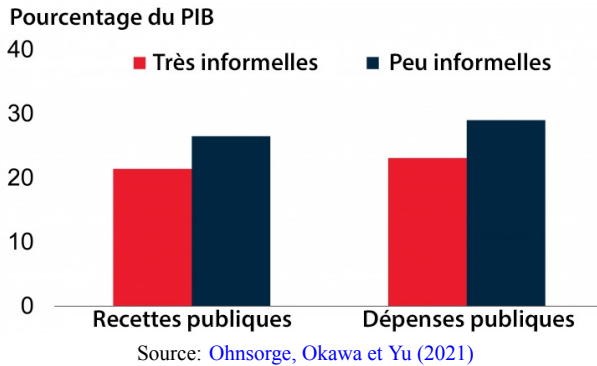
Figure 1.4: Effort fiscal et la norme de l'UEMOA



Selon les estimations de [Nose and Viseth \(2021\)](#), le secteur informel en Afrique, compte en moyenne pour 40% du PIB environ, pour les pays à faibles revenus et pour 35% du PIB pour les pays à revenus intermédiaires. Pour leur part, [Ohnsorge, Okawa et Yu \(2021\)](#) ont montré que la prépondérance du secteur informel s'accompagne d'un niveau de recettes et de dépenses considérablement plus faible. Ainsi, les recettes publiques sont inférieures de 5 à 12 points de pourcentage de PIB à celles des autres économies (Figure 1.5) dans les pays émergents et en développement où la taille du secteur informel est supérieure à la médiane. Dans le cas particulier des pays de l'UEMOA, d'après les estimations des instituts nationaux de statistiques, la part du secteur informel dans le PIB représente en moyenne 50% du PIB, et va de 40% au

Togo à 64% au Niger.

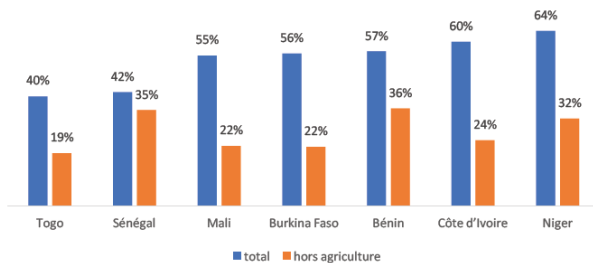
Figure 1.5: Recettes et dépenses publiques dans les économies informelles



Manifestement, le poids du secteur informel est liée aux activités agricoles notamment les cultures vivrières et de rente, élevage et les activités de pêches, représentant aussi une part importante du PIB et largement informelles. La Figure 1.6 montre en effet, que la production agricole représente plus de la moitié de la production informelle dans l'ensemble des pays de l'UEMOA à l'exception du Sénégal et un peu moins au Bénin. Cependant, lorsque les activités agricoles y sont exclues, la contribution du secteur informel au PIB passe de 53% à 27% en moyenne. Ces dernières regroupent les petites exploitations familiales qui pour la plupart du temps, se lancent dans des cultures vivrières destinées à l'autoconsommation. En plus de cela, il y a également des productions qui sont dites "souterraines" résultant d'activités productives réalisées par des entreprises enregistrées, mais ne sont pas déclarées (ou pas totalement) en vue d'échapper aux impôts ou à la réglementation, ou du fait de leur caractère illégal si tel est le cas. Le fait donc que les entreprises informelles n'entrent pas dans la base d'imposition,

celles-ci échappent à la fiscalité, créant ainsi un manque à gagner fiscal aux États.

Figure 1.6: Contribution du secteur informel au PIB dans l'UEMOA en 2014



Source: [Rapport](#) sur la mobilisation des recettes fiscales dans l'UEMOA

La littérature existante sur la la mobilisation des ressources fiscales reconnaît que la prédominance de la production informelle et sa forte persistance, minent la collecte des taxes surtout dans les pays en développement (Ogbuabor et al., 2014; Phiri & Nakamba-Kabaso, 2012; Brun et al., 2007) ou encore constituent une source de fraude et d'évasion fiscale (De Paula & Scheinkman, 2007; Alm & Martinez-Vazquez, 2010).

Par ailleurs, il y a également plusieurs facteurs institutionnels qui expliquent la sous-mobilisation croissante des sources d'imposition dans les pays de l'Union. Ces facteurs comprennent entre autres la complexité des codes des impôts, l'utilisation intensive des dépenses fiscales, réduisant l'assiette fiscale, tant en matière de TVA que de l'IS, ainsi que l'intégration insuffisante de l'économie informelle dans le système fiscal. La complexité des codes des impôts compromet fortement la possibilité d'une politique fiscale bien conçue pour accroître le niveau de mobilisation des recettes.

Au regard de ces faits stylisés, nous pouvons retenir que malgré les efforts consentis par les pays pour mobiliser davantage de ressources et consolider les finances publiques, la collecte des recettes fiscales reste entravée par certains facteurs institutionnels et structurels tels que la prédominance des activités informelles, les flux financiers illicites, ou encore les choix de politiques fiscales en matière d'exonérations conformément aux textes réglementaires.

1.3.1.2 Faits stylisés sur la dette publique

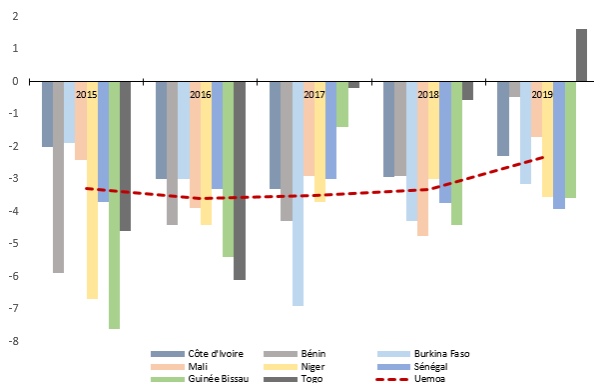
Le solde budgétaire⁵ constitue un critère clé du pacte de convergence. Dans la Zone UEMOA, il est déficitaire d'un peu plus de 3% du PIB jusqu'en 2018 depuis la mise en vigueur du nouveau pacte en 2015 et s'est nettement amélioré en 2019 pour se situer en deçà de la norme, soit un déficit de 2,3% du PIB. Cette performance au niveau régionale est due aux améliorations au niveau de tous les pays qui ont réussi à réduire leur déficit respectifs, et le Togo qui réussi à dégager un excédent du solde budgétaire de base en 2019 après une maîtrise des déficits (inférieur à 1%) 2 ans plus tôt.

Cependant, les efforts de consolidation budgétaire qui avaient permis de respecter collectivement le plafond de déficit public de 3% du PIB dès 2019 (-2,3% du PIB) ont été compromis par la crise de la COVID-19. Ainsi, en 2020, le déficit public consolidé s'est fortement creusé à 5,7% du PIB, du fait de l'effet combiné d'une augmentation des dépenses (+3,2 points de PIB) pour répondre à la pandémie et d'une baisse des recettes internes (-1,1 point

⁵Dans le nouveau pacte, le solde budgétaire calculé est égal au total des recettes budgétaires dons extérieurs compris diminué des dépenses publiques globales. Il correspond ainsi au solde du Tableau des Opérations Financières de l'État (TOFE). C'est un indicateur qui permet de mesurer la capacité de l'État à couvrir ses dépenses courantes y compris les charges d'intérêt et ses dépenses en capital sur ressources internes avec ses recettes budgétaires, notamment les recettes fiscales et non fiscales. Autrement dit, il permet d'avoir une appréciation globale du budget de l'État et aide à évaluer le besoin d'endettement de l'État. En outre, il est également utilisé en dehors de l'UEMOA, comme par exemple dans l'UE et la CEDEAO. Selon la norme, il doit être $\geq -3\%$.

de PIB), du ralentissement économique et de certaines mesures d'exonération fiscales. En 2021, le déficit public est resté stable à 5,7% du PIB et les besoins de financement ont été couverts en grande partie par le marché régional ou par l'émission d'Eurobonds (Bénin, Côte d'Ivoire, Sénégal).

Figure 1.7: Evolution du solde budgétaire de base dans la Zone UEMOA



Quant au taux d'endettement dans la zone, les faits stylisés montre que le niveau est structurellement élevé. Par exemple, le taux moyen de l'encours de la dette publique était supérieur au seuil de 70% du PIB fixé par le pacte de convergence. Mais comme on peut le remarquer sur la Figure 1.8, si le niveau moyen de dette de la Zone est resté depuis lors inférieur au seuil, cela n'est pas directement le fait des efforts budgétaires des Etats mais en est partie lié aux programmes de réduction de la dette dont bénéficient les pays en développement de manière générale visant à rendre viable la dette des Pays Pauvres Très Endettés (PPTE). Au premier trimestre 2011, les pays de l'UEMOA ont atteint le point d'achèvement de l'initiative PPTE et seront rejoints par la Côte d'Ivoire en 2012. Cette initiative a permis aux pays de l'Union de réduire con-

sidérablement le poids de la dette, qui devenait de plus en plus insoutenable. Par conséquent, à partir de 2011, le ratio de la dette sur PIB a été ramené à des niveaux faibles dans les pays de l'Union, et se situe autour de 25% du PIB ou moins dans la plupart des pays, à l'exception du Togo où il est ramené à 34% en 2010 et de la Guinée-Bissau à un niveau de 46% en 2011 (voir Figure 1.9).

Par contre, le constat est que à partir de l'année 2013, il y a une tendance à la hausse du taux d'endettement dans tous les pays, de sorte même à distinguer deux groupes de pays. Le premier constitué des pays où le niveau de la dette a évolué pour atteindre plus ou moins 40% en 2019 comme par exemple le Benin, le Burkina Faso, la Côte d'Ivoire, le Mali, et le Niger. Dans le deuxième groupe, le poids de la dette dans le PIB en 2019 est beaucoup plus élevé c'est-à-dire supérieur à 60% du PIB en Guinée-Bissau et au Sénégal, et représente un peu plus de la moitié du PIB au Togo (soit 52%).

Figure 1.8: Encours de la dette publique en pourcent du PIB dans l'UEMOA

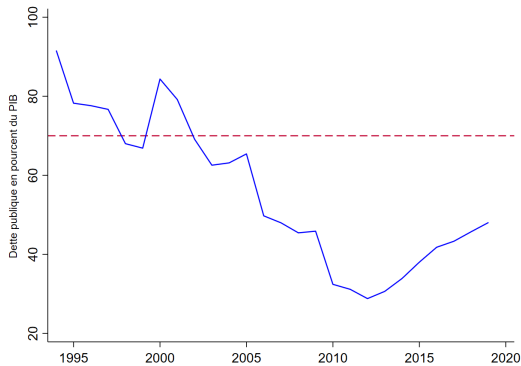
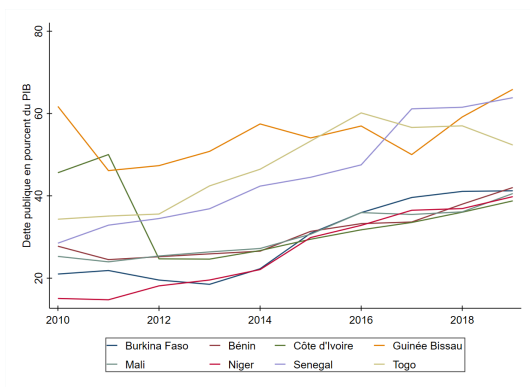


Figure 1.9: Encours de la dette publique en pourcent du PIB dans les pays de l'UEMOA



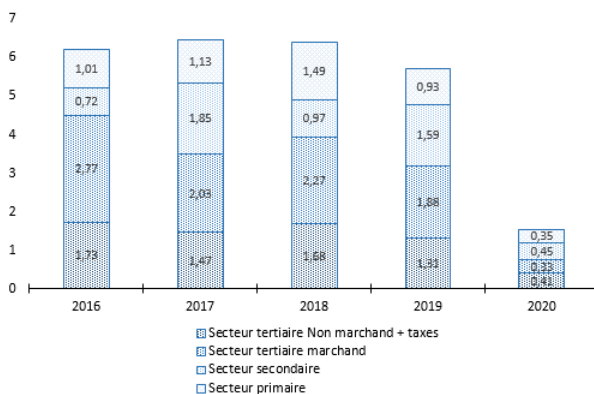
En 2021, le taux d'endettement de l'UEMOA est estimé à 56,1% du PIB, soit une augmentation de 5 points de PIB par rapport à 2020 et de 11,7 points de PIB par rapport à 2019. Cette évolution se justifie en grande partie par la hausse des besoins de financement engendrée par la pandémie de COVID-19. Dans l'Union, la Guinée Bissau se trouve en tête avec un risque de surendettement élevé (80,7%) suivi par le Sénégal (75,7%) qui dépassent tous les deux le plafond communautaire de l'UEMOA de 70% du PIB tandis que le Togo s'en rapproche (63,8% du PIB). Si la part de la dette extérieure demeure la plus importante (33,7% du PIB en 2021 contre 22,4% pour la dette domestique), elle a néanmoins enregistré une diminution de 0,9 point de pourcentage par rapport à 2020, et la dette intérieure continue de progresser rapidement dans plusieurs États membres. Toutefois, il faut noter qu'en termes de part (%) du totale de la dette, le Bénin dispose de la proportion la plus importante de dette extérieure (71,5%), suivi par la Côte d'Ivoire (64,4%) et le Niger (62,4%) tandis que le Togo dispose de la plus faible proportion (40,4%).

1.3.1.3 Situations économique et financière récentes dans l'UEMOA

Les évolutions économiques récentes au sein de l'Union indiquent deux faits majeurs: une dynamique de croissance économique freinée par la crise sanitaire, et une faible progression des ressources face à des besoins de dépenses de plus en plus croissants. D'une part, avant que la crise sanitaire ne vienne porté un coup d'arrêt en 2020 à la dynamique de croissance dans tous les secteurs de l'espace communautaire, l'UEMOA a fait preuve d'une relative résilience au regard du contexte international peu favorable à son activité économique, régional voir même interne. En effet, elle a enregistré une croissance moyenne annuelle de 6,2%, sur la période 2015 – 2019, malgré l'accentuation des menaces sécuritaires et la chute des cours de ses principaux produits d'exportation entre autres. Tous les secteurs économiques ont contribué positivement à cette croissance avec le tertiaire marchand comme plus grand contributeur au cours de la période (voir le graphique 1.10).

Néanmoins, la structure économique de l'Union repose sur des secteurs fragiles, particulièrement le secteur agricole, représentant en moyenne 17,6% du PIB nominal de l'Union, sur la période 2016 – 2020, à dominance pluviale, avec une forte influence sur les autres branches de production et qui constitue la principale source de revenu des ménages. On peut également souligner un poids important du secteur tertiaire marchand dans la région, en termes de création de valeur ajoutée, au détriment, notamment, du secondaire industriel hors activités extractives. Cela témoigne, cependant, la nécessité d'accélérer les politiques nationales de diversification économique porteuses d'emplois et de stabilité économique.

Figure 1.10: Contribution des secteurs à la croissance de l'Union



Source: Sur la base des données de la Commission de l'UEMOA

Les conséquences économiques de la pandémie de Covid-19 sont venues affaiblir davantage quelques fondamentaux de l'économie de l'Union déjà touchés par la crise sécuritaire et la baisse de la demande, notamment les échanges extérieurs, l'investissement privé et la consommation, en lien avec les pertes d'emplois dans les secteurs des services notamment le tourisme, commerce, hôtellerie, etc.. Les Etats membres ont procédé à la fermeture de leurs frontières (sauf le Bénin), des mises en quarantaine des principales villes, des couvre-feux contribuant à ralentir une activité économique déjà affectée. Toutefois, les mesures d'accompagnement prises par les autorités publiques, à savoir la distribution de vivres aux ménages vulnérables, la prise en charge périodique par les Etats des factures d'eau et d'électricité pour certaines couches sociales, ou encore des transferts monétaires vers certains ménages ciblés (Togo) ont contribué à en atténuer les conséquences. La croissance de l'Union a pu ainsi ressortir avec un taux positif estimé à 1,5%, en 2020 après 5,7% en 2019. En ce qui concerne les prix à la consommation,

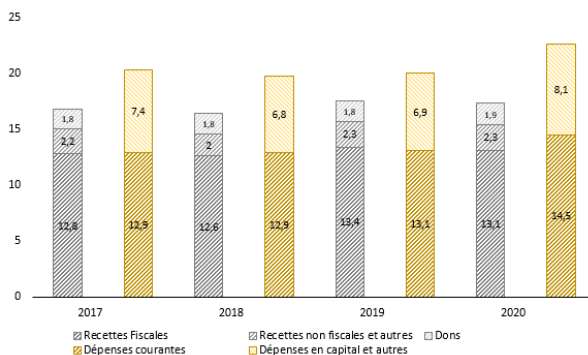
ils ont été globalement maîtrisés en 2020, en dépit des tensions inflationnistes engendrées par les problèmes d'approvisionnement des marchés, observés au cours des deuxième et troisième trimestres. Le taux d'inflation annuel moyen est ressorti au sein de l'Union à 2,1%, après 0,7% en 2019.

D'autre part, le recouvrement des ressources budgétaires de l'Union a toujours demeuré en dessous des attentes des autorités publiques, au regard des taux de croissance économique relativement élevés et du potentiel fiscal de ses Etats membres. Cette situation qui s'est aggravée, en 2020, s'explique, entre autres, par la dominance du secteur informel dans l'économie et le besoin de renforcer les capacités des administrations fiscales et douanières. En effet, outre les contre performances temporairement observées et le ralentissement de l'activité économique induit par la crise sanitaire, les Etats membres ont pris des mesures d'assouplissement fiscal au profit des entreprises touchées par les conséquences de la pandémie. Au cours de la période récente, les dépenses publiques totales n'ont cessé d'augmenter, essentiellement pour combler les déficits d'infrastructures (routière, énergétique, etc.), à travers la mise en oeuvre des plans nationaux de développement. En 2020, les charges ont fortement augmenté dans le cadre des plans de riposte des Etats membres avec l'augmentation des soutiens aux ménages et au secteur privé. La nécessité d'adopter des mesures d'urgence et de mettre en oeuvre des plans de riposte pour contrer les effets de la crise sanitaire ainsi que le souci de préserver un environnement favorable à une reprise de l'activité économique ont conduit la Conférence des Chefs d'Etat et de Gouvernement à suspendre, le 27 avril 2020, le Pacte de Convergence, de Stabilité, de Croissance et de Solidarité (PCSCS) entre les Etats membres.

La structure des agrégats des finances publiques de l'Union (Figure 1.11) révèle des recettes fiscales qui, à elles seules, couvrent à peine les charges courantes (elles sont approximées au dépenses courantes dans le

cadre de la mise en oeuvre du cadre d'analyse minimum de la directive N°010/2009/CM/UEMOA). Au regard du poids important des dépenses en capital, les Etats membres ont, de plus en plus, eu recours au marché financier. Cette situation exige la mise en oeuvre de mesures efficaces de recouvrement des recettes fiscales et non-fiscales dans les Etats membres afin d'assurer la viabilité de la dette.

Figure 1.11: Agrégats des finances publiques de l'Union (% du PIB)



Source: Sur la base des données de la Commission de l'UEMOA

Par ailleurs, l'exécution des opérations financières des États membres, dans un contexte de ralentissement de l'activité économique, se traduirait par une augmentation des déficits budgétaires, en raison, principalement, d'une forte hausse des dépenses totales.

Les recettes totales⁶ et dons ont augmenté de 2,5% pour représenter 17,6% du PIB, après 17,7% en 2019, sous l'effet exclusif de la hausse des dons. Les recettes totales baisseraient de 3,7% pour représenter 14,8% du

⁶Les statistiques citées proviennent du [Rapport annuel sur le fonctionnement et l'évolution de l'Union, UEMOA, 2020](#), p.26.

PIB, du fait de la contraction de 3,1% des recettes fiscales et de 10,6% des recettes non fiscales. La pression fiscale de l'Union serait de 12,9% en 2020, après 13,6% un an plus tôt. La baisse des recettes fiscales enregistrée dans tous les États membres s'expliquerait par l'incidence des mesures fiscales prises pour contenir les effets de la crise sanitaire sur les entreprises et les ménages. Au niveau des dons, on note également une progression de 55,8% pour atteindre 2,8% du PIB en 2020, après 1,8% en 2019, en lien avec les appuis des partenaires pour la mise en oeuvre des plans de riposte contre la COVID-19 dans les États membres. Quand aux dépenses totales et des prêts nets, ils connaissent une hausse de 20,1% pour représenter 23,6% du PIB, après 20,2% en 2019, en liaison avec l'accroissement des dépenses courantes et des dépenses en capital. De même, les paiements au titre des intérêts de la dette ont augmenté de 15,2%. La progression des dépenses en capital de 31,2% s'explique par la poursuite des projets d'infrastructures socio-économiques inscrits dans les plans de développement économique et social des États.

En somme, le déficit budgétaire global s'est creusé davantage représentant 5,9% du PIB en 2020 contre 2,5% en 2019. Sans prendre en compte les dons, il se situerait à 8,7% en 2020 contre 4,3% en 2019. En conséquence, le taux d'endettement de l'Union est ressorti en 2020 à 49,3% alors qu'il était de 44,1% en 2019. Par ailleurs, il convient de noter que la dette intérieure continue de progresser rapidement dans plusieurs États membres, en lien avec les interventions sur le marché financier régional.

A l'orée de ces faits stylisés, une réflexion profonde, d'une part sur l'amélioration de l'efficacité des dispositifs de mobilisation des recettes fiscales s'impose en vue d'accroître la performance fiscale des États, et d'autre part sur les stratégies d'endettement permettant de financer les besoins d'investissement, compatibles avec la soutenabilité de la dette.

1.3.2 Contraintes de l'appartenance à l'UEMOA

Les contraintes qui pèsent sur le financement des économies de l'UEMOA peuvent être multiples. Mais ici, nous mettons seulement en lumière celles qui sont liées à la configuration des instruments de politiques économiques qu'impose une union économique et monétaire. C'est entre autres le choix d'une politique monétaire commune, qui nécessite une surveillance multilatérale des budgets nationaux pour éviter les dérapages budgétaires, et une harmonisation fiscale et douanière, dont le but est de minimiser la concurrence fiscale entre Etats membres et garantir ainsi une parfaite intégration des économies de l'Union.

1.3.2.1 Contraintes sur les prélèvements fiscaux

L'harmonisation fiscale et douanière constitue un facteur d'intégration pour tout espace régional. Ainsi, elle apparaît comme un choix incontournable aux pays de l'UEMOA dont les besoins en ressources publiques sont particulièrement importants et pour lesquels le libre accès à un marché plus large, rend nécessaire la mise en place d'un marché commun.

Dans le contexte de l'UEMOA, l'harmonisation fiscale et douanière engagée dans le cadre de la consolidation du marché commun de l'Union, a fait l'objet de l'adoption de plusieurs directives notamment en matière de fiscalité directe et indirecte. L'un des enjeux étant d'harmoniser, pour le bon fonctionnement du marché commun, les législations des Etats membres et particulièrement le régime de la fiscalité, en se basant sur l'option d'un encadrement des taux des principaux impôts et une définition commune de l'assiette. Pour rendre l'intégration effective, un canal important est la transition fiscale, qui repose elle-même sur divers leviers tels que la réalisation du marché commun caractérisé par la libre circulation des personnes et des biens, le tarif extérieur

commun et l'harmonisation des législations fiscales des Etats membres.

L'instauration d'une union douanière opérationnelle et le tarif extérieur commun (TEC) entre les Etats membres constitue un volet essentiel du processus d'unification des espaces économiques nationaux. L'union douanière telle que prévue par le traité de l'UEMOA s'est fait en deux (02) étapes complémentaires. La première étape qui s'étale du 1er juillet 1996 au 31 décembre 1999, a consisté à l'adoption d'un régime préférentiel transitoire (Acte 04/1996) visant à libéraliser progressivement les échanges commerciaux entre les pays de l'Union. Il s'agit en particulier d'instituer les règles d'origine commune, de lever les quotas qui étaient jusqu'alors en vigueur et de réduire de manière significative les tarifs douaniers. A titre d'exemple, le TEC fut instauré en 1997 (règlement N°02/1997/CM/UEMOA) et comptait quatre taux : 0% sur les biens dits essentiels, 5% sur les biens du secteur primaire, 10% sur les biens intermédiaires et 30% sur les biens de consommation jusqu'en fin 1998, puis de 25% en 1999. La deuxième étape a consisté en la mise en place du TEC à l'endroit des pays tiers qui entre en vigueur à partir du 1er janvier 2000 dans le but d'uniformiser les droits et taxes perçus sur les marchandises qui entrent dans l'Union, quel que soit le pays d'accueil, ramenant le TEC appliqué aux biens de consommation au taux de 20%. Par ailleurs, le 12 janvier 2006, le TEC a été élargie aux autres pays de l'Afrique de l'Ouest dans le cadre d'une intégration régionale des Etats membres de la CEDEAO. Son entrée en vigueur était prévue au 1er janvier 2008 mais le TEC est finalement entré en vigueur en janvier 2015, après la définition de la 5ème catégorie (à la demande du Nigéria) de 35% sur les biens spécifiques pour le développement économique.

La coordination fiscale au sein de la zone a débuté en 1998 avec les principales directives en matière de fiscalité indirecte encadrant la TVA et les droits

d'accises. En effet, deux (02) directives⁷ portant harmonisation des législations des Etats membres en matière de TVA ont été adoptées. L'objectif principal de la directive de 1998 était d'homogénéiser l'application de la TVA dans tous les pays de l'UEMOA, sachant que bien avant l'entrée en vigueur de la directive, tous les pays avaient déjà une TVA à l'exception de la Guinée Bissau. Il s'agissait de faire converger l'assiette et les taux de TVA pratiqués par les Etats membres dans le but de minimiser la concurrence fiscale tout en préservant la neutralité de la TVA, et in fine améliorer le rendement budgétaire de la TVA dans les Etats membres. La plupart des pays appliquent un taux de TVA de 18% sauf le Niger où le taux est de 19%. Concernant les droits d'accises, plusieurs directives ont été prises. La première, le N°03/98/CM/UEMOA de 1998, précise le régime de taxation de certains biens comme les boissons alcoolisées, le tabac, le café, les huiles et corps gras, les produits pétroliers. Les droits d'accises furent modifiés par une nouvelle directive en 2009 (N°03/2009/CM/UEMOA), qui augmente les taux plancher et plafond de certains produits et ajoute cinq (05) biens à une liste de produits assujettis sur option. L'objectif de l'ensemble de ce dispositif était de simplifier la taxation des produits concernés, en vue d'accroître leur rendement fiscal et d'éliminer certains mécanismes de concurrence entre Etats membres.

⁷Il s'agit de la directive N°02/98/CM/UEMOA du 22 décembre 1998, modifiée par la directive N°02/2009/CM/UEMOA du 27 mars 2009. Initialement, la directive de 1998 fixe un seuil d'assujettissement des entreprises à la TVA entre 30 et 50 M FCFA pour les ventes de biens et entre 15 et 25 M FCFA pour les prestations de services, définit un taux unique de taxation compris entre 15 et 20%, les règles communes pour le calcul de l'assiette, une liste de biens et de services exonérés, et laisse la possibilité pour les Etats d'assujettir ou non le secteur agricole à la TVA. Les conditions de déductibilité et de remboursements de crédits de TVA sont aussi définies. La deuxième directive qui fut adoptée en 2009, modifie les seuils d'assujettissement en l'augmentant de 50 à 100 M FCFA pour la vente de biens et de 30 à 50 M FCFA pour les prestations de service. Elle introduit également un taux réduit de TVA variant entre 5 et 10% applicable sur cinq produits maximum pris dans une liste communautaire limitée de biens et services de grande consommation. Enfin la directive N°02/2010/CM/UEMOA relative à la taxation des revenus des capitaux mobiliers, a réduit l'assiette de TVA en assimilant tous les services liés aux marchés financiers de l'UEMOA à des exportations.

En ce qui concerne la fiscalité directe, les axes de coordination fiscale au sein de la l'Union ont essentiellement portés sur l'harmonisation de l'impôt sur les bénéfices et de l'impôt sur les revenus des capitaux mobiliers (intérêts, dividendes, gains de capitaux). A cela s'ajoute également le règlement qui établit les règles de non double imposition et d'assistance administrative entre Etats membres et son règlement d'exécution. La démarche consiste à rapprocher dans un premier temps les bases imposables des impôts directs dans les Etats membres, avant d'encadrer les taux partiqués pour ces impôts. De fait, trois (03) directives⁸ adoptées définissent respectivement l'assiette, le taux et le mode de prélèvement de l'IS au sein de l'UEMOA. Chaque Etat membres soumet à un taux unique compris entre 25 et 30% les bénéfices industriels et commerciaux des personnes morales au titre de l'impôt sur les sociétés. L'impôt minimum forfaitaire (IMF)⁹ est aussi autorisé (directive N°01/2008/CM/UEMOA) et constitue une source non négligeable de recettes pour certains États membres. Ces directives laissent une marge plus ou moins importante aux pays dans le choix des mesures nationales à adopter pour les

⁸La directive N°08/2008/CM/UEMOA précise que le taux unique de l'IS doit être compris entre 25 et 30%, et la directive N°01/2008/CM/UEMOA détermine l'assiette de l'IS, dont les principaux éléments sont (i) le principe de territorialité est appliqué (et non celui de mondialité), (ii) les entreprises ont le droit de reporter leur perte sur les trois exercices suivants. Les exonérations sont autorisées au titre des Codes des investissements nationaux ou d'autres codes particuliers communautaires ou non (minier, pétrolier, forestier, etc). Cette directive soumet la plupart des charges déductibles à la discrétion des États membres, précise les formes et conditions d'amortissement et de reports de pertes. Les modalités de prélèvement de l'IS par un acompte majoré à 3% sur les importations et sur les achats ou acquisitions faits par l'État dans le cadre des marchés publics sont déterminées par la directive N°07/2001/CM/UEMOA. Cet acompte peut être porté à 5% pour les entreprises ne disposant pas d'un numéro d'identification fiscale (NIF). La même directive statut également sur les seuils minimums d'assujettissement aux différents régimes, à savoir le régime réel qui s'applique aux personnes morales dont le chiffre d'affaires est au moins de 100 M FCFA pour les activités commerciales et du secteur primaire ou 50 M FCFA pour les autres activités. Les entreprises dont le chiffre d'affaires est en dessous de ces seuils, sont soumises au régime du réel simplifié. Par ailleurs, la directive N°02/2011/CM/UEMOA a été adoptée concernant la taxation des sociétés d'investissement à capital fixe (SICAF), dont le portefeuille se compose au minimum de 50% d'actions de sociétés non cotées.

⁹L'IMF n'est encadré par aucune directive et son mode de calcul varie d'un pays à l'autre.

mettre en application.

Il convient de noter que l'harmonisation fiscale et douanière se trouve peu contraignante pour les Etats membres, à la fois au niveau institutionnel qu'au niveau de l'application des textes communautaires, en matière de mobilisation des recettes fiscales et douanières pour financer les dépenses publiques nécessaires au développement. Tout d'abord, soulignons que les objectifs de mobiliser de manière optimale les recettes tout en minimisant l'impact négatif de la fiscalité sur la compétitivité des entreprises de l'Union par rapport à celles d'autres pays, et celui de minimiser les effets négatifs de la concurrence fiscale, sont nobles. Mais en pratique, ces textes prévoient une panoplie de dérogations fiscales qui finalement affaiblissent le rendement de l'impôt concerné et compromettent ainsi l'objectif d'harmonisation et de transition fiscales. De surcroît on assiste à de multiples conventions particulières accordant des avantages fiscaux (convention d'établissement, convention de concession, etc.) et de régimes dérogatoires qui sont accordés à titre exceptionnel.

Ces exonérations multiples contenues dans la législation de droit commun, le code des investissements, les codes sectoriels et les conventions d'État contribuent de manière décisive à affaiblir les recettes fiscales, notamment les recettes de TVA et d'impôt sur les bénéfices. Ainsi, concernant l'IS, les taux effectif de taxation sont bien inférieurs aux taux communautaires, en raison des nombreuses exonérations accordées dans tous les pays de l'Union. Aussi, concernant la TVA qui est un moteur essentiel pour les recettes, l'introduction de nombreuses exonérations, ne font que dégrader sa performance. Clairement, l'octroi systématique des exonérations est cependant incompatible avec une mobilisation efficace des recettes fiscales.

De même, dans le cas des droits d'accises, la directive n'imposant pas de contrainte sur le taux (le taux plancher est fixé à 0 et le plafond est indéfini), cela implique que le taux minimum de chaque bien assujetti lorsqu'il diffère de

0%, correspond au taux appliqué dans l'État membre qui taxe le moins ce bien en question. Cette approche, même si elle permet de faciliter la conformité de la directive par les États membres, elle laisse par contre un potentiel fiscal non négligeable inexploité.

Au delà de ces contraintes, on peut rajouter le fait que les États membres n'ont pas totalement la possibilité d'utiliser les instruments fiscaux pour des fins de politiques fiscales incitatives pour attirer les financements externes ou pour mener des politiques de dépenses fiscales orientées vers les populations les plus vulnérables. Même si cela est permis, il doit se faire dans les limites des textes communautaires visant à garantir le respect de la souveraineté fiscale des États membres. Par conséquent, si les pays de l'UEMOA ont confié la gestion de leur politique monétaire à une institution supranationale comme la BCEAO, ils n'ont pas en réalité une main mise totale sur les instruments budgétaires pour lever des ressources propres face aux besoins colossaux d'investissements nécessaires pour la croissance et le développement. Les pays de l'UEMOA connaissent structurellement une sous-mobilisation des recettes, certainement liée aux fondamentaux de leurs économies, ainsi qu'à l'harmonisation fiscale et douanière au nom de l'intégration économique et régionale, qui limitent les marges de manoeuvre des États membres en matière de politique fiscale.

1.3.2.2 Contraintes sur la dette ou la surveillance multilatérale des budgets

Les États membres de l'UEMOA ont une politique monétaire commune depuis la création de la BCEAO en 1962, et des politiques budgétaires nationales totalement autonomes. Cette gestion autonome des politiques budgétaires ont entraîné des dérapages en termes de politiques jusqu'en 1993, qui s'est traduit par une mauvaise performance à la fois du secteur réel et monétaire.

Face à ces divergences des politiques, la Commission va se doter dès janvier 1994 d'un mécanisme formel de suivi de la mise en œuvre de la convergence macroéconomique dans l'Union avec la création du Conseil de convergence, composé des ministres des Finances des États membres et du Gouverneur de la BCEAO. A cet effet, le traité de l'UEMOA fut adopté le 20 janvier 1994, avec pour objectif de renforcer la cohérence et la convergence entre les politiques budgétaires nationales et la politique monétaire commune, en vue d'améliorer l'efficacité d'ensemble des politiques économiques. Ce traité définit certains critères auxquels les États membres doivent désormais se conformer pour une meilleure convergence et stabilité de la zone.

Quelques années plus tard, ce dispositif a été renforcé par l'adoption (décembre 1999) d'un nouveau Pacte de Convergence, de Stabilité, de Croissance et de Solidarité (PCSCS), entré en vigueur en 2000, permettant une meilleure appréciation de l'assainissement des finances publiques et la convergence des politiques budgétaires, pour le maintien de la stabilité au sein de l'Union. Ce nouveau traité introduit également une hiérarchisation entre des critères de premier rang et des critères de second rang. La Commission effectue le suivi de la mise en œuvre de ces critères à travers son dispositif de surveillance multilatérale.

En janvier 2015, l'acte additionnel N°1/2015/CCEG/UEMOA instituant le nouveau pacte de convergence entre les États membres de l'UEMOA a été adopté en remplacement du pacte adopté en 1999. L'ancien pacte instaurait quatre critères de convergence nominale de premier rang qui devaient être respectés et quatre critères de second rang dont l'objet était de concourir au diagnostic de la situation macroéconomique. Il s'agissait pour les critères de premier rang de :

- un solde budgétaire de base nul ou positif,
- un taux d'inflation annuel moyen au plus égal à 3%,

- un ratio de la dette publique sur PIB au plus égal à 70%, et
- l'obligation de ne pas accumuler d'arriérés de paiement.

Quant aux critères de second rang, ils portaient sur les ratios :

- de la masse salariale sur les recettes fiscales (norme $\leq 35\%$),
- des investissements financés sur ressources intérieures par rapport aux recettes fiscales (norme $\geq 20\%$),
- du déficit extérieur courant hors dons sur le PIB nominal (norme $\geq 5\%$),
- des recettes fiscales rapportées au PIB nominal (norme $\geq 17\%$).

Pour les nouveaux critères, le nombre a été réduit à cinq (05), dont trois (03) critères de premier rang et deux (02) de second rang. Les trois nouveaux critères de premier rang sont :

- le ratio du déficit budgétaire global (dons compris) sur PIB nominal $\leq 3\%$,
- le taux d'inflation annuel moyen $\leq 3\%$;
- le ratio de l'encours de la dette totale sur PIB nominal $\leq 70\%$.

Les deux nouveaux critères de second rang sont relatifs aux :

- le ratio de la masse salariale sur les recettes fiscales $\leq 35\%$, et
- le ratio de recettes fiscales sur le PIB nominal $\geq 20\%$.

Parmi les autres critères qui sont considérés comme des contraintes, certains limitent la marge de manoeuvre des politiques budgétaires de relance comme par exemple le déficit extérieur courant hors dons rapporté au PIB

nominal qui ne doit pas excéder 3% ainsi que le ratio de l'encours de la dette intérieure et extérieure rapporté au PIB nominal qui doit être inférieur ou égal à 70%.

Aujourd'hui, face aux besoins importants de ressources pour financer les dépenses publiques, les pays de l'UEMOA n'ont eu de cesse que de combler le gap de financement en faisant recours à l'endettement. En réalité, l'endettement des États est admis et la priorité n'est plus tant le niveau de dette que la stabilisation du ratio d'endettement par rapport au PIB. Le pacte de stabilité considère qu'il existe un seuil de soutenabilité de la dette en limitant le ratio d'endettement à 70% du PIB.

Or, les pays de l'UEMOA ont fait le choix d'une politique monétaire commune, impliquant *de jure* une indépendance de la banque centrale, donc de la BCEAO. Son unique objectif étant de maintenir la stabilité des prix, il est donc nécessaire que la BCEAO assure cette mission en étant préservée de l'influence politique des gouvernements des pays membres de l'Union. Comme les États n'ont pas la main sur leur politique monétaire, ils n'ont plus la possibilité de monétiser leurs dettes, de dévaluer ou susciter de l'inflation pour résoudre les crises d'endettement. Ils doivent cependant, le cas échéant, mettre en place les règles budgétaires nécessaires pour prévenir une situation de crise. Ce sont ces règles qui sont encadrées par le PCSCS dans le cadre de la surveillance multilatérale des budgets. Par conséquent, une politique monétaire commune implique une politique budgétaire contrainte. Finalement le ratio seuil d'endettement constitue un baromètre permettant de déterminer la capacité d'un pays à recourir à l'endettement pour financer ses dépenses. Plus un pays a un ratio d'endettement proche du seuil, plus il restreint ses marges de manœuvre à utiliser l'endettement comme source de financement afin de combler ses besoins d'investissement. Et de surcroît, dans une telle situation, les pays ne peuvent recourir à des stimuli fiscaux que dans certaines limites,

car la dette publique risquent de se dégrader davantage.

Il faut noter que depuis la mise en place de la surveillance multilatérale des budgets, les États se sont retrouvés dans l'incapacité de respecter les traités. La plupart des pays a connu des niveaux d'endettement supérieurs au seuil de 70%, ce qui a nécessité à plusieurs reprises des opérations de remise¹⁰ de dette, afin de rendre les niveaux d'endettement soutenable. Malgré les multiples interventions, on constate toujours malheureusement que, quelques années plutôt, les ratio d'endettement repartent à la hausse. Ainsi les Etats avec un niveau de dette élevé (proche du seuil, ou supérieur) se trouvent particulièrement menacés. Ils sont considérés comme insolubles et supposés plus dignes de crédit, ce qui les conduit à limiter leur consommation et investissement afin de réduire le niveau de la dette. Par conséquent, c'est l'ensemble de l'économie qui se trouve ainsi gravement atteinte.

Il convient de souligner que la surveillance multilatérale des budgets qui s'impose aux pays de l'UEMOA au motif du partage d'une monnaie commune, constitue de réelles contraintes pour les Etats à faire recours aux modes de financement classiques notamment la monnaie et le budget pour mettre en oeuvre des politiques économiques de relance nécessaire pour amorcer le développement et le bien-être des populations. Même si cela garantit une consolidation des finances publiques au sein de la zone, l'impossibilité de creuser les déficits empêche les États de réaliser les dépenses d'investissement pour répondre aux besoins actuels et futures des populations. Pour preuve, on peut se référer à la décision de la Commission européenne (mars 2020) de suspendre les règles budgétaires au sein de la zone euro dans laquelle existe également un encadrement des budgets nationaux (3% de déficit et 60% de

¹⁰Ces opérations consistent en des plans de désendettement, coordonnés au niveau multilatéral qui ont permis d'alléger le fardeau que constituait l'endettement pour les pays de l'UEMOA. Concrètement, les bailleurs de fonds bilatéraux et multinationaux accordent des remises de dette à ces États via l'initiative en faveur des pays pauvres très endettés (PPTE) et l'initiative d'allègement de la dette multilatérale (IADM).

dette/PIB), qui dans le contexte particulier de la crise sanitaire, afin de laisser aux États les marges de manoeuvre nécessaires pour faire face financièrement à la crise d'une ampleur sans précédent. Suite à cette annonce, l'Uemoa va aussi décider de suspendre un mois après (Avril 2020) le pacte de convergence pour renforcer la résilience des Etats membres.

1.3.2.3 Contraintes sur le financement monétaire

L'Institut d'émission commun aux Etats membres de l'UMOA est la Banque Centrale des Etats de l'Afrique de l'Ouest (BCEAO). Conformément à l'article 8 ses statuts, l'objectif prioritaire de la politique monétaire de la BCEAO est d'assurer la stabilité des prix. En pratique, la BCEAO a opté pour une cible d'inflation de 2% comme principal objectif de la politique monétaire de l'UEMOA. Cet objectif semble contraindre la BCEAO dans sa contribution au financement des économies de l'Union. Il se pose légitimement la question de savoir si cette cible d'inflation retenue par la BCEAO (2%) ne semble pas contraignante pour des économies ayant besoin des taux de croissance annuel élevé du PIB réel dans leur objectif de lutte contre la pauvreté.

La poursuite de cet objectif double, notamment une forte croissance et un faible niveau d'inflation, renvoie à la nécessité d'effectuer un arbitrage entre l'inflation et la croissance économique comme décrit par la courbe de Phillips. Cette courbe rend bien compte du dilemme qui existe entre inflation et chômage, et suggère qu'il est possible d'obtenir un supplément de croissance économique entraînant une baisse du chômage, par le biais d'une politique monétaire expansionniste. La hausse du taux d'inflation, conséquence de la politique monétaire expansionniste, serait le prix à payer pour obtenir la croissance.

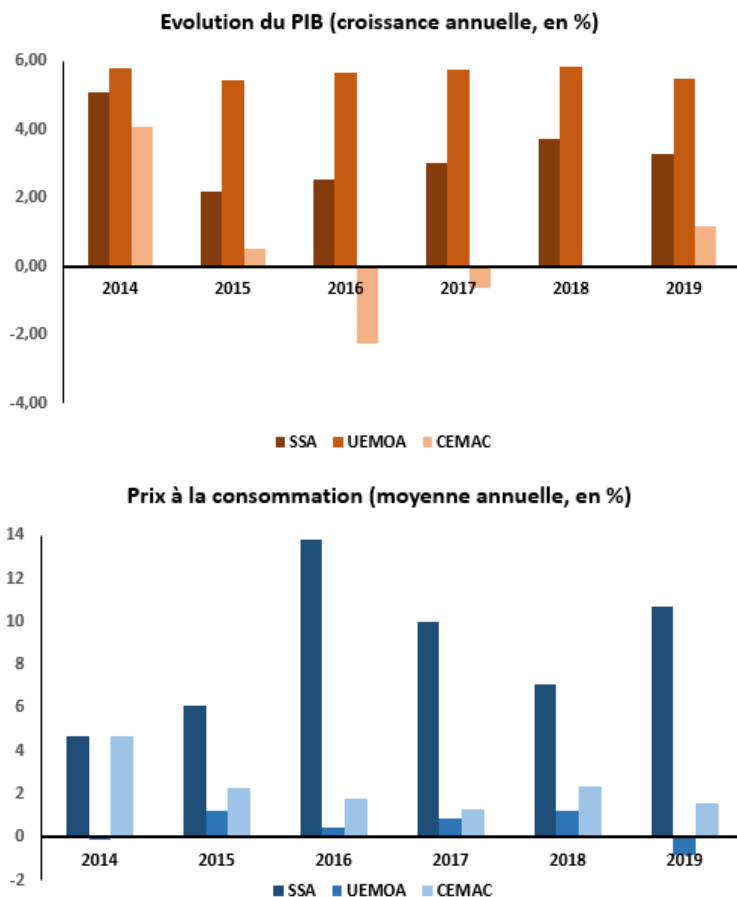
Toutefois, il est factuel de remarquer que la mise en œuvre du dispositif de gestion monétaire de la BCEAO a permis aux pays membres de l'Union

de connaître la stabilité monétaire au cours des soixante dernières années. On s'en aperçoit par le biais des performances observées dans la sous région contrairement aux pays voisins non membres de l'Union (par exemple la Gambie, le Nigeria, la Sierra Leone, le Ghana, etc.) qui gèrent chacun sa monnaie nationale et qui ont connu une instabilité de leur système monétaire caractérisée par des niveaux d'inflation élevés ainsi qu'une forte volatilité des taux de change. Ce dispositif de gestion monétaire de la BCEAO comprend essentiellement trois volets dont :

- le marché monétaire par voie d'appel d'offres, qui utilise le guichet d'appel d'offres avec le système d'adjudications (injection ou reprise de liquidités), et le marché interbancaire;
- les procédures permanentes de refinancement, avec le taux de prêt marginal, mises en œuvre à l'initiative des établissements de crédit;
- le système des réserves obligatoires, comprenant trois champs d'intervention, à savoir, le champ d'application des réserves, l'assiette de calcul et le coefficient des réserves obligatoires.

Les faits stylisés sur ces dernières années dans l'espace UEMOA, montrent que le contrôle de l'inflation permet à la zone de réaliser des performances de croissance économique. Comparé aux pays de la CEMAC ou encore d'Afrique Subsaharienne, l'UEMOA présente des niveaux de croissance économique plus élevés avec une parfaite maîtrise de l'inflation sur la période allant de 2014 à 2019 comme le montre la Figure 1.12.

Figure 1.12: Évolution des taux d'inflation et de croissance économique



Cette tendance confirme l'argument consistant à dire que la poursuite de l'objectif principal de stabilité des prix par la BCEAO (Article 8 du nou-

veau statut) limite ses marges de manoeuvre en matière de financement des économies de la Zone. Il semblerait donc que le maintien de la stabilité des prix par la BCEAO pour l'ensemble de la zone prime sur le soutien que cette dernière peut apporter en terme de financement des économies de l'Union. Il faut noter tout de même que l'objet de la politique monétaire, est de fournir aux économies, la quantité de monnaie nécessaire à la croissance économique et à la réalisation du plein emploi, tout en garantissant la stabilité de la monnaie. En conséquence, si la politique monétaire telle que mise en oeuvre par la BCEAO a permis jusqu'alors d'assurer la stabilité des prix à court termes, elle reste cependant limitée pour favoriser à long terme, une croissance économique nécessaire pour assurer le plein emploi au sein de la sous région.

Néanmoins, on peut souligner quelques avancées dans les mesures de gestion de la politique monétaire de la BCEAO. Ces avancées sont implicitement le reflet d'une reconnaissance du constat sur l'incapacité de la politique monétaire à financer la croissance économique dans les pays membres. Et ce, du fait de nombreuses études ayant fourni des preuves empiriques sur les mécanismes de transmission de la politique monétaire au secteur réel, parmi lesquels on note celles consacrées aux interactions entre inflation et croissance dans les pays de l'UEMOA. Parmi ces études, certains ont mis en avant un niveau d'inflation structurellement faible, qui constitueraient une source de distorsions dans l'activité économique, ou encore accentueraient l'irrégularité et le ralentissement de la croissance économique (Combey & Nubukpo, 2010; Védie, 2018; Dramani & Thiam, 2012; Konte et al., 2012), ce qui implique qu'il existerait une perte de croissance relative à la réduction de l'inflation. Mais, pour Sall (2019), les pertes de croissance susceptibles d'être engendrées par l'utilisation de la cible d'inflation de 2% définie par le Comité de Politique Monétaire en lieu et place du taux optimal d'inflation seraient nulles dans tous les pays, à l'exception du Togo.

Ces contributions à la littérature ont apporté une certaine flexibilité dans les instruments ainsi que le cadre institutionnel de mise en oeuvre de la politique monétaire par la BCEAO. A titre d'exemple, au cours de ces dernières années, dans un contexte de maîtrise de l'inflation, la politique monétaire de la BCEAO est restée accommodante, offrant ainsi au système bancaire la possibilité et les moyens de financer l'activité économique à des conditions souples et avantageuses. En effet, la BCEAO a pris un certain nombre de mesures (BCEAO, 2017) telles que :

- le réaménagement depuis 2008, de ses taux directeurs avec quatre baisses successives des-dits taux. Le taux minimum des appels d'offres d'injection de liquidités est ainsi passé de 3% à 2,5%, tandis que le taux du guichet de prêt marginal a été réduit de 4,75% à 3,5% depuis le 16 septembre 2013. Le taux minimum des appels d'offres d'injection de liquidités est demeuré à ce niveau bas de 2,5% depuis cette date. Quant au taux du guichet de prêt marginal, le 16 décembre 2016, il est passé de 3,5% à 4,5% afin d'améliorer le fonctionnement du marché monétaire notamment le marché interbancaire, celui sur lequel les banques se prêtent de l'argent entre elles;
- la baisse du coefficient des réserves obligatoires de 5% à 3%, depuis le 16 mars 2017, libérant de manière substantielle la capacité des établissements de crédit à financer l'économie;
- la création d'un guichet spécial de refinancement (3 mois minimum et 12 mois au plus) permettant notamment de refinancer des créances ayant une durée résiduelle de 20 ans;
- l'élargissement aux obligations du Trésor, des gammes de supports admissibles d'office au refinancement de l'Institut d'émission;

- l'admissibilité des crédits bancaires octroyés aux systèmes financiers décentralisés en support des refinancements de la BCEAO.

La combinaison de ces mesures a accru les demandes de ressources des banques aux guichets de la BCEAO. Ainsi, les créances de l'Institut d'émission sur les établissements de crédit sont passées de 365,0 milliards à fin décembre 2008 à 4.704,9 milliards à fin décembre 2016, puis à 3.986,5 milliards à fin août 2017. En relation avec ces financements accordés par la BCEAO aux banques à des taux relativement bas et avec les autres mesures favorables prises par l'Institut d'émission, les taux débiteurs appliqués par les banques à leur clientèle ont tendanciellement baissé au cours des dix dernières années. En effet, le taux moyen appliqué aux crédits (taux moyen débiteur) est ressorti à 6,92% en août 2017 contre 8,08% en 2009 et plus de 12% en 2000.

1.3.2.4 Contraintes sur le financement externe

Les règles de convertibilité des francs CFA peuvent, en un certain sens, contraindre le volume de capitaux étrangers disponibles pour financer les économies domestiques. La convertibilité d'une monnaie est la possibilité pour cette dernière d'être librement échangée contre une autre devise ou encore la capacité à régler des transactions internationales en devises à partir de comptes en monnaie nationale. Si la majeure partie des pays les plus avancés (États-Unis, Canada, Grande Bretagne, zone euro, Japon, etc) disposent des devises facilement convertibles, de nombreux pays continuent d'avoir une politique monétaire qui tend à maîtriser la quantité de monnaie convertible, comme par exemple les pays de la zone franc, ou de l'UEMOA en particulier. Le franc CFA (XOF) est arrimé à l'Euro depuis la création de l'euro en 1999 avec une parité fixe. Cette ancrage à l'euro peut avoir plusieurs avantages, notamment offrir aux économies de l'Union une meilleure résistance

aux chocs macroéconomiques et permet de maîtriser l'inflation en assurant la stabilité de la devise, ce qui est favorable aux échanges et aux investissements. Toutefois, cette garantie de la convertibilité du franc CFA à taux fixe se traduit dans les faits par un sous-financement des économies de l'Union. En effet, il est difficile voire même impossible pour la BCEAO, de défendre la parité fixe FCFA/Euro, et de conduire simultanément une politique monétaire optimale au service de la croissance en créant des conditions nécessaires pour attirer durablement les capitaux étrangers pour le financement des économies nationales.

Cependant, comme nous l'enseigne la théorie économique, ayant opté pour un régime de change fixe avec une liberté de circulation des capitaux, il est impossible pour la BCEAO d'avoir une politique monétaire durablement différente de celle de la zone ancre (zone Euro) en référence au triangle d'incompatibilité de Mundell¹¹. Les mécanismes économiques sous jacents se résument comme suit : si en effet, dans un contexte de libre circulation des capitaux, un pays décide de pratiquer une politique monétaire autonome en baissant son taux d'intérêt directeur, les capitaux internationaux placés dans sa devise se portent sur d'autres monnaies, à la recherche d'une meilleure rémunération. Dans ces conditions, il en résulte une dépréciation monétaire qui finit par rendre impossible le maintien de la monnaie nationale dans la bande de fluctuation autorisée par l'appartenance au système de changes fixes.

Dans le contexte de l'UEMOA, il faut rappeler que la configuration qui prévaut aujourd'hui est celle qui existait en 1914 avec le système d'Étalon-or c'est-à-dire la mise en place d'un système de change fixe (parité fixe

¹¹Le triangle d'incompatibilité de Mundell est un principe développé par Robert Mundell et Marcus Fleming dans les années 1960 (*A Theory of Optimum Currency Area*, *American Economic Review*, 1961) d'après lequel il n'est pas possible pour un Etat de maintenir à la fois un taux de change fixe, la liberté de circulation des capitaux, et l'indépendance de la politique monétaire de la Banque centrale. En revanche, il faut que l'un de ces objectifs soit abandonné, pour que les deux autres deviennent réalisables.

FCFA/Euro) et la libre circulation des capitaux. En vertu de ce choix, la BCEAO renonce à son indépendance monétaire et financière et reste donc contrainte dans l'utilisation de ses instruments lui permettant de faire face aux cycles conjoncturels et d'implémenter une politique monétaire autonome, en baissant son taux d'intérêt directeur en vue de drainer les capitaux extérieurs vers le financement à long terme des investissements structurels qui constitue le principal moteur (de court et de long terme) de la croissance des économies de l'UEMOA.

Avec un tel scénario, les marges de manoeuvre de la BCEAO, surtout en matière de financement externe sont incontestablement limitées, en raison de la contrainte externe imposée par les règles de convertibilité (par le biais de la parité fixe) qui n'offriraient pas la possibilité de mener une politique susceptible d'offrir des conditions de rémunérations des capitaux pouvant attirer les investisseurs externes. En réalité, il est possible de conduire une politique monétaire autonome avec les changes fixes, mais à condition que le contrôle des changes empêche les mouvements de capitaux. Or, les économies de l'UEMOA ont des besoins colossaux en investissements pour financer de grandes infrastructures régionales ou des programmes de développement dont les coûts de réalisation sont nettement supérieurs aux capacités budgétaires des États, et même quand elles sont combinées avec les capacités d'épargne privée domestique disponible. Il est donc clair qu'une multitude de sources de financement est nécessaire et tout choix d'instruments de politique macroéconomique qui restreint les mouvements de capitaux est incompatible avec les difficultés d'accès au financement dont souffrent les pays de la zone UEMOA.

Il semble donc impossible d'avoir une liberté de circulation des capitaux, en plus d'une maîtrise du taux d'intérêt directeur de la BCEAO, et un système de changes durablement fixes. Dès lors, le maintien d'une parité fixe entre le FCFA et l'Euro se traduit implicitement par des contraintes qui limi-

tent la capacité de dispositif monétaire de la BCEAO à mobiliser les capitaux extérieurs au service de la croissance des économies de l'Union.

1.4 Objectifs, questions de recherche et contributions de la thèse

Depuis plusieurs décennies, l'obsession de la discipline budgétaire et de la stabilité monétaire sont au cœur des politiques publiques menées par les pays de l'UEMOA. Contrôler strictement l'inflation, limiter la dette et les déficits publics constituent finalement à la fois le guide et le baromètre des gouvernements et de la Banque Centrale. Sur le plan macroéconomique, une telle configuration a permis à la Zone de maîtriser l'inflation et d'assurer progressivement une convergence nominale des économies de l'Union, contre manifestement un coût en matière de financement de la croissance, du fait notamment d'une réduction des marges de manœuvre de l'instrument monétaire et le recours aux emprunts pour financer les dépenses prioritaires, notamment en ce qui concerne les infrastructures économiques et les services sociaux de base. Clairement, les modes traditionnels de financement de l'économie sont devenus inopérants. En outre, au sein de la Zone, on note également une faible progression dans la mobilisation des ressources fiscales pouvant s'expliquer par la prédominance des activités informelles et la fraude fiscale engendrant un manque à gagner fiscal pour les Etats.

Quels alternatifs de financement pour la Zone UEMOA?

Au sein de l'UEMOA, les pays sont confronté à des besoins importants de ressources pouvant leur permettre de financer leurs déficits infrastructurels, de renforcer leurs capacités de production et de réaliser les nouveaux plans de développement à objectifs multiples. En effet, la configuration actuelle des

stratégies de lutte contre la pauvreté et de promotion de l'emploi repose essentiellement sur une mise en place des plans nationaux de développement à objectifs multiples, impliquant à la fois, les acteurs publics et privés. Les Etats fondent le financement de ces plans, en grande partie, sur le secteur privé national et international. Cependant, les objectifs des plans de développement nationaux ou régionaux s'inscrivent dans un programme international de développement bien plus ambitieux (comme les Objectifs de Développement Durable), et nécessitent d'importantes ressources financières. Or, les pays de l'Union éprouvent de réelles difficultés qui empêchent la progression des ressources fiscales, et la plupart de ces pays demeurent vulnérables face aux crises d'endettement public. Il est par conséquent nécessaire que ces pays utilisent des stratégies de financement qui leur permettent de maintenir leur dette à un niveau soutenable. Cette thèse se propose de creuser la question suivante: quels sont les mécanismes innovant de financement dont les pays de l'UEMOA pourront faire recours, pour à la fois financer leurs ambitions de développement et maintenir leurs dettes à des niveaux soutenables?

Cette question principale sera déclinée en des questions spécifiques suivantes: existe-t-il un espace budgétaire ou un potentiel de mobilisation de ressources fiscales dans les pays de l'UEMOA? Si oui, qu'est-ce qui explique la faible mobilisation des recettes fiscales dans ces pays? Par ailleurs, les partenariats publics et privés (PPPs) constituent-ils une source de financement alternative crédibles? Ou encore, quelle est la structure optimale de la dette publique dans l'espace UEMOA? Et quelles sont, par conséquent, les incidences d'un recours à ces différents types d'endettement pour le financement des infrastructures publiques sur les agrégats macroéconomiques, en particulier sur le taux de croissance économique et le taux d'endettement public?

L'objectif principal de cette thèse est d'identifier des mécanismes innovant de financement pouvant permettre aux pays de l'UEMOA de se désendetter

et de financer la croissance des dépenses publiques tout en maintenant la dette publique soutenable. De ce fait, des objectifs spécifiques sont fixés notamment, analyser les effets de :

- une mobilisation plus accrue des ressources fiscales et non-fiscales;
- une structuration de type Partenariat Public-Privés;
- un endettement extérieur concessionnel ou commercial;
- un endettement intérieur sur le marché régional y compris le secteur bancaire;
- ou une combinaison d'au moins deux ou de l'ensemble de ces mécanismes.

Les travaux de cette thèse se positionnent dans la littérature sur le financement des économies, en adressant simultanément les questions relatives à la mobilisation fiscale, à la dette publique et au financement des économies dans la zone UEMOA à l'aide de démarches théorique et empirique mobilisant les techniques d'analyses statistiques et économétriques, les nouvelles techniques de modélisation en équilibre général dynamique stochastique (DSGE), ainsi que la théorie des jeux. Dans cette thèse, nous affirmons dans un premier temps qu'il y a, au sein de l'UEMOA, un potentiel de mobilisation de ressources fiscales et identifions les pistes sur lesquels les pays de l'Union peuvent s'appuyer pour exploiter cet espace budgétaire disponible. Ensuite, nous démontrons qu'il y a également du potentiel en matière de financement des infrastructures publiques par les contrats de types Partenariats Publics et Privés. Et enfin, nous montrons que l'adoption d'une stratégie efficace d'endettement et la diversification des sources de financement permettront aux pays de dégager une marge de manoeuvre pour optimiser le financement

des économies dans l'Union. Les travaux de recherches dans cette thèse ont donné lieu à cinq (05) chapitres réparties en deux (02) parties complémentaires.

La première partie se compose de trois (03) chapitres, dont l'objectif consiste à montrer que les disposent d'une marge de manœuvre considérable en matière de mobilisation de ressources fiscales et de donner quelques leviers sur lesquels ils pourront s'appuyer pour accroître les recettes fiscales à l'avenir. Le chapitre 1 interroge sur l'existence d'un espace budgétaire dans les Etats membres de l'UEMOA. L'objectif étant de montrer que les Etats disposent d'une marge de manoeuvre budgétaire leur permettant de mobiliser des ressources fiscales additionnelles pour assurer le financement de l'économie et du développement, sans pour autant mettre en danger la viabilité de leur position financière, ni la stabilité de leurs économies. Pour se faire, nous nous basons sur une approche de taxation optimale. La théorie de taxation optimale permet de modéliser le système de taxation qui minimise les distorsions et les inefficacités économiques (la perte de bien-être collectif) sous la contrainte budgétaire exogène de l'Etat, et permet de définir les taux de taxation optimaux maximisant le bien-être collectif pour un niveau de recettes fiscales donné. Dans ce chapitre, nous mobilisons les techniques d'estimation de panels hétérogènes non stationnaires. Ainsi, à partir d'un modèle d'optimisation de [Scully \(1996\)](#) et d'un modèle quadratique, nous confirmons sur la base de preuves empiriques, l'existence d'un espace budgétaire inexploité au sein de l'Union. Les résultats fournissent une preuve de la relation en U inversé entre la fiscalité et la croissance. Par ailleurs, les résultats montrent que depuis 1980, les performances fiscales enregistrées par les pays de l'UEMOA sont sous-optimales. Le taux optimal d'imposition qui maximise la croissance sur la période 1980-2017 est de 20,6% du PIB. Comparé au taux d'imposition moyen de 12,6% du PIB sur la période étudiée, il existerait donc un supplé-

ment de recettes fiscales non perçues par les administrations fiscales à hauteur de 8,0% du PIB. Il est donc clair que les Etats peuvent mobiliser davantage de recettes fiscales sans aucun préjudice sur l'activité économique, afin de financer des dépenses d'investissement productives, et ainsi simuler la croissance en ayant moins recours à l'endettement.

Le chapitre 2 porte sur la recherche des causes de la faible mobilisation des recettes fiscales dans les pays l'UEMOA. Il s'agit de mettre l'accent sur le rôle des facteurs institutionnels dans l'explication de l'insuffisance de la mobilisation des recettes fiscales, aux cotés des déterminants structurels. Dans un premier temps, nous croisons différentes définitions d'une "institution" en vue de bien contrôler les multiples canaux par lesquels celle-ci peut influencer la collecte des taxes par les pouvoirs publics. Si au sens courant, une institution désigne les systèmes organisés et stables autour desquels s'organisent les activités sociales, dans la pensée classique, elle privilégie l'étude des systèmes formels et codifiés, de sorte que l'on peut distinguer des institutions juridiques, politiques, économiques, religieuses ou sociales. Cependant, nous examinons l'effet des facteurs institutionnels sur la collecte des ressources fiscales en utilisant différentes mesures institutionnelles dont la contrainte sur l'exécutif, des mesures de bonne gouvernance notamment la qualité de la bureaucratie, l'état de droit et la corruption, ou encore des indicateurs relatifs au d'institutions politiques tels que les indices de régime politique, et en distinguant les régimes démocratiques et autoritaires. Certains autres facteurs comme les libertés civiles et politiques ainsi que les tensions ethniques reflétant l'état des institutions sociales sont également introduits dans l'analyse. L'analyse montre que la faible mobilisation des recettes fiscales dans l'UEMOA est symptomatique des réguliers conflits politiques et socio-économiques qui persistent dans la région. De fait, les recettes fiscales augmentent parce que des institutions fortes et la démocratisation exercent davan-

tage de contraintes sur le pouvoir exécutif, une meilleure bureaucratie et une bonne gouvernance augmentent le respect de l'état de droit, réduisent la corruption, établissent un contrat social entre les contribuables et les gouvernements, dans un contexte de liberté politique plus grande et de consolidation ethnique. Ainsi, ce chapitre alerte sur la nécessité de renforcer la démocratie et de mettre en place des institutions fortes afin de mobiliser davantage de ressources fiscales.

Le chapitre 3 s'intéresse à l'analyse de l'efficacité du système de TVA dans les pays de l'UEMOA. La TVA occupe une place importante dans la mobilisation des ressources des États, et il nous paraît cependant utile de s'interroger sur son efficacité. Théoriquement, la performance d'un système de TVA est liée à l'efficacité des mesures d'application et de contrôle des obligations de TVA par l'administration fiscale, et à la capacité des autorités à définir une politique fiscale optimale. A défaut, cela crée un manque à gagner, dont l'écart de TVA permet de mesurer. L'écart de TVA ou la "VAT gap", qui correspond à la différence entre les recettes théoriques (ou potentielles) de TVA et le montant de TVA effectivement perçue, constitue un indicateur clé qui permet de prendre des mesures visant à augmenter les recettes fiscales, de lutter contre la fraude fiscale et le non-respect des obligations de TVA. Concrètement, nous avons tout d'abord estimé les écarts de TVA et ses composantes pour les pays de l'Union, en utilisant une approche dite "descendante" et ensuite conduit une analyse économétrique en vue de comprendre la nature et les causes de l'écart de TVA, et identifier les facteurs spécifiques aux pays expliquant les différents niveaux de performance en matière de TVA. Les résultats montrent que seule (à peu près) la moitié des recettes potentielles de TVA est collectée chaque année au sein de l'Union. Cette mauvaise performance est entre autre le reflet du fonctionnement des administrations fiscales (écart de conformité) et des choix de politiques fiscales (écart de politique). La

TVA constitue dès lors un potentiel de ressources fiscales à exploiter. Cependant, ce chapitre attire l'attention des décideurs politiques sur la nécessité de doter les administrations fiscales de moyens adéquats pour faire face à la non-conformité aux règles de TVA, et d'aligner les politiques fiscales sur les directives de l'UEMOA en matière politiques de TVA.

La deuxième partie de la thèse est composée de deux (02) chapitres qui s'intéressent aux questions relatives au financement de l'économie et à la soutenabilité de la dette publique. Ainsi, le chapitre 4 montre qu'il existe un grand intérêt pour les pays à s'appuyer sur les Partenariats Public-Privés (PPPs) comme outil de financement de l'économie, surtout dans un contexte de contraintes budgétaires. Les pays l'UEMOA comme tous les pays en développement d'ailleurs, font face à un défi non résolu en matière d'infrastructures et de financement du développement, caractérisé par d'importants besoins en infrastructures économiques et sociales, de réelles difficultés de mobilisation de ressources fiscales et un niveau d'endettement élevé. Ce constat interpelle sur la nécessité de réfléchir à des sources alternatives de financement. L'analyse permet de répondre à la question suivante: les PPPs constituent-ils une source alternative de financement des infrastructures publiques ? A l'aide d'une modélisation théorique simple et de la théorie des jeux, nous comparons les effets du financement des infrastructures publiques par des investissements en PPPs au financement par les investissements publics purs. Ensuite, le modèle est testé et validé empiriquement. En effet, les PPPs sont d'autant plus avantageux qu'ils permettent de partager et de mieux gérer les risques associés, d'améliorer la qualité et de réduire les coûts de la fourniture de biens et services publics. L'évidence empirique montre que les investissements en PPP et les investissements publics purs sont des facteurs clés qui influent différemment sur le taux de croissance économique à long terme mais que les deux types d'investissement n'affectent pas la

croissance économique de la même manière. Cependant, l'investissement en PPP joue un rôle important et plus puissant que l'investissement public dans la stimulation du processus de croissance. Nous observons également que le niveau d'endettement affecte le potentiel de croissance des investissements en PPP. Et tant que la dette reste en dessous d'un certain seuil, il y a un impact d'accélération de la croissance. Plus précisément, l'impact de l'investissement en PPP sur la croissance est consolidé à mesure que le niveau de la dette augmente à un point où aucun impact favorable ne pouvait être escompté.

Enfin le chapitre 5 met en évidence les stratégies de financement de l'économie compatibles avec la soutenabilité de la dette publique. Particulièrement, il s'agit de simuler plusieurs mécanismes de financement visant à intensifier les investissements publics tout en maintenant la dette publique sur une trajectoire soutenable. A cet effet, l'analyse mobilise les nouvelles techniques de modélisation macroéconomique appliquée à l'analyse des régularités des cycles réels, d'identification de la nature des chocs et d'évaluation des politiques: les modèles dynamiques stochastiques d'équilibre général (DSGE). On peut anticiper que la soutenabilité de la dette souveraine est intrinsèquement liée à la structure de cet endettement ainsi qu'à la configuration des différentes stratégies de financement des investissements publics. Le but étant de tirer des enseignements pour les pays de l'UEMOA, en matière des stratégies de financement dont ils pourront faire recours, et pouvant permettre de maintenir leur endettement à un niveau soutenable. Plusieurs sources de financement ont été examinées telles qu'une augmentation des taxes sur la consommation, une augmentation des taxes sur la rente des ressources naturelles, ainsi que différents types de dette notamment les prêts concessionnels et subventions, la dette commerciale extérieure et la dette intérieure. Il en ressort que des combinaisons possibles d'au moins deux de ces mesures,

constitueront les meilleurs stratégies de financement garantissant une dette publique de long terme soutenable.

Part I

Collecting Extra Tax Revenue

Chapter 2

Do The WAEMU Member States Still Have Fiscal Space? Answering By “Optimal Taxation Approach”

Abstract

Yes. This paper based on the optimal taxation approach, confirms the existence of an unexploited fiscal space within WAEMU that member States can use to finance their productive investments. Using [Scully \(1996\)](#) and quadratic models through a panel time-series models with heterogeneous slopes, the outcomes provide a clear evidence of inverse U-shaped tax-growth relationship. Our findings show that since 1980, the fiscal performances recorded by the WAEMU countries are sub-optimal. The optimal level of taxes that maximizes growth over the period 1980 – 2017 is 20.6% of GDP. Compared to the average tax rate of 12.6% of GDP over the study period, there is an additional uncollected tax revenue of 8.0% of GDP. The findings clearly show the existence of a fiscal space that allows an additional tax revenues mobilization in order to finance more productive investment expenditures, and thus simulate the level of economic activity by making less use of debt. Obviously, the results also indicate that the optimal tax rates are heterogeneous among countries in the Zone and therefore the available fiscal space varies from one country to another.

keywords: Fiscal space . optimal taxation . growth maximization . Scully Model

JEL Codes: H21 . O40

2.1 Introduction

Many developing countries, particularly those in Sub-Saharan Africa, are more and more dealing with the problem of raising additional fiscal resources to meet their growing public spending needs. For [Culpeper and Bhushan \(2010\)](#) domestic resources allow developing countries to have flexibility and freedom in the policies implemented with this freedom subject to constraints in the form of terms and conditions set by donors. Resource mobilization based on fiscal instruments is therefore the main sustainable and predictable source of financing for development and thus provides usable budget margins for the purpose of funding priority expenditures, especially in terms of investment in economic infrastructure and basic social services. [Musgrave \(1959\)](#) attributes three traditional functions¹ to fiscal policy: allocation of resources, income redistribution, and economic stabilization. Tax revenues are therefore an essential tool for financing growth and development.

In the recent years, the economic activity of WAEMU² member States has remained dynamic with an average growth rate of 6% over the period 2012 – 2017, driven by investments in infrastructure, rigorous private consumption and favorable agricultural harvests, in a context of price stability. However, this economic growth has been accompanied by an increase in the

¹Allocation function arises from the socially unsatisfactory and sub-optimal nature of market functioning. This is the reason why the state intervenes to meet social needs. Redistribution aims at correcting the inequalities generated by the primary distribution of income, in the sense of greater social equity. As for the stabilization function, it differs from the previous ones in that it results from the vagaries of the economic situation, which may lead to inflation and unemployment.

²The West African Economic and Monetary Union (WAEMU), includes 8 West African countries including Benin, Burkina Faso, Cote d’Ivoire, Guinea Bissau, Mali, Niger, Senegal and Togo. Its objective is to unify national economic areas, to transform the Union into a buoyant and attractive market for investors, and to consolidate the macroeconomic framework of the member States, through the harmonization of their economic policies, in particular their fiscal policies, as well as by strengthening their common currency.

ratio of public debt to GDP which stands at 47.8% in 2018 (WAEMU, 2018)³. This increase in public debt may reflect a low recovery of tax revenues in member States, suggesting that government use indebtedness to finance the economy at the expense of additional fiscal resources.

Within WAEMU Zone, the contribution to revenues by taxes remained low especially in the 1980s due to the existence of tariff barriers to trade, as well as low contribution to revenues by consumption taxes, particularly VAT. Before the 1990s, VAT was implemented only in two of the eight countries (Cote d’Ivoire in 1960 and Senegal in 1980). This low revenue mobilization in the 1980s therefore, motivated countries to undertake the fiscal transition which, essentially, was based on the substitution of domestic tax resources for decreasing tariff revenues. Currently, the tax burden⁴ rate remains low and below the minimum of 20% of GDP set by ECOWAS and recommended by the United Nations Development Program (UNDP) for the financing needs of ambitious development plans such as sustainable development goals. For example, the tax burden represents on average 35% of GDP in OECD countries and is a main way to finance public goods and services. Nevertheless, in the early 2000s, some revenue collection performance was recorded in the WAEMU countries.

³Semi-annual implementation report of multilateral surveillance, WAEMU Commission, 12/2018.

⁴The tax burden rate, defined as an indicator for measuring the weight of taxes in a country’s economy, is the total amount of tax revenue collected, expressed as a percentage of GDP, and indicates the share of production that is levied by the state in the form of taxes. It can therefore be considered as an indicator of state control over the resources produced by the economy. This is a key indicator of tax policy that allows for measures to improve tax revenues and fight against tax fraud and tax evasion. It is also a context and a mechanism for guiding the allocation of an economy’s resources, in particular through fiscal incentives, and changing the redistribution of income and wealth.

CHAPTER 2. DO THE WAEMU MEMBER STATES STILL HAVE FISCAL SPACE? ANSWERING BY “OPTIMAL TAXATION APPROACH”

Figure 2.1: Trends of tax rate in WAEMU member States

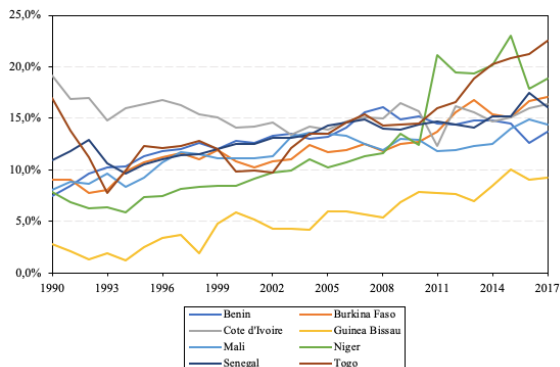


Figure 2.1 above shows that, between 2000 and 2017, Togo has significantly increased its level of tax revenue mobilization, which has been above 20% of GDP since 2016. Other countries also had modest performances where the tax burden rates reached in 2017, 13% in Benin, 14% in Mali, 16% in Senegal and Cote d'Ivoire, 17% in Burkina Faso and 18% in Niger. On the other hand, Guinea-Bissau, for its part, is still experiencing enormous difficulties because of the weakening due to various political crises. However, it has made very little progress and its tax revenue collection rate has stood at 9% of GDP.

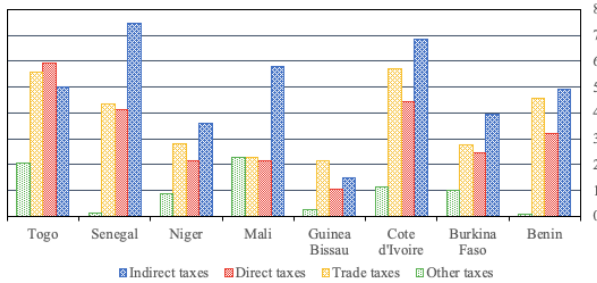
These performances in the collection of tax revenues in the countries of the Zone can be explained in particular by the increase in indirect taxes, mainly due to VAT adopted by all member States (except Guinea-Bissau) and Togo being the latest to have introduced it in 1995. The high contribution of indirect taxes would be partly due to tax harmonisation achieved in the Union. Thus, a common tax directives have made it possible to regulate direct and indirect taxation in the member States since the end of 1998. This coordination has

resulted in a change in the structure of tax revenues from more contributory domestic tax revenues to door-to-door tax revenues. For example, WAEMU has succeeded in defining a base for corporate tax and has regulated its rate between 25% and 30%. As for VAT, the rate is between 15% and 20%. With the exception of Niger whose rate is 19%, and Guinea-Bissau which does not have VAT but rather a general sales tax of 15%, countries currently apply VAT at a rate of 18%. The other areas of VAT harmonisation are based on extending its scope, the threshold for VAT liability, the tax base and the approximation of the arrangements for taxing and reimbursing credits.

The following Figure 2.2, presents the tax revenue structure of the WAEMU countries. The averages of the different tax components are expressed as a percentage of GDP. The graph shows that direct taxes are the weakest link in the mobilization of tax revenues within the Zone. They are generally taxes on corporate profits and personal income taxes, and are much lower than indirect taxes. In countries such as Burkina Faso, Benin, Mali, Niger, Cote d’Ivoire and Senegal, indirect taxes accounted for just over double the direct taxes. In addition, direct and indirect taxes are the same in OECD countries, and each account for an average of 11% of GDP. As a result, it appears that the mobilization efforts in WAEMU focus much more on indirect taxes, in particular the VAT, than on corporate and personal income taxes. This structure reflects the economies in which informal activities predominate. Indeed, most of the inputs used in informal production comes from formal industries and this leads to its indirect taxation since VAT revenues borne on inputs cannot be refunded because informal industries are not subject to VAT.

CHAPTER 2. DO THE WAEMU MEMBER STATES STILL HAVE FISCAL SPACE? ANSWERING BY “OPTIMAL TAXATION APPROACH”

Figure 2.2: Components of tax revenue in WAEMU member States (1980-2017)



Two essential factors may explain the low level of tax revenue, namely tax evasion and the predominance of the informal sector. In fact, production activities not reported to the tax authorities are considered economically as informal. In 2014, within WAEMU (excluding Guinea Bissau), the average share of informal sector accounted for 50% of GDP. This predominance of the informal sector is linked to agricultural activities, in part, food and cash crops, livestock and fisheries. Farm households produce food crops for self-consumption, and therefore these products escape the market and are not subject to taxes. In addition, the agricultural sector has more than half of all informal jobs. This significant size of the informal sector that is difficult to tax, generates a tax revenue shortfall for each member State, and thus constitutes a second factor of low tax revenue mobilization. However, this paper examines the optimality of tax return in WAEMU economies. Thus, we will answer the following questions: does the [Scully](#) curve exist in WAEMU member States? If so, at what level is it? Otherwise, what is the optimal level of taxation which maximizes growth in WAEMU context?

The optimal taxation approach is of great interest for the estimation of fiscal space. This is because it establishes a long-term relationship between eco-

nomic growth and tax rate in contrast to the potential tax or tax gaps approach which allows rather to assess the effectiveness of tax systems. The optimal tax approach allows us to show that, WAEMU countries can increase the tax revenues necessary for sustained economic growth and the transformation of their economies without necessarily compromising the ability of economies to generate wealth. In this light, we believe that the optimal taxation approach is more effective in showing the existence of fiscal space than the potential tax or tax gaps approach.

To our knowledge, this paper is the first attempt focusing on the assessment of fiscal space through growth-maximizing tax rate in the WAEMU Zone. It's also the first one using a panel time-series models with heterogeneous slopes while most of the time, studies are based on time series data. This paper should be useful both for researchers because of its empirical approach in the context of WAEMU, and for policy makers by providing to them some suggestions for mobilizing additional tax revenue without this leading to a decrease in economic growth rates. The following sections of this paper are organized as follows : Section 2 carries out a review of the literature on the assessment of tax burden. Section 3 describes the methodological approach adopted, presents data analysis and relevant sources of data, and Section 4 discusses the findings. And, the last section concludes with policy implications of the optimal tax policy.

2.2 Literature review

2.2.1 Theoretical review

Endogenous growth models that emerged in the early 1990s with the externality of public spending on infrastructure clearly reflect the non-linear effects of taxation on long-term growth. The works of [Barro \(1990\)](#) shows that an increase in tax rate provides resources to finance productive public expenditure needs but reduces the marginal productivity of private capital. There is therefore a threshold in the long-term taxation-growth relationship. [Laffer \(1981\)](#) argues that taxation can be detrimental to the economy. It postulates through the assumption of an inverse U-shaped, for the existence of tax revenues threshold. As the marginal tax rate rises, tax revenues rise to a maximum because from 100% there is erosion of tax base. Keynesian analysis of taxation is based on the principle that economic agents work to satisfy a need for well-being. It argues that high taxation will result in two effects: a substitution effect whereby economic agents may decide to work less and devote the remainder of their time to other activities, and an income effect that results in incentives for economic agents to work harder to recover their initial well-being.

[A. Smith \(1776\)](#) already noted that tax could harm the activities that finance it. This intuition was modeled by a curve similar to the [Laffer](#) curve, presented in the works of [Dupuit \(1844\)](#). Increasing tax rates beyond its optimal level will have a negative impact on labor supply through a substitution effect whereby economic agents may decide to reduce working time by dedicating themselves to other types of work, or activities such as leisure or untaxed activities rising the informal economies and situations of tax fraud and evasion. Thus, there would be a tax rate, not to exceed, under penalty of discouraging work and the formation of income and thus a decrease in tax

revenues.

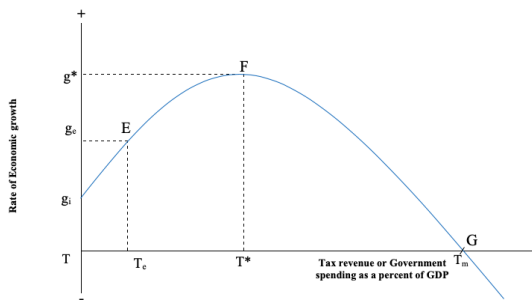
Scully (1991) shows a functional relationship between economic growth and the size of government in a given country. It illustrates this postulate from an inverted U curve called the Scully curve shown in Figure 2.3 below. The x-axis represents government expenditures as a percentage of national income assumed equal to tax revenues as a percent of GDP, and the y-axis the economic growth. The inverted U-shaped curve shows the existence of a functional relationship between economic growth and the level of government spending.

The economic analysis underlying the shape of the Scully curve is as follows. First, we consider that the share of tax revenue in GDP equal to zero is associated with the growth rate (g_i). This growth rate is low because the economy is sub-optimal when the state does not provide any goods and services that are actually financed by the tax revenues collected. Under these conditions, private agents provide their own security, enforce contracts, establish standards and measures, and generally operate without the provision of many public goods and services provided by governments.

Second, we consider that in this country, there is a private sector using the supply of capital, labor and many other resources. In this case, the government taxes and spends (T_e) percent of GDP. The level of government activity then leads to a rate of economic growth (g_e). The highest growth is the result of the benefits from public goods and services provided through tax revenues, which increases overall economic efficiency in the private sector. This high efficiency results from positive externalities for the private sector due to the production of public services such as education, health, security, justice, infrastructure, monetary stability, national defense etc. Thus, at this low level of taxation corresponding to public expenditure, the deterrent effects of taxation on labor, saving and investment and risk-taking are negligible.

However, all economic activity is characterized by diminishing marginal returns. In this case, government expenditure financing individual projects is a priori meeting the most urgent needs and exploiting appropriate opportunities for the substitution of inefficient private activities. As government spending grows, other government-funded projects gain less and less productivity. At a certain level, the marginal productivities of increased public spending cancel each other out. This point corresponds to T^* in Figure 2.3 where tax revenues as a percentage of GDP (assumed to be equal to government expenditures) maximize the rate of economic growth. Any further increases in tax revenues and hence in government spending beyond point T^* translate into negative effects on economic growth: the Scully curve begins to decline. Thus, Figure 2.3 shows that at a maximum tax level (T_m), there corresponds a zero-growth rate, and that beyond, the growth rate becomes negative.

Figure 2.3: Scully Curve



Source: Adapted from [Chao and Grubel \(1998\)](#)

Then, what are the transmission channels through which a high taxation of economic activities results in negative externalities starting from a certain given threshold? The existing literature argues that the non-linear effects of

taxation on economic growth are transmitted through several mechanisms.

First, higher size of taxation of labor income can discourage labor supply. Thus, an increase in the tax rate reduces the net salary and generates a substitution effect as well as an income effect. The substitution effect reduces work incentives to the benefit of leisure with a lower opportunity cost. On the contrary, the income effect results in an incentive to work because of the decline in the real income of the individual as a result of the increase in the tax rate. Similarly, taxation can affect labor supply through taxes on consumption, which push up product prices thus reducing real wage.

High tax rates can accentuate economic distortions through their impact on saving and investment. Withholding taxes on capital income reduce the net return on savings and lead as in the case of labor supply, to a substitution effect and an income effect. The substitution effect results in a decrease in savings incentives and pushes individuals to increase their current level of consumption to the detriment of their future consumption, the opportunity cost of which has decreased. As for the income effect, on the contrary, it results in a fall in the real income of the individual, which leads the latter to reduce his current consumption. When the substitution effect is greater than the income effect, then it discourages savings and taxation discriminates against future consumption expenditure. This phenomenon generates a loss of collective well-being by creating a sub-optimal level of inter-temporal transfer of resources.

Taxation could also have a disincentive effect on investment decisions. In fact, the levies increase the cost of capital and exert through this channel, a disincentive effect on private investment expenditure. This results in a shortage of the capital stock and therefore decreases the productivity of the labor factor. Differentiated taxation of the factors of production, especially capital, is also a source of economic distortion. In most cases, there are significant differences

between the marginal effective tax rates on capital income, depending on the type of investment, the source of financing and the domicile of the company. As post-tax real rates of return on investments in substitutable assets tend to converge, the result is a misallocation of resources induced by tax policy and low productivity of the capital stock than in the case where all capital income are subject to a uniform rate.

Another mechanism through which taxation affects the productive efficiency of an economy is the taxation of realized capital gains. In an economy where capital gains are taxed only at the time of their realization, the owners of securities are encouraged to postpone the realization of their gains over time: this is the “locked-in” effect. These behaviors lead to a loss of economic efficiency because they cause relative price volatility, inefficient equity management, and a delay in project maturity affecting the discounted value of tax payments.

2.2.2 Empirical review

Although several recent empirical studies have examined the relationship between the level of taxation and economic growth, there is a lack of such studies in developing countries (Keho, 2010). While there is unanimity in the literature on the non-linearity between taxation and long-term economic growth, the main empirical results obtained are the subject of several controversies, because of the specificity of the tax structures of the countries, the variables selected, methodological approaches, as well as some results varying over time within the same country. The empirical results of Barro (1990) based on a sample of poor and rich countries have shown that a high level of taxation has negative impacts on growth (Eaton, 1981, Skinner, 1987). Engen and Skinner (1992) have shown that a 2.5 percentage point increase in the tax burden would probably reduce long-term growth rates by 0.18 points based

on data from a sample of 107 over the period 1970 – 1985. [Plosser et al. \(1992\)](#) and [Myles \(2000\)](#) confirm these results, highlighting a negative effect of taxation on per capita growth rate in 22 OECD countries during the period 1960 – 1980. For [Leibfritz, Thornton, and Bibbee \(1997\)](#), a 10-point increase in the tax rate would reduce the growth rate by 0.5 percentage point in OECD economies.

[Scully](#) conducts a series of studies to determine the optimal tax level. He finds that a tax rate about 20% of GDP corresponds to a maximum growth rate. [Scully \(1991\)](#) uses a quadratic model with a sample of 103 countries over the period 1957 – 1987, and observes that a tax rate of 19.3% would maximize growth. In 1995, using data from 1949 – 1989 data, it shows that a tax rate between 21.5% and 22.9% of the Gross National Product would maximize economic growth in the United States. [Scully \(1998\)](#) makes the same estimates over the period 1950 – 1995 and obtains an optimal tax rate of 21%. [Scully \(1996\)](#) highlights the existence of threshold effects in New Zealand over the period 1927 – 1994. The results place the optimal tax rate at around 21% of GDP, with an annual growth rate of 4.8%.

[Kennedy \(2000\)](#) makes three criticisms of [Scully \(1996\)](#)'s paper on the effect of taxation on economic growth ([Scully, 1996](#)). These criticisms were about the specification of the model, the test of homogeneity degree and spurious estimate of the optimal tax rate. Addressing [Kennedy](#)'s criticisms, [Scully](#) found that the result is not affected by incorporating factor inputs into the model, that the function is homogeneous of degree one, and that the growth maximizing tax rate is about 20 percent of GDP, as in the original paper ([Scully, 2000](#)). [Scully \(2003\)](#) used two different models - [Barro \(1990\)](#) and [Scully \(1996\)](#) - over the period from 1960 to 1990, and concluded that the tax rate that maximizes economic growth in the United States is 25.1 and 19.3% respectively. [Scully \(2006\)](#) re-examined the US data (1929 – 2004), but for

this paper using its own methodology developed in 1996 and concludes that the optimal tax rate is 23% of GDP.

Several other studies have used the [Scully \(1996\)](#) method to estimate the optimal size of taxation. These studies have resulted in very heterogeneous results. [Chao and Grubel \(1998\)](#) present some historic data on taxation by Canadian government between 1929 and 1996, and the optimal tax rate that maximizes economic growth determined using the [Scully \(1996\)](#) method is 34% of national income. [Abdullaev, Konya, et al. \(2014\)](#) have applied the [Scully \(1996\)](#) method to Uzbekistan data for the period 1996 – 2011 and found that the tax rate is 22% of GDP in 2001 and is 31.25% of GDP after 2001. With a modified [Scully \(1996\)](#) model, [Davidsson \(2012\)](#) concludes with a low tax rate of 11.1% of GDP in 12 randomly selected countries for the period 1982 to 2012. The results obtained by [Saibu et al. \(2015\)](#), showed optimal rates of 15% in South Africa over the period 1964 – 2012 and 30% in Nigeria over the period 1970 – 2012. In South Asian countries, [Husnain, Haider, Salman, and Shaheen \(2015\)](#) removing the government’s balanced budget assumption, introduce the term deficit into the [Scully \(1996\)](#) model. They find that a tax rate of 13.78% would maximize economic growth over the period 1975 – 2012. Similarly, [Motloja, Makhoana, Kassoma, Houdman, and Phiri \(2016\)](#), applied the [Scully \(1996\)](#) optimization model to quarterly data collected before (i.e 1994 : Q1-2009 : Q2) and after (i.e 2009 : Q2-2016 : Q2) the 2009 crisis and set an optimal tax rate for South Africa of 22% of GDP in the post-recession period. [Amgain \(2017\)](#) applied the [Scully \(1996\)](#) and quadratic models to data from 32 Asian countries over the period 1991 – 2012, and found that the growth maximizing tax-rate is about 18% of GDP.

[Scully \(1998\)](#) also determines the optimal tax rate for several developed countries based on the same econometric model used to determine the optimal

tax rate in the United States [Scully \(1996\)](#). The selected sample of countries includes the United States (1929 – 1989), Denmark (1927 – 1988), United Kingdom (1927 – 1988), Italy (1927 – 1988), Sweden (1927 – 1988), Finland (1927 – 1988) and New Zealand (1927 – 1994). Estimates suggest an optimal average tax rate of 20% and range from 16.6% for Sweden to 25.2% for the United Kingdom. However, the levels of taxation observed are higher and range from 34.1% in the United Kingdom to 51.6% in Denmark. These results show that taxation policy in developed countries is characterized by tax rates above optimal rates, which translates into lower growth rates in these countries. [Aydin, Esen, et al. \(2019\)](#) explore the impact of taxation on economic growth in transition economies, using a dynamic panel threshold model of 11 Central and South-eastern European and Baltic countries during the transition process between 1995 and 2014. The results suggest that the optimal size of taxes which maximizes growth rate is approximately 18 percent of GDP for full transition economies, 18.5 percent for developing economies, and 23 percent for developed economies. [Branson and Lovell \(2001\)](#) estimated the optimal tax burden for New Zealand over the period 1946 – 1995 from a linear programming model. They concluded that beyond 22.5% of GDP, taxation would become a source of economic distortion.

The empirical review reveals that studies on the tax-growth relationship within the WAEMU region are scarce. However, some of them cover a number of countries. [Keho \(2010\)](#) using annual data covering the period from 1960 to 2006, finds that the optimal tax rate was between 22.1% and 22.3% of GDP in Cote d’Ivoire. Similarly, by examining the optimal level of taxation in Togo over the period from 1960 to 2016, [Amedanou \(2019\)](#) found an optimal tax rate of 22.6% of GDP. In Burkina Faso, with annual data covering the period 1960 – 2012, the optimal tax rate is found to be 29.1% of GDP ([CAPES, 2014](#)). A brief review of empirical literature has been summarized

in Table 2.13 (Appendix A). Thus, our paper attempts to contribute to the empirical literature by estimating the optimal size of taxation which maximizes growth in WAEMU counties over the period 1980 – 2017.

2.3 Methodology, data and sources

2.3.1 Methodological approach

The purpose of this paper is to estimate the optimal level of taxes which maximizes growth rate for WAEMU member States. The tax rate refers to the share of tax revenue in GDP and economic growth measured by real GDP per capita growth. By doing so, this study focuses on two models. We first estimate the Scully optimization model [Scully \(1996\)](#) and the quadratic model.

2.3.1.1 Scully Optimization Model

[Scully \(1996\)](#) has developed an econometric model to determine the tax rate that maximizes economic growth. This model is preferred over empirical specifications based on the assumption of a quadratic trend between the level of taxation and economic growth. Otherwise, the results of these empirical models are consistent only when the data contain a concave parabolic trend described by the [Laffer \(1981\)](#) curve.

[Scully \(1996\)](#) considers that there are two sectors of activity within an economy: public and private sectors. In this model, one-year tax revenues are used to finance public expenditure $G_t = \tau(Y_t)$, where (τ) is the tax burden rate and Y_t is the national income or GDP. The share of untaxed national income $(1 - \tau)Y_t$, is used to finance the production of goods and services in the private sector. The level of domestic production is determined by the combination of products provided by the public and private sectors. Thus, to determine the

optimal tax level, we specify a Cobb-Douglas production function as follows:

$$Y_{i,t} = \delta(G_{i,t-1})^\alpha [(1 - \tau)Y_{i,t-1}]^\gamma \quad (2.1)$$

In this equation, Y is national output or GDP, G government spending to finance the production of public goods, the tax rate (τ) in year (t) of countries (i). Then δ , α and γ are the parameters. Let postulate for a balanced budget of governments. Hence, the government budget constraint is written as follow:

$$G_{i,t} = \tau Y_{i,t} \quad (2.2)$$

Where (τ) is the ratio of tax revenues to GDP called tax burden. From equations (6.1) and (6.2), equation (6.1) can be re-written as follows:

$$Y_{i,t} = \delta(\tau Y_{i,t-1})^\alpha [(1 - \tau)Y_{i,t-1}]^\gamma \quad (2.3)$$

However, the growth rate is defined by:

$$\frac{Y_{i,t}}{Y_{i,t-1}} = 1 + g$$

Hence, we divide each side of equation (2.3) by $Y_{i,t-1}$:

$$\frac{Y_{i,t}}{Y_{i,t-1}} = \delta(\tau)^\alpha (1 - \tau)^\gamma [Y_{i,t-1}]^{\alpha+\gamma-1}$$

However, we obtain:

$$1 + g = \delta(\tau)^\alpha (1 - \tau)^\gamma [Y_{i,t-1}]^{\alpha+\gamma-1} \quad (2.4)$$

The optimal tax rate τ_{opt}^* which maximizes the level of economic growth, is obtained by the first-order condition which consists in canceling the first

derivative of equation (2.4) with respect to (τ) i.e. $\text{diff}(g,\tau)=0$

$$\frac{\partial g}{\partial \tau} = \delta[Y_{i,t-1}]^{\alpha+\gamma-1} [\alpha(\tau)^{\alpha-1}(1-\tau)^\gamma - \gamma(\tau)^\alpha(1-\tau)^{\gamma-1}] = 0$$

$$\Rightarrow \alpha(\tau)^{\alpha-1}(1-\tau)^\gamma = \gamma(\tau)^\alpha(1-\tau)^{\gamma-1}$$

$$\frac{\alpha}{\tau} = \frac{\gamma}{(1-\tau)}$$

Hence, the optimal tax rate is obtained by the expression:

$$\tau_{opt}^* = \frac{\alpha}{(\alpha + \gamma)} \tag{2.5}$$

We postulate that the Cobb-Douglas type production function used has constant returns to scale. Thus, $\alpha + \gamma = 1$ i.e. $\gamma, \alpha < 1$. However, according to (2.5), the optimal tax rate is: $\tau_{opt}^* = \alpha$.

To estimate the parameters of the model, we write (2.4) under the hypothesis of constant returns:

$$1 + g = \delta(\tau)^\alpha(1-\tau)^\gamma[Y_{i,t-1}]^{\alpha+\gamma-1}$$

Since $\alpha + \gamma = 1$, then we obtain:

$$1 + g = \delta(\tau)^\alpha(1-\tau)^\gamma$$

Or $\gamma = 1 - \alpha$

$$1 + g = \delta(\tau)^\alpha(1-\tau)^{1-\alpha}$$

$$\frac{1+g}{1-\tau} = \delta \left(\frac{\tau}{1-\tau} \right)^\alpha$$

Applying the linear log on each side of the equation, we obtain:

$$\log \left[\frac{1+g}{1-\tau} \right] = \lambda_i + \theta_t + \log \delta + \alpha \log \left[\frac{\tau}{1-\tau} \right] + \varepsilon_{i,t} \quad (2.6)$$

To obtain the optimal tax rate that maximizes economic growth, we estimate the previous equation (2.6) by two panel time-series estimators, allowing for heterogeneous slope coefficients across country members including CCEMG and AMG, and obtain the value of the coefficient α . The slope of the independent variable (α) in log form can be directly interpreted as an elasticity and corresponds to the tax threshold maximizing economic growth. It is expressed as a percent of gross domestic product.

This model is estimated without control variables (see [Scully, 1996, 2000](#)). But many economists criticize the [Scully \(1996\)](#) model to be inappropriate for determining the exact tax rate that would maximize economic growth (e.g. [Sieper, 1996](#); [Chapple, 1997](#); [Easton, 1999](#); [Kennedy, 2000](#) and [Hill, 2008](#)). [Kennedy \(2000\)](#) argues that taxation is not the only determinant of the growth rate, and since other factors influence growth, he considers that [Scully's](#) model gives a spurious and biased estimate of growth-maximizing tax rate because the contribution of capital goods to output are omitted in the production function. [Scully \(2000\)](#) responds to these criticisms by noting that the contribution of previously-accumulated capital and the technological changes in the aggregate production function are implicitly captured by the presence of the lag production term $Y_{i,t-1}$ in the current production function, and also demonstrates that incorporating factors inputs into the model does not change the analytical findings. Another issue in the model is the assumption of balanced budget. In fact, few countries have a balanced budget and in addition all countries in the

sample have budget deficit over the entire period of the study. Nevertheless, the Scully (1996) method provides some insight for determining the optimal level of taxation to maximize economic growth.

2.3.1.2 Quadratic Model

In empirical studies, the non-linear relationship between tax burden and economic growth is examined through econometric specifications taking into account an asymptotic distribution of the tax rate consistent with the Laffer (1981) and Scully (1996).

This method consists in estimating equations in quadratic forms and is based on the assumption of an inverted U-shaped curve, which would justify the positive effect of tax burden on economic growth before the threshold beyond which the effect becomes negative. Thus, we specify a following growth model as a quadratic polynomial of the tax rate, associating some control variables:

$$g_{i,t} = \lambda_i + \theta_t + \delta y_{i,t-1} + \beta \tau_{i,t} + \psi \tau_{i,t}^2 + \varphi' Z_{i,t} + \varepsilon_{i,t} \quad (2.7)$$

where $g_{i,t}$ is the growth rate, $\tau_{i,t}$ is tax rate measured in terms of percent of GDP, $y_{i,t-1}$ is the one year lag of GDP per capita measuring the conditional convergence of the model and implies that countries with the highest GDP per capita face a low growth in comparison to those who have lower per capita GDP, and $Z_{i,t}$ is the set of control variables i.e. the vector of other relevant variables identified in empirical studies as factors affecting the economic growth rate of the Zone, i denotes the country, t denotes the temporal fixed effect common to all countries and allows controlling the trend effect of the economic growth rate and $\varepsilon_{i,t}$ is the idiosyncratic random error and is identically and independently distributed (*iid*) over i and t . Thus, we use as a

control variable the growth rate of deficit⁵ that represents a tax variable with direct effects on investment decisions and growth, the growth rate in capital stock measured by the share of total investment in GDP, the degree of openness that represents the share of foreign trade in GDP i.e. the sum of exports and imports relative to GDP, the population growth rate and finally the growth rate of the terms of trade.

The optimal tax rate τ_{opt}^* from (2.7) that maximizes economic growth is obtained by differentiating $g_{i,t}$ with respect to (τ) and expressing the resultant equation in terms of τ_{opt}^* yields:

$$\tau_{opt}^* = -\frac{\beta}{2\psi} \quad (2.8)$$

2.3.2 Data and sources

In this paper, we used an unbalanced panel data for 8 WAEMU member States from the period 1980 to 2017. Details of the construction, definition and source of each variable is presented in Table 2.14 (see Appendix A). As these countries belong to a regional economic integration zone (ECOWAS) as well as a monetary union (WAEMU), there is a strong likelihood that these economies share common unobservable factors. In the panel data literature, a rising body of evidence concludes that panel data models are likely to exhibit substantial cross-sectional dependence in the errors, which may be due to the presence of common shocks and unobserved components that ultimately form part of the error term, spatial dependence, and pairwise idiosyncratic dependence in the disturbances without a particular pattern of common components or spatial dependence (see among Pesaran, 2004, 2015; Robertson & Symons, 2000, and Anselin, 2001). For empirical purposes, we assume the following simple

⁵The growth rate of deficit is calculated as revenue minus total expenditure, expressed as a % of GDP.

model for $i = 1, \dots, N$ and $t = 1, \dots, T$:

$$y_{it} = \beta_i x_{it} + u_{it} \quad \text{where,} \quad (2.9)$$

$$u_{it} = \alpha_{1i} + \lambda_i f_t + \varepsilon_{it} \quad (2.10)$$

$$x_{it} = \alpha_{2i} + \lambda_i f_t + \gamma_i c_t + e_{it} \quad (2.11)$$

where y_{it} and x_{it} are observable, β_i is the country-specific slope on the observable regressor, and u_{it} contains the unobservables and ε represents the error terms. In equation (2.10), the unobservables are constituted by group fixed effects α_{1i} , that capture time-invariant heterogeneity across groups, as well as an unobserved common factor f_t with heterogeneous factor loadings λ_i , which can capture time-variant heterogeneity and cross-section dependence. It is important to notice that the factors f_t and c_t are not limited to a linear evolution in time; they can be non-linear and non-stationary, with obvious implications for cointegration, and that the presence of c_t is to underline the fact that the observables x will also be determined by factors other than f_t . The error terms ε_{it} and e_{it} are assumed to be white noise.

In the recent literature on time series panel econometrics, methods that explicitly address correlation problems between panel members have been developed, including the Common Correlated Effects Mean Group (CCEMG) and Augmented Mean Group (AMG) estimators (see Pesaran, 2006; Eberhardt & Bond, 2009 for details). The CCEMG estimator of Pesaran (2006) allows for the empirical set-up as set out in equations 2.9, 2.10 and 6.11. These empirical settings imply cross-sectional dependence, time-varying unobservable variables with heterogeneous impact across panel groups, and problems of identification (β_i is unidentified if the regressor contains f_t). The CCEMG estimator deals with this problem through a simple but powerful augmentation of the group-specific regression equation by including the cross-sectional

averages of the dependent and independent variables, \bar{y}_i and \bar{x}_i , as additional regressors. The combination of \bar{x}_i and \bar{y}_i can account for the unobserved common factor f_i . In addition, the estimator is robust to nonstationary common factors according to [Kapetanios et al. \(2011\)](#). The second estimator called AMG is developed by [Eberhardt and Teal \(2010\)](#). The AMG procedure is implemented step by step (three in total), the details of which can be found in the authors’ original work. The common point with the CCEMG is that the AMG in its last step, the group-specific model parameters are averaged across the panel (weights may be applied). Furthermore, [Eberhardt and Bond \(2009\)](#) found that in Monte Carlo simulations, AMG and CCEMG achieve similar results in terms of bias or root mean square error (RMSE) in panels with nonstationary variables, whether cointegrated or not, and multifactor error terms such as the cross-section dependence.

2.3.2.1 Cross-sectional Dependence

At this stage, we considered it useful to perform the cross-sectional dependence tests on our data to guarantee that the cross-sections in the panel data analysis are independent in order to obtain consistent estimates of the coefficients, as proposed in [Pesaran \(2004\)](#). Hence, we apply cross-sectional dependence tests that are applicable to a variety of panel data models, including stationary and unit root dynamic heterogeneous panels with short T and large N. In the case in question, our analysis spans a period of 38 years and 8 countries. Given that we alternatively use two regression models, the Scully model and a quadratic model, we also present the diagnostic test tables separately. We first present the findings of the CD test performed on the [Scully](#) model in [Table 2.1](#). According to these results, the null hypothesis of cross-section independence is rejected at the 1% significance level for both variables. The probability-values are close to zero and indicate that data are correlated across

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panel groups.

Table 2.1: Cross-section Dependence test of Pesaran (2004) of Scully model

Variables	CD-test	Prob.
Dependent variable	9.101	0.000 ^a
Independent variable	11.054	0.000 ^a

^a Denotes statistical significance at 1% level

Secondly, the results of the CD test of the quadratic model are summarized in Table 2.2. However, these results are somewhat mixed. Except for variables such as population growth, investment and deficit growth (for which the p-values are greater than 10%), the null hypothesis of cross-sectional independence is rejected at the 1% significance level according to p-values that are very close to zero. This nevertheless implies the presence of a cross-sectional dependency in our data. Accordingly, in the goal to obtain unbiased estimates of our analysis, we applied the second generation unit root test because in presence of dependency between the panel groups, the first generation unit root tests are irrelevant and produce invalid results.

Table 2.2: Cross-section Dependence test of Pesaran (2004) of quadratic model

Variables	CD-test	Prob.
GDP per capita growth	6.436	0.000 ^a
Initial GDP per capita	3.325	0.001 ^a
Tax burden	11.344	0.000 ^a
Square of tax burden	11.263	0.000 ^a
Population growth	-1.606	0.108
Investment	1.455	0.146
Terms of trade growth	3.078	0.002 ^a
Deficit growth	0.384	0.701
Share of agriculture	4.728	0.000 ^a
Openness	7.013	0.000 ^a

^a Denotes statistical significance at 1% level

2.3.2.2 Panel Units root test

In order to account for cross-section dependence among the panel groups, we used the unit root test developed by Pesaran (2007) which is a second generation unit root test. Table 2.3 displays the results of Pesaran (2007) panel unit root test for variables in level and in first differences. According to the results, the two variables turn out to be stationary or non-stationary depending on the number of lags considered and with or without trend included in the unit root test in level. In addition, it can be observed that the two variables seem to be stationary in first difference whatever the number of lags, and the deterministic chosen (constant or constant and trend). The implication of these unit root outcomes is that the variables are mixed stationary, i.e. $I(0)$ and $I(1)$.

Table 2.4 provides a summary of the results of the unit root test performed on the quadratic model. We can observe that the results are similar i.e. the variables are mixed stationary. Considering the tests performed on the variables in level, we can notice that, some variables are stationary $I(0)$ and others are non-stationary, depending on the number of lags selected, and on the deterministic chosen as constant only, or constant and trend. Then we performed the test on the variables taken in first difference this last time. We can affirm, as for lags 1 and 2, that all the variables are stationary in first differences $I(1)$ and even with the use of the trend or not, in addition to the constant as deterministic. It would not have escaped us that, on the basis of the results of the unit root tests, whether carried out on the Scully model or the quadratic model, we should use estimation techniques that can accommodate both the nonstationarity of the variables and cross-sectional dependence between the data. In response to the diagnostic tests carried out, however, we focus on two candidate estimators, including AMG and CCEMG, which are likely to give similar performance in terms of bias or Root Mean Square Error (RMSE) in panels with nonstationary variables and multifactor error terms such as cross-

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sectional dependence.

Table 2.3: Panel Unit Root test by Pesaran (2007) of the Scully model

	Lags	$Z_t - \bar{bar}^a$	Prob.	$Z_t - \bar{bar}^b$	Prob.
Variables in levels					
Dependent variable	0	-7.989	0.000	-9.327	0.000
	1	-4.279	0.000	-5.455	0.000
	2	-1.034	0.150	-1.813	0.035
Independent variable	0	-2.782	0.003	-3.588	0.000
	1	-0.862	0.194	-2.151	0.016
	2	0.131	0.552	0.449	0.673
Variables in first differences					
Dependent variable	0	-13.224	0.000	-13.031	0.000
	1	-12.268	0.000	-11.440	0.000
	2	-8.073	0.000	-6.906	0.000
Independent variable	0	-11.983	0.000	-11.260	0.000
	1	-10.410	0.000	-9.387	0.000
	2	-6.955	0.000	-5.754	0.000

^a constant included; ^b constant and trend included

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Table 2.4: Panel Unit Root test by Pesaran (2007) of the quadratic model

	Lags	$Zt - bar^a$	Prob.	$Zt - bar^b$	Prob.	$Zt - bar^a$	Prob.	$Zt - bar^b$	Prob.	
	Variables in levels					Variables in first differences				
GDP per capita growth	0	-13.024	0.000	-12.673	0.000	-13.270	0.000	-13.114	0.000	
	1	-8.325	0.000	-6.925	0.000	-13.106	0.000	-12.775	0.000	
	2	-4.357	0.000	-3.290	0.000	-8.929	0.000	-7.419	0.000	
Initial GDP per capita	0	-0.173	0.431	-1.867	0.037	-12.729	0.000	-11.965	0.000	
	1	1.554	0.940	-0.361	0.359	-8.302	0.000	-6.920	0.000	
	2	2.664	0.996	1.090	0.862	-3.230	0.001	-1.755	0.040	
Tax burden	0	-3.049	0.001	-4.178	0.000	-12.364	0.000	-11.672	0.000	
	1	-1.489	0.068	-3.384	0.000	-11.300	0.000	-10.010	0.000	
	2	-0.427	0.335	-0.556	0.289	-7.350	0.000	-5.842	0.000	
Square of tax burden	0	-3.140	0.001	-4.041	0.000	-12.124	0.000	-11.400	0.000	
	1	-2.404	0.008	-3.656	0.000	-11.792	0.000	-10.846	0.000	
	2	-0.810	0.209	-0.701	0.242	-7.381	0.000	-5.802	0.000	
Population growth	0	-1.471	0.071	4.046	1.000	-0.356	0.361	0.851	0.803	
	1	-7.098	0.000	-7.145	0.000	-7.790	0.000	-8.561	0.000	
	2	-2.788	0.003	1.785	0.963	-1.695	0.045	-2.619	0.004	
Investment	0	-3.415	0.000	-3.888	0.000	-12.862	0.000	-12.507	0.000	
	1	-1.863	0.031	-2.509	0.006	-8.911	0.000	-7.387	0.000	
	2	-1.582	0.057	-2.111	0.017	-6.380	0.000	-4.768	0.000	
Terms of trade growth	0	-11.349	0.000	-10.731	0.000	-13.270	0.000	-13.114	0.000	
	1	-8.175	0.000	-6.780	0.000	-11.979	0.000	-11.257	0.000	
	2	-5.313	0.000	-3.815	0.000	-9.463	0.000	-8.276	0.000	
Deficit growth	0	-6.380	0.000	-5.407	0.000	-13.021	0.000	-12.611	0.000	
	1	-3.330	0.000	-1.864	0.031	-10.091	0.000	-9.177	0.000	
	2	-2.196	0.014	-0.751	0.226	-5.882	0.000	-4.650	0.000	
Share of agriculture	0	-2.760	0.003	-3.236	0.001	-12.478	0.000	-12.036	0.000	
	1	-1.668	0.048	-2.289	0.011	-10.565	0.000	-9.772	0.000	
	2	-0.088	0.465	-0.805	0.210	-6.956	0.000	-5.735	0.000	
Openness	0	-2.529	0.006	-1.588	0.056	-12.807	0.000	-12.378	0.000	
	1	-1.875	0.030	-0.417	0.338	-7.904	0.000	-6.761	0.000	
	2	-1.942	0.026	-0.549	0.292	-6.333	0.000	-4.767	0.000	

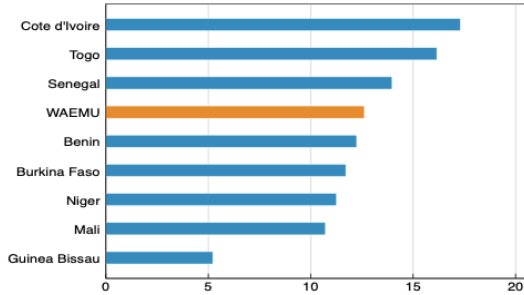
^a constant included; ^b constant and trend included

2.3.2.3 Descriptive analysis

Figure 2.4 below illustrates the average size of tax revenues as a percentage of GDP over the period 1980-2017. This graph shows that only two countries have average tax burden above 15% of GDP. The average tax revenue for the entire sample over the period is 12.6% of GDP, which remains low compared to the average in Africa at 19.1% of GDP and that of other regions in the world as in Latin America standing at 22.3% of GDP where tax structures are comparable to those in Africa. Only Cote d'Ivoire has average tax revenues above 17% of GDP.

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Figure 2.4: Status of average tax burden in WAEMU countries (1980-2017)



By observing the linear relationship between tax level and growth, we find a quasi-positive correlation. Figure 2.5 below shows the trends in average tax burden and per capita GDP growth rate. The average tax rate is represented by the upper line, and the lower line represents the average growth of GDP per capita. We find that the relationship between the two variables is subject to positive externalities. The underlying explanation of this positive relationship is that the size of taxation in the WAEMU countries remains low, and therefore cannot create distortions as in the case of countries with strong taxation.

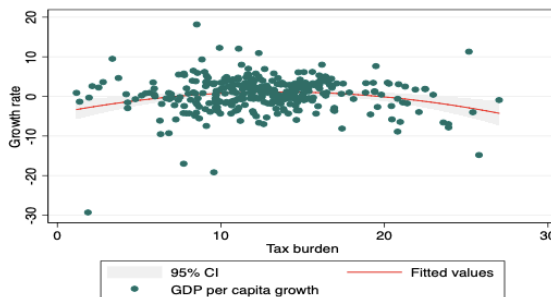
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Figure 2.5: Linear relationship between tax burden and Growth in WAEMU



Figure 2.6 below, illustrates the non-linear effects of taxation on growth. On this graph, the tax burden is in x-axis and per capita GDP growth is in y-axis. The curve shows up to a certain threshold, probably between 15-20 percent of GDP, taxation has a positive impact on growth and beyond this threshold, the impact becomes negative. But this is a graphical view and does not guarantee any causal relationship. The econometric estimates will give us a better indication of the optimal threshold level of taxation.

Figure 2.6: Quadratic line fit between tax rate and growth in WAEMU Member States



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Table 3.3 below shows both evolution of the annual average rate of tax burden and economic growth rate over the period 1997 – 2016, subdivided in five-year⁶ period, for the countries of the Economic Community Of West African States, ECOWAS. This table shows that countries in the WAEMU Zone have a higher tax burden than other ECOWAS countries. However, the difference in average GDP growth per capita remains ambiguous. The table also provides information on the country heterogeneity effect of the relationship between taxation and economic growth in west African countries.

⁶Two arguments justify the use of the five-year average. The economic argument considers that the five years are reasonable enough to capture the influence of taxation on economic growth. But less than five years, tax-financed public investments in the form of large public infrastructure projects will not be implemented. In contrast, a period longer than five years may call into question the reliability of the statistical relationship between revenue shocks and expenditure and the public decision-making process. The statistical argument considers that measuring variables as five-year averages limits noise in high-frequency data from measurement errors. [Dollar and Kraay \(2002\)](#) advise using the five-year averages to avoid the unnecessary introduction of noise in the synchronization of distribution data and other variables considered.

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Table 2.5: Taxation - Growth relationship in ECOWAS Countries, 1997–2016

Five-year average (%) of	GDP per capita growth				Tax burden			
	1997-01	2002-06	2007-12	2012-16	1997-01	2002-06	2007-12	2012-16
WAEMU countries								
Benin	2.15	0.58	0.77	2.01	12.8	14.3	15.4	14.3
Burkina Faso	2.95	3.24	2.44	2.21	11.2	11.7	12.6	15.4
Cote d'Ivoire	-0.90	-1.56	-1.18	6.33	15.0	14.1	15.6	16.2
Guinea Bissau	-4.32	-0.40	1.98	0.36	4.9	5.1	6.8	8.5
Mali	3.82	1.73	1.01	1.05	11.0	13.2	12.6	13.3
Niger	-0.03	0.02	0.67	2.76	8.5	10.7	13.8	15.1
Senegal	2.12	1.56	0.36	2.37	15.5	17.7	18.6	19.4
Togo	-0.61	-0.40	2.09	3.17	12.2	14.4	15.7	18.9
ECOWAS countries outside WAEMU								
Cape Verde	7.94	5.20	4.04	0.43	15.2	18.8	20.0	18.5
Gambia	10.87	-1.05	0.38	0.00	10.9	11.9	14.4	15.8
Ghana	9.66	2.82	5.34	2.62	9.7	12.5	13.2	14.7
Guinea	7.68	0.62	1.78	3.14	7.7	8.4	10.1	13.7
Liberia	-0.75	-4.48	3.32	0.60	11.9	12.2	17.0	19.1
Nigeria	0.86	6.13	4.14	0.93	7.7	8.2	7.2	N/A
Sierra Leone	-3.13	5.65	3.10	2.85	6.6	8.6	8.7	10.0

For example, if we look at the WAEMU countries, we note that tax revenues as a percent of GDP followed an upward trend over the period. At the same time, growth rates of GDP per capita similarly showed an increasing trend. Thus, the increase in taxation levels is accompanied by an improvement in economic performance. This remark raises the problem of the effects of a structurally weak level of taxation on economic growth within WAEMU. However, it should also be noted that in some countries, such as Burkina Faso and Guinea Bissau, greater mobilization of tax revenue as a percentage of GDP has resulted in lower economic growth, especially over the last 10 years. Outside the WAEMU Zone, the increase in tax revenues as a percent of GDP has been followed by a decline in living standards in countries such as Ghana, Gambia, Guinea and Cape Verde. Observations from some countries remain inconsistent. For example, Nigerians saw their standard of living deteriorate despite the lowering of the tax rate on end-period values in particular. The relationship between tax and growth in other countries such as Liberia and Sierra Leone remains ambiguous.

It should therefore be noted that within the ECOWAS region, countries have an annual tax level of less than 20 percent of GDP (minimum tax revenue as a percent of GDP set by the ECOWAS convergence criteria) and low average rates of economic growth. In all countries tax revenue levels as a percent of GDP remain below the required tax threshold. These countries, however, have an untapped budget space that can enable them to generate more tax revenue that can maximize economic growth rates. This observation partially answers our problem concerning the existence or not of a tax potential within WAEMU member States.

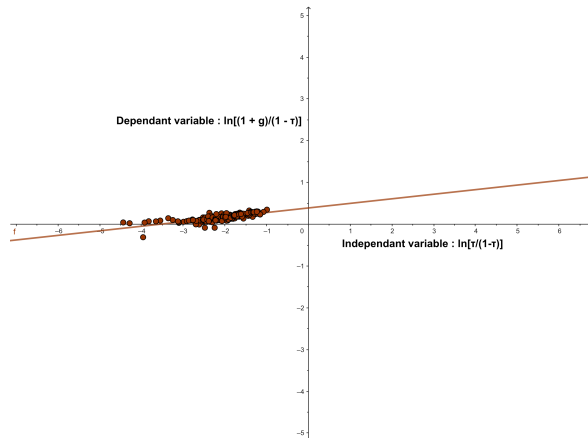
In the case of the WAEMU countries, this conclusion is consistent with Figure 2.6 which illustrates the non-linearity between the level of taxation and economic growth. On the other hand, this graphical representation does not take into account the other factors besides the tax burden, which determine economic growth. This may eventually call into question the margin of the optimal tax rate identified. As a result, it seems imperative to carry out an empirical investigation in order to more accurately detect the tax-growth relationship within WAEMU.

2.4 Empirical results

The results of the Scully (equation (2.6)) are presented in Tables 2.6 and 2.7. Scully’s model is defined such that the dependent variable includes logarithm of $(1 + g)$ divided by $(1 - \tau)$, and the independent variable includes logarithm of tax revenue as a percent of GDP (τ) divided by $(1 - \tau)$. The coefficient (α) associated with the independent variable $\ln[\tau/(1 - \tau)]$ is an elasticity and corresponds to the optimal tax burden. Figure 2.7 below shows the regression line and the empirical observations. We represent on the x-axis the independent variable and the dependent variable is represented in the y-axis. As observed,

the slope is clearly positive, although it appears to be slight.

Figure 2.7: Parameter estimation and regression line of Scully model



Source: Author's calculation

The findings of the [Scully](#) model are contained in Table 2.6. But the corresponding optimal tax rates are inferred from the obtained elasticities and are shown in Table 2.7. We have implemented the CCEMG and AMG estimators reporting unweighted coefficient averages. The coefficient of the independent variable given by the CCEMG estimator in column [1] is found to be 0.151. Therefore, the optimal tax burden that would maximize economic growth in the WAEMU is 15.1% of GDP. However, once each country regression is augmented with a linear country trend (see column [2]), the CCEMG estimator yields a coefficient equal to 0.180 suggesting an optimal tax burden of 18% of GDP. As regards the AMG estimator in columns [3] and [4], the results are even more interesting. When “common dynamic process” is introduced into the regression as an additional covariate, as is the case in column [3], the result

suggests a coefficient of 0.193, and thus an optimal tax threshold of 19,3% of GDP. In contrast, the result improves a little bit, when the AMG estimator was implemented while imposing the "common dynamic process" with unit coefficient by subtracting it from the dependent variable. This corresponds to the results in column [4] which concludes on an optimal tax burden of 20.2% of GDP in the WAEMU zone.

In addition, it seems necessary to question the uniqueness of this obtained optimal tax rate, taking into consideration the heterogeneity of the WAEMU economies. In fact, the optimal tax rate may vary from one country to another depending on the characteristics of each country. The WAEMU countries present some differences in terms of geographical location, some being coastal countries while others are Sahelian, as well as different levels of political stability and industrialization. These parameters may cause the optimal tax rate to differ from one country to another. Accordingly, from the different regression techniques used to obtain the results in Table 2.6, we have deduced the individual elasticities, i.e. the coefficient of the independent variable of the Scully model for each of the countries in our sample. The results are summarized in Table 2.7. As we can observe, the elasticities are all statistically significant at 1%, no matter the country or the estimation technique used, except of course for those of Senegal when the CCEMG estimator has been applied augmented by a linear trend term in column [2] or not as in column [1]. The findings show that the optimal tax rates vary from country to country, which clearly shows heterogeneity in the optimal tax rate level due to the divergent characteristics of the economies in the Zone. The implication of this variation in optimal tax rates is that the available fiscal space that we would like to predict for countries would be just as heterogeneous as the estimated thresholds. Given this fact, to facilitate the fiscal space forecasting exercise, we will voluntarily retain for each country a single threshold, probably the

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highest one, since the different estimators applied with the various trend controls and common dynamic process have suggested varying threshold levels for each country. But it is only after estimating the quadratic model, which is likely to allow us to account for a number of shortcomings mentioned in the related literature about the Scully model, that we can actually predict the occurrence of a fiscal space in the WAEMU countries.

Table 2.6: Empirical results of Scully Model

	[1] CCEMG dep. var	[2] CCEMG dep. var	[3] AMG dep. var	[4] AMG dep. var - CDP [•]
Independent variable	0.151*** (0.000)	0.180*** (0.000)	0.193*** (0.000)	0.202*** (0.000)
Country trend		0.000 (0.679)	0.001 (0.323)	0.001 (0.390)
Common dynamic process			0.985*** (0.000)	
Constant	-0.064 (0.647)	-0.021 (0.876)	0.547*** (0.000)	0.563*** (0.000)
Number of obs.	287	287	287	287
Number of countries	8	8	8	8
# of sign. trends	n/a	1	4	4
RMSE	0.034	0.034	0.034	0.035

Note: P-values reported in parentheses.*** denote significance levels at 1%. The dependent variable in columns [1], [2] and [3] corresponds to the transformed expression for the growth rate, and the independent variable corresponds to the transformed expression for the tax rate. In column [4] the dependent variable is the transformed form of the growth rate minus CDP[•] denoting the “Common Dynamic Process” that can only be used when implementing the AMG estimator.

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Table 2.7: Country-specific coefficients of Scully Model

	[1] CCEMG dep. var	[2] CCEMG dep. var	[3] AMG dep. var	[4] AMG dep. var - CDP*
Estimated elasticity	0.151*** (0.000)	0.180*** (0.000)	0.193*** (0.000)	0.202*** (0.000)
Optimal single tax rate	15.1%	18.0%	19.3%	20.2%
Country-level optimal tax rate				
Benin	0.123*** (0.000)	0.122*** (0.000)	0.157*** (0.000)	0.122*** (0.000)
Burkina Faso	0.118*** (0.000)	0.116*** (0.001)	0.178*** (0.000)	0.164*** (0.000)
Cote d’Ivoire	0.184*** (0.000)	0.316*** (0.000)	0.339*** (0.000)	0.333*** (0.000)
Guinea-Bissau	0.205*** (0.001)	0.202*** (0.002)	0.161*** (0.000)	0.174*** (0.000)
Mali	0.128*** (0.000)	0.215*** (0.000)	0.201*** (0.000)	0.201*** (0.001)
Niger	0.187*** (0.000)	0.160*** (0.004)	0.151*** (0.000)	0.164*** (0.000)
Senegal	0.110** (0.033)	0.122** (0.029)	0.230*** (0.000)	0.181*** (0.000)
Togo	0.158*** (0.000)	0.181*** (0.000)	0.202*** (0.000)	0.206*** (0.000)
Number of obs.	287	287	287	287
Number of countries	8	8	8	8

In view of the numerous criticisms of the [Scully \(1996\)](#) model, we use an alternative method which consists in estimating a quadratic relation integrating the square of the tax burden. This model includes a number of control variables. Next, we carry out two robustness tests, the first for political stability by introducing the variables regulation of political participation and the durability of political regime, and the second for quality of institutions by introducing a synthetic index of institutional quality⁷.

The two estimators AMG and CCEMG were also applied to the quadratic

⁷Variables such as the regulation of political participation, the durability of political regime and the synthetic index of institutional quality are clearly defined in the [Table 2.14](#) in Appendix.

model. The reasons for applying these estimators are obviously the same as for the Scully model. Therefore, as we also found evidence of cross-sectional dependence between countries, and the series are integrated of order 1 in the quadratic model, the CCEMG and AMG estimators should provide more reliable inferences once the common factors are controlled for. Thus, after applying these two estimators to the quadratic model, the CCEMG estimator appeared to be of relatively little usefulness. For this reason, the results of the CCEMG estimator are presented in Table 2.11 in appendix for those who may be interested. It should be recalled that in the quadratic model, the derivation of the optimal tax rate depends not only on the opposite signs of the variables tax burden and the square of tax burden, but also on the statistical significance of the coefficients associated with these two variables. Unfortunately, in the respective estimated equations, despite the fact that the opposite signs were obtained, the two variables were not found to be simultaneously significant, either in the baseline model (columns [1] and [2]) or with the control variables (columns [3] and [4]), nor by controlling the equations by the country trend, or by political stability. Nevertheless, once we control the equations by the quality of the institutions, the two variables of interest - tax burden and the square of tax burden - are found to have opposite signs and to be statistically significant, which allows us to predict an optimal tax rate of 13.35% of GDP. Up to this point the tax burden has a positive effect on growth, and growth starts with decreasing beyond this point.

The findings of using the AMG estimator on the quadratic model, in contrast, appear to be more interesting and are presented in Table 2.8. As we can clearly observe, the coefficients associated with the tax burden and tax burden squared variables are both of opposite signs and all statistically significant in each column of the Table 2.8. These conditions are necessary and sufficient for the prediction of the optimal tax rate according to the equation (6.8). The

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benchmark model is presented in the first two columns. There are no control variables introduced but the equation has been augmented by the linear trend term (column [1]) and imposes the ”common dynamic process” with a unit coefficient (column [2]). The results suggest an optimal tax rate of 20.6% and 20.2% of GDP respectively.

Table 2.8: Quadratic model estimation by the AMG estimator

VARIABLES	[1]	[2]	[3]	[4]	Sensitivity with regard to		
	Benchmark model		Control variables		Political Stability		Quality of institutions
Tax burden	2.557*** (0.000)	2.469*** (0.000)	3.279*** (0.008)	3.300*** (0.003)	3.587*** (0.003)	1.867*** (0.005)	4.568*** (0.002)
Tax burden square	-0.062*** (0.007)	-0.061*** (0.002)	-0.143* (0.058)	-0.136** (0.037)	-0.154** (0.047)	-0.061*** (0.009)	-0.199** (0.047)
Deficit			-0.313 (0.313)	-0.236 (0.474)	-0.238 (0.464)	-0.054 (0.835)	-0.265 (0.477)
Investment			0.264** (0.025)	0.292** (0.018)	0.276*** (0.004)	0.205* (0.079)	0.345*** (0.004)
Openness			-0.047 (0.402)	-0.058 (0.379)	-0.028 (0.683)	-0.025 (0.722)	-0.085 (0.249)
Share of Agriculture			-0.210* (0.098)	-0.096 (0.595)	-0.105 (0.528)	0.013 (0.944)	-0.098 (0.641)
Population growth			8.997* (0.069)	8.216 (0.106)	9.880** (0.045)	7.473 (0.148)	11.458 (0.190)
Terms of trade growth rate			0.014 (0.230)	0.006 (0.466)	0.010 (0.516)	-0.004 (0.621)	0.005 (0.726)
Initial per capita GDP			-0.083*** (0.000)	-0.077*** (0.000)	-0.075*** (0.000)	-0.083*** (0.000)	-0.077*** (0.004)
Country trend	0.003 (0.986)	0.011 (0.937)	-0.121 (0.671)	-0.096 (0.742)	-0.178 (0.595)	-0.259 (0.374)	0.044 (0.880)
Common dynamic process		0.952*** (0.000)		0.773*** (0.000)	0.779*** (0.000)	0.717*** (0.000)	0.704*** (0.000)
Durability of political regime					-0.122 (0.122)		
Regulation of political participation						-1.017 (0.437)	
Quality of institutions							0.102 (0.906)
Constant	-20.341*** (0.002)	-19.327*** (0.002)	24.810 (0.178)	16.135 (0.381)	8.925 (0.623)	21.272 (0.306)	-9.345 (0.677)
Observations	294	294	287	287	287	269	230
Number of id	8	8	8	8	8	8	7
# of sign. trends	5	5	5	4	4	2	1
RMSE	3.450	3.357	2.406	2.312	2.254	2.027	2.053
Optimal tax rate	20.6	20.2	11.5	12.1	11.6	15.3	11.5

But since the idea is to take into account the omitted variables in the Scully model, we estimate the quadratic model by adding the control variables. The results are presented in the columns [3] and [4], and show that the model seems

to be more sensitive. In the light of the estimated equation (column 3), it is revealed that the economic growth is determined by the variables such as the growth rate of investment, population growth and the share of value added in agriculture. The growth rate of investment and population growth have a positive impact while the share of agriculture in GDP exert a negative impact. Indeed, after introducing the control variables we obtain a tax threshold of 11.5% which increases to 12.1% when we impose the common dynamic process with a unit coefficient in column [4].

The sensitivity tests of the results are presented in the right part of the Table 2.8. First, we test the sensitivity of the threshold to political stability (columns 5 and 6). [Aizenman and Jinjarak \(2005\)](#) have shown that political stability improves the collection of VAT. This suggests that the conditions of political stability are favorable to the tax revenues mobilization, and thus would have an impact on the estimated optimal tax rate. Indeed, we use two variables of political stability [Aizenman and Jinjarak \(2005\)](#) including the durability of the political regime and the regulation of political participation, which we introduce one after the other. Considering the result of column [5] the durability of the political regime has not a significant impact. However, the model remains valid because the two variables of interest remain statistically significant and of opposite signs. The tax burden has a positive impact with the coefficient 3.587, while the square of tax burden has a negative impact with the coefficient -0.154 and are respectively significant at 1% and 5% level. The tax threshold associated with this model is 11.6% of GDP. On the other hand, the result of column [6] including the regulation of political participation as an indicator of political stability shows that the optimal tax burden is 15.3% of GDP meanwhile the estimated coefficient of the variable political regime participation is not statistically significant. The tax burden has a positive effect with the coefficient 1.867 while the square of tax burden has a negative effect

with the coefficient -0.061 and they are both significant the level of 1%.

Finally, we test the sensitivity of the model with respect to quality of institutions⁸, according to [Ajaz and Ahmad \(2010\)](#) who found that developing countries face a number of institutional problems in revenue mobilization. The robustness check shows that institutional quality has no significant statistical impact on growth. Indeed, considering the validity of the model through the expected opposite signs of the tax variables (the coefficients of tax burden is 4.568; the square of tax burden coefficient is -0.199) the optimal tax rate estimated for this model is 11.5% of GDP. We clearly find that the optimal tax rate threshold estimated by the quadratic model is sensitive to the control variables, political stability, as well as quality of institutions.

To obtain the optimal tax rates for each specific country, using the quadratic model, we estimate the coefficients of the specific country from the different equations estimated from the AMG estimator (Table 2.8, columns 1, 2, 3 etc.). The findings are annexed in Table 2.9 containing only the coefficients associated with the variables of interest i.e. tax burden and the square of tax burden. According to the results, we are not in a condition to calculate the threshold for some countries such as Benin, Burkina Faso, Mali and Togo, since the conditions of joint significance and opposite signs of the coefficients β and ψ associated respectively with the variables tax burden and the square of tax burden, are not satisfied. Nevertheless, as we can see for the country-level thresholds, for those countries for which it was possible, the optimal tax rates are different from one country to another according to various equations estimated, from the baseline models through models including control variables and sensitivity tests.

In summary, we may retain on the basis of the results provided by the two

⁸Quality of institutions is the arithmetic mean of ICRG indices of Bureaucracy quality, Law and order, and Control of corruption. These data are not available for Benin, and therefore estimates were made for the other 7 countries of the Union.

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alternative models used (Scully and quadratic models), that the optimal tax rate that would maximize economic growth is between 11.5% and 20.6% of GDP in the WAEMU member States. But according to the specific characteristics of the countries in the region, the optimal tax threshold is far from being unique. Therefore, the estimates have provided country-specific optimal tax thresholds, which also differ according to the model used. For this purpose, we have had the idea to summarize the lower and upper bounds of the estimated thresholds for each country in Table 2.12 that you can find in the appendix. But to calculate the country-specific available fiscal space, we will use the estimated threshold in the upper bound for each country and compare it to the average of the tax revenue to GDP ratio in that country, over the study period of 1980 – 2017. This is shown in the following Table 2.10. The line (A) contains the estimated optimal tax rates, while line (B) contains the average tax revenue to GDP ratio over the study period, for the WAEMU Zone as well as for each country. Thus, the available fiscal space is calculated as the difference (A-B). Based on these results, our study predicts the existence of a fiscal space in the WAEMU Zone that can represent on average up to 8% of GDP in terms of additional tax revenues. Nevertheless, it should be noted that the extent of this fiscal space is not the same for all countries. For example, in Benin, it represents 3.4% of GDP, which means that Benin can mobilize additional tax revenues of up to 3.4% of GDP without constraining the growth of production in the country, while Cote d’Ivoire can raise up to 16.6% of GDP in tax revenues without having a diminishing effect on its economic growth.

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Table 2.9: Country-specific coefficients of Quadratic Model using AMG estimator

COUNTRIES		[1]	[2]	[3]	[4]	Sensitivity with regard to		
		Benchmark model		Control variables		Political Stability	Quality of institutions	
Benin	β	-0.889 (0.686)	-0.089 (0.964)	0.577 (0.707)	0.211 (0.894)	0.010 (0.995)	1.194 (0.559)	
	ψ	0.057 (0.550)	0.008 (0.927)	0.017 (0.800)	0.016 (0.806)	0.021 (0.763)	-0.017 (0.832)	
Burkina Faso	β	2.488* (0.055)	2.302 (0.089)	-0.472 (0.774)	-0.462 (0.785)	-0.291 (0.867)	-0.672 (0.688)	-2.191 (0.210)
	ψ	-0.082 (0.122)	-0.077 (0.158)	0.047 (0.548)	0.046 (0.567)	0.039 (0.640)	0.046 (0.552)	0.108 (0.148)
Cote d'Ivoire	β	3.934*** (0.002)	4.115*** (0.002)	0.820 (0.406)	1.711* (0.092)	1.603 (0.127)	1.562 (0.179)	5.547*** (0.000)
	ψ	-0.082** (0.010)	-0.088*** (0.009)	-0.016 (0.556)	-0.041 (0.144)	-0.037 (0.199)	-0.039 (0.207)	-0.151*** (0.000)
Guinea-Bissau	β	5.213** (0.013)	5.239** (0.013)	8.880*** (0.001)	8.782*** (0.001)	10.005*** (0.000)	2.865* (0.097)	10.908*** (0.001)
	ψ	-0.119 (0.458)	-0.121 (0.456)	-0.594*** (0.008)	-0.516** (0.023)	-0.631*** (0.005)	-0.145 (0.252)	-0.729*** (0.009)
Mali	β	1.875 (0.458)	0.808 (0.774)	3.826 (0.328)	4.898 (0.235)	5.219 (0.229)	-0.416 (0.942)	6.432 (0.152)
	ψ	-0.038 (0.750)	0.009 (0.943)	-0.196 (0.237)	-0.268 (0.150)	-0.272 (0.156)	-0.042 (0.861)	-0.320 (0.111)
Niger	β	1.571* (0.094)	2.016** (0.045)	2.748* (0.093)	3.461* (0.052)	3.412* (0.085)	2.681 (0.213)	3.969** (0.029)
	ψ	-0.048 (0.142)	-0.060* (0.078)	-0.073 (0.118)	-0.092* (0.068)	-0.091 (0.108)	-0.070 (0.250)	-0.101* (0.056)
Senegal	β	4.955** (0.013)	4.049** (0.025)	8.107*** (0.008)	5.971** (0.015)	5.967* (0.052)	4.951** (0.040)	4.316* (0.069)
	ψ	-0.154** (0.025)	-0.135** (0.030)	-0.284** (0.013)	-0.189** (0.042)	-0.189* (0.096)	-0.157* (0.080)	-0.127 (0.158)
Togo	β	1.309 (0.375)	1.312 (0.380)	1.743 (0.284)	1.825 (0.276)	2.773 (0.126)	2.771 (0.103)	2.998 (0.115)
	ψ	-0.027 (0.548)	-0.026 (0.561)	-0.044 (0.404)	-0.048 (0.384)	-0.068 (0.229)	-0.063 (0.258)	-0.073 (0.261)
Country-level optimal tax rate								
Benin	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Burkina Faso	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Cote d'Ivoire	24.0	23.4	n/a	n/a	n/a	n/a	n/a	18.4
Guinea-Bissau	n/a	n/a	7.5	8.5	7.9	n/a	n/a	7.5
Mali	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Niger	n/a	16.8	n/a	18.5	n/a	n/a	n/a	19.6
Senegal	16.1	15.0	14.3	15.8	15.8	15.8	n/a	n/a
Togo	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Observations	294	294	287	287	287	269	230	
Number of id	8	8	8	8	8	8	7	

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Table 2.10: Estimates fiscal space in terms of tax revenue to GDP

	WAEMU	Benin	Burkina Faso	Cote d’Ivoire	Guinea-Bissau	Mali	Niger	Senegal	Togo
Estimated optimal tax rate (A)	20.6	15.7	17.8	33.9	20.5	21.5	19.6	23.0	20.6
Average tax revenue to GDP (B)	12.6	12.3	11.7	17.3	5.3	10.7	11.3	14.0	16.2
Fiscal space (A-B)	8.0	3.4	6.1	16.6	15.2	10.8	8.3	9.0	4.4

2.5 Conclusion and policy implications

This paper shows the existence of a fiscal space within the WAEMU Zone through an optimal taxation approach. In fact we examine the optimality of tax yield within the WAEMU Zone for 1980 – 2017, using the Scully and quadratic models. The results confirm the evidence of an inverted U-shaped tax-growth relationship. The optimal tax rate to maximize growth for 8 WAEMU countries is around 20.6% of GDP.

The analysis reveals a structurally low level of taxation throughout the study period. The average tax revenue for all 8 countries over the period 1980 – 2017 is 12.6% of GDP and then the level of tax revenue likely to maximize the rate of economic growth is about 8 percentage points higher than the current level. Subsequently, we predicted the optimal tax rates for each member country of the WAEMU, believing that, given the different characteristics of these economies, the optimal tax rate would be far from being unique for all countries. As a result, the fiscal space available is heterogeneous between countries and varies from 3.4% in Benin to 16.6% in Cote d’Ivoire in terms of additional tax revenue as a proportion of GDP.

These results illustrate the inability of WAEMU countries to mobilize tax revenues up to the required tax threshold. This low level of taxation causes countries to lose substantial revenue and thus reduce their fiscal space. These countries thus find themselves in a situation characterized by a limited mar-

gin of public finances with relatively high debt ratios leading to brake the economic growth. Thus, within WAEMU there would be a substantial fiscal space that would allow governments to allocate additional resources to pursue priority objectives without compromising economic stability. The challenge for countries, is then to find ways to improve the tax collection system by enhancing the efficiency of tax revenue collection, and reducing as far as possible revenue losses related to tax policy and compliance. As the objective of our study was to estimate the growth-maximising tax rate, and thus predict the fiscal space, we believe that the use of this fiscal space should involve measures to increase tax revenues without compromising the rate of productivity growth. For example, it would be more reasonable to start by optimizing tax collection, trying to recover as much as possible tax revenue that is still being lost due to the existence of a number of structural problems in such economies and the functioning of tax administrations that sometimes seem to be deficient.

However, in order to exploit this existing fiscal space, states have to face many structural difficulties in mobilizing tax revenues. These obstacles stem from the predominance of tax incivility resulting in fraud and tax evasion, the existence of an agricultural sector based on subsistence agriculture and an important informal sector, corruption and lack of serious controls of taxpayers' declarations by the tax and customs authorities. These statements are related to studies on the factors of low revenue mobilization. [Auriol and Warlters \(2005\)](#) argues that the existence of the informal sector that is difficult to tax is a major problem in developing countries. Nevertheless, we can notice that small businesses end up in the informal sector because of their incomes below the threshold required to be subject to tax. The most obvious frauds are committed by qualified professionals not by small businesses. Rather, it is a matter of fiscal incivility (see [Kanbur, 2009](#) and [Kanbur & Keen, 2014](#)). Other structural factors that hinder tax collection have also been highlighted

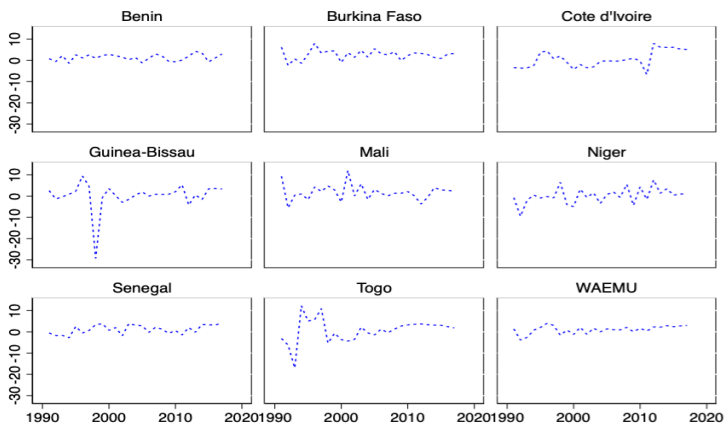
in the literature, including weak tax administrations, demoralization of taxpayers and poor governance. For example, [Attila, Chambas, and Combes \(2009b\)](#) found a significant relationship between low tax revenue mobilization and governance indicators, including corruption. But the analysis of the relationship between tax and governance indicators also raises the question of causal interactions. In addition, governance issues are not typical of tax collection administrations, but are much more general in developing countries. But as taxation being a great playing an importance rule in the execution of the government functions [Musgrave \(1959\)](#), it seems obvious that particular attention should be paid to governance issues in terms of tax revenue mobilization. Furthermore, the low tax revenue mobilization could also be due to the introduction of investment incentive schemes based on exemptions and derogation granted to different categories of economic operators. This is related to [Tareq and Gupta \(2008\)](#) who consider that incentives reduce the tax base and complicate tax administration, which constitutes a major source of revenue loss and leakage to the economy. But investment decisions depend on many other factors that often weigh more heavily than tax incentives. Rather, countries should improve the business climate by ensuring that tax measures remain as neutral as possible for investors.

The major economic implication of this study is that the WAEMU members States have a fiscal space to increase its level of taxation in order to produce positive externalities induced by the tax levy. This increase in tax revenues will make it possible to finance investment expenditures and thus stimulate the level of economic activity by making less use of indebtedness. In this respect, it is not a question of governments multiplying taxes or increasing existing ones. On the contrary, they should consider promoting fiscal citizenship, broadening the tax base and strengthening tax and customs administrations while having a more specific view on taxpayer reporting con-

trols. However, it is essential for governments to be more transparent and cooperative in managing public finances in order to improve the efficiency and traceability of public spending, and reduce sources of waste. This will strengthen taxpayer confidence on which fiscal citizenship is based.

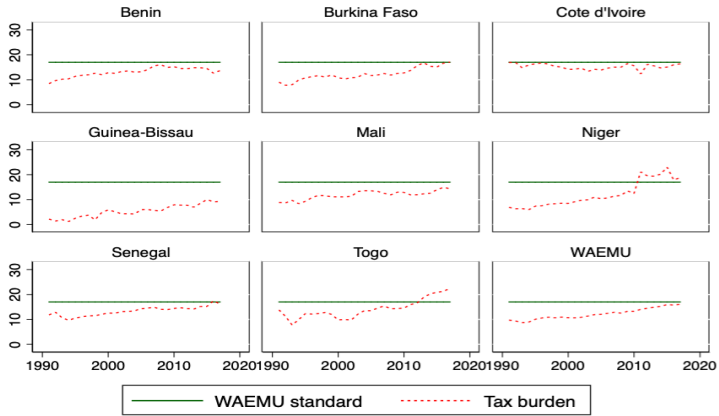
2.6 Appendix

Figure 2.8: GDP per capita growth rate in WAEMU member States



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Figure 2.9: Trends of tax rates in WAEMU member States



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Table 2.11: Quadratic model estimation by the CCEMG estimator

VARIABLES	[1]	[2]	[3]	[4]	Sensitivity with regard to:		
	Benchmark model		Control variables		Political Stability		Quality of institutions
Tax burden	2.753* (0.063)	3.133** (0.025)	2.675 (0.124)	3.087** (0.019)	2.027 (0.106)	1.917 (0.102)	2.643** (0.049)
Tax burden square	-0.131 (0.131)	-0.130 (0.118)	-0.117 (0.263)	-0.115 (0.112)	-0.059 (0.209)	-0.046 (0.276)	-0.099* (0.065)
Deficit			-0.399* (0.095)	-0.418 (0.164)	-0.426 (0.110)	-0.619 (0.107)	0.084 (0.411)
Investment			0.302*** (0.002)	0.234** (0.047)	0.253** (0.020)	0.274 (0.116)	0.437** (0.011)
Openness			0.024 (0.626)	-0.046 (0.466)	-0.014 (0.808)	0.031 (0.815)	-0.089 (0.180)
Share of Agriculture			0.050 (0.674)	-0.020 (0.933)	-0.039 (0.868)	0.164 (0.349)	0.118 (0.538)
Population growth			7.573 (0.383)	6.835 (0.342)	5.789 (0.550)	4.551 (0.420)	6.958 (0.493)
Terms of trade growth rate			0.041* (0.066)	0.016 (0.271)	0.003 (0.686)	0.031* (0.097)	0.079** (0.028)
Initial per capita GDP			-0.053*** (0.004)	-0.101*** (0.000)	-0.099*** (0.000)	-0.076*** (0.000)	-0.091*** (0.002)
Country trend		0.002 (0.972)		0.138 (0.668)	0.179 (0.530)	0.242 (0.555)	0.121 (0.699)
Durability of political regime					0.035 (0.732)		
Regulation of political participation						-0.341 (0.867)	
Quality of institutions							-0.371 (0.804)
Constant	9.833 (0.595)	7.534 (0.680)	5.538 (0.900)	14.092 (0.674)	11.916 (0.737)	11.870 (0.755)	-2.784 (0.955)
Observations	294	294	287	287	287	269	230
Number of id	8	8	8	8	8	8	7
# of sign. trends	n/a	1	n/a	2	2	4	0
RMSE	3.303	3.232	1.923	1.745	1.954	1.396	1.378
Optimal tax rate	n/a	n/a	n/a	n/a	n/a	n/a	13.35

Table 2.12: Lower and upper bound estimates of the optimal tax threshold

	WAEMU	Benin	Burkina Faso	Cote d'Ivoire	Guinea-Bissau	Mali	Niger	Senegal	Togo
Lower bound threshold (%)	11.5	12.2	11.6	18.4	7.5	12.8	15.1	11.0	15.8
Upper bound threshold (%)	20.6	15.7	17.8	33.9	20.5	21.5	19.6	23.0	20.6

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Table 2.13: Summary of empirical review

Researchers	Sampling country and period	Methods	Results
Abdullaev and Konya (2014)	Uzbekistan (1996 – 2011)	Scully model	22 and 31.2% of GDP over two different periods
Amedanou (2019)	Togo (1960 – 2016)	Quadratic and Scully models	22.6% of GDP
Amgain (2017)	Panel of 32 Asian countries (1991-2012)	Quadratic and Scully models	18 % of GDP
Aydin and Esen (2019)	Panel of 11 Central and South-eastern European and Baltic countries (1995 and 2014)	Hansen model	18% of GDP for full transition economies 18.5% of GDP for developing economies 23% of GDP for developed economies.
Chao and Grubel (1998)	Canada (1926 – 1996)	Scully model	34% of GDP
Center for Analysis of Economic and Social Policies (2014)	Burkina Faso (1960 – 2012)	Scully model	29.1% of GDP
Davidson (2012)	Panel of 12 countries (1982 – 2012)	Scully model	11.1% of GDP
Husnain, Haider and Salman (2015)	4 South Asia countries (1975 – 2012)	Scully model	13.7% of GDP
Keho (2010)	Cote d'Ivoire (1960 – 2006)	Quadratic and Scully models	21.1 – 22.3% of GDP
Motloja and al. (2016)	South Africa, Quarterly data (1994:Q1 – 2009:Q2) and (2009:Q2 – 2016:Q2)	Scully model	22% of GDP
Saibu (2015)	South Africa (1964 - 2012) Nigeria (1970 - 2012)	Quadratic and Scully models	15% of GDP for South Africa 30% of GDP for Nigeria
Scully (1991)	103 countries (1960 –1980)	Quadratic model	19.3% of GDP
Scully (1995)	USA (1949 – 1989)	Scully model	21.5 – 22.9% of GNP
Scully (1999, 2000)	New Zealand (1927 – 1994)	Scully model	19.7– 20.02% of GDP
Scully (2003)	USA (1960 – 1990)	Scully and Barro models	19.3 – 25.1% of GDP
Scully (2006)	USA (1929 – 2004)	Scully model	23% of GDP
Terzi and al. (2017)	Tunisia (1966 – 2015)	Quadratic and Scully models	15.2 - 19.6% of GDP

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Table 2.14: Definitions of variables and sources

Variables	Description	Sources
Per capita GDP growth	Growth rate of GDP per capita	World Development Indicators (WDI)
Population	Population growth rate	
Openness	Share of foreign trade in GDP (Imports + Exports, % of GDP)	
Terms of trade growth rate	Annual growth in the terms of trade index	Calculation based on WDI data
Previous per capita GDP growth	Previous GDP per capita is obtained by the lag of one year of GDP per capita	
Investment	Proportion of total investment in GDP (Gross Fixed Capital Formation, total % of GDP)	World Economic Outlook (WEO)
Tax burden	Ratio of total tax revenue as a percentage of GDP	Calculation based on data taken from Central Bank of West African States (CB-WAS)
Deficit	Revenue minus total expenditure, expressed as a percentage of GDP.	World Development Indicators (WDI)
Share of agriculture	Agriculture share of GDP: value added (percent of GDP). Agriculture corresponds to ISIC divisions 1-5 and includes forestry, hunting, and fishing, as well as cultivation of crops and livestock production.	
Regulation of political participation	Participation is regulated to the extent that there are binding rules on when, whether, and how political preferences are expressed. One-party states and Western democracies both regulate participation, but they do so in different ways, the former by channeling participation through a single party structure, with sharp limits on diversity of opinion; the latter by allowing relatively stable and enduring groups to complete non-violently for political influence. The index ranges from 1 “unregulated” to 5 “regulated”.	Integrated Network for Societal Conflict Research (IN-SCR)
Durability of regime	The number of years since the most recent regime change (defined by a three-point change in the POLITY score over a period of three years or less) or the end of a transition period defined by the lack of stable political institutions (denoted by a standardized authority score).	
Quality of Institutions	Synthetic index of institutional quality is the arithmetic mean of ICRG indices of Bureaucracy quality, Law and order, and Control of corruption. The higher the index, the higher the institutional quality.	Authors’ calculations based on International Country Risk Guide (ICRG, 2009) data.

Chapter 3

Politics, Institutions and Tax Mobilization in WAEMU Countries

Abstract

This paper argue that the main determinant of differences in tax revenue collection cross countries are differences in political regimes and institutions. The evidence based on the 8 member States of West African Economic and Monetary Union (WAEMU) over the period 90 – 2017, clearly supports that tax collection leads to better economic institutions and more democratic political system. Thus, handling the problem of tax collection will entail reforms of these institutions and a democratization of the political regimes. Institutions, political regimes, and democracy significantly increase tax collection while autocracy reduces it. The findings turn out to be robust accounting for the potential endogeneity of various institutions and aid intensity through 2SLS estimates.

keywords: Political regimes . Democracy . Autocracy . Institutions . Tax revenue

JEL Codes: P37 . H20

3.1 Introduction

Probably the most recurrent questions in public finance concerning the cross-country differences in tax revenues collection levels. Why are some countries better performers than others? Why some countries tax almost half of the wealth produced in their countries while the others are struggling to take more than a fifth? Is there a tax blessing or rather a tax curse in some countries? All these questions lead to further investigation of the real reasons underlying the low level of tax collection in developing countries.

The question of tax effort enhancement, particularly in developing countries, has received renewed attention in recent years in order to meet the challenges of financing sustainable development goals. These studies pay particular interest to the institutional roles in levying of tax revenues (see for example, [Marshall et al. \(2018\)](#); [Ricciuti et al. \(2019\)](#); [Mawejje \(2019\)](#); [D. Chachu \(2021\)](#); [D. O. Chachu and Nketiah-Amponsah \(2021\)](#) among others). While some economists have recognized that developing countries face institutional problems in tax revenues collection ([Ajaz & Ahmad, 2010](#); [Torgler et al., 2008](#); [Thornton, 2008](#); [Chand & Moene, 1999](#); [Ghura, 1998](#); [Gupta, 2007](#); [Attila et al., 2006](#); [Lotz & Morss, 1967, 1970](#)).

Most of these studies focusing on the role of institutions in tax collection, argue that corruption seems to be the primary reason for the low tax mobilization in developing countries. Other studies have even revealed that corruption reduces tax revenues by more than half e.g. [R. Bird \(1990\)](#); [R. M. Bird \(1992\)](#); [Krugman et al. \(1992\)](#); [Alm et al. \(1991\)](#). But the question is whether the good institutions are only about the control of corruption? It is not so obvious. Hence, what are institutions?

According to ([North, 1981](#), pp.201-202), institutions are “a set of rules, compliance, and moral and ethical behavior norms designed to *constrain* the behavior of individuals in the interests of maximizing the wealth or utility of

principals”. Some definitions refer to the protection of property rights, the enforcement of rules and laws, and the control corruption. Institutions are also defined as political forms or structures that are regulated by public laws, as established by legislation or custom. Note that in each of these definitions, the key word “constraints” is the most common. In addition, [Acemoglu et al. \(2001\)](#) argue that when constraints on the executive persist, many features of institutions change regularly.

Now, let consider institutions as the set of formal or non-formal rules that organize political, economic and social interactions among individuals. Consequently, it seems important to take into account these different dimensions of institutions in the analysis of the relationship between institutions and tax revenues mobilization.

Furthermore, a number of other studies have focused on political institutions and level of tax revenues. [Fjeldstad et al. \(2000\)](#) emphasize the importance of political considerations in shaping tax policies and their implementation. The literature has examined the role of institutions in tax collection through political regimes i.e. variables such as democracy and autocracy are used to explain the changes in tax revenue collection across developing countries. It has been examined by [Ehrhart \(2011\)](#); [Cheibub et al. \(2010\)](#); [Acemoglu and Robinson \(2006\)](#) and [Cheibub \(1998\)](#). This type of literature suggests that the level of executive constraints and democratic regimes are able to improve the collection of tax revenues, whereas corruption reduce it significantly.

The present essay contributes to this literature and argue that political regimes and institutions constitute the fundamental differences among countries in respect of tax revenues collection. In this regard, the developing countries can raise tax revenues by building strong political, economic and social institutions. To this end, our study examines the effects of different types of

institutions on tax revenues collection using ‘constraint on executive’ from Polity IV and ICRG measures of governance, which focus mainly on bureaucratic quality, rule of law, and corruption. We also use measures of political regimes such as democracy, autocracy, and polity2 scores in order to explore the influence of political institutions on tax revenues mobilisation.

Our empirical investigation uses the panel data covering the height countries of West African Economic and Monetary Union over the period of 1990-2017. For the empirical purposes, we use the Ordinary Least Squares (OLS) and Two-Stage Least Squares (2SLS) regressions. The OLS regressions ignore the possibility that quality of institutions may be caused by the tax levels rather than the other way around. Considering this eventual endogeneity of tax share, OLS estimates would be biased and overrated the influence of tax on the quality of institutions. Hence, we address these endogeneity problems through two-stage least squares (2SLS) estimation.

There is recent literature concerning the relationship between institutions and tax collection. The focus of our essay is on the use of political regimes measured by political institutions as one of the causes of the low level of tax collection in poor countries. The paper is organized as follows. Section 2 provides a brief theoretical background. Section 3 describes the data and empirical specification. Section 4 presents the empirical findings and the last section concludes.

3.2 Literature review

Over the last few decades, several studies have investigated the role of institutions in explaining the differences in the economic performance across countries. These studies emphasized the prominent and positive role of institutions in determining the country’s growth. The pioneering studies are

those of North (1981); H. Huang and Xu (1999); Rodrik (2004); Acemoglu et al. (2001); McArthur and Sachs (2001); Glaeser et al. (2004) and Hall et al. (2010). Furthermore, economic analyst defined tax revenue as the share of a country's national income that is collected by the government through taxes, in such a way that the tax share is the ratio of total tax revenues to GDP. As a result, economic performance is subject to an increase in tax revenues, although the inverse relationship is not always apparent. In brief, institutions, economic output and tax collection go in a parallel direction.

In the existing literature, a number of studies have been devoted to the structural factors of tax revenue. The differences in the empirical outcomes are subject to the sensitivity of a set of countries and the period of analysis. For example, Gupta (2007) concludes that structural factors such as GDP per capita, trade openness, agriculture share in GDP and foreign aid significantly affect tax revenues collection as well as some other institutional factors such as corruption and political stability across developing countries. In addition, Lotz and Morss (1970) indicate that per capita income and trade share determine the tax share. Similarly, Piancastelli (2001) suggests that per capita income, the ratio of trade to GDP, and the share of agriculture in GDP are the most consistent explanatory variables of the tax collection. The results of Ghura (1998) concludes that the tax share increases with openness and income, but declines with the share of agriculture in GDP. These findings thus reinforced those of Tanzi (1992) that half of the change in the tax share is explained by external debt, per capita income, agricultural share and ratio of imports. Likewise, ad intensity have also been identified as one of the factors that may explain the differences in tax collection among countries. Bräutigam and Knack (2004) find that the increase in aid ratio to GNP is associated with larger declines in tax share to GDP. They also find that political violence significantly reduces tax revenue collection. These outcomes have already been

emphasized by the work of [Boone \(1996\)](#); [Feyzioglu et al. \(1998\)](#); [Adam and O'Connell \(1999\)](#). [Clements et al. \(2004\)](#) also investigate the impact of aid on the tax effort and concludes that it depends on the composition of aid (grants *vis-à-vis* loans). These results show that concessional loans are associated with higher tax collection, while the opposite effect is found for grants.

Recently, some other studies have been devoted to the impacts of institutional quality on tax revenues mobilization. The findings obtained are also sensitive to the various measures used to capture the “quality of institutions”. For instance, [R. Bird et al. \(2004\)](#) underlined the important role of institutional factors such as rule of law, entry regulations and corruption, in tax revenue collection. Later, [Torgler et al. \(2008\)](#) have shown through 2SLS method using panel data over the period of 1990 – 1999 and 1998 – 2000, for developing and developed countries respectively. In this regard, developing countries can improve tax collection by reinforcing their institution together with effective control of corruption and the improvement of voice and accountability. Similarly, developed countries can also increase their tax collection as long as they maintain their institutional quality. Additionally, [Attila et al. \(2009a\)](#) analyze the relationship between corruption and public revenues using panel data of 125 countries covering the period of 1980 – 2002. Their results show negative impact of corruption on public revenues collection.

There is another strand of the literature that is focusing on impact of different types of political system on tax revenue collection. According to [Fjeldstad et al. \(2000\)](#), political considerations are important in shaping tax policies and their implementation. The literature identifies three channels through which the type of regime affects taxation, see [Garcia and von Haldenwang \(2016, pp.486-488\)](#). In this respect, the first channel is about *economic growth* based primarily on the assumptions of theory modernization, while the second channel is about *redistribution* linked to the concepts of public choices and game

theory. Whereas, the third channel is mainly *legitimacy* which has derived essentially from fiscal sociology and fiscal contractualism. Additionally, [Moore et al. \(2018\)](#) exposed three positive connections between expansion of taxation and government performances. They argue that, expansion of taxation can (i) create incentives for governments to promote economic growth as a way of expanding tax base, (ii) facilitate tax collection by improving the quality of public administration, and can (iii) be a catalyst for mobilising and empowering citizens to demand greater reciprocity and accountability from governments, while encouraging governments to be responsive in order to encourage tax compliance. In fact, increased tax collection may provide the spark for improving the quality of government in building ‘*fiscal social contract*’ between taxpayers and states.

Hence, [Meltzer and Richard \(1981\)](#) argue that democracies are likely to be more redistributive than dictatorship because the median elector always support redistributive tax policy, especially in the context of increased inequalities. Indeed, a few other studies have confirmed this belief. In this way, [Alesina and Rodrik \(1994\)](#) affirm that demand for taxation will be stronger in societies where a large part of population does not have access to capital and where the choice of policy is determined by the median voter theorem like in democracy. In addition, [Acemoglu and Robinson \(2005\)](#) have modeled democracy as a dictatorship of the middle and poor classes and autocracy as a dictatorship of the rich because rich are acting against redistribution and *de facto* against taxation, while autocratic regimes have less incentive to engage in reforms for enhancing taxes.

In view of [Boix et al. \(2003\)](#), democratisation should eventually lead to higher tax revenue mobilization. Likewise, [Garcia and von Haldenwang \(2016\)](#) confirm these outcomes in their investigation on the relationship between political regimes and tax collection. Their findings suggest that the characteris-

tics of the polity affect taxation, but there is no linear trend in favour of democracy. Nonetheless, these results are in disagreement with previous studies for example, [Cheibub \(1998\)](#) observed differences across countries regarding the level of taxes collected by the government are not due to the fact that some are under a democracy and others are under a dictatorship, and therefore, concerns about the inability of democratic regimes to collect taxes are unfounded. However, these studies did not explore how the political regime impacted the structure of taxation. To fill this gap, [Kenny and Winer \(2006\)](#) focused on the structure of taxation in a sample of 100 democratic and nondemocratic regimes. They find that democracies rely substantially on income tax, possibly because this tax source requires a higher degree of voluntary compliance. But in contrast, [Mulligan et al. \(2004\)](#) and [Profeta et al. \(2013\)](#) did not find, any relationship between the strength of democracy and the structure of taxation.

3.3 Methods and Data

This paper tries to find the impact of institutions and political regimes on collection of tax revenues while using data on WAEMU countries over the period of 1990 – 2017. Accordingly, we test the assumptions that the low level of tax collection in WAEMU countries is mainly due to weaknesses in institutions and political system. In this respect, we use regressions based on cross-sectional¹ averages which is an appropriate approach to test relation-

¹Even if a panel analysis would be desirable, it is neither reasonable nor fruitful in practice. A potential consequence of a cross-sectional approach, which consists of averaging variables over periods of years, is that it tends to hide episodes of institutional change within countries, which reflect changes in political and economic conditions. It is therefore unlikely in practice that a panel analysis will provide any benefit because the relationships between institutions and tax share are fairly stable over time. The same arguments were also used by [Ricciuti et al., 2019](#) in explaining taxation in developing economies in terms of how political institutions affect fiscal

ships whose mechanisms have long-run characteristics. This is an accepted methodological approach in econometric research on institutions (see for example [Acemoglu et al., 2001, 2003](#); [Bräutigam & Knack, 2004](#) and [Ricciuti et al., 2019](#) among others) and involves explaining the dependent variable using the long-run averages of the explanatory variable to capture the structural change across countries. Thus, to capture the institutional effect of tax share, the regression specification takes the form of:

$$\Delta TaxShare_i = \alpha_0 + \alpha_1 \Delta Inst_i + \mu_i \quad (3.1)$$

while to capture the effect of political regimes, we use the same specification in which the variable $\Delta Inst_i$ is replaced by political regimes variables *Polity2*, then *democracy* and *autocracy* when accounting for the specific effects of each of these types of political regimes.

For the purpose of empirical estimation in each equation, the dependent variable is the change in tax share i.e. the end period value minus the initial value for the tax share. Following [Bräutigam & Knack, 2004](#), we did not use the annual variation in the data because impacts on institutions may show up with a substantial lags and perhaps it is difficult to find good instruments for institutions based on available yearly data, but some of variables contain missing values. In addition, the change in tax share may be affected by other factors such as culture and religion ([Strielkowski & Čábelková, 2015](#)). Indeed, a practical implication of using the change in the tax share from 1990 to 2017 as dependent variable is that factors that are invariant over long periods of time are unlikely to be of significant importance.

capacity.

3.3.1 Data analysis

In the context of empirical analysis, we are using two measures of institutions. In this respect, first we use “ICRG *quality of institutions index*” considering that good institutions mean increasing compliance to the rule of law, reducing the level of corruption and establishing a better bureaucracy. Hence, as suggested by [Knack and Keefer \(1995, pp.210-212\)](#) and [Bräutigam and Knack \(2004\)](#), we constructed an ICRG *quality of institutions index* of 16-point scale by summing up two variables which are 6-point scale including “*law and order and corruption*” and “*quality of bureaucracy*” which is 4-point scale. The higher values indicate good quality of institutions and otherwise. The data for this measure is available annually from the *Political Risk Services (PRS) Group* and have been published from 1984 to 2017. However, data for Benin is not available, which reduces our index to sample of 7 countries. Whereas, for our second measure of institution, following [Acemoglu et al. \(2001\)](#) [Glaeser et al. \(2004\)](#) work, we use Policy IV measure of “*executive constraints*” which refers to “the extent of institutionalized constraints on the decision making powers of chief executives, whether individuals or collectivities”. This variable ranges from 1 to 7 where higher values correspond to greater extent of institutionalized constraints on the power of chief executives. The mean of constraints on executive is used according to [Glaeser et al. \(2004\)](#) because the average of such constraints over time is a good proxy for the “permanent” or “durable” constraints.

To analyze the impact of political regimes on tax collection, we use the “*Polity2 score*” from Policy IV database which provides a convenient avenue for examining general regime effects. This variable is a modified version of the Polity score computed by subtracting the autocracy score from the democracy score. *Polity2 score* ranges from +10 (strongly democratic) to -10 (strongly autocratic). But, since our essay involves assumptions of varying

effects of democracy and autocracy on tax collection, we also test separately “*democracy*” and “*autocracy*”.

3.3.2 Control variables and treatment

We included a set of control variables which have been frequently used in the tax revenue mobilization literature such as Lotz & Morss, 1967, 1970; Ghura, 1998; Bräutigam & Knack, 2004; Attila et al., 2006; Gupta, 2007; Ndiaye, 2014; Brun et al., 2015; Nguyen, 2019. These control variables include GDP per capita, the share of agriculture, the degree of openness, the size of population, the labor force participation rate, the aid intensity. The data for all these variables are available yearly from *World Development Indicators*. Whereas the data for physical capital or investment which are taken from *World Economic Outlook*. Summary statistics for all variables are presented in 3.2. Each of these variables is discussed in the following lines.

It seems important to control for “*political violence*”, otherwise estimates could produce a spurious correlation between high tax levels and political regime or with bad quality institutions. Political instability in sense of domestic violence or conflict can destabilize political regimes and weakens institutions, by making corruption more likely, and violating the law and order. However, we do not have data on political violence so we use the variable “*internal conflict*” which consist of an assessment of political violence in the country and its actual or potential impact on governance. The high ratings are given to those countries where there are no armed or civil opposition to the government and the government does not indulge in any arbitrary violence, directly or indirectly against its own people. The lower ratings are given to countries embroiled in an on-going civil war. The data are from *International Country Risk Guide* and range from 0 to 12.

We have also attempted to include the *initial tax share value* in order to

capture the regression to the mean effects and control for the limited possibility that countries with higher and lower rankings may increase or decrease their scores respectively, since the tax share is bounded by 0% and 100%, whereas the Polity score is bounded by -10 and 10 , and the ICRG index is bounded by 0 and 16 . Unfortunately, we were unable to capture the mean effects because the *change in tax share* is strongly correlated with the *initial tax share*, as the *change in tax share* did not vary over the time period used for this analysis. Despite showing the expected sign, we did not include the *initial tax share* in our estimation due to the fact that it biasness with the predicted sign of the variables of interest.

As suggested by Srinivasan (1986) and replied later by Bräutigam and Knack (2004), in presence of economies of scale in providing strong institutions or effective tax collection, the increase in population could be associated with an increase in the *tax share* or the ICRG *quality of institutions index*. Hence, we address this possibility by including the *population growth* rather than the size of population.

Likewise, higher aid intensity is associated with larger deviation in tax share and in the quality of institutions. Hence, averages by country over the 1990–2017 period are constructed for each country (see Bräutigam & Knack, 2004). The aid intensity or dependence is defined as the ratio of the “Official Development Assistance (ODA)” to GNP. ODA includes grants and loans with a grant element of at least 25%. Appendix A presents the conceptual definition of each variable of interest.

In our estimates, we address the problem of endogeneity that could be the product of reverse causation. Firstly, higher level of taxation can provide resources for investment and building strong political and economic institutions. Moreover, Ross (2004) concludes that when the proportion of public spending financed by taxes is important, then governments are more likely to

be representative. On the other hand, Aid is steered according to the recipient need and of the donor interest (Bräutigam & Knack, 2004). If there is a significant relationship between Aid and tax collection, then those factors that steer donor's decisions should indirectly predict change in tax share. In such cases, OLS estimates would likely be biased. However, we tackle these endogeneity concerns through two-stage least squares (2SLS) approach. In this regard, we used only instruments taken from Bräutigam and Knack (2004) which are in line with variables used in our analysis, to obtain predicted values of *quality of institutions*, *polity2*, *democracy*, *autocracy* and *aid intensity*. So, these exogenous instruments include *initial GDP per capita*, *initial population*, *infant mortality*, *colonial heritage dummies* (WAEMU countries are ex-colonies of one of two donor countries i.e. Portugal and France), and *political freedom* for which data are available from Freedom House. We also include *external conflicts* considering that separatist moments such as ethnic and tribal can weaken institutions and overthrow elected democratic regimes. As well, it is also believed that colonial powers may also privilege one group or over the others by directing more Aid to them. Annual data are extracted from ICRG database.

Table 3.1, based on data from Central Bank of West African States, shows the changes in tax revenue ratios to GDP in the 8 countries of the West African Economic and Monetary Union (WAEMU) over the period of 1990 – 2017. Five of these countries have collected more tax revenues in between 5.2 and 6.5 as a percentage of GDP in 2017 than they did in 1990. Senegal and Togo increased tax collection by 8.0% and 10.9% respectively, while Benin collected 2.8% less over the same time period.

Table 3.1: Changes in Tax Share in WAEMU Countries, 1990 – 2017

Country	Change in tax share
Benin	-2,76
Burkina Faso	5,22
Cote d'Ivoire	5,57
Guinea Bissau	6,25
Mali	6,30
Niger	6,49
Senegal	8,03
Togo	10,96

Furthermore, given that data such as ICRG data and political violence are not available for Benin, so the results presented in this paper include only 7 WAEMU countries, limiting the number of observations to 196 according to the descriptive statistics in the Appendix B. But a change in specification model, by omitted *ICRG index*, measure of institutional quality and *political violence* as control variable, so then by inclusion of Benin in the empirical analysis give quite statistically robust results.

3.4 Results and discussion

Table 3.2 shows the impact of institutional quality on tax collection. The first two columns report OLS regression results, testing respectively the effects of the ICRG index and the executive constraints, on the tax share. The results reveal a positive significant effect of institutions of tax revenue in both regressions. The 2SLS estimator (columns 3 and 4), which controls for the potential endogeneity of institutional quality and Aid intensity, confirms these results. Controlling for political violence does not change the conclusion that institutional quality improves tax collection.

Our analysis suggests also a number of patterns in the confounding variables. Population growth is positively and significantly associated with tax share in both equation. This result is in contradiction with [Bahl \(2005\)](#) who has pointed out that the tax system of countries with faster growing population, may lag behind in the ability to capture new taxpayers, suggesting a diminishing population effect on tax revenue. However, it is certain that a country with a fast growing population has a potential consumer market that could generate additional consumption taxes. In addition, population growth is beneficial for economic growth, and thus increases tax revenues.

As expected, the change in per capita GDP has a positive association on tax effort. GDP per capita is used as a proxy for the country's level of development. This result is in line with previous ones which found that the capacity to collect and pay taxes, as well as that of demand for income elastic public goods and services, increase with the level of development [Chelliah \(1971\)](#); [Bahl \(1971\)](#); [Gupta \(2007\)](#). In addition, when GDP per capita rises, people increase spending and government can collect more tax revenues [Nguyen \(2019\)](#).

Political violence coefficient is associated with a significant fall in tax collection as expected. This is consistent with the results in [Bräutigam and Knack \(2004\)](#) that political violence significantly reduces tax revenues/GDP. We can also cite the results of [Aizenman and Jinjarak \(2008\)](#) who have argued that political stability is favourable for tax revenues collection, particularly VAT.

In addition, the share of agriculture is associated with a decline in tax revenue effort. [Gupta \(2007\)](#) and [Torgler et al. \(2008\)](#) have found similar results. Different arguments have been put forth to establish the negative relationship between agriculture share and tax effort. For example, WAEMU countries are essentially agriculture-based, with a large part of a subsistence agriculture

sector that may be hard to tax. Likewise, a large share of agriculture activities are also exempted from taxes for political considerations. In addition, a larger share of agriculture sector may reduce the need to spend on public good and services, as public sector activities are urban-based according to [Tanzi \(1992\)](#).

Our results show that trade openness is positively and significantly related to tax effort. Some previous studies have found the same results, for example [Gupta \(2007\)](#); [Aizenman and Jinjark \(2008\)](#); [Nguyen \(2019\)](#); [Ehrhart \(2013\)](#). We also find a significant positive impact of physical capital on tax effort. This outcome implies that increase in investment will surely generate more revenue for the government. [Nguyen \(2019\)](#) has found the similar result. While, one standard deviation in labor force participation rate is associated with increasing tax revenue collection. This result can be due to the fact that as more people contribute to the production of goods and services, the proportion of households income will increase. In fact, as suggested by [Gravelle and Marples \(2014\)](#), tax revenues will increase through income tax channel. Also, many households will have a marginal propensity consumption boosting tax revenues through consumption. Finally, there will be an increase in national production and consequently in tax revenues.

Similarly, the coefficient of Aid intensity is linked to a rise in tax effort. The results in column 1 and 2 consider aid intensity as exogenous and does not take into account the fact that Aid may be influenced by tax effort and other relative factors, for example, donors interest and recipient needs. So, correcting for this eventual endogeneity (column 3 and 4) does not affect our results. One standard deviation in Aid/GNP is associated with 0.41 in column 3 and 0.49 in column 4. A number of studies have found the same results. For instance, our findings are consistent with that of [Clements et al. \(2004\)](#) who conclude on a positive effect of foreign Aid on tax effort, contrary to those obtained by [Bräutigam and Knack \(2004\)](#); [Boone \(1996\)](#); [Feyzioglu et](#)

al. (1998) and Brun et al. (2015). These contradictory outcomes depend on the composition of the Aid variable used. Clements et al. (2004) indicate that the burden of future loan repayments may induce governments to higher tax collection if foreign aid comes primarily in the form of loans. In contrast, Aid in the form of grants reduces the incentives to expand the tax base, through a moral hazard problem. In case of our study, Aid intensity includes loans with a grant element of at least 25 percent, which have strong increasing effect on tax effort in the sample.

Table 3.2: Estimation of Institutional Quality Effect on Tax Collection

Variables	OLS Method		2SLS Method		First-Stage Regressions		
	ICRG index (1)	Exec. constr. (2)	ICRG index (3)	Exec. constr. (4)	ICRG index (5)	Exec. constr. (6)	Aid (7)
Constant	-14.032*** (0.00)	-18.755*** (0.00)	-14.894*** (0.00)	-21.040*** (0.00)	-19.551* (0.06)	-22.229*** (0.00)	307.214*** (0.00)
Change in GDP Capita	1.847*** (0.00)	3.185*** (0.00)	-1.193 (0.19)	3.500*** (0.00)	-0.486 (0.58)	-0.656*** (0.00)	-19.090*** (0.00)
Population growth	3.763*** (0.00)	2.955*** (0.00)	6.476*** (0.00)	3.323*** (0.00)	-2.905*** (0.00)	-0.187*** (0.00)	-4.735*** (0.00)
Political Violence	-0.380*** (0.00)	-0.324*** (0.01)	-0.648*** (0.00)	-0.400*** (0.00)	0.137** (0.04)	-0.029*** (0.00)	-0.338*** (0.02)
Physical Capital	0.107*** (0.00)	0.086*** (0.00)	0.088*** (0.00)	0.068** (0.01)	-0.041*** (0.01)	-0.001 (0.50)	-0.047 (0.14)
Trade Openness	-0.006 (0.81)	0.042 (0.16)	-0.052 (0.18)	0.080** (0.02)	0.058*** (0.00)	-0.007*** (0.00)	-0.061** (0.02)
Agriculture share of GDP	-0.122*** (0.00)	-0.129*** (0.00)	-0.295*** (0.00)	-0.203*** (0.00)	0.110*** (0.00)	0.006** (0.03)	0.157*** (0.00)
Labor force participation rate	0.135*** (0.00)	0.169*** (0.00)	0.202*** (0.00)	0.192*** (0.00)	0.041** (0.03)	-0.040*** (0.00)	-0.567*** (0.00)
Initial (log) population					0.791*** (0.00)	0.821*** (0.00)	-4.722*** (0.00)
Initial (log) GDP per Capita					1.078 (0.19)	1.811*** (0.00)	-25.717*** (0.00)
Ethnic Tensions					1.099*** (0.00)	0.268*** (0.00)	4.745*** (0.00)
Infant Mortality in 1990					-0.030** (0.02)	0.049*** (0.00)	-0.101*** (0.00)
Political freedoms					-0.300*** (0.00)	-0.007 (0.52)	-0.298 (0.10)
Aid	0.356*** (0.00)	0.378*** (0.00)	0.408*** (0.00)	0.497*** (0.00)			
Quality of institutions	0.301*** (0.00)	0.505* (0.06)	1.496*** (0.00)	0.512* (0.06)			
R-squared	0.659	0.653	0.443	0.637	0.715	0.981	0.900
Number of countries	7	7	7	7	7	7	7
Stock and Yogo F Test					693.79	29.99	45.21

Note. — Robust p-values in parentheses. ***, ** and * indicates respectively significance at 1%, 5% and 10%. For these estimates, Aid, ICRG index and Executives constraints are treated as endogenous. Exogenous instruments in 2SLS include initial (log) population, initial (log) GDP per capita, political freedoms, infant mortality in 1990, ethnic tensions and settler origins. Settler origins is dropped because of collinearity. Missing country in regressions is Benin since its data are not available in the ICRG database.

The findings then widely support our conceptual prediction that effective institutions will rely on a efficient tax system and a relatively high tax effort. A very strong institutional quality effect is found. In our preferred specification (column 4), 1 point increase in *executive constraints* is associated with 0.51 percentage point in tax revenue/GDP. Other things being equal, countries may boost tax collection by implementing good institutions. This expected result raises an interesting implication that low level of tax revenue collection in WAEMU Zone may arguably related to the weakness of existing institutions.

Results in column 5, 6 and 7 of Table 3.2 show the first-stage regressions from which predicted institutional quality and Aid values are generated for the 2SLS results reported in column 3 and 4. Following [Bräutigam and Knack \(2004\)](#) we use a set of exogenous instruments for predicting Aid and institutional quality, including initial GDP per capita, initial population, infant mortality, political freedoms, colonial heritage dummies, and ethnic tensions. [Bräutigam and Knack \(2004\)](#) conclude that GDP per capita, population size and colonial origins are significant predictors of Aid. In addition, the evidence in [Acemoglu et al. \(2001\)](#) have showed a close connection between initial population density, colonial identity and creation of good economic institutions. The results in column 6 and 7 show that all exogenous instruments included are significant predictors of institutional quality and Aid controlling for other factors, except for political freedom. But, in column 5 using ICRG index to capture institutional quality effect, political freedom and other instrument are significant predictor except initial GDP per capita.

The standard overidentification test of [Stock and Yogo \(2005\)](#) reveals that exogenous instruments are jointly valid, since the F-test statistic is higher than 10 in columns 5 to 7. These result indicate that our exogenous instruments including initial (log) GDP per capita, initial (log) population, infant (log) mortality, political freedoms and ethnic tensions, do not significantly predict

changes in tax share independently of their connection with institutions and Aid (knowing that the Aid is not predicted by the initial population).

Table 3.3 presents the results testing the impacts of political regimes on tax collection. Column 1 reports OLS regression results, using the *Polity2 score* as an outcome variable, which captures the regime authority spectrum from hereditary monarchies to consolidated democracies. A positive relationship is found between tax collection and *Polity2 score*. This implies that, political regimes in general affects positively tax collection in the sample. This result is consistent with that of Ehrhart (2011) who has concluded on a positive and significant association between the level of democracy measured by Polity2 score and tax revenues.

Similarly, results from column 2 consider the possibility that political regimes and Aid levels may also be affected by tax collection, rather than the other way around. Addressing this endogeneity concern, the 2SLS estimates indicate that the findings remain unchanged. In this case, the *Polity2 score* coefficient is larger than that of OLS. The *Aid* coefficient in 2SLS regression indicates that 1 percentage point increase in Aid intensity increases the tax share by 0.32 percentage point. Likewise a 1 standard deviation in Polity2 score is associated with 0.26 percentage point in tax share. These results have the expected signs and are in line the with the literature.

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Table 3.3: Estimation of Political Regime Effect on Tax Collection

Variables	OLS	2SLS	First-Stage Regressions	
	Column 1	Column 2	Polity2	Aid
Constant	-16.084*** (0.000)	-16.425*** (0.000)	51.132 (0.23)	42.351*** (0.00)
Change in GDP Capita	2.902*** (0.000)	3.023*** (0.000)	2.933 (0.33)	0.704** (0.02)
Population growth	3.017*** (0.000)	2.746*** (0.000)	-0.162 (0.87)	0.413*** (0.00)
Political Violence	-0.367*** (0.001)	-0.414*** (0.000)	0.159 (0.36)	-0.075*** (0.00)
Physical Capital	0.080*** (0.002)	0.057** (0.024)	-0.066 (0.10)	0.008* (0.08)
Trade Openness	0.030 (0.283)	0.034 (0.254)	0.068 (0.15)	-0.024*** (0.00)
Agriculture share of GDP	-0.112*** (0.001)	-0.099*** (0.001)	-0.098* (0.05)	-0.018*** (0.00)
Labor force participation rate	0.162*** (0.000)	0.186*** (0.000)	-0.338*** (0.00)	-0.069*** (0.00)
Initial (log) population			-0.008 (0.99)	0.572*** (0.00)
Initial (log) GDP per Capita			-4.291 (0.21)	-4.104*** (0.00)
Ethnic Tensions			-2.601*** (0.00)	0.138* (0.08)
Infant Mortality in 1990			0.176*** (0.00)	0.075*** (0.00)
Political freedoms			-1.997*** (0.00)	0.062** (0.01)
Settler origins			0.521 (0.77)	-17.717*** (0.00)
Aid	0.363*** (0.000)	0.315*** (0.000)		
Polity2 Score	0.136** (0.011)	0.258*** (0.000)		
R-squared	0.667	0.647	0.706	0.998
Number of countries	7	7	7	7
Stock and Yogo F Test			56.90	6078.18

Note. — Robust p-values in parentheses.***, ** and * indicates respectively significance at 1%, 5% and 10%. For these estimates, Aid and Polity2 are treated as endogenous. Exogenous instruments in 2SLS include initial (log) population, initial (log) Gdp per capita, political freedoms, infant mortality in 1990, ethnic tensions and settler origins. Settler origins is a dummy variable equals 1 for french colonies and 0 otherwise i.e. Guinea-Bissau which is a Portuguese colony. Missing country in regressions is Benin since its data are not available in the ICRG database.

We also observed a number of consistency in coefficient of control variables. In this regard, GDP per capita, Population growth, physical capital and labor force participation have positive correlation with tax revenue/GDP as expected. Whereas, political violence and the share of agriculture are associated with decreasing tax revenue/GDP. However, trade openness is found to be positively correlated with the tax effort, but the effect is not statistically significant.

The results in the last 2 columns show the first-stage regressions through which we generate the predicted values of *Polity2 score* and *Aid* for 2SLS regression. The F-Test statistic of [Stock and Yogo \(2005\)](#) overidentification test supports the validity of our instruments. Exogenous instruments for *Polity2 score* and *Aid* include ethnic tensions and different measures of recipients need and donor interest, which have been earlier used in [Bräutigam and Knack \(2004\)](#) as instruments of *Aid* and quality of governance. Among all instruments used for political regimes (column 3), ethnic tensions, initial infant mortality and political freedom are significant predictors of political regime controlling for other factors. Whereas, all instruments included are significant predictors of *Aid* (column 4).

Since various types of political regimes can be distinguished, we also wonder whether there will be different patterns in democracy and autocracy. The theoretical literature suggests that democratic regimes have incentive to enhance tax collection while autocratic regimes is associated with a deteriorating effect. Thus, we test separately the impact of democratic and autocratic regimes on tax effort.

The results in [Table 3.4](#) indicate that there is a positive and significant connection between tax revenue mobilization and democratic regimes (column 3). In contrast, autocratic regimes score are decreasing with tax effort (column 4). Accounting for endogeneity of democracy and autocracy, con-

firms these outcomes. Our findings are in line with some previous studies such as Ehrhart (2013, 2011); Meltzer and Richard (1981); Alesina and Rodrik (1994); Acemoglu and Robinson (2005) and Boix et al. (2003) which argue that democracies are likely to be more redistributive and thus lead to increase tax revenue/GDP, contrary to autocracies which have less incentive to perform tax collection. 1 point increase in democracy score rise tax share of 0.4 percentage point while 1 point increase in autocratic score reduces tax share of 0.6 percentage point.

Some specific control variables have significant association with tax effort in the sample (column 3 and 4). For example, change in per capita GDP, population growth, physical capital, and labor force participation rate is lead to increase tax revenue/GDP. However, variables such as political violence and the share of agriculture have negative and significant effect on tax revenue/GDP. While trade openness have no significant impact.

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Table 3.4: Estimation of Various Political Regimes on Tax Collection

Variables	OLS Method		2SLS Method		First-Stage Regressions		
	Democracy (1)	Autocracy (2)	Democracy (3)	Autocracy (4)	Democracy (5)	Autocracy (6)	Aid (7)
Constant	-15.566*** (0.000)	-13.858*** (0.000)	-16.650*** (0.000)	-13.432*** (0.000)	20.760 (0.43)	-35.121* (0.06)	40.881*** (0.00)
Change in GDP Capita	2.666*** (0.000)	2.402*** (0.000)	2.891*** (0.000)	2.377*** (0.000)	1.314 (0.42)	-2.062 (0.16)	0.573* (0.05)
Population growth	2.609*** (0.000)	2.827*** (0.000)	2.300*** (0.000)	2.685*** (0.000)	0.060 (0.92)	0.314 (0.59)	0.481*** (0.00)
Political Violence	-0.287*** (0.011)	-0.322*** (0.005)	-0.322*** (0.002)	-0.377*** (0.000)	0.001 (0.99)	-0.107 (0.23)	-0.080 (0.00)
Physical Capital	0.070*** (0.006)	0.069*** (0.010)	0.049** (0.043)	0.050* (0.057)	-0.057* (0.01)	0.046** (0.04)	0.013*** (0.00)
Trade Openness	0.034 (0.241)	0.029 (0.332)	0.042 (0.159)	0.031 (0.342)	0.052* (0.08)	-0.040* (0.08)	-0.029*** (0.00)
Agriculture share of GDP	-0.131*** (0.000)	-0.129*** (0.000)	-0.124*** (0.000)	-0.120*** (0.000)	-0.050* (0.06)	0.020 (0.49)	-0.016*** (0.00)
Labor force participation rate	0.169*** (0.000)	0.165*** (0.000)	0.193*** (0.000)	0.186*** (0.000)	-0.195*** (0.00)	0.165*** (0.00)	-0.063*** (0.00)
Initial (log) population					0.208 (0.71)	0.371 (0.38)	0.627*** (0.00)
Initial (log) GDP per Capita					-1.597 (0.46)	2.939** (0.05)	-4.023*** (0.00)
Ethnic Tensions					-1.266*** (0.01)	1.439*** (0.00)	0.183** (0.02)
Infant Mortality in 1990					0.118*** (0.00)	-0.066*** (0.00)	0.071*** (0.00)
Political freedoms					-1.152*** (0.00)	1.045*** (0.00)	0.071*** (0.00)
Settler origins					0.795 (0.49)	-0.457 (0.59)	-17.865*** (0.00)
Aid	0.347*** (0.000)	0.339*** (0.000)	0.311*** (0.000)	0.298*** (0.000)			
Autocracy		-0.323** (0.013)		-0.582*** (0.000)			
Democracy	0.214** (0.014)		0.402*** (0.000)				
R-squared	0.598	0.605	0.582	0.588	0.703	0.694	0.998
Number of countries	7	7	7	7	7	7	7
Stock and Yogo F Test					65.01	41.80	6878.18

Note.— Robust p-values in parentheses.***, ** and * indicates respectively significance at 1%, 5% and 10%. For these estimates, Aid, democracy and autocracy are treated as endogenous. Exogenous instruments in 2SLS include initial (log) population, initial (log) Gdp per capita, political freedoms, infant mortality in 1990, ethnic tensions and settler origins. Settler origins is a dummy variable equals 1 for french colonies and 0 otherwise i.e. Guinea-Bissau which is a Portuguese colony. Missing country in regressions is Benin since its data are not available in the ICRG database.

The first-stage regressions for predicted values of endogenous variables including democracy, autocracy and Aid are presented in column 5 to 7. Exogenous instruments are also jointly valid according to F test statistics which are greater than 10. Ethnic tensions, infant mortality and political freedom

are significant predictors of *democracy*. Whereas in case of *autocracy*, except initial population and settler origins, the other instruments are significant predictors. Therefore, settler origins and initial population are not significant predictors in columns 5 and 6. Initial GDP per capita appears to be non-significant in column 5. In column 7, results reveal that all instruments are significant predictors of *Aid*. The implications of the validity of exogenous instruments indicate that they do not predict significant changes in tax collection independently of their impact on *democracy*, *autocracy*, and *Aid*.

3.5 Concluding remarks

A number of recent studies have investigated the cross-country differences in tax revenues mobilization. Some of them have emphasized the role of economic institutions in tax collection while others have interested in political institutions effect. In our study we are interested in exploring how these various types of institutions are affecting tax collection in WAEMU Member States. We believe that two key lessons can be drawn from this analysis.

First, the main explanation for cross-country differences in tax revenues collection levels are primarily link to the standard of their institutions. Our findings revealed a robust statistical relationship between tax collection and institutional quality, particularly when we correct for recipient needs and donors interest, and for differences in institutions. The results are robust with the two different variables used as proxy for the quality of institutions. However, the low levels of tax collection in WAEMU countries are related to the weak quality of institutions. The weaknesses of the institutions in WAEMU reflect the origins of the settlers amplified by the lack of political freedom and ethnic tensions. This statement is not unhistorical. It may appears illogical if we do not refer to the West African history. Prior to colonization, there were already

empires from which Ashanti, Dahomey, Manding, Mossi and Songhai empires that were organized in such a way to extract resources from the majority of the population for the profit of a minority. In reality, the settlers simply inherited these existing institutions in order to extract resources easily, without developing effective institutions which can enable colonies to take over the path of economic development. That is why, for long period of time, institutions have not contributed significantly to increase compliance to the rule of law, reducing corruption, building better bureaucracy or constraining the decisions making powers of chief executives. Investigating the causes of low tax revenue mobilization involves understanding the instruments that can be used to strengthen the quality of institutions.

Second, the status of political regimes also explains the differences in the levels of tax collection across countries. Political regimes in general improves tax collection, although the results differ depending on the type of political regime. Democracies collect much more tax revenue than autocracies. Yet, the results remain consistent after controlling for predictors of political institutions and Aid intensity. Ethnic tensions and lack of political freedom weaken democratic political institutions and strengthen autocratic regimes.

The evidence is at most evocative. It does suggest that, from the idea of understanding the cross-country differences in tax revenue collection, it is unavoidable for WAEMU countries, to build strong institutions and establish more democratic regimes. Hence, our investigation poses challenging issues for WAEMU countries. Nevertheless, countries with better economic, social and political institutions are better performer of tax collection than the others. Tax revenues raise because strong institutions and democratization put more constraints on the power of chief executives. A better bureaucracy and quality of governance increase compliance to the rule of law, reduce corruption, build a fiscal social contract between taxpayers and governments, and overall, in a

context of larger political freedom and ethnic consolidation.

Overall, our evidence confirms that differences in political and economic institutions appear to be the primary factor underlying the differences in tax revenue collection across countries. Nevertheless, until today, WAEMU region still one of the parts of world where institutional and political reforms are urgently required with no debate. The ongoing sociopolitical and economic conflicts that persist in this region bear witness to this fact. Having said that, our analysis does not appear to be consistent with the belief of tax blessing in some countries or tax curse in others. The better institutions, the better democracies, the better tax collection will be.

3.6 Appendix

Table 3.5: Conceptual definitions and scores of variables of interest

Variables	Conceptual definitions
Bureaucracy quality (0-4), ICRG	High scores are assigned to countries where the bureaucracy has the strength and expertise to govern without drastic changes in policy or interruptions in government services, and which are autonomous from political pressure and to have an established mechanism for recruitment and training.
Law and Order (0-6), ICRG	Is a single component of two elements scored from zero to three points. "Law" is an assessment of the strength and impartiality of the legal system while "Order" is an assessment of popular observance of the law.
Control of corruption (0-6), ICRG	Is an assessment of corruption within the political system that distorts the economic and financial environment, reduces the efficiency of government and business by enabling people to assume positions of power through patronage rather than ability, and generate instability in political system.
Measures of institutions	
ICRG insitutional quality index	Is the sum of the three ICRG indicators above and is an 16 point scale, including bureaucracy quality, law and order, and corruption in government. Higher scores indicates good quality of institutions and lower scores indicates bad quality of institutions.
Executive constraints (1-7), Polity IV	Refers to the extent of institutionalized constraints on the decisionmaking powers of chief executives, whether individuals or collectivities. This variable ranges from 1 to 7 where higher values equal a greater extent of institutionalized constraints on the power of chief executives.
Measures of Political Regimes	
Polity2, Polity IV	This variable is a modified version of the Polity variable added in order to facilitate the use of the Polity regime measure in time-series analyses. It modifies the combined annual POLITY score by applying a simple treatment, or "fix," to convert instances of "standardized authority scores" i.e. -66, -77, and -88. (see Marshall et al., 2018 for details of the treatment). The variable ranges from -10 to +10.
Democracy (0-10), Polity IV	This variable is a measure of the degree of democracy and is an 11-point scale which is derived from codings of the competitiveness of political participation, the openness and competitiveness of executive recruitment, and constraints on the chief executive. (see Marshall et al., 2018 for details of the coding).
Autocracy (0-10), Polity IV	This variable is a measure of the degree of autocracy and is an 11-point scale which is derived from codings of the competitiveness of political participation, the regulation of participation, the openness and competitiveness of executive recruitment, and constraints on the chief executive. (see Marshall et al., 2018 for details of the coding).

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Table 3.6: Summary statistics

Variables	N	Mean	Std. Dev	Min.	Max.
Change in Tax share	224	5.76	3.65	-2.76	10.96
Change in ICRG index	196	-1.33	2.14	-4.75	1.00
Executive Constraint	224	4.08	0.94	2.27	5.00
Polity2 Score	224	2.23	4.71	-8.00	8.00
Democracy	206	4.24	2.87	0.00	8.00
Autocracy	206	1.79	2.11	0.00	8.00
Aid share of GNP	224	12.31	6.63	5.55	28.05
Initial Tax Share	224	10.27	5.01	2.79	19.15
Population growth	224	2.84	0.46	1.83	3.91
Change in GDP Capita	224	0.33	0.33	-0.03	1.01
Political Violence	196	7.90	1.58	3.33	11.00
Physical Capital	224	18.64	7.93	3.92	49.52
Agriculture share of GDP	224	31.87	9.88	11.98	61.42
Trade Openness	224	34.25	8.27	17.84	68.32
Labor force participation rate	224	71.53	9.36	47.65	85.10

Chapter 4

Potential of Tax Resources in WAEMU Member States: estimating the VAT Gap and its determinants

Abstract

This paper focused on the estimates of the VAT gap in WAEMU Member States using the “top-down approach” and conducted econometric analysis to assist in the understanding of the nature and causes of the VAT gap, and to identify country-specific characteristics that appear related to different levels of the VAT gap. The VAT gap is the difference between the theoretical VAT liability and VAT actually collected. It is often expressed in relative terms as a ratio of a theoretical VAT liability. Panel Corrected Standard Errors, robust OLS regression and instrumental variable methods have been used to identify the factors which explain the different levels of VAT gap. Two variables were found to have the strongest relationship with the level of the VAT gap. The VAT gap share increases with the final consumption (% of GDP) of households and non-profit organizations. Second, if the VAT burden, characterized by the ratio theoretical VAT liability to GDP is included as a candidate explanatory variable, then we find a significantly positive connection with the VAT gap. But, we have identified the risk that this estimated correlation could be biased by the measurement errors in the estimation of the theoretical liability. After taking into account this risk through instrumental variable regression, we conclude on a negative and significant relationship with the VAT gap. However, it is up to policymakers to account for not only the VAT rates but also the structure of the tax base with a view to a more efficient VAT system.

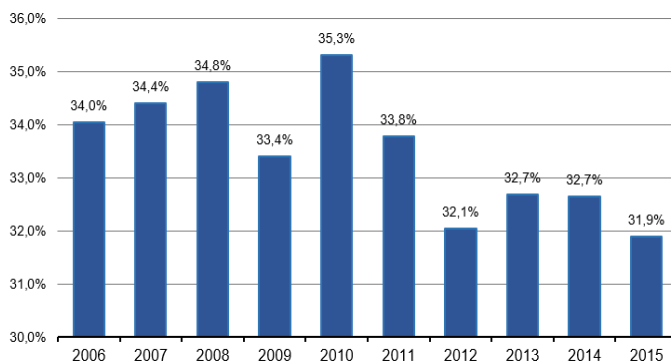
keywords: VAT Gap . VAT evasion. Theoretical VAT liability . VAT Compliance

JEL Codes: H20 . H26

4.1 Introduction

Value Added Tax (VAT) plays a substantial role in mobilizing tax resources. For example, in WAEMU Member States, excluding Guinea Bissau, the share of VAT in total tax revenues amounted to an average of 35.6% and approximately 6% of GDP in 2015. According to the International Monetary Fund (IMF), VAT has established itself as a robust source of revenue, appearing as a relatively efficient instrument. It usually accounts for about a quarter of tax revenue and it turns out that VAT has long been adopted in high-income countries. Others such as [Keen and Lockwood \(2010\)](#) have affirmed that, all other things being equal, countries that introduce VAT generally raise more revenue. Figure 4.1 shows that in WAEMU countries, VAT accounts for more than a one-third of tax revenues.

Figure 4.1: Share of VAT in Total Tax Revenue in WAEMU



Source: CBWAS and BDSM-UEMOA, own representation of data

Theoretically, the performance of a VAT system is linked to the effectiveness of tax administration enforcement and control measures by the tax ad-

ministration, and the ability of the authorities to define an optimal tax policy. Otherwise, the VAT gap rises further. The reasons can be varied. First, failures in tax policy may lead, in particular to the bankruptcy of certain economic operators, to tax evasion and incomplete declarations. Similarly, when a tax administration does not have the necessary capacities, particularly, material, human, financial and in terms of organization and anticipation, we often witness negligence in the collection of taxes, mistakes made in determining the tax base, tax evasion and inappropriate tax deductions. These factors create a shortfall in VAT revenues, that the VAT gap measures.

The VAT gap is the overall difference between the expected VAT revenue and the amount actually collected (European Commission, 2017). It's a key indicator that allows measures to be taken to improving tax revenues and combating tax evasion as well as non-compliance VAT. It provides guidance to better target tax policy measures, including the determination or adjustment of the tax base and the VAT threshold, in order to reconsider certain principles, such as the application of a single rate geourjon2016tva. It also makes it possible to identify the faults related to the tax administration, in particular the evaluation and collection of VAT. In addition, the VAT gap is of great importance in the assessment of the informal economy and citizens' fiscal responsibility canikalp2016estimating.

Currently, the big challenge for governments in developing countries, particularly those in WAEMU, is to find ways to durably reduce the public debt ratio, against a backdrop of growing needs for financing the economy, especially in terms of investment in economic infrastructure and social basic services. Thus, beyond the financial strategies oriented towards the public-private partnership and the rationalization of the government expenditure, a greater mobilization of public resources becomes unavoidable. In fact, the government is moving towards increasing tax revenues. This one can not be

done, with economic efficiency, without a serious analysis of the shortfall of VAT, since VAT is the primary source of tax revenue for all of these countries. In this respect, quantifying and analyzing the VAT gap could potentially contribute to reducing it through the reduction of tax evasion and tax fraud as well as unpaid VAT credits due to insolvency and costs related to corporate tax discipline or VAT compliance.

The purpose of this article is to demonstrate that WAEMU Member States have sufficient leeway to mobilize domestic tax resources and provide some pointers on which they can rely to improve the efficiency of their tax revenues in the future. Specifically, the aim is to estimate the VAT gap of six (06) WAEMU Member States over the period 2006 to 2015 and then to identify the common determinant to these countries with respect to various factors related to the economic, social and tax system.

In the first part of this paper, we review the different methods for estimating the VAT gap and previous econometric studies that determine the factors influencing the VAT gap or the VAT performance measured by other indicators than the VAT gap. In the second part, explanatory variables selected are presented in a table with the relevant sources of data. We also presented the estimates of the VAT gap, and the econometric approach adopted in this article. In the third section, we present and analyze the results of each regression, and compare them with previous literature. And the last section concludes.

4.2 Review of Literature

Three main approaches are used to estimate the VAT gap in the literature. One of them is grounded in econometric techniques, such as stochastic frontier analysis and time series analysis. However, the results are quite sensitive to the choice of determinants and assumptions used in the model. In addition, the results may be difficult to interpret from the point of view of VAT compliance. The use of this approach is therefore not recommended for the studies, whose main objective is to estimate the VAT gap, although it may still be useful for more general studies on the effectiveness of the VAT system.

The other two methods are identified in [Reckon \(2009\)](#) and are based on macroeconomic or individual companies data. The first one is so-called *bottom-up* approach basing on basic statistical techniques, such as random sampling of taxpayers for the control or analysis of the behaviors and risks of non-compliance with VAT obligations. This approach offers valuable information on the specific behaviors of taxpayers. As such, it can be used to test and interpret estimates of the top-down approach. Nonetheless, this method is not generally used by researchers because they can not obtain relevant information. The second one is so-called *top-down* approach based macroeconomic data from the national accounts to assess the amount of the theoretical VAT liability for the whole economy and compare it to the actual VAT receipts collected by the tax authorities. The theoretical VAT liability include the VAT applied to the final consumption of households and non-profit organizations, which is the most important part thereof, as well as the VAT applied to intermediate consumption and gross fixed capital formation of firms and institutions that do not have a full right to deduct VAT. However, even if the top-down approach is supposed to provide reasonable results at the macroeconomic level, it does not explain the behavior of non-compliance VAT by companies.

A large series of studies have investigated the determinants of VAT rev-

enue losses. Some of them focused on other indicators than the VAT gap. This is the case, for example, of [Christie and Holzner \(2006\)](#) that wondering about the causes of tax evasion, did not refer to similar studies mentioning that, in general, there is no econometric modeling of tax evasion. [S. Smith and Keen \(2007\)](#) confirmed this point of view. They have equated the lack of empirical work on the determinants of the VAT gap with the difficulty of measuring VAT noncompliance.

Recently many studies have attempted to fill this gap. But, the majority of these studies have focused on European countries, and quite often on EU Member States. For instance, [R. M. Bird et al. \(2012\)](#) have focused on the relationship between VAT administration costs and VAT evasion and have found a significant correlation between the tax gap and the administrative costs of VAT compliance in the EU Member States. Likewise, [Agha and Haughton \(1996\)](#) constructs and analyses the VAT compliance rates in a sample of 17 OECD countries, using Ordinary Least Squares “further OLS” cross-country regression. The results suggest that a high VAT rate and the number of VAT rates reduce the level of VAT compliance. In addition, VAT compliance is even greater in small countries in terms of population and in countries where VAT has been introduced for a long time. [Christie and Holzner \(2006\)](#) examined data from a panel of 29 European countries over the period 2000-2003, using a fixed effects regression. The conclusions of their paper are as follows: a high weighted average VAT rate has a negative impact on VAT compliance, greater legal and judicial efficiency is favorable to VAT compliance, the countries where citizens want more power for local authorities (used as a proxy for tax morale) have a low rate of VAT compliance, and countries where travel revenues account for a large share of GDP are more respectful of VAT compliance. In addition, the authors found no statistically significant relationship between the rate of VAT compliance and other determinants such as corrup-

tion index, income inequality, confidence in the health care system, level of poverty, GDP per capita and the complexity of the VAT system.

The study of [Reckon \(2009\)](#) is also widely referenced in the literature. [Reckon \(2009\)](#) quantifies and performs an econometric analysis of the VAT gap in 25 EU Member States, in order to identify the intrinsic characteristics of each country that determine the different levels of VAT gap. Econometric estimates have identified the level of corruption in countries as having the most significant link with the VAT gap, and have shown that a low level of corruption tends to reduce the VAT gap share. Similarly, the VAT burden measured by the theoretical VAT liability divided GDP is positively correlated with the VAT gap. On the other hand, an increase in the standard rate of VAT, which also expresses the VAT burden, reduces the VAT gap. They also found that countries with large populations have high VAT gap share. Next, the authors suspected a bias in the estimated relationships due to the possibility of measurement errors in the estimation of the theoretical VAT liability. The authors use the instrumental variables method to account for this bias, using the standard VAT rate and the share of final government consumption in GDP as instruments of the VAT burden. But no significant link was found between the VAT gap share and the VAT burden.

In addition, a series of studies has also been published by the Center for Social and Economic Research (CASE) for quantifying and analysing the VAT Gap in the EU Member States. Among them we can cite the one of [Barbone et al. \(2013\)](#) using data from CASE previous calculation of the VAT gap for 27 EU countries over the period 2000 to 2011. This report proceeds with a fixed effects regression and analyzes the influence of the business cycle and the VAT rate. A number of control variables were also used. There are, for example, the Corruption Perception Index (further “CPI”), that could influence the tax morale and tax enforcement, and GDP per capita which expresses the

differences in the level of development between countries, which could impact the VAT compliance. Lather, [Poniatowski et al. \(2018\)](#) performing the CASE VAT gap analysis using data from its own VAT gap estimates for 28 EU Member States over the period 2012 to 2016. They authors found a significant and non-linear relationship between the VAT gap and the level of population, meaning that the marginal impact is positive i.e. in favour of a higher VAT gap with a minimum level of population, but the impact remains null on the interval between the minimum and maximum levels of population, and becomes negative beyond the maximum level.

More, [Zídková et al. \(2014\)](#) conducted an econometric analysis of potential factors influencing the VAT gap in 24 EU Member States. This study was carried out over two selected years, in particular 2002 and 2006. The results identified, in the surveyed countries examined, two factors common for both studied years, which affected the VAT gap that are the final consumption of households and non-profit organizations that grows with VAT gap, and the share of VAT in GDP that negatively impacts the VAT gap. Other exogenous variables were also highlighted to explain the level of the VAT gap including the share of intra-community trade, the number of VAT rates, GDP per capita, the final consumption of restaurant and hotels services which are all negatively correlated to the VAT gap in contrast to the share of the shadow economy which has a positive impact. In [Zídková and Pavel \(2016\)](#) including 25 EU Member States over the period 2000–2011, the results reveal that the VAT gap grows when the standard VAT rate and the difference between the standard and reduced VAT rate increase, and that the share of household consumption in GDP increases with the VAT gap while the share of VAT receipts in GDP is associated with a deteriorating effect.

Some other studies have focused on developing emerging countries. The results depend on the explanatory factors used to explain the VAT revenue

losses. [Kasnauskienė and Krimisieraitė \(2015\)](#) conclude that when the marginal propensity to save i.e. the share of disposable income devoted to saving increases, it is to the detriment of consumption, and this accentuates the VAT gap in the short-run. In the long run, the relationship between the two components is not significant, as business take into account changes in the preferences of households savings in the short-term, but in the long run they adapt and seek alternatives than avoiding tax obligations. Authors also used other explanatory variables such as inflation, cash and cash equivalents i.e. money, and gross fixe capital formation. Inflation is defined as the continuous and widespread rise in price levels. That being so, it is therefore not without significant effects either on the VAT compliance or the VAT gap. First of all, in the short term, inflation causes an increase in the demand for goods and services in anticipation of a rise in prices by consumers. This increase in demand, however, leads to an increase in VAT receipts and therefore reduces the VAT gap. But in the longer run, inflation reduces the purchasing power of assets held by households. Therefore, to keep the same level of cash, households are forced to reduce their consumption to save more. As a result, VAT receipts fall and the VAT gap widens further [Kasnauskienė and Krimisieraitė \(2015\)](#). On the other hand, producers and consumers alike, in trying to escape the negative effects of inflation, may be pushing for alternatives such as illegal trade in goods and/or services for relatively low prices.

According to [Tedds and Giles \(2002\)](#), the development of the public sector associated with increased government spending or economic regulation is often one of the incentives to engage in informal or illegal activities. From there, the variable “final consumption expenditure of general government” is used as a determinant of the VAT gap. Similarly, the perception of public sector performance or the perception of how government revenue is spent is also likely to explain compliance with tax obligations or not. [Godin, Hin-](#)

driks, et al. (2015) have shown that the quality of government (which reflects the degree of independence of the tax administration from political pressures as well as the quality of policy formulation and implementation) has impact on the efficiency of the tax system. We take into account this potential impact through a government effectiveness variable "Government Effectiveness" Poniatowski et al. (2018). It can be noted that when a country's economy is growing, companies must provide sufficient supply of goods and services to meet demand, sustain growth and compete in the market. This increase in supply requires increased investment, that can increase income and reduce incentives for noncompliance of VAT Kasnauskienė and Krimisieraitė (2015). In fact, we will try to measure this impact through the variable "Gross Fixed Capital Formation" expressed as a percentage of GDP.

The literature also reveals that some studies have instead explored possible explanatory factors for some other measures of VAT revenue productivity. Aizenman and Jinjarak (2005) quantified and analyzed the C-efficiency ratio, defined as the ratio of VAT revenues to overall consumption (i.e. final consumption of households, non-profit organizations serving households, and the government) divided by the standard rate of VAT. This ratio depends both on VAT compliance and the "purity" of the VAT system. However, in the non-existence of VAT evasion, a widespread application of the standard VAT rate without recourse to exemptions that compromise the VAT neutrality would lead to a "perfect" C-ratio equal to 100%. The authors showed that the C-ratio decreases with the share of the agricultural sector in GDP. On the other hand, other variables such as the degree of openness of the economy, the stability of the political system including "the durability of political regime and the regulation of political participation," and GDP per capita have been found to have positive relationship with the C-ratio.

Another indicator has been used in Ebrill et al. (2001) that is so-named

the VAT Revenue Ratio (VRR), defined as VAT revenues divided by the potential tax base, and multiplied by the standard VAT rate. The difference with the C-efficiency ratio calculated by [Aizenman and Jinjarak \(2005\)](#) is that the potential tax base is the final consumption (as in the C-efficiency ratio) net of VAT revenues, because the consumption amounts registered in the national accounts are declared on the basis of prices including VAT. The results showed that the VAT revenues ratio increases as the share in international trade increases. They also show that the higher the difference between the VAT rates applied in the country, the more the VRR increases. A positive relationship has also been identified between the VRR and the time for which VAT has been introduced in the country.

In view of the literature, there are no previous studies focusing on an econometric analysis of the potential determinants of the VAT gap in the West African Economic and Monetary Union (WAEMU) Member States. This article aims to fill this gap by highlighting the factors identified in the review and discuss their impact on the VAT gap in case of WAEMU Member States.

4.3 Methods and data

4.3.1 Theoretical Background

4.3.1.1 Model for estimating the theoretical VAT liability

The total amount of the theoretical VAT liability is the sum of the VAT amount paid by the final consumers and paid by producers. Final consumers pay VAT on purchases of taxable goods and services, while producers pay VAT on inputs when producing non-taxable or exempt goods and services, (see Box 1, Pg. 125). The value-added model for theoretical VAT liability can therefore be written as follows:

$$TVL = \sum_{b=1}^n (TVLc_b + TVLp_b) \quad (4.1)$$

where b denotes a particular industry, and n is the total number of industries. TVL is the total amount of theoretical VAT liability. $TVLc_b$ represents the amount of theoretical VAT liability paid by final consumers c on purchases of taxable goods and services of the industry b . $TVLp_b$ is the amount of theoretical VAT liability paid by producers in industry b on inputs when they produce exempt goods and services.

The amount of theoretical VAT liability paid by final consumers c on purchases of taxable goods and services of the industry b is determined by:

$$TVLc_b = \sum_{o=1}^q C_o^b * \tau_o * \Theta_b \quad (4.2)$$

where C_o^b the amount of final consumption expenditure of goods or services o of industry b and τ_o ¹ is the VAT rate that applies to goods or services o and q is the number of goods and services o , and Θ_b ² is the share of non-exempt final consumption.

The amount of theoretical VAT liability paid by producers in industry b on inputs when producing exempt goods and services is determined by:

¹This is the first tax policy variable in the model. In reference policies, the single VAT rate is applied. Over the period of our study, this rate is 18.0% for all WAEMU Member States, except Niger which applies a rate of 19.0% and Guinea Bissau which does not apply VAT.

²In the reference tax policy, 100.0% final consumption of goods and services is subject to VAT, which leads to a the share of non-exempt final consumption $\Theta_b = 0.0\%$ for each industry. According to Art.3 of the Directive n°02/98/CM/UEMOA, are subject to VAT the supply of goods and services, carried out for consideration by a taxable entity acting as such, as well as imports.

$$TVLP_b = \sum_{o=1}^q (IC_o^b + GFCF_o^b) * \tau_o * (1 - e^b) * r_b \quad (4.3)$$

where IC is the Intermediate Consumption. $GFCF$ is the Gross Fixed Capital Formation. r_b ³ is the proportion of value-added in industry b produced by entities registered for VAT, and e^b represents the proportion of non-exempt production.

³The share of the contribution of entities subject to VAT registration in GDP (r_b), is calculated by the proxy $(1 - \lambda_b)$, where λ denotes the share of the informal sector's or industry's contribution of GDP with data available by sector and by industry at national statistical institutes. Admittedly, this proxy does not take into account the existence of a VAT registration threshold set for example, at FCAF 30.0 or 50.0 million for goods, and 15.0 and 25.0 million for services, of annual turnover in the country's Financial Acts. However, this bias should be mitigated by the existence in the informal sector of some firms whose turnover exceeds the registration threshold for VAT. It is the second tax policy variable, to account for the formal and the existence of a VAT registration threshold for formal firms. The tax authority may decide to widen or narrow the base of entities subject to VAT. In the reference policy, all entities trading in goods and services are subject to VAT, which leads to $r_b = 100.0\%$ for each industry. As regards data related to tax policy and administration, notably the vector of VAT rates per item (τ) and the proportion of deductible VAT on inputs subject to the deduction system (θ) they come from the General Tax Code of WAEMU countries, supplemented and modified by the Finance acts over the period 2006 – 2015.

Box 1: Who pays VAT and in which cases ?

VAT is a real tax applied to all commercial transactions, at each step of the selling of goods or services. It is an indirect tax paid by the consumer and collected by registered firms. They can collect VAT and thus deduct the VAT paid on their purchases of goods or services. Finally, the registered firm pays the amount of VAT on its margin to the treasury, hence the name *Value Added Tax*. Then, the total amount of VAT collected by the tax authorities on the chain of sales or services is equal to the VAT paid by the final consumer to the last seller or service provider. The *registered firm for VAT* is any person who independently carries out an economic activity on a regular basis such as the supply of goods or services. It should not be confused with the *taxpayer* who is under liability to pay VAT : you thereby understand that a taxpayer is always subject to VAT but that the reverse is not the case. However, being registered for VAT does not necessarily mean that you will have to charge VAT on your invoices and deduct the VAT paid. There are indeed exemptions and specific VAT regimes, for example, exports generally subject to zero rate. Any transaction that therefore does not fall within the scope of VAT is not subject to VAT.

4.3.1.2 Measuring and reporting the gap

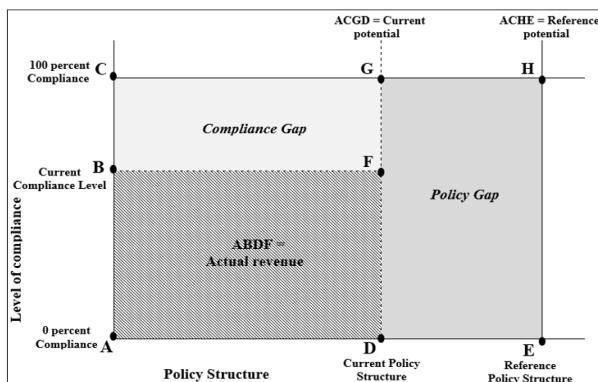
The VAT gap is determined by subtracting from the theoretical VAT liability, the amount of actual VAT collected, available in the national accounts data. Specifically, the determination of the VAT gap involves subtracting the amount of VAT receipts, determined on the accrued collections basis, from the amount of the theoretical VAT liability, estimated using the reference policy framework. Then, the VAT gap would be expressed as:

$$VATGap = \frac{\text{Theoretical VAT Liability, reference policy framework} - \text{VAT receipts, accrued collections}}{\text{Theoretical VAT Liability, reference policy framework}}$$

In our econometric model, this variable represents the dependant variable and is called VAT gap share meaning that the VAT gap which is the difference between the theoretical VAT liability and VAT actually collected, is expressed as a share of the theoretical VAT liability. But generally, the VAT gap could be expressed in absolute or relative terms as a ratio of the theoretical VAT

liability or GDP. The following Figure shows our model for estimating the VAT gap and its two components.

Figure 4.2: Illustration of the components of the Tax Gap



Source: Adapted from [Hutton \(2017\)](#)

With regard to the reference policy framework, we provide an overview of the evolution of the scope of VAT application in the WAEMU, guided by the Union’s VAT directives, and the specific legislation of member States as set out in their general tax codes or finance acts.

The VAT legislations of the Member States are harmonized by two main directives, in particular directive n°02/98 and directive n°02/2009. The first one defines the scope of application of VAT, establishes a community list of goods and services that can be exempted, sets the VAT liability threshold for goods and for services, frames the statutory single rate of VAT, as well as the framework for the VAT credits refund by defining the deductible activities, an optional refund threshold and the time limit for refund, and all this in order to guarantee the neutrality of VAT for subject firms. This neutrality has been reinforced by the adoption of directive n°02/2009 modifying the regis-

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tration thresholds for goods and services. It also authorizing a reduced rate for a limited number of products. In addition, two specific directives were also adopted: a first directive n°06/2002/CM/UEMOA determining the common list of medicines, pharmaceutical products, equipment and specialized products for medical activities, and a second one, notably the directive n°02/2010 harmonizing the taxation applicable to securities, including provisions relating to VAT and assimilating to exports the supply of services related to financial market operations carried out by financial intermediaries approved by the CREPMF⁴, exempting them from any tax other than VAT. You will find further details in Table 4.1 on the evolution in VAT application in the zone and the specific dispositions implemented by each Member State.

⁴CREPMF-Regional Council for Public Savings and Financial Markets

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Table 4.1: Historical application of VAT in the Zone and countries specificities

	VAT framework in the WAEMU	Country specificities
Tax base	The price of the goods or service, the accessories such as commission, packing, transport and insurance fees charged by the supplier to the purchaser or the contractor, as well as the amount of customs duties, excise duties and any other tax applicable to the goods or service, with the exception of VAT itself. Directive n°02/98/CM/UEMOA	The VAT base remains in all Member States as mentioned in the Directive n°02/98/CM/UEMOA
Scope of VAT application	Agricultural sector is excluded from the VAT scope, with the ability for Member States to submit it under the conditions and modalities they define themselves (art. 4, Directive n°02/98/CM/UEMOA). Article 5 allows the exclusion of transport activities from the scope of application on a transitory basis.	For some member states, are excluded from the scope of VAT application, agricultural activities (Cote d'Ivoire, Togo, Niger and Mali) but some products may be by option in Cote d'Ivoire: coconuts, plants and flowers, bananas and pineapples. While agricultural activities are included by option in Benin and Burkina Faso. Transport included by option in Benin (including public transport and passengers) and Cote d'Ivoire (open to people and goods transport companies of the real regime) while it is included by full right in Burkina and Togo (except maritime and air transport). The transport sector is also included in Mali and Niger. Are excluded in Senegal, telecommunications services rendered by a telecommunications operator established in Senegal on behalf of a natural or legal person licensed outside Senegal.
VAT Threshold	Turnover, all duties and taxes between 30 and 50 million FCFA for goods, and between 15 and 25 million for services, art.16, Directive n°02/98/CM/UEMOA. In 2009, a new directive n°02/2009/CM/UEMOA in his article 16 status on a turnover between 30 and 100 million FCFA for goods, and between 15 and 50 million for services.	Annual turnover excluding tax of 50 million FCFA (goods and services) for all member States. In 2018, Togo raised this amount to FCFA 60 million in violation of the legislation set by WAEMU defining a range of 15 and 50 million for services. See Togo LFI 2018
VAT rate	A statutory rate applicable for all transactions between 15 and 20% set by the n°02/98/CM/UEMOA in Art. 29. Prior to this harmonization, rates were comprised of 10 and 20% in the member states. Togo, Burkina Faso and Cote d'Ivoire had a single rate of 18%. The other countries had more than one rate, except Senegal with a rate of 17%. Reduced rates between 5 and 10% applicable to a maximum of 10 goods and services have been authorized by the directive n°02/2009/CM/UEMOA. All the goods and services concerned are included in the Community list including (i) goods: edible oils, sugar, manufactured milk, pasta, livestock and poultry feed, day-old chicks, flour of maize, millet, sorghum, rice, wheat and fonio, agricultural and computer equipment, solar energy production equipment. (ii) services: accommodation and food services provided by hotels, restaurants and similar approved organizations and services provided by the organizers of approved tourist circuits, rental and maintenance of agricultural equipment, and services related to the activities of undertakers. Article 12 of Directive n°02/2010/CM/UEMOA on the harmonization of the taxation of securities in the member states exempts the supply of services related to financial market transactions by financial intermediaries approved by the CREPFM (treated as exports for VAT purposes).	The statutory rate is 18% in all member states except Niger where it is 19%, as well as Guinea Bissau which has not yet introduced VAT but uses a general sales tax of 15%. Benin and Burkina Faso have a single rate of 18%. A reduced rate of 5% exists in certain countries such as Mali on computer, solar and agricultural equipment (Art. 229 Mali LFI n°2011 – 078, the products are listed in point D of sub-sec.1 of sec. 1 of 1 ^o chap. 1 of title 2 of the CGI 2011) and in Niger on the import or wind operations of products such as: sugar, edible oil, livestock feed, manufactured milk, flour of maize, millet, sorghum, rice, wheat and fonio, computer equipment for technical and vocational schools, excluding consumables (Art. 226 Niger LF 2018 – 82). Cote d'Ivoire has a reduced rate of 9% on products such as milk, pasta, solar energy production equipment and petroleum products, Art.359 Cote d'Ivoire CGI, Ord. n°2011-180. The reduced rate of 10% in Togo (Togo, LFI (2017) on cooking oils, sugars, cereal flours, milk, pasta, chicks, agricultural equipment, livestock and poultry feeds, and in Senegal but only for accommodation and food services provided by senior tourist establishments.
VAT exemption	VAT exemptions on activities and transactions listed in the common list defined in Articles 21 and 22 of the Directive n°02/98/CM/UEMOA. The list includes in particular exports of goods and services, imports of goods whose supply is exempt from VAT within the country, as well as imports placed under a customs suspended regime and supplies of services related to goods placed under a customs transit regime, supplies of non-processed and basic foodstuffs, hospitalization and medical care, the supply of medicines and pharmaceutical products and specialized materials and products for medical activities, sales of postage and tax stamps, books, newspapers and periodical publications of information, original works of art, banking operations and insurance and reinsurance services, social installations of water and electricity supplies, transfers of buildings and rentals of buildings for domestic use. This list was amended by the Directive n°02/2009/CM/UEMOA in its article 21, adding gas for domestic use to the list of exemptions, and defining the list of non-processed food products and basic necessities exempt from VAT (see annex to the Directive n°02/2009/CM/UEMOA of 27 March 2009), while the article 22 remained unchanged.	Most of the member states have taken additional dispositions and products in violation of WAEMU regulations, outside the common list Directive n°02/2009/ Art.21 among which Benin (public transport operations, procurement of agricultural equipment, equipment for the manufacture of packaging, light-sensitive devices, buildings for maritime navigation, computer equipment, tankers, coaches, minibuses, motorcycles and bicycles) Togo (computer equipment, cell phones and solar panels which may be subject to reduced rates according to the Directive but are not exempted) Cote d'Ivoire (road, rail, waterway, marine and lagoon transport, log wood, natural latex, agricultural equipment and inputs including cocoa processing equipment, pesticides, fungicides and fertilizers, animal feed and feed packaging, and new and used transport vehicles), Burkina Faso (acquisition of agricultural equipment for the manufacture of packaging, sales of packaging for the conditioning of fruits and vegetables, hulling and conditioning of cereals, sales of livestock and poultry feed, photosensitive devices), Mali (exemptions for petroleum products) and Niger (transport of goods and passengers by road and mining products)
VAT credit refund	According to Art. 34 of the Directive n°02/98/CM/UEMOA, VAT credits on inputs to export products and inputs to taxable products (with the exception of meals and entertainment expenses, tourist or mixed-use vehicles, except those acquired by professional lessors or financial lessors) and fuel expenses. VAT taxpayers are eligible for the VAT credits refund on request at the end of a calendar half-year, except for products resulting from resale without further processing (Art. 39). Member States may set a repayment threshold of a minimum amount which may not exceed 1 million FCFA. Art. 40 The examination period is limited to three months for requests made at the end of a calendar half-year, and two months for those made at the end of a two-month period, while the execution of the refund is carried out within fifteen days following the date of the request, see Art. 41	The activities eligible for reimbursement according to the general tax codes of the Member States are compliant with the Directive n°02/98/CM/UEMOA. No refund threshold is set in some Member States such as Benin, Cote d'Ivoire, Mali, Niger and Togo. This is fixed at FCFA 1 million in Burkina Faso while in Senegal the repayment must concern an amount at least equal to 500, 000 FCFA. The processing time is 2 to 3 months in Burkina Faso and Togo, 2 months in Cote d'Ivoire and Senegal with the possibility of an accelerated processing time of 15 days. The refund must be made within 15 days following the approval of the application in Senegal, within 8 days following the order of payment in Cote d'Ivoire (in the form of a tax exemption certificate) while the refund of VAT credits is limited to 60% (Mali) and 75% (Benin) within 30 days of receipt of the application. In Togo, it is reimbursed by tax exemption certificates valid for 6 months.

4.3.2 Top-down estimates of the VAT Gap

This section presents the results of our top-down⁵ estimation of the VAT Gap across West African Economic and Monetary Member States. Hence, the Table 4.2 sets out the VAT gap for each Member State over the period 2006 – 2015. In the last column of the table, the VAT gap is expressed as a share of the theoretical VAT liability. This variable measures the proportion of theoretical liability that is not remitted. The third column includes the total VAT gap, expressed in FCFA million.

The VAT gap were estimated from 2006 to 2015 for 6 of the 8 countries covered by this study. So there are no VAT gap estimates for Senegal because no use national accounts data are available for it, and Guinea Bissau is also excluded because it has not yet adopted the VAT but instead uses a general sales tax. We can observed that the estimated VAT Gap have decline for many Member States over the period 2006 – 2015, consequently in the latter half of the sample period. For example, we observe that in Togo, the VAT Gap fell from 58% in 2010 to 38% in 2015, and over that same period it dropped from 64% to 50 in Niger. For Burkina Faso, we estimated the VAT Gap falling from 57 to 52 between 2010 and 2015. The potential explanations of the remarkable fall of the fall in the VAT gap in theses countries is due to the reforms of VAT legislation adopted in 2009 harmonizing the VAT applying in the Member States, modifying the VAT liability threshold for goods and for services, revising the list of exemptions, and authorizing a reduced rate on a maximum number of goods and services chosen from a defined Commu-

⁵The top-down approach based on the final consumption model and other demand-side data, as is the case with most recent studies (Reckon, 2009; Barbone et al., 2013). The design principle behind such a model is a construct a VAT revenue model that tries to better target VAT base. It is a methodological approach with three stages. The theoretical VAT liability is first estimated, then the VAT revenue actually collected is determined, and finally the VAT gap are calculated and reported as a percentage of the theoretical VAT liability or nominal GDP. The method of estimating the VAT gap and its components (see Figure 4.2).

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nity list. Nevertheless, the estimates for those Member States contradict such comments. We can notice that the VAT gap have increase between 2010 and 2015 from 51% to 59% in Benin and from 63% to 65% in the case of Cote d'Ivoire.

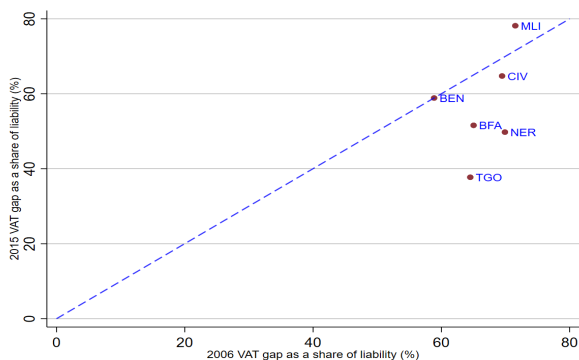
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Table 4.2: Estimates of the VAT Gap based on top-down approach

Member States	Year	Theoretical VAT liability	VAT receipts	Total VAT gap (FCFA)	VAT gap share (%)
Benin	2006	390 460	160 616	229 844	58.9
Benin	2007	411 753	192 831	218 922	53.2
Benin	2008	469 642	216 263	253 379	54.0
Benin	2009	482 710	228 322	254 388	52.7
Benin	2010	502 121	244 653	257 468	51.3
Benin	2011	524 089	253 634	270 455	51.6
Benin	2012	589 611	260 109	329 502	55.9
Benin	2013	635 172	392 319	242 853	38.2
Benin	2014	675 518	293 408	382 110	56.6
Benin	2015	694 641	285 705	408 936	58.9
Burkina Faso	2006	401 568	140 453	261 115	65.0
Burkina Faso	2007	419 637	159 010	260 627	62.1
Burkina Faso	2008	466 625	181 719	284 906	61.1
Burkina Faso	2009	514 433	214 409	300 024	58.3
Burkina Faso	2010	544 494	231 842	312 652	57.4
Burkina Faso	2011	642 290	280 023	362 267	56.4
Burkina Faso	2012	700 484	364 389	336 095	48.0
Burkina Faso	2013	763 046	423 261	339 785	44.5
Burkina Faso	2014	771 452	385 471	385 981	50.0
Burkina Faso	2015	802 072	388 347	413 725	51.6
Cote d'Ivoire	2006	1 051 946	321 254	730 692	69.5
Cote d'Ivoire	2007	1 067 237	371 573	695 664	65.2
Cote d'Ivoire	2008	1 141 133	413 054	728 079	63.8
Cote d'Ivoire	2009	1 212 232	386 800	825 432	68.1
Cote d'Ivoire	2010	1 329 431	498 683	830 748	62.5
Cote d'Ivoire	2011	1 333 655	286 860	1 046 795	78.5
Cote d'Ivoire	2012	1 482 770	503 340	979 430	66.1
Cote d'Ivoire	2013	1 612 805	526 533	1 086 272	67.4
Cote d'Ivoire	2014	1 799 084	588 592	1 210 492	67.3
Cote d'Ivoire	2015	1 948 549	687 021	1 261 528	64.7
Mali	2006	667 698	190 125	477 573	71.5
Mali	2007	473 670	187 179	286 491	60.5
Mali	2008	538 278	190 258	348 020	64.7
Mali	2009	566 872	241 706	325 166	57.4
Mali	2010	634 989	250 269	384 720	60.6
Mali	2011	704 948	275 954	428 994	60.9
Mali	2012	723 689	244 993	478 696	66.1
Mali	2013	869 111	288 168	580 943	66.8
Mali	2014	956 784	252 821	703 963	73.6
Mali	2015	1 010 054	220 717	789 337	78.1
Niger	2006	286 109	86 105	200 004	69.9
Niger	2007	281 475	99 500	181 975	64.7
Niger	2008	313 292	105 434	207 858	66.3
Niger	2009	345 879	122 724	223 155	64.5
Niger	2010	374 367	136 966	237 401	63.4
Niger	2011	400 699	144 824	255 875	63.9
Niger	2012	433 543	146 518	287 025	66.2
Niger	2013	506 395	176 488	329 907	65.1
Niger	2014	448 062	198 661	249 401	55.7
Niger	2015	477 657	239 913	237 744	49.8
Togo	2006	213 800	75 887	137 913	64.5
Togo	2007	198 878	84 633	114 245	57.4
Togo	2008	229 149	90 023	139 126	60.7
Togo	2009	240 062	92 535	147 527	61.5
Togo	2010	259 809	109 214	150 595	58.0
Togo	2011	289 068	134 014	155 054	53.6
Togo	2012	309 555	156 455	153 100	49.5
Togo	2013	328 370	184 012	144 358	44.0
Togo	2014	347 995	210 249	137 746	39.6
Togo	2015	382 232	210 424	171 808	45.2

The Figure 4.3, providing a cross-country analysis of the trend in estimated VAT gap between 2006 and 2015, reinforces the comments we set out above. Thus, we plot the estimated VAT gap expressed as a share of theoretical VAT liability in 2015 against the estimate we obtained for 2006. The dashed diagonal line in the figure is a 45 degree line. For those Member States lying above this diagonal line, the VAT gap is estimated to have increased between 2006 and 2015. For those below the diagonal line, the VAT gap is estimated to have fallen. As can be observed from the Figure 4.3, most Member States are in the latter group. Indeed, over the period from 2006 to 2015, while the estimated VAT gap increased in Mali, they remained almost stable in Benin, and instead fell in the other countries, with a steeper decline in Togo.

Figure 4.3: Comparison of estimated VAT gap in 2006 and 2015



Source: Based on author's estimates

Table 4.3 reports the aggregate estimates of VAT gap and its components as illustrated in the Figure 4.2 in section 4.3. We notice that the overall VAT gap (as a share of theoretical liability) in the 6 WAEMU Member States has

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declined, in value terms, by approximately 7 percent over the period 2006 to 2015 despite a rise from 2010 to 2011. The compliance gap expressed as a share of VAT collected under the current policy, is fell by 12 percentage points between 2006 and 2013 and remained stable at the end of the sample period. As a share of theoretical liability, the estimated policy gap remained stable over the period.

Table 4.3: Aggregate estimates of the VAT gap and its components, 2006-2015

WAEMU-6	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
VAT gap ^a	68	62	62	62	60	65	60	58	61	61
Compliance gap ^b	59	50	51	50	48	53	50	47	50	50
Policy gap ^a	22	24	23	23	23	24	22	21	22	22

Note: WAEMU-6 exclude Guinea Bissau and Senegal

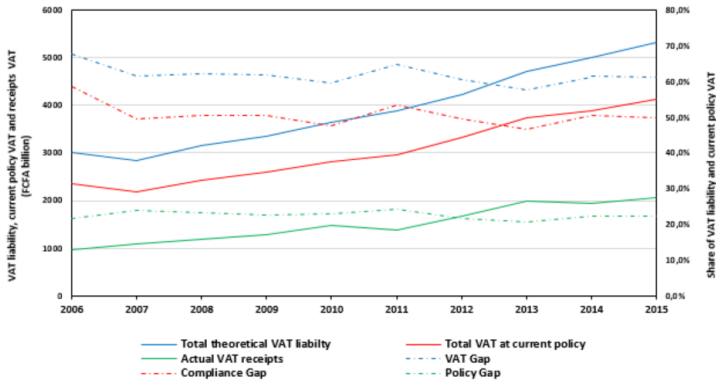
^a as a share of theoretical liability (%)

^b as a share of current policy VAT (%)

Nevertheless, we note a few changes in annual data. The Figure 4.4 shows the annual trends in the aggregate estimates of the VAT gap and its components. On the left we plot in billion FCFA the amounts of theoretical VAT liability, current policy VAT and VAT receipts and on the right we plot the VAT gap and components (compliance and policy gaps) in percentage terms.

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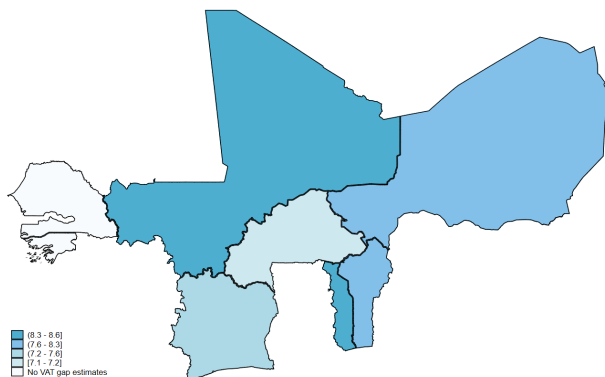
Figure 4.4: WAEMU VAT Gap and its components, 2006-2015



Source: Based on author's estimates

Furthermore, we also underline the importance of expressing VAT gaps as a share of GDP. This ratio allows particularly for both trend analyses while still making the fiscal evident. However, trend analysis can be affected by changes in the relative size of relevant tax base to GDP. For example, an increase in the relative size of final consumption to GDP will appear to rise, even if the ratio VAT gap to GDP remained constant. Thus, we note some cross-country similarities as shown in the Figure 4.5. The average ratio of the VAT gap to GDP ranges from 7.1% in Cote d'Ivoire to 8.6% in Mali.

Figure 4.5: Average VAT gap ratio to GDP in WAEMU Member States, 2006-2015



Source: Based on author's estimates

4.3.3 Econometric analysis of the VAT Gap

We present in Table 4.4 the relevant variables identified based on the analysis of referenced earlier works and our own intuitions. In this table, we are also presented a brief description of the reasons for which they were introduced, and the source from which they were obtained. Several of these variables have been used in [Agha and Haughton \(1996\)](#); [Aizenman and Jinjarak \(2005\)](#); [Christie and Holzner \(2006\)](#); [Reckon \(2009\)](#); [Zídková et al. \(2014\)](#) and [Zídková and Pavel \(2016\)](#) studies cited earlier.

Three of variables in the following table are not available on a time series basis. The data of the judicial/legal effectiveness index that we consider as a proxy for the punishment rate and the audit rate, are downright not available for WAEMU Member States. The poverty gap at the national poverty line used to measure the effect of poverty on VAT gap, contains only two or three observations at most for countries and does not contain any at all for Mali.

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Likewise the data of the share of tertiary education, used to capture the impact of the level of education on VAT gap, are available for a single year only or two for some countries, over the study period considered. Therefore, we estimate the model without introducing the judicial/legal effectiveness index, poverty rate and the share of tertiary education.

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Table 4.4: Candidates Explanatory Variables

Variable	Underlying factor captured by the variable	Source of Data
Final consumption per Capita	Size of potential VAT base and also level of development	Own calculation based on World Bank (national accounts)
GDP	Size of economy	World Bank (national accounts)
GDP Growth	Business cycle	World Bank (national accounts)
GDP per Capita	Wealth/level of development	World Bank (national accounts)
Government Consumption expenses on GDP	Size of public sector	World Bank (national accounts)
Gross Fixed Capital Formation of construction products divided by GDP	Construction services	Own calculation based on World Bank and National accounts data
Household Final Consumption of Restaurants and Hotel Services (% of total consumption)	Proxy for effect of Tourism	Own calculation based on National accounts data
Inflation	Change in the general level of price	World Bank (national accounts)
Share of Final consumption of Household and NPISH on GDP	Size of potential VAT base	World Bank (national accounts)
Share of intra-community trade total imports	Openness of economy, Carousel-type fraud	WAEMU Commission
Unemployment	Business Cycle and income inequality	World Bank (national accounts)
Value Added in Agriculture on GDP	Share of Agriculture	World Bank (national accounts)
Value Added in Construction on GDP	Relative size of construction industry	Own calculation based on World Bank and National accounts data
Difference between Standard and Reduced rate (if multiple then average thereof)	Tax policy and complexity of VAT system	Own calculation based on financial acts and general tax codes
Implicit Tax Rate of Consumption (revenue from all consumption taxes divided by total consumption)	Tax burden	Own calculation based on Ecomac, Ecowas data and CBWAS
Number of VAT rates	Complexity of VAT system/fiscal policy	Financial acts and general tax codes
Standard VAT rate	VAT burden	WAEMU commission report
Tax Quota (total tax revenue incl. Social security) on GDP	Total Tax Burden	World Bank (national accounts)
Theoretical VAT Liability divided by GDP	VAT burden	Own calculation based on top-down estimate
VAT on Total Tax Revenues	Significance of VAT in Tax Structure	Own calculation based on Central Bank and national accounts data
VAT revenues on GDP	Tax quota (VAT burden)	Own calculation based on World Bank and National accounts data
GINI coefficient	Income inequality	SWIID
Poverty gap at the national poverty line	Poverty	World Bank (national accounts), Global Poverty Working Group
Population	Country size	World Bank (United Nations, World Urbanization Prospects).
Urban population	Urbanization of population	World Bank (United Nations, World Urbanization Prospects).
Judicial/legal effectiveness index	Proxy for the punishment rate and the audit rate	NA
Government Effectiveness	Quality of the government	Worldwide Governance Indicators (WGI)
Perception of Corruption Index	Level of corruption, confidence of people in public sector	Transparency International Report
Regulation of political participation	The degree of organization and institutionalization of participation	INSCR data
Durability of political regime	The number of years since the most recent regime change	INSCR data
Share of Shadow Economy	Significance of Shadow economy	Hassan and Schneider (2016)
Share of Tertiary Education	Level of education	World Bank (education statistics)

4.3.3.1 Econometric Model

Since the purpose of this paper is to analyse the impact of the different factors identified on the VAT gap, we consider the following linear regression model:

$$VATGap_{it} = \theta_0 + \theta_{1j}X_{j,it} + \theta_{2k}W_{k,it} + \theta_{3l}Z_{l,it} + \alpha_i + v_{it} \quad (4.4)$$

where, i denotes the country, t the year, $VATGap_{it}$ is the VAT gap share, θ_0 is a constant, the θ_{1j} is the regression coefficient representing impact of exogenous tax variables $X_{j,it}$, θ_{2k} is the regression coefficient representing impact of exogenous economic variable $W_{k,it}$, θ_{3l} is the regression coefficient representing impact of exogenous social variable $Z_{l,it}$. α_i is the random component constant over time and v_{it} is the random component varying over time.

With respect to the estimation process adopted, we start our analysis by estimating a random effects model. We have chosen to use random effects given that this model decomposes the error term in to a country-specific component or a random effect that is fixed over time and an unrelated noise component that varying over time or between countries. We do not use the fixed effect models that includes a specific intercept term for each country. Including a such intercept characters in the regression, may surely mask the impact of any candidate explanatory factors that do not change so much over time or very close to being invariant over time even though there may be remarkable differences between countries. In this instance, the standard VAT rate and the difference between standard and reduced rates could be such a case. Considering that we are interested in estimating the impact of such variables, the random-effects model seems appropriate in our analysis.

However, one of the key assumptions of the random effect specification is that the noise component of the disturbance term in the the model is not autocorrelated and homoskedastic i.e has a constant variance. Therefore, the esti-

mated standard errors can lead to misleading inferences about statistical significance when hetereskedasticity or autocorrelation are present in the model.

To identify those variables that exhibit a not-insignificant relationship with the VAT gap share, we have adopted a general-to-specific approach. This technique consist starting with the most general model that includes all the candidate explanatory variables. We then drop, one at a time, variables from the model, starting with the one that has the highest p value, so that the final model should contain only variables significant at a level of 95 % or more.

Descriptive statistics for the dependant and explanatory variables used in our case study are presented in Table 4.5. With the exception of some variables such as GDP per capita, final consumption per capita and GDP all the others are expressed in relative forms as a ratio in decimal term. The difference between standard and reduced VAT rates is expressed in percentage points while the standard VAT rate is in percentage. These details are very useful in interpreting the results.

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Table 4.5: Summary statistics of dependant and independant variables

VARIABLES	Minimum	Maximum	Average	Standard Error
VAT gap Share (% VAT liabilities)	37.73	78.49	59.58	8.84
GDP per Capita (million CFA francs)	0.13	0.69	0.30	0.15
Growth of GDP (Annual growth)	-4.39	11.85	4.67	2.79
GDP (trillion FCFA francs)	1.25	15.96	4.48	3.71
Agriculture value added (% of GDP)	20.98	43.21	31.44	7.01
Inflation	-1.09	20.38	2.57	3.54
Unemployment, % of population	0.32	11.71	3.54	2.79
Households and NPISH FC expenditure (% of GDP)	58.35	91.96	72.33	7.73
Urban Population, % of population	16.21	49.44	34.38	10.91
Tax Quota (Tax revenue incl. social security) on GDP	11.86	21.40	14.76	1.95
Gross fixed capital formation (% of GDP)	8.95	38.89	22.10	7.51
Government Consumption Expenses on GDP	8.38	23.85	15.59	3.56
Perception of Corruption Index	20.00	39.00	29.52	4.99
GINI Coefficient	35.00	45.70	40.66	2.95
Share of Shadow Economy	29.45	56.63	39.24	7.28
Government Effectiveness	-1.54	-0.46	-0.86	0.31
Durability of political regime	0.00	24.00	9.95	8.01
Regulation of political participation	2.00	3.00	2.59	0.50
Share of Intra-community Trade in Total Import	1.83	60.62	15.89	16.29
Standard rate (%)	18.00	19.00	18.17	0.38
Number of VAT Rates	1.00	2.00	1.20	0.40
Age of VAT	11.00	56.00	25.17	12.59
Difference between standard and reduced rate of VAT	9.00	19.00	16.90	2.67
Final consumption per Capita (million CFA francs)	0.12	0.83	0.32	0.17
Household FC of RHS on Total Consumption	0.71	9.13	4.13	2.64
VAT on Total Tax Revenues	19.21	58.72	36.59	9.28
VAT Revenues on GDP	2.40	9.81	5.39	1.59
Theoretical VAT Liability divided by GDP	9.94	18.51	13.22	1.84
Implicit Tax Rate	7.23	16.51	11.91	2.18
GFCE in Construction on GDP	4.69	16.50	11.27	3.02
Population (millions)	5.84	23.11	14.13	4.96
Square of population (millions)	34.08	534.00	223.85	137.08

4.4 Results

The results of estimating random effects specification using a general to specific approach over the period 2006-2015, are presented in the Table 4.6. Various diagnostic tests including those verifying the assumptions about the disturbance term that is expected to be homoskedastic and not autocorrelated, are also presented.

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Table 4.6: Random effects estimates

Dependent variable	VAT Gap as a share of theoretical VAT liability	
Explanatory variables	Coefficient	Standard Error
GDP per Capita (million CFA francs)	9.821	4.275
GDP (trillion FCFA francs)	-0.688	0.190
Growth of GDP (Annual growth)	-0.148	0.033
Theoretical VAT Liability divided by GDP	2.455	0.065
Households and NPISH FC expenditure (% of GDP)	0.090	0.024
VAT Revenues on GDP	-7.386	0.111
Share of Intra-community Trade in Total Import	0.023	0.008
Agriculture value added (% of GDP)	0.107	0.024
Age of VAT	0.141	0.028
Number of VAT Rates	1.443	0.352
GINI Coefficient	0.505	0.072
Share of Shadow Economy	-0.139	0.027
Perception of Corruption Index	-0.072	0.027
Government Effectiveness	2.937	0.592
Implicit Tax Rate	0.159	0.049
Constant	40.375	3.159
Statistical indicators		
Number of observations: 49		Number of countries : 6
Diagnostic tests		
Hausman test statistic:	3.19 (p = 0.9994)	
Likelihood ratio test for heteroskedasticity:	28.58 (p = 0.0000)	
Wooldridge test for autocorrelation:	7.1548 (p = 0.0441)	

First, we perform the Hausman test. It concludes that there is a low risk of a possible bias in the estimated coefficients in terms of the correlation between the explanatory variables and random effects. But, a such correlation might have expected such a correlation with one of the explanatory variables, i.e. VAT liability as a proportion of GDP. This concern has been previously raised in [Reckon \(2009\)](#) considering that errors in estimating a country's theoretical VAT liability, and consequently its VAT gap, are arguably affect the estimate of the VAT burden for that country. Thus, we suspect a endogeneity problem in the estimated model. We have also checked for the presence of autocorrelation and heteroskedasticity. Wooldridge's test for autocorrelation was carried out. The null hypothesis of no first-order autocorrelation was rejected by p-value 0.04. Moreover, we have also carried out a likelihood ratio test that concludes on a presence of heteroskedasticity implying that the null

hypothesis on homoskedastic i.e. the noise term has a constant variance across countries was rejected.

These two diagnostic tests indicate that the fundamental assumptions of the validity of the random effects model are not fulfilled. The assumptions of homoskedasticity and no autocorrelation are violated and under such conditions the estimated standard errors cannot be relied for statistical testing. Christie and Holzner (2006) and Reckon (2009) have found similar results when they, respectively, carried out the same tests on their estimated random effects model. Then, the estimated random effects appear to be non-consistent. We thus use two different alternative estimation techniques that are robust to the detected autocorrelation and heteroskedasticity. First, we use the Panel Corrected Standard Errors in combination with guessing a non first-order autocorrelation of the disturbance term. The second approach consists of estimating the model by Ordinary Least Squares (OLS) and then correcting the standard errors that are *robust* to homoskedasticity and autocorrelation. To do so, the *robust* and *cluster* options were used after the *regress* command. We noticed that this approach does not specify the form of the autocorrelation but uses itself the detected correlation in the data to estimate the standard errors. The general-to-specific approach was applied to each of these techniques.

The following Table 4.7 presents the findings of the estimation using the panel corrected standard errors approach. The model assumes that there is first-order autocorrelation with a specific coefficient of the AR(1) process for each panel and the disturbances terms are assumed to be panel-level heteroskedastic only with no contemporaneous correlation across panels. The results suggest the following:

Firstly, the relationship between the VAT gap and the VAT burden is subject to controversy. Reckon (2009) and Zídková et al. (2014) have found simi-

lar conflicting signs. A one standard deviation in the theoretical VAT liability divided by GDP and the standard VAT rate increase the VAT gap share of 2.237 and 3.027 percentage point respectively. The contradiction stems from the negative sign of the VAT revenues on GDP that is associated with a decreasing effect with the VAT gap of 7.413 percentage point. However, the obtained signs are conforms to the previous one. For example, [Barbone et al. \(2013\)](#) showed that a positive association between the VAT burden and the VAT gap can only be observed in countries with a low level or corruption. [Reckon \(2009\)](#) considers that the result is probably biased by mistakes in the estimate of the theoretical VAT liability, also used as the variable representing the VAT burden. After correcting for endogeneity by instrumenting the VAT burden by standard VAT rate and government final consumption, he found a negative and non significant relationship between the VAT burden and the VAT gap share. The unexpected negative association between the VAT revenues on GDP and the VAT gap share could be lead to the better compliance of citizens satisfied with the services provided by the government financed by an increase in VAT revenues that are well allocated by politicians in countries with low levels of corruption. It is also necessary to note that VAT revenues also depend on other parameters such as the size and structure of the tax base, and therefore this may eventually compromise the expected positive sign with the VAT gap.

Two other significant variables characterizing the tax system are also shown in the final model. The estimated coefficient of these variables have the expected sign. The implicit tax rate appears to increase with the share of the VAT gap supporting the hypothesis that a higher tax burden increases the incentive for taxpayers to commit tax evasion. The number of VAT rates is also rise with the VAT gap share. This positive association between the number of VAT rates and the VAT gap was also reached by [Agha and Haughton \(1996\)](#).

The more VAT rates there are, the greater the VAT gap grows. So, the result confirms the assumptions that the VAT compliance is low in complex VAT system.

Some of the economic variables used in the model have proven to be determinants of the VAT gap. We have found that the level of development reduces the VAT gap. An increase of 1 million of francs CFA in GDP per capita coincides with a decrease in the VAT gap share by 14.2 percentage points. As expected, the share of agriculture have a positive relationship with the VAT gap share. The coefficient estimates for the government consumption expenses on GDP have unexpected sign. We have found instead a positive relationship. A possible explanation of this surprising positive sign may be the argument we mentioned above that a large tax burden pushes tax payers to evade paying taxes. The share of shadow economy is expected to increase the VAT gap but the estimates coefficient have a negative association. For example, one standard deviation in the share of shadow economy is associated with a fall in the VAT gap share by approximately 0.1 percentage point. This opposite sign may hide a punitive VAT policy of the informal sector. Informal sector firms that are not subject to VAT because of specific measures (for example turnover below the VAT threshold) do not charge VAT and therefore cannot deduct it. However, when they purchase intermediate products (exempt or not) from firms charging VAT, import inputs, or carry out export transactions, they cannot deduct the VAT paid since they do not collect it. In absence of compensatory measures, the failure to reimburse VAT to informal sector firms, creating the phenomenon of VAT remanence, can increase the efficiency of VAT and thus reduce the VAT gap. However, this undermines the principle of VAT neutrality because the concerned firms, whether informal or not, cannot recover the input VAT paid, which increases their production costs.

We also found a number of patterns in the coefficients of the social and others factors. The perception of corruption index downfalls the VAT gap, as it was found, for example, in [Reckon \(2009\)](#) that a lower perception of corruption appears to reduce the VAT gap share. The durability of political regime also has a negative association with the VAT gap share, and the result is in line with that of [Aizenman and Jinjark \(2005\)](#) who have found that the political stability system including the durability of political regime and regulation of political participation enhances the efficiency of VAT. A positive relationship is found between GINI coefficient and the VAT gap share i.e. countries with a high income inequality have a higher VAT gap share. [Aizenman and Jinjark \(2005\)](#) also showed that urbanization improves the efficiency of VAT collection. We note a contradiction on this point in relation to our results which show a positive influence of the urban population share on the VAT gap meaning that an increase in the share of urban population accentuates the VAT gap.

However, we believe that a number of conflicting signs that have been observed could be due to the endogeneity bias raised above or to some other important variables that have been removed from the model because of the general-to-specific approach that we use. But we expect that the estimation by the instrumental variable (IV) method could provide partial or perhaps full confirmation of these assumptions.

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Table 4.7: Panel Correction Standard Error modelling results

Dependent variables	VAT Gap as a share of theoretical VAT liability	
Explanatory variables	Coefficient	Panel Correction Standard Error
GDP per Capita (million CFA francs)	-14.186	2.475
Theoretical VAT Liability divided by GDP	2.372	0.058
Government Consumption Expenses on GDP	0.161	0.050
VAT Revenues on GDP	-7.413	0.083
Agriculture value added (% of GDP)	0.108	0.020
Standard rate (%)	3.027	0.529
Number of VAT Rates	0.787	0.248
GINI Coefficient	0.447	0.046
Share of Shadow Economy	-0.086	0.021
Perception of Corruption Index	-0.045	0.022
Durability of political regime	-0.086	0.021
Implicit Tax Rate	0.087	0.035
Urban Population	0.297	0.045
Constant	-12.736	10.599
Statistical indicators	Number of observations : 48 Number of countries : 6 R-squared : 0.9998	

The results of the *robust* regression are shown in Table 4.8 and suggest once again the conflicting signs about the link between the VAT burden and the VAT gap. The estimates coefficient of final consumption of households and NPISH⁶ share has a positive correlation with the VAT gap share as expected. An increase of 1 percentage point in the share of final consumption of households and NPISH results in an increase of 0.1 percentage point in the VAT gap share. The age of VAT also have a positive relationship with the VAT gap i.e. countries that introduced VAT at an early date have a larger VAT gap share. This is for example the case of Cote d'Ivoire, second country in the world to have introduced VAT in 1959, after France, which has a VAT gap as a share of theoretical VAT liability of 64.9% against 49.8% in Niger, which introduced VAT in 1985, or 37.7% for Togo, which introduced it in 1995. In addition, Togo is the last country to have introduced VAT in the country sample but it is the most efficient in closing the VAT gap share between 2006 and 2015, as showed by the Figure 4.3. However, a focus on the case of Mali

⁶NPISH - Non-Profit Institutions Serving Households

could contradict this assertion. Mali introduced VAT in 1990 but its VAT gap share is estimated to be 78.1% in 2015, which represents the maximum value of the estimated VAT gap share (see Table 4.5). The case of Mali seems nevertheless particular because of the increase in the VAT gap share, over the study period, for which the causes are obviously other than the age of VAT. One might have expected that the more time goes on, the more States will be able to implement measures allowing VAT compliance and those ensuring VAT neutrality. By contrast, member States' VAT systems (even countries where VAT was adopted very early, such, e.g. Cote d'Ivoire) are designed with incentive exemptions or exemptions on final consumption, reduced rates and complex refund mechanisms, which constitute poor VAT practices.

Table 4.8: Robust regression modelling results

Dependent variables	VAT Gap as a share of theoretical VAT liability	
Explanatory variables	Coefficient	<i>Robust</i> Stand.Error
Theoretical VAT Liability divided by GDP	2.531	0.233
Households and NPISH FC expenditure (% of GDP)	0.094	0.026
VAT Revenues on GDP	-6.869	0.225
Age of VAT	0.056	0.016
Constant	54.961	1.277
Statistical indicators	Number of observations : 60 Number of countries : 6 R-squared : 0.992	

Table 4.9 shows the results of our instrumental variable modelling based on the model presented in Table 4.8. Reckon (2009) points out that there may be a possible problem of endogeneity which can be attributed to the use of VAT burden as an explanatory variable though the Hausman test supports random effects modelling. Considering the findings presented in Tables 4.7 and 4.8, the VAT gap share and VAT liability as a share of GDP have a positive connection that is theoretically and intuitively satisfying meaning that levying a large share of the wealth produced through VAT amplifies VAT evasion and avoidance. However, if it proves that a problem of endogeneity is present,

this implies that the magnitude of this positive effect has probably been over-estimated. In this case, the estimated coefficients reported in Tables 4.7 and 4.8, and the association between the VAT gap share and the VAT burden could be trapping the effect of any errors in the computation of theoretical liability of VAT.

To take into account this possible bias, we perform the Durbin-Wu-Hausman endogeneity test that rejects the null hypothesis of regressor is exogenous. Following Reckon (2009), we test for endogeneity of the variable VAT burden using a set of variables as instruments of VAT burden including the standard VAT rate, the VAT revenue on GDP and the government final consumption on GDP. The sine qua non condition is that the instruments should be correlated with the VAT burden, but they must not be correlated with the error term. Since, the test of Durbin-Wu-Hausman was failed, estimates coefficients from OLS may be biased, we use the instrumental variables approach to obtain an unbiased estimate of the effect of the VAT burden, which results are showed in the Table 4.9. The reported standard error are robust to autocorrelation and heteroskedasticity as in Table 4.8.

Table 4.9: Instrumental variable robust regression modelling results

Dependent variables	VAT Gap as a share of theoretical VAT liability	
Explanatory variables	Coefficient	Robust Standard Error
Theoretical VAT Liability divided by GDP ^b	-8.630	2.124
Households and NPISH FC expenditure (% of GDP)	1.371	0.244
Constant	74.603	17.159
Statistical indicators	Number of observations : 59 Number of countries : 6 R-squared : not printed Root Mean square error: 11.9	

^b The variable theoretical VAT Liability divided by GDP is treated as endogenous and is instrumented by the standard VAT rate, VAT revenue on GDP and government final consumption on GDP

The outcomes in Table 4.9 reveal that after having instrumented the VAT burden, its sign becomes negative suggesting that countries with a larger VAT burden have a lower VAT gap share. The change of sign in the IV model

is consistent with the fact that the positive relationship found in Tables 4.7 and 4.8 can be assigned to the bias occurring from correlations between the estimate VAT burden and the error in the estimating the VAT gap. We have also tested the validity of exogenous instruments used with the overidentification test of Stock and Yogo (see [Stock & Yogo, 2005](#)). This test confirms that the exogenous instruments are jointly valid by the F-test statistic of 15.1. According to the results in Table 4.9 we conclude on a negative and significant relationship between the VAT burden and the VAT gap share. [Reckon \(2009\)](#) concluded that there is no reliable statistical evidence of any relationship between the VAT burden and the VAT gap, once the VAT burden has been instrumented while [Christie and Holzner \(2006\)](#) as to them have found a positive correlation between VAT gap and the VAT burden measured by a weighted average VAT. However, [Reckon \(2009\)](#) points out that [Christie and Holzner](#)'s results is vulnerable to a risk of bias due to correlations between VAT gap and VAT burden arising from possible errors in computing the theoretical VAT liability or the weighted average VAT rate, when compared to his own based on robust and panel corrected regressions, as is the case with results in our estimates reported in Tables 4.7 and 4.8. So [Reckon \(2009\)](#) criticises [Christie and Holzner \(2006\)](#) to not use an instrumental variable approach or any other way to address this bias, and considers that the authors does not therefore, provide reliable statistical evidence of any relationship between the VAT burden and the VAT gap. Far from closing the debate, our investigation is not subject to this criticism and asserts, after controlling for the risk of bias in the estimation of the theoretical VAT liability, that there is a statistically and significantly negative relationship between the VAT burden and the VAT gap.

4.5 Conclusion and discussion

The paper estimated the VAT gap for each West African Economic and Monetary Union (WAEMU) Member State using the top-down approach over the period 2006 – 2015, except Senegal and Guinea-Bissau. Senegal is not included in our analysis because no use tables are available for it while Guinea-Bissau is not included since it has not yet adopted VAT, and therefore we have only computed the VAT gap for 6 Member States.

We also conducted an econometric analysis in order to identify factors that can cause differences in the VAT gap between countries and over time. The results of the various econometric techniques adopted have led to the following lessons. Firstly, we found a strong positive relationship between the VAT gap and the share of final consumption of households and NPISH in GDP. This relationship implies that a larger size of potential VAT base further widens the VAT gap share. The result is consistent with the literature and the assumption that a larger VAT base should lead to higher levels of VAT evasion. Secondly, our study is the first to have established a significant negative relationship between the VAT gap and the VAT burden, after controlling for endogeneity using the instrumental variable method. Initially, when the variable VAT liability as a proportion of GDP is included as an exogenous variable, we find a significantly positive association with the VAT gap as expected, reasoning with the existing literature on this topic based on the presumption that a higher tax burden should accentuate levels of tax evasion and non-compliance. But, we have subsequently identified the risk that this estimated result could be biased by the measurement errors in the computation of the theoretical VAT liability. After taking into account this risk of measurement bias in the esti-

mation of theoretical VAT, we conclude that the VAT burden is negatively and significantly associated with the VAT gap share.

It should be remembered that if the negative sign is contrary to our expectations, it may be due to fact that the VAT burden combines economic and tax factors and each one can have an impact in one or other sense on VAT compliance, and may probably symptomatic of the unreliability of the measurement of the theoretical VAT based on national accounts data. In fact, we note some shortcomings that may be related to the use of national accounts data for the estimation of VAT gap. First, it is necessary to question the reliability of the available data as well as what it actually measures, because it should not be ignored that the availability of extremely detailed information on the structure of the transactions would guarantee correct treatment in VAT application on goods and services exchanged.

Another type of limitation lies in the use of the top-down approach. On the one hand, this method rather requires an exercise of judgment to identify those exchanges that are likely to have a significant impact on the measurement of net VAT liability at the level of the economy as a whole. In most cases, food product expenditure is taxed less than that of beverages, but both are significant part of household consumption expenditure. We therefore believe that taking into account the details of very ready-made items, for example by distinguishing between non-alcoholic and alcoholic beverages (proposed by [Reckon, 2009](#)) can have a significant impact on the estimated VAT gap, but unfortunately the national accounts data used do not provide these details. On the other hand, the top-down approach relies on the extent of overlap between taxable activities and those contributing to the national accounts. Some activities, such as the exemptions for small businesses or construction of own house building, do not overlap. Finally, this approach does not take into account the legal avoidance of VAT liability on which the VAT gap estimates

also depend. Other factors can also be evoked such as the unpaid VAT liability due to insolvencies, and the lack of completeness in the national accounts measuring legal or illegal activities.

However, the use of data outside of the national accounts, when such data are available, can help to mitigate the limitations of this work. In view of these points, we believe that our estimated VAT liability can be affected by these different factors, some of which may have marginal impacts, and others which may have a significant impact on the results obtained.

It is up to political decision makers to implement their tax policy, particularly that of an efficient VAT system based not only on VAT rate, but also taking into account the structure of the tax base. Nevertheless, it is obvious that WAEMU countries have to broaden the VAT base by gradually abolishing VAT exemptions, whether they are incentives or based on final consumption, limiting the reduced rate to one if necessary, setting up compensatory mechanisms for businesses exempt without the ability to deduct the VAT paid, and improving the fluidity of VAT credit refunds, to ensure VAT neutrality.

Part II

And Getting Into Debt

Chapter 5

Financing the Economy in Debt Times: the Crucial Role of Public-Private Partnerships

Abstract

This paper aims to show that there is a great interest for countries to rely on Public-Private Partnerships (PPPs) as a tool for financing the economy, especially in times of debt. First, we conceptualize through game theory a better risk management between the public and private sectors in case of co-investment. Second, building on [Iossa and Martimort \(2009\)](#), we demonstrate that PPPs investments produce greater economic and social gains than pure public investments by providing incentives and transferring risks to the private sector. The implications of the model are diverse: financing the provision of public infrastructure through PPPs allows for sharing the associated risks, improves the quality and reduce the costs of the provision of public goods. The model has been empirically tested on 14 Sub-Saharan African countries over the period 1990 – 2017. The impact of PPP investments is significantly higher than that of pure public investments. The evidence also shows that the positive impact of PPP investments strengthens economic growth as the public debt grows to a point where there is no longer any significant pro growth impact.

keywords: Public-Private Partnerships . Pure public investment . Game theory . Risk management . Economic growth . Public debt . Fiscal constraints.

JEL Codes: L32 . H54 . C71 . G32 . O40 . H63

5.1 Introduction

Number of countries are showing a growing interest in Public-Private Partnerships (PPP) contracts that involve collaboration between a government agency and a private entity that can be used to design, finance, build and operate projects, such as social and economic infrastructure. Financing development is a real challenge for developing countries. To face this, public entities are stepping up partnerships with private companies to finance infrastructure projects in the form of PPPs (Eggers & Startup, 2006) mostly in developing countries which have registered a significant increase in private sector participation in funding and building infrastructure since the 1990s (Iossa & Martimort, 2009). More broadly speaking, the use of PPPs provides a larger mobilization of financial resources towards the funding of public infrastructure, which are crucial links in the potential for long-term growth.

From an economic point of view, PPPs are justified by their ability to efficiently allocate risks between public and private partners, and hence provide incentives for better public infrastructure delivery. Additionally, PPP contracting can allow savings to be reallocated to long-term investments for the financing of the real economy. In the latter case, Arezki et al. (2016) confirms that matching long-term savings with bankable PPP projects will optimize resource allocation and stimulate economic growth. These arguments suggest that public-private co-investments constitute an alternative source of financing for economic growth. Guerguil and Keen (2014) and Abiad et al. (2014) made the remark that since the early 1990s in both middle and low income countries, PPPs have raised as an alternative source of financing to scale up public capital stock.

Economic theory recognizes the provision of public goods and services by government (Musgrave, 1959) given the inability of markets to provide public goods, internalize externalities and cover costs in cases where significant

economies of scale exist. Because private operators do not have the required skills to exclude free riders or to charge users a competitive price. Thus traditionally, governments have built, maintained and rehabilitated infrastructures such as roads, ports and airports, as well as telecommunications and electricity networks, which are essential for economic activities. In order to fulfill their obligations, governments finance economic and social infrastructure out of public investment by imposing taxes. When there is any difficulty in collecting tax revenues, the governments resort to borrowing to support public investment and boost economic growth.

The needs for infrastructure in developing countries are increasing now-days, especially in emerging economies. Yet, developing countries face immense challenge in solving infrastructure provision and its funding i.e large economic and social infrastructure needs, weak tax mobilization and a high level of public debt. It is clear from the fact that the latter two limit the sources of funding for public investment. Faced with such a complex scenario, governments are increasingly turning to public-private partnerships, directing private sector funds towards the financing of public goods and services. It is worth noting that [Hammami et al. \(2006\)](#) have already drawn attention to the fact that PPPs tend to be more common in countries where governments suffer from heavy debt burdens. Moreover, [Watts et al. \(2000\)](#) have confirmed that the use of PPPs for funding social infrastructure projects will help reduce the overall level of government borrowing and help governments in maintaining and improving current level of services.

However, it is important to keep in perspective that PPPs do not always avoid long-term debt overhang. In general, PPPs allow governments to avoid or defer infrastructure spending without giving up their benefits. It may therefore be particularly attractive for governments that are limited in their current ability to finance infrastructure to use PPPs to bypass spending controls

and move public investment off-budget and debt off the government's balance sheet. But it consequently forces governments to face potentially high budgetary costs in the medium to long term so that in the long term the risk of over-indebtedness is not spared. And furthermore, where debt sustainability is not a concern, there are other considerations that need to be taken into account in order to ensure the efficiency of infrastructure services, including (i) the legal framework governing PPP contracts, (ii) the processes for selecting and implementing PPPs, and the role of the ministry of finance in this context, and (iii) the contractual obligations that underpin PPPs and that directly determine the fiscal risk incurred by the government (Akitoby et al., 2007). Moreover, governments should also strive for transparent tax accounting and full disclosure of all fiscal risks involved in PPPs.

PPPs constitute arrangements in which the private sector takes over infrastructure assets and services traditionally provided by governments. They are mostly contracted for wide range of social and economic infrastructure projects including transportation infrastructure, telecommunication, water plants, financial support, innovative financing, general public services such as hospitals, schools etc. So, should we still be asking whether PPP investment can be an alternative source of funding for government expenditures? Obviously, in view of developing countries' current fiscal constraints, one can only answer in the affirmative.

Economic growth is driven by investment and occurs when aggregate output increases, offering and expanding employment opportunities that allow for increased income and mobility for individual workers, thus improving the standard of living. Hence, one of the most important questions that can be asked is whether PPPs allow for a more efficient allocation of resources and lead to an increase in country's productivity? The existing literature have yielded widely different estimates of the impact of infrastructure

investment on economic growth (Estache & Garsous, 2012; Dintilhac et al., 2015; Arezki et al., 2016), particularly efficient transport infrastructures that enhance competitiveness and boost economic growth by raising the marginal product of labor and capital, thereby the overall efficiency of the productive mix (Aschauer, 1989) and strengthen the attractiveness of certain areas towards new production facilities, which are reflected in self-reinforcing growth processes (Messina, 2008). Even if empirical studies prove that the economy is positively boosted by PPP investments, the real question is: can PPP investment be a credible alternative funding instrument to traditional public investment?

While many theoretical arguments are put forward to support the potential economic benefits of PPPs contracts, often claimed to be far greater than those of traditional public goods provision, empirical evidence has very rarely compared the economic and social gains of funding through public or PPP investments. This paper draw on theoretical and empirical studies to looks at the policy implications of PPP's impact on country's economic growth, focusing on 14 Sub-Saharan African countries, most of which are facing funding deficits and growing needs for socio-economic infrastructures.

According to the results, the economic and social gains from infrastructure and services financed by PPP investments are higher than those from pure public investments. If the debt level is already high and reaches an unsustainable level, there is a diminishing effect of PPP investment on growth. As such, in order to meet the growing needs for infrastructure development, given their budgetary constraints, governments should engage in co-investment with the private sector. But beware, reforms aimed at making public debt levels sustainable would be a guarantee for positively higher returns from financing socio-economic infrastructure through public-private partnerships (PPPs).

Our paper contributes to the relevant literature on two strands. First, it

looks at the impact of PPP investments on economic growth. A large part of the literature finds that the extent and type of PPP contracts are drivers of economic growth (Shediac et al., 2008; Zangouezinezhad & Azar, 2014; Oluwasanmi & Ogidi, 2014 and Mofokeng, 2019) even if some have assessed this effect when looking at the macro-economic benefits of PPPs (Checherita, 2009; Lee et al., 2018; Uddin & Akter, 2021). Others have rather shown that private sector participation accelerates growth through productivity gains, such as La Porta and Lopez-de Silanes (1999); Trujillo et al. (2002) and Brown et al. (2006). Second, a large part of the literature, including the latest extensions of the neoclassical growth model as well as endogenous growth theories, has pointed to the role of public investment in economic growth (see, for example, Romer, 1986; Barro, 1991; Barro & Lee, 1993; Fischer, 1993). One view holds on the importance of public investment in long-term economic growth because it not only generates positive spillovers in the economy through physical infrastructure and services, but also attracts private investment, thereby enhancing economic growth (Arrow & Kurz, 1970; Barro, 1990, among others). In another segment of the literature, several other authors have argued that public investment does not necessarily have a pro-growth impact on the economy (Khan & Kemal, 1996; Devarajan et al., 1996; Ghani & Din, 2006) or even on the level of output per worker (Milbourne et al., 2003).

The paper is structured as follows. In section 2 the theoretical framework is presented. Section 3 provides an empirical preliminary testing of the model. Section 4 discusses the empirical findings. And, the last section concludes and derives some economic policy implications.

5.2 Theoretical framework of infrastructure financing

The simulation model is based on the Solow–Swan economic growth framework of Solow (1956) that has been broadly used in literature on public infrastructure and long run economic growth (e.g. Devarajan et al., 1996). Further, we assume that public capital is a public good and that the production function has constant returns to scale in the private inputs. The aggregate production function is assumed to take the following Cobb-Douglas form:

$$y_t = \Lambda_t Z_t^{\varphi} K_t^{\theta} L_t^{1-\theta} \quad \text{with } \varphi \geq 0 \text{ and } \theta < 0 \quad (5.1)$$

where y denotes total output (or GDP) of the economy, K is the private capital, L the labour force, φ and θ being respectively the productive infrastructure and private capital share, Λ_t denotes a measure of productivity that is assumed to be exogenous. Z^e is the productive infrastructure that can be procured by pure public investment or public-private partnerships (PPP) investment since public infrastructure can be financed by each of these forms of investment.

We can therefore isolate both *pure public investment* I_{pp} and *public-private partnerships (PPP) investment* I_{ppp} and compare their corresponding effects on total output. Thus we distinguish φ_1 and φ_2 such that φ_1 is the associated effect of public infrastructure funded by pure public investment and φ_2 is the one associated if the infrastructure is funded by a public-private partnerships (PPP) investment.

$$y_t = \begin{cases} \Lambda_t Z_t^{\varphi_1} K_t^{\theta} L_t^{1-\theta} & \text{if } Z_t^e(I_{pp}) \\ \Lambda_t Z_t^{\varphi_2} K_t^{\theta} L_t^{1-\theta} & \text{if } Z_t^e(I_{ppp}) \end{cases} \quad (5.2)$$

Under our testing intuition, we expect $\varphi_2 > \varphi_1$, stating that PPPs invest-

ment is more productive and efficient than pure public investment, such that the estimated coefficient of PPP investment is greater than that of the pure public investment, as it should be since PPP contracts do not impact the public infrastructure and services provision in the same way.

There are a number of reasons that have been advanced in the literature that make the hypothesis of $\varphi_2 > \varphi_1$ seem feasible. PPP is a form of collaboration between government and private sector aiming at realisation a project or supplying public services (European-Commission, 2003). In other words, as defined by Blöndal (2005), PPPs refer to arrangements whereby the private sector designs, finances, builds, maintains and operates (DFBMO) infrastructures assets provided traditionally by the public sector. Such contracts are made attractive, not only by the constraints on public funds, but also by efforts to improve the quality and efficiency of public services. However, the provision of these types of infrastructure is inherently high-risk, and this is actually why, as Uzunkaya (2017) pointed out, risk sharing is one of the conditions listed for private sector participation. In these types of contracts, both government and private sponsors achieve some gains adequate to level of realising by them particular assignments. In case responsibilities are allocated so that each sector does what it can do best, public services or infrastructure can only be provided more efficiently. Hence, PPP agreements are based on the goal of sharing the risks of providing public infrastructure and services, so that each player manages the risk it can best control. Then, PPPs contracts can be considered as a game in which public and private partner are the players and each has two strategies *vis-à-vis* risk during the project life cycle.

5.2.1 Gaming the risk allocation in PPPs contracts

According to Scharle (2002) the relationships among PPP participants can also be described in the language of ‘gaming’, where the government G and the

private company C are considered as two players in a co-operative game. Each player has two strategies to make facing the risk: either take and hence *manage* (m) or *transfer* (t). We discuss the risk allocation among PPP contractors through the following payoff matrix:

G, C	<i>manage</i>	<i>transfer</i>
<i>manage</i>	(G_m, C_m)	(G_m, C_t)
<i>transfer</i>	(G_t, C_m)	(G_t, C_t)

- (G_m, C_m) corresponds to the scenario in which both the government and the private company feel able to manage the risk. In this context the two parties can jointly manage the risk or let one party manage it by negotiating.

- (G_t, C_t) corresponds to the scenario in which both the government and the private company feel unable to manage the risk. Here we can distinguish two options: either (i) the risk is transferred to the insurance companies, or (ii) is jointly managed on the basis of a negotiation between the two parties.

- $(G_m, C_t), (G_t, C_m)$ corresponds to the scenario in which each party expects the partner to manage the risk on its own.

In the model, government and private company are acting on the basis of compromise and cooperation. The game in its presented form does not allow for a possible Nash equilibrium to be defined in this matrix. A numerical approach would be required for that purpose. Nash equilibrium is a situation in which no player has incentive to change a preferred choice knowing the decision of the opponent. As in all games, several Nash equilibria or none are possible. In any case, any changes in conditions and external environment of the projects, often pushing the cooperators towards renegotiation for example, leads to a modification in their expected payoff. As a result, both players

will change their initial choice to a better strategy, and thus the Nash equilibrium changes accordingly. Since PPPs are essentially long-term contracts, they are often vulnerable to various external changes that stem from political, social and economic environments. When this happens over the duration of the contract, both parties engage in renegotiation based on risk allocation, as any change in the PPP contract may alter the allocation of risks.

In fact, the government or the private partner do not face the same risk throughout the PPP project's cycle, and moreover do not have the same management and implementation skills. Therefore, the risks should be allocated to the parties who are able to manage them properly, and this is because the payoff will be greater the more one party can successfully handle the risk and therefore accept to take the risk. The choice of the government or the private sector to *manage* or *transfer* the risk is based on their respective expected benefits which in turn depend on the external environment and project characteristics.

A key point to remember here is that PPP relationships evolve in a context of imperfect information, e.g. once the PPP contract is concluded the government and the private operator are both in a Principal-Agent relationship. And hence, no one knows whether the other will make sufficient efforts to maximize their partner's payoff. Generally each party acts to optimize its own payoffs. Consequently, there are opportunistic behaviors on the part of contractors in PPPs contracts which ranges from rent-seeking behavior on the part of the private company to maximizing the chance of re-election¹ on the part of the government in place. Therefore, it is important that the two par-

¹Public authorities may use PPPs for reasons other than economic and social efficiency, such as electoral goals. Engel et al. (2009) consider that the probability of the government being re-elected is high, as much as the infrastructure investments made during the mandate are high. Thus, a government may involve in PPPs to overcome their short-term budget constraints by using private funds to finance public infrastructure (Checherita, 2009; Engel et al., 2009; Basílio, 2017).

ties cooperate along the life cycle of PPP project, maximising their bargaining power in order to increase their access to information and better address the risks involved. It is for this reason that Kargol and Sokol (2007) states that the detachment of decision making and decision executing, and unclear assignment of responsibilities between government and private company raises the risk associated with PPPs.

PPP contracting has risk-sharing advantages in terms of risk diversification by operators according to their risk management skills. This places the onus on the government to take on the risks it can manage, such as political, legal and institutional risk, and the liability for cost overruns that may occur with delays in awarding permits. The demand risk is also a matter for the government. As for the private partner, it has the responsibility to furnish the management skills and expertise necessary to operate and deliver the most efficient public infrastructure. However, it is clear that government should not substitute the market as an alternative mechanism for the provision of public goods and services, nor *vice versa*, in addressing social problems. Co-investment in terms of Public-Private Partnerships (PPP) allows using advantages both public and private sectors in increasing of social welfare.

As such, under the PPPs contracting, the coefficient related to productive infrastructure φ in equation (5.1) is likely to be higher on the basis of the foundations stipulating that risk allocation and management induce a greater impact φ_2 than the traditional provision of public goods and services via pure public investment φ_1 , making the testing intuition $\varphi_2 > \varphi_1$ plausible.

5.2.2 Welfare gains in Public-Private Partnerships (PPP) contracts

Consider an economy consisting of two sectors: public and private, each with a desired level of welfare. We assume that the public sector utility function

is related to both economic and social gains and their linked, while the private sector utility function is assumed to only related to economic gains. The public sector represented by the government (G) relies on a private company (C) to provide public infrastructure i and services j covering k sectors such as energy, transport, water and sewerage, telecommunication, and municipal solid waste. The cost of payments to the contractor is borne by the users. User demand in each sector $[Q_j^1(p), Q_j^2(p) \dots, Q_j^k(p)]$ is defined by assuming that in all sectors, C exerts the same level of effort in quality of infrastructure $(\theta_i^1, \theta_i^2 \dots, \theta_i^k)$ and effort in service quality $(\Psi_j^1, \Psi_j^2 \dots, \Psi_j^k)$. The demand function for services $Q_j^k(p)$ is stochastic and depends on the quality of the infrastructure and the effort of the company in providing the service. The users demand function is assumed to be inelastic and defined in terms of a price level p_0 such that:

$$Q_j^k(p) = \begin{cases} 0 & p > p_0 \\ q_0 + q\theta_i + \psi_j + \mu & \text{if } p \leq p_0 \quad \forall k \end{cases} \quad (5.3)$$

where the demand risk is assumed to be exogenous and is captured by the random μ with a normal distribution, $\mu \sim \mathcal{N}(0, \sigma^2)$. $q_0 \geq 0$ represents demand that can not be reduced, i.e the level of demand when no effort is made by C , and the marginal gain of the agents' efforts are positive in particular $q \geq 0$. Note that the quality effort induces a diminishing in the satisfaction without any coast disadvantages for the agent to enhance efforts. Hence, the expected income (R) of the company C can be expressed as follows:

$$E_\mu(R) = E_\mu[p_0 Q_j^k(p)] = p_0 E_\mu[Q_j^k(p)] \quad \forall k$$

$$E_\mu(R) = p_0 E_\mu(\max\{q_0 + q\theta_i + \psi_j + \mu, 0\}k) \approx p_0 (q_0 + q\theta_i + \psi_j)k,$$

where the approximation above holds when σ^2 is small enough compared to the base size of demand q_0 . In order to make our analysis simpler, we ignore any incentive issue on the cost side and suppose that there are no marginal costs of service delivery. Let's notice that, in monetary values, the desutility associated to the effort in infrastructure quality is counted of $\frac{\theta_i^2}{2}$ and the one in service quality is counted of $\frac{\psi_j^2}{2}$.

As mentioned in section 5.2.1, from the time the PPP contract has been signed between the government and the private company, the provision of infrastructure and services to the community occurs in a situation of moral hazard. However it is not possible to verify both θ_i and ψ_j . Faced with this context of asymmetric information coupled with moral hazard, the government (G) should provide incentives² for private company (C), thereby increasing efficiency in infrastructure and services quality, and allowing access to services at a lower cost than it was the case under the traditional public sector provision. In some situations, service quality may be observable, so PPP contracts can set targets up front and provide incentives for the private company to invest in achieving them, either through bonuses or penalties. Yet in cases where the quality of services cannot be observed, and therefore cannot be targeted and contracted, problems of moral hazard prevail to a greater extent. To achieve our objective³, we will focus on the latter case, and consider that

²This statement is based on the idea that moral hazard is the only source of incentive issue (Iossa & Martimort, 2009) and that, both buyer and seller are confronted with similar uncertainty about transaction costs and demand conditions in many procurement contexts, or otherwise, only the realized demand that is observable can be used ex ante at the contracting stage between G and C (Bajari & Tadelis, 2001).

³The objective is to show that there is an additional payoff in funding socioeconomic infrastructure through co-investment between the public sector and private partner compared to funding through traditional public investment. While much has been investigated in the economic literature about the impact of both public and Public-Private Partnership (PPP) investments on the aggregate output of countries, to our knowledge, this is not yet the case for the comparative effects of PPP and pure public investments in financing national output. Our presumption seems to be that the nature of the financing (whether it involves private participation or not) could lead

efforts in infrastructure quality and service quality are not observable. This assumption implies that in this context, PPP contracts take place in an imperfect information environment, which increases the risks associated with PPPs and therefore requires cooperation between government and the private company to better manage the risks, shared according to the competences of each or mutually managed. Let consider the size of the realized demand Q as an indicator of quality and Φ as the incentive given by the government G to the private company C with respect to quality levels. G is considered to be risk-neutral. Therefore, G maximizes its expected social welfare function measured by the social gain of the service net of the costs and incentive payment granted to C . The private company C for its part maximizes its expected gain while being risk-averse with constant absolute level of risk-aversion $\pi > 0$.

5.2.2.1 Under the Pure Public investment

In this scenario, the government builds or purchases physical assets, retains ownership of them, and uses public sector employees or private contractors to provide the required service. The equilibrium is solved in three steps.

In the first step, the government contracts the builder of the infrastructure, and then the operator, which is separate from the builder. This operator is rewarded by a rule of rent-sharing $h(R)$. As already shown in [Bajari and Tadelis \(2001\)](#) and [Iossa and Martimort \(2009\)](#), we follow their lead and also restrict our analysis to linear contracts of the form

$$h(R) = w + \Phi R$$

where $\Phi \in [0, 1]$ can take on only two extreme values, and w represents a fixed

the two parties to cooperate in order to reduce the sources of inefficiencies that may exist in the provision of public infrastructure and services which are the main channels through which these investments affect national output.

payment or subsidy awarded to the company. Φ is the share of the profits that is left to the company and the rest $\lambda = 1 - \Phi$ is carried by the government. Notice that $\Phi = 0$ is a fixed payment contract with the fee payment of $w > 0$ meaning that the government mandates the operator to provide the services in exchange for a fixed payment that does not depend on the actual level of usage of the services, such that the government is bound to assume all demand risks. Otherwise, $\Phi = 1$ and there is no additional compensation fee payment, i.e. $w = 0$. In this case, the operator earns its revenue by charging the end users of the infrastructure directly and controls all demand risks.

Now, let's consider that the operator receives a fixed incentive payment⁴ that depends rather on the demand achieved Q . The builder has no incentive to put any effort into the design of the project, as the fee he receives is fixed and does not cover the efforts made to improve the quality of the building, hence:

$$\theta_{i/tr}^k = 0, \quad \forall k \tag{5.4}$$

Second, let's look at the operator's side. The incentives constraint under the assumption that provider will maximise the certain amount of its expected utility by accounting for the builder's effort, is given by:

$$\psi_j^k = \sum_k \left[w + \Phi p_0 (q_0 + \tilde{\psi}_j) - \frac{\tilde{\psi}_j^2}{2} - \frac{\pi \sigma^2 \Phi^2 p_0^2}{2} \right] = k \Phi p_0 \tag{5.5}$$

Remember that to simplify the analysis, we had previously assumed that the company exerts the same level of effort regardless of the sector k . In this scenario, an increase in the share of profits Φ left to the company C encour-

⁴The justification for this fixed payment assumption is developed in [Iossa and Martimort \(2009\)](#), see p.8

ages the effort to improve demand and consequently a greater operational risk which is transferred to C i.e. a premium risk that can be quantified by $\frac{\pi\sigma^2\Phi^2}{2}$. If a government has up-front negotiating power with the builder and provider, it will be tempted to take all their profit, making its partners indifferent between delivering the service and securing their standardized external opportunities at zero. Then, the payment amount of fee w is set to cover the premium risk necessary to attract a risk-averse operator willing to take certain operational risks as required by the granting of incentives.

And last, we assume that the government maximizes social welfare under the incentive constraints (5.4) and (5.5) while taking into account the total profits as well as the costs of investing in efforts, covering the risk premium. The problem of social welfare maximization of G is thus written:

$$\sum_k \left[\max_{\psi} p_0 (q_0 + \psi_j) - \frac{\psi_j^2}{2} - \frac{\pi\sigma^2\Phi^2 p_0^2}{2} \right], \text{ subject to (5.5)}$$

However, we can express the effort and marginal pay-off as follows in the second-order equilibrium (SBE).

$$\sum_k \psi_{j/tr}^{SB} = \Phi^{SB} \sum_k p_0 = k \frac{p_0}{1 + \pi\sigma^2} \quad (5.6)$$

As indicated above, $\Phi^{SB} \in [0, 1]$. This implies that the risk-averse company only gets a portion of the total profit due to insurance reasons and under-supplied effort below the first-best solution. Then, the fixed payment w^{SB} is set such that the company breaks even in the expectation. It should be recalled once again that granting incentives commits the company to taking more risk. Indeed, this risk is socially costly so that the effort under the first-best condition is more than its second-best level. The social welfare under the traditional

public sector investment can be expressed as:

$$SW_{tr}^{SB} = \left(p_0 q_0 + \frac{p_0^2}{2(1 + \pi\sigma^2)} \right) k \quad (5.7)$$

5.2.2.2 Under the Public-Private Partnership (PPP) contracting

In PPP contracts, government G transfer investment investments projects from public sector to the company C in private sector. It consists of a long-term contractual arrangements where C participate in, or supports G in the delivery of public infrastructure. In such collaboration, private company C can finance, design, build, maintain and operate public infrastructure. So, under the PPP scenario, C is in charge of the infrastructure's building and operational aspects, and can therefore decide either to maximize θ_i or ψ_j

$$(\theta_i, \psi_j^k) = \sum_k \left[w + \Phi p_0 (q_0 + q\tilde{\theta}_i + \tilde{\psi}_j) - \frac{\tilde{\theta}_i^2}{2} - \frac{\tilde{\psi}_j^2}{2} - \frac{\pi\sigma^2\Phi^2 p_0^2}{2} \right] \quad (5.8)$$

Accounting for the additional non-negativity constraint $\theta_i \geq 0$, the incentive constraints can be expressed as below:

$$\psi_j = k\Phi p_0 \quad \text{and} \quad \theta_i = k\Phi p_0 q = \psi_j q \quad (5.9)$$

Let us point out that the level of effort in the quality of the services provided is the same under both the traditional public sector provision and the PPP contracting. This remark is not similar for the infrastructure quality θ_i given the positive external effects that are internalized in PPP contracts.

The private company C benefits from somewhat internalizing the cost of building high quality infrastructure since its revenues depend on it, and ad-

ditionally the incentives granted by G are all the greater the more risk⁵ is transferred to C as is the case with public-private partnerships, since quality is difficult to contract. The government's problem is to maximize its payoff by taking into account how the Company C opts to invest in the quality of the infrastructure and effort. The G 's problem is expressed as follow:

$$\sum_k \left[\max_{\theta, \psi} p_0 (q_0 + q\theta_i + \psi_j) - \frac{\theta_i^2}{2} - \frac{\psi_j^2}{2} - \frac{\pi\sigma^2\Phi^2 p_0^2}{2} \right] \text{ subject to } (6.7)$$

at equilibrium, the following levels of effort can be derived:

$$\psi_{j|pp}^{SB} = \frac{p_0(1+q^2)}{(1+q^2+\pi\sigma^2)}k \quad \text{and} \quad \theta_{i|pp}^{SB} = \frac{p_0q(1+q^2)}{(1+q^2+\pi\sigma^2)}k$$

when public and private actors contract in co-investment, the social welfare is

$$SW_{pp}^{SB} = p_0q_0k + \frac{p_0^2(1+q^2)}{2(1+q^2+\pi\sigma^2)}k$$

As a result, PPP payoffs far outweigh the payoffs from pure public investment

$$SW_{pp}^{SB} > SW_{tr}^{SB}$$

The welfare payoff under investment through public-private partnership (PPP) raises with the magnitude of the external effect q so that:

$$\frac{\partial}{\partial q} (SW_{pp}^{SB} - SW_{tr}^{SB}) > 0$$

⁵The allocation of risks between the two parties (G and C) has been discussed in this section. Cooperation allows for the transfer of risk to either the public or private sector as is necessary, and thus allows for better management of risks associated with PPP contracts. Thus, when the government transfers more risk to the private company, it is expected that the fee payment will be set at a level that covers the risk, at least the premium risk, given that C is risk averse, $\pi > 0$.

Applying PPP is associated with a lot of benefits: increasing the quality of public goods or infrastructure, decreasing of costs of their providing, or more efficient allocation of resources. In particular, if the investment is made on the basis of a partnership between government and the partner, there is a quality-enhancing effort and increasing in cost-reducing effort in the provision of infrastructure. The PPP contract also provides a framework for efficient risk management, such that greater powered incentives and more operational risk being transferred to the private sponsors.

Proposition: *Public-private partnerships (PPP) investment is more productive and efficient than pure public investment, as we showed PPP contracts do not impact the infrastructure quality and service provision in the same way. Public-private partnerships provide a better management and risk-sharing framework between government and private partners and allow for the transfer of certain risks to the private sector against payment of incentives, thereby improving the quality of infrastructure and services provided.*

5.2.3 Comparative payoffs for households

Since financing on the basis of public-private partnerships has a greater impact on the economy than financing through pure public investment, this additional impact is felt in the utility of citizens. Each household derive utility $u(\cdot)$ from private consumption c and public infrastructure and services w , so that household's utility per time t is given by

$$U(q_1, \dots, q_c, SW^{SB}) = u(q_1, \dots, q_c) + SW^{SB} \quad (5.10)$$

Each country having a population size n , then

$$w = \frac{1}{n} SW^{SB}$$

is the public consumption benefiting household. Consequently, household maximizes its welfare by combining consumption c (with $c = 1, \dots, C$) and gain of public projects:

$$U = \int_0^{\infty} u(c)e^{-\rho t} dt + w$$

where ρ denotes the time preference. The utility function can be usefully written in its isoelastic form as follows:

$$u(c) = \frac{c^{1-\delta} - 1}{1 - \delta}, \quad \delta \neq 1$$

More precisely, the specific functional forms for utility function under the traditional public sector provision funding through pure public investment,

$$U(c, w) = \int_0^{\infty} e^{-\rho t} \left(\frac{c^{1-\delta} - 1}{1 - \delta} \right) dt + \frac{1}{n} k \left(p_0 q_0 + \frac{p_0^2}{2(1 + \pi \sigma^2)} \right) \text{ subject to (5.2) if } Z_i^e(I_{pp})$$

is compared to the the specific functional forms for utility function under the contracting public-private partnership (PPP) investment

$$U(c, w) = \int_0^{\infty} e^{-\rho t} \left(\frac{c^{1-\delta} - 1}{1 - \delta} \right) dt + \frac{1}{n} k \left(p_0 q_0 + \frac{p_0^2(1 + q^2)}{2(1 + q^2 + \pi \sigma^2)} \right) \text{ subject to (5.2) if } Z_i^e(I_{PPP})$$

5.3 Some preliminary testing

5.3.1 Empirical prediction

In this section we perform an empirical test of our prediction model. The purpose of this test is simply to provide empirical evidence to support our modelling intuition. To this end, we conduct an empirical investigation comparing

the impact of public investment to PPP investment on economic growth in 14 Sub-Saharan African Countries. For this aim, we employed the linear Pooled Mean Group (PMG) estimator for dynamic heterogeneous panels developed by Pesaran et al. (1999). Since our data covers a small number of countries as compared to the number of period $N = 14$ and $T = 28$, the PMG estimator is therefore likely to provide more consistent results than the classical dynamic model from panel data of Arellano and Bond (1991), because a longer period is a synonym of increasing the number of instruments and throws back the null hypothesis of instrument exogeneity through the Sargan validity test. Accordingly, the GMM only grasps the short-term dynamics of the data. Thus, our study applied a panel ARDL approach to account for the short- and long-run effects prevailing between variables. The ARDL(p, q_1, \dots, q_k) dynamic panel is specified in the form:

$$y_{it} = \mu_i + \sum_{j=1}^p \delta_{ij} y_{i,t-j} + \sum_{j=0}^q \gamma'_{i,j} X_{i,t-j} + \varepsilon_{it} \quad (5.11)$$

where the subscripts i and t represent respectively country and time period. The dependant variable y_{it} is the real GDP per capita growth; X_{it} is a $k \times 1$ vector of our explanatory variables with γ'_{ij} the coefficient vectors having also $k \times 1$ dimension; δ_{ij} are the scalars or the lag dependent variable coefficients; μ_i is country-specific effect; and ε_{it} represents the time-varying regression residual.

The specific model for PMG estimator in which we redefine into the error-correction equation is given below:

$$\Delta y_{it} = \varphi_i (Ec_{it}) + \sum_{j=1}^{p-1} \delta_{ij}^* \Delta y_{i,t-j} + \sum_{j=0}^{q-1} \gamma'_{i,j} \Delta X_{i,t-j} + \vartheta_{it} \quad (5.12)$$

where ϑ_{it} denotes the errors independently distributed for the country i and the time t ; $\varphi_i = -(1 - \sum_{j=1}^p \delta_{ij})$; $Ec_{it} = y_{i,t-1} - \theta'_i X_{it}$ with $\theta_i = \sum_{j=0}^q \gamma_{it}/(1 - \sum_k \delta_{ik})$; $\delta_{ij}^* = -\sum_{m=j+1}^p \delta_{im}$ with $j = 1, 2, \dots, p-1$; and $\gamma_{ij}^* = -\sum_{m=j+1}^q \gamma_{im}$ with $j = 1, 2, \dots, q-1$;

The parameter φ_i is the error-correcting of adjustment speed term which defines the long-term convergence or divergence of the model. In the model, the convergent or divergent nature depends on the sign of the value of error correction term. This parameter is expected to be significantly negative under the prior hypothesis that the variables show a return to a long-run equilibrium. But, in case it is equal to zero i.e $\varphi_i = 0$, that means there would be no evidence for a long-run relationship.

Three candidates' approaches are suggested in the literature on dynamic heterogeneous panel estimation for estimating of equation (6.2). First, we have the dynamic fixed effects (DFE) estimation approach in which the time-series data for each country (i) are pooled and only the intercepts are allowed to differ across countries. Second, we have the Mean Group (MG) estimator that fits the model separately for each country (i), computes a simple arithmetic average of the coefficients, and allows the intercepts, slope coefficients, and error variances to differ across countries. And finally, we have the PMG estimator that combines both pooling and averaging that allows the intercept, short-run coefficients, and error variances to differ across the country (as would the MG estimator) but constrains the long-run coefficients to be equal across countries (as would the DFE estimator). The specification used a Maximum Likelihood (ML) method to estimate the parameters since the equation (6.2) is non linear in parameters (see Pesaran et al., 1999). The test of difference giving the efficiency gain among these three models is carried out with the familiar Hausman test. We use alternatively each of these three

estimators only for the baseline model.

5.3.2 Data and choice of variables

The data set consist of annual observations over the period 1990 – 2017 and covers 14 Sub-Saharan African countries⁶. Our analysis considers for both, time and cross-country variation in the data. The choice of these countries is based on the availability and accuracy of data, especially data on investments in PPPs that are our primary concern.

In our Investment-growth model, the dependent variable is economic growth measured by the growth rate of real GDP per capita. Notice that governments make investments to pursue a variety of objectives, including increasing per capita income. The reason we focus on growth is that since growth is one of the government’s goals, it is then useful to assess the contributions of both pure public and PPP investment to this goal.

Actually, as we are interested in the comparative effects of pure public and PPP investments as driver of economic growth, we used two variables of interest for capturing the investment-growth impact : pure public and public-private partnerships (PPP) investments. Thus, we expect not only that these two investment measures have positive effects as shown in a part of the existing literature, but above all that, an increase in the PPP investment will produce a greater effect than that of an increase in the pure public investment. The investment flows data are from the IMF Investment and Capital Stock Dataset⁷ (2019).

⁶The 14 countries covered by this analysis are: Benin, Burkina Faso, Cameroon, Congo Republic, Cote d’Ivoire, Gabon, Gambia, Ghana, Guinea, Mali, Nigeria, Senegal, Sierra Leone and Togo.

⁷Most of the time, studies on Public-Private Partnerships use data from the Private Participation in Infrastructure (PPI) Project Database. The PPI database has data on over 6,400 infrastructure projects in 137 low- and middle-income countries and covers projects in energy, transport, water and sewerage, telecommunications, and Municipal Solid Waste (MSW) sectors. Projects

The set of controls variables includes the initial GDP per capita to account for the conditional convergence hypothesis assuming that economic growth converges across countries and over time, and several underlying factors that can affect the change in the growth rate of GDP per capita. Key among these are the physical capital measuring by the investment in gross capital formation, the government expenditure in percent of GDP to control for the effect of government spending and taxation, the growth rate of population as proxy for the change in labour force, the trade openness to appraise the effect of international shocks on domestic economic growth, the ratio of domestic credit to GDP accounting for the important role played by the private sector in expanding production capacity, and the broad money stock that is used to consider the effect of currency in circulation and demand deposits. We use the value of one year's lag in the GDP per capita variable to measure its initial level in order to pick out the convergence tendency of Solow (1956), an insight that countries with lower initial production per capita (poorer countries) grow faster than those with higher production per capita (richer countries) and converge to similar levels of income. We therefore expected the sign of this variable to be negative to confirm this principle. According to the economic growth literature, certain of our control variables are expected to have positive effects such as physical capital, growth rate of population, trade openness, the ratio

include management or lease contracts, concessions, greenfield projects, and divestitures. However, the use of PPP investment data derived from this database could be problematic in case of our analysis. The logic behind this claim is that the total investment commitments agreed at the financial closure of a PPP project. Romp and De Haan (2005) consider that the use of such data should be considered as being in the upper bound of the size of PPPs. As a matter of fact, it makes more sense to use a measure of PPP investments that varies with actual PPP investments over the life cycle of a project. Certain authors, among whom Romp and De Haan (2005) and Kappeler and Nemoz (2010) have tackled this measurement problem and proposed to spread the amounts of investment commitment equally over certain years. It is for this interest that we have chosen to use the IMF Investment and Capital Stock Dataset which constructed its PPPs flows for 170 countries by spreading the total transaction amounts over 5 years to convert to yearly PPP investment flows expressed in constant 2011 international dollars.

of domestic credit to GDP and while negative effects are expected for others as government expenditure as a share of % of GDP and broad money stock (positive/negative sign can be expected). The definition of data used in this analysis and its measurement, derived from different sources are presented in Table 5.6 in appendix.

A descriptive analysis (Tables 5.4 and 5.5 in appendix) of the investment data shows that the average share of pure public investment in GDP (4.46%) remains relatively higher than that of PPP investment (0.49%) in our sample. The maximum PPP investment was reached in The Gambia in 2014, accounting for 14.8% of GDP. But in terms of pure public investment, the maximum represents 26.3% of GDP in 2013 in Congo Republic.

A view at the country level indicates that Togo and The Gambia have the highest average level of PPP investment at 1.29% and 1.62% of GDP respectively. In Togo, such investments have been drained by major infrastructure projects, particularly those of railways, electricity and above all thermal power stations, container terminals and the port of Lome. In The Gambia, it concerns the natural gas transmission, water and electricity management and ACE (African Coast to Europe) submarine infrastructure projects. Among the countries in our sample, the Congo Republic has the highest level of pure public investment as a percent of GDP of 26.3% in 2013 with a mean of 8.8% ahead of Burkina Faso which spent in average 6.47% of its GDP on pure public investment over the period 94 – 2017.

5.3.3 Results

First, we perform the unit root test in order to verify and take into account for non stationarity in the variables due to the wide time period in our study. To achieve that, we apply a second-generation panel unit root test, based on Pesaran (2007) unit root test, for variables in level and in first differences, the

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results of which are reported in the Table 5.1. We can remark through these results that some variables are stationary I(0) while others non-stationary in level, but that all the variables have been found to be stationary in the first differences I(1). Given that the order of integration of our series does not exceed I(1) the application of the ARDL model in such context would be largely satisfying.

Table 5.1: Panel Unit root test by Pesaran (2007)

CIPS stats	Variables in levels				Variables in first differences			
	Zt-bar ^a	p-value	Zt-bar ^b	p-value	Zt-bar ^a	p-value	Zt-bar ^b	p-value
GDP per Capita growth	-4.587	0.000	-2.701	0.003	-13.36	0.000	-11.51	0.000
Initial GDP per Capita	4.930	1.000	-0.541	0.294	-4.375	0.000	-1.724	0.042
Pure public investment	-3.287	0.001	-3.270	0.001	-9.334	0.000	-8.215	0.000
PPP investment	0.574	0.717	1.376	0.916	-3.651	0.000	-1.360	0.087
Private capital	-2.582	0.005	-2.409	0.008	-8.331	0.000	-6.304	0.000
Government expenditure	-1.061	0.144	-1.017	0.155	-7.073	0.000	-4.971	0.000
Population growth	-10.00	0.000	-13.30	0.000	-12.23	0.000	-13.29	0.000
Trade openness	0.187	0.574	1.099	0.864	-7.560	0.000	-6.230	0.000
Money stock	-3.624	0.000	-1.839	0.033	-6.617	0.000	-5.278	0.000
Domestic credit	-4.497	0.000	-1.965	0.025	-8.705	0.000	-7.492	0.000
Central government debt	-2.030	0.021	-0.895	0.186	-8.186	0.000	-6.736	0.000

Note: (a) constant included (b) constant and trend are included. Lags equal to 1.

The results of the benchmark models using the three different candidate estimators, including PMG, MG and DFE are presented in Table 5.3 in appendix. The test of difference in these estimators is performed with the familiar Hausman test. The results provide the dynamic relationships i.e. short-run and the long-run relationships among variables. Whatever the model, the Hausman statistic (Table 5.3 in appendix) confirms the null hypothesis of the constraint of uniformity of the coefficients in the long run, indicating that the PMG is more efficient and consistent than the other candidates (MG and DFE) and that the simultaneous equation bias is minimal for these data (Pesaran et al., 1999).

In the output shown in the Table 5.2, the estimated Short-run coefficient of pure public investment is positive and statistically non-significant. Also, the

Short-run coefficient of PPP investment is statistically non-significant, but exerts negative effect. Often under the PMG estimator, only the long term parameters are of interest. The error correction parameter is found to be significantly negative, confirming the prior hypothesis that the variables show a return to a long-run equilibrium, in both the growth-pure public investment and growth-PPP investment models. The higher marginal productivity of PPP investment is precisely what we want to test, and so the most interesting results from the point of view of these estimates are the two respective coefficients of pure public investment in model (1) and PPP investment in model (2). In other terms, $\varphi_2 > \varphi_1$.

Considering the models (columns 1 and 2) in Table 5.2, we find that the coefficient of pure public investment $\varphi_1 = 0.174$ is positive and significantly different from zero at the 1% level. And more interestingly of course, the marginal impact of PPP investment also turned out to be positive with a coefficient $\varphi_2 = 0.547$ that is also statistically significantly and different from zero at 1%. On the basis of these estimates, there is little doubt that the long-term growth effects of PPP investment outweigh the long-term growth effects of pure public investment as expected. We can therefore confirm the tested hypothesis previously announced, according to which, investing through public-private partnerships would produce greater economic and social benefits than conventional public investment, so that $\varphi_2 > \varphi_1$. All things being equal, PPP investment would produce 3.14 times more economic growth impacts than pure public investment in the long term.

In order to further explore the effects of PPP investment on growth in debt times, we re-estimated model (2), introducing an interaction term of PPP investment with a debt conditional variable being 1 when the debt level is above 70% of GDP and 0 otherwise, in line with the convergence criteria in practice in the sample countries. The results are also presented in the Table 5.2

(column 3a) and the interaction variable is named *debt conditions*. Since the coefficient of *debt conditions* variable is significantly different from zero at 1%, it suggests that there would be a certain difference in the impact of PPP investment on the countries' economic growth linked to their level of indebtedness. The coefficient has a negative sign. In concrete terms, this result means that PPP investment produces a lower impact in countries with a high level of debt (the level of debt in our analysis is set in reference to the community debt threshold set by convergence criteria) compared to those with a low level of debt. But in fact, this gives us no idea of the magnitude of the effect of PPP investment on growth in highly indebted countries. To find this out, we should first consider another coefficient such as that of PPP investment. In the case of the latter, we can see that this coefficient has a positive slope, with an amplitude of 0.438 and close to being significantly different from zero at the 10% level. This coefficient is interpreted as the impact of PPP investment in countries with low debt levels, i.e. below the threshold of 70% of nominal GDP. Hence, for countries with a high level of debt (more than 70% of GDP), the impact of PPP investment on economic growth is given by $0.438 + (-0.958) = -0.52$. The interpretation is that PPP investment rather decelerates the growth process in countries with high levels of debt. A possible explanation for this identified negative conditional effect on public debt relates to the fact that PPPs do not always avoid long-term debt distress. It should be noted that long-term contracts defer payment obligations and spread them over long periods, and therefore the fiscal consequences of PPPs are often overlooked in the short term. However, the full fiscal implications of PPPs only become clear once the payment obligations of PPPs contracts affect the government budget. Thus, countries with a high level of debt at the outset, face an unsustainable debt situation afterwards in meeting PPP obligations. Yet it is clear that a high level of public debt is likely to crowd out long-

term economic growth. For example, excessive debt increases the interest rate which slows down growth by increasing the demand for loanable funds, or it causes high inflation that modifies consumption behaviour over time in relation to so-called rational consumer expectations. In addition, there is also the channel of taxation, as the payment of debt servicing requires an increase in taxes, leading to a fall in disposable income (and therefore savings), and thus crowding out private investment, which is the essential link in the chain of growth.

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Table 5.2: Results of empirical prediction using PMG estimator

VARIABLES	Public	PPP	debt> 70	debt> 80	debt> 90
	(1)	(2)	3a	3b	3c
Long-Run effects					
Investment variables	0.174*** (0.008)	0.547*** (0.003)	0.438* (0.089)	0.639*** (0.004)	0.183 (0.314)
Debt conditions			-0.958*** (0.009)	-0.657** (0.029)	-0.607* (0.074)
Per capita GDP, year's lag	-0.004*** (0.000)	-0.007*** (0.000)	-0.007*** (0.000)	-0.006*** (0.000)	-0.006*** (0.001)
Private capital	0.215*** (0.000)	0.234*** (0.000)	0.389*** (0.000)	0.240*** (0.000)	0.334*** (0.000)
Government expenditure	-0.140** (0.011)	-0.215*** (0.000)	-0.344*** (0.003)	-0.232*** (0.000)	-0.295*** (0.002)
Population, annual growth	0.136 (0.609)	1.014*** (0.000)	1.449*** (0.002)	1.082*** (0.000)	1.194*** (0.002)
Trade openness	0.023** (0.020)	0.028*** (0.006)	-0.034** (0.040)	0.031** (0.011)	-0.013 (0.339)
Domestic credit	0.088** (0.038)	0.129*** (0.001)	-0.071 (0.167)	0.091** (0.026)	-0.013 (0.757)
Money stock	-0.047* (0.091)	-0.071*** (0.005)	0.028 (0.484)	-0.052* (0.074)	0.010 (0.777)
Short-Run effects					
Error Correction	-1.248*** (0.001)	-1.152*** (0.000)	-0.617** (0.017)	-1.172*** (0.000)	-0.806*** (0.004)
Δ.Investment variables	0.078 (0.664)	-0.032 (0.990)	1.401 (0.618)	0.254 (0.923)	0.916 (0.737)
Δ.Debt conditions			-2.315** (0.020)	7.211 (0.171)	3.700 (0.433)
Δ.Per capita GDP, year's lag	0.041 (0.247)	0.031 (0.315)	-0.032 (0.271)	0.032 (0.281)	-0.007 (0.825)
Δ.Private capital	-0.113 (0.251)	-0.105 (0.331)	-0.064 (0.582)	-0.120 (0.259)	-0.094 (0.382)
Δ.Government expenditure	-0.122 (0.534)	0.165 (0.368)	0.144 (0.464)	0.168 (0.391)	0.136 (0.475)
Δ.Population, annual growth	13.530 (0.153)	9.859 (0.290)	5.269 (0.597)	8.914 (0.352)	7.482 (0.430)
Δ.Trade openness	0.015 (0.704)	0.002 (0.946)	-0.002 (0.947)	-0.017 (0.607)	0.002 (0.941)
Δ.Domestic credit	0.362 (0.330)	0.375 (0.362)	0.510 (0.134)	0.380 (0.366)	0.512 (0.169)
Δ.Money stock	-0.148 (0.339)	-0.202 (0.244)	-0.204 (0.292)	-0.188 (0.281)	-0.249 (0.157)
Constant	0.230 (0.774)	1.317 (0.224)	2.328*** (0.004)	0.396 (0.677)	1.677** (0.029)
Observations	357	357	355	355	355
Number of id.	14	14	14	14	221
Log Likelihood	-757,35	-760,13	-746,96	-751,45	-753,70

Note: Pvalues in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

In line with this idea of testing the magnitude of the impact that PPP investment would have on countries' economic growth according to different level of debt, we simulate once again a deepening of the debt level by 10% of GDP beyond the threshold, which can indicate a period of severe fiscal constraint. Thus, countries with severe budgetary constraints are defined as those with a public debt of more than 80% of GDP, i.e. 10% or more outside the community level. These results are reported in column 3*b*. The findings seem to be similar to the previous one. One thing that is different, however, is that the slope is steeper at the 80% debt level (from column 3*a* to 3*b*). This indicates that, for countries whose debt is increasing but remains below or equal to 80% of GDP, investments contracted in the form of PPPs continue to accelerate the country's economic growth, even to a greater extent, and consequently above 80%, there is a downward trend in the growth diminishing effect of PPP investment (in column 3*b*, the impact of PPP investment for higher debt countries is given by the magnitude $0.639 + (-0.657) = -0.018$). From this point of view, reaching the community debt threshold is not a fact that could possibly harm the returns from PPP investments. However, if debt exceeds 90% of GDP, no growth enhancing effect of PPP investment can be predicted by our results, as can be seen in column (3*c*), where the coefficient of PPP investment is found to be positive but not significant.

In summary, the results in Table 5.2 indicate the following: firstly, both pure public investment and PPP investment positively drive economic growth in countries, and of the two, PPP investment appears to have the greater effect. Secondly, that the stimulus effect of PPP investment remains and seems to be more powerful even beyond the community debt threshold. And finally, that PPP investment is unlikely to produce any positive growth effects when the debt level reaches a certain level of 90% of GDP in the country.

After having looked at the coefficients of the different investment vari-

ables, we can now describe the relative contributions of the different factors controlling the growth of production. Most of the control variables have the expected sign and are overall significant in long-run, whatever the specification. The initial GDP per capita is a key determinant of long-run economic growth. The negative sign of the associated coefficient confirms the conditional convergence hypothesis (Solow, 1956) saying that countries with a low level of per capita income grow faster than those with a high level of per capita income. The accumulation of the capital stock, population growth, trade openness, and domestic credit also boost long-term economic growth. In contrast, the stock of money and government expenditures induce a fall in the long-run growth. The negative sign of the money stock is not necessarily expected. That said, the long-term impact of an increase in the money supply is always difficult to predict. The increase in the stock of money leads to artificially increase the prices of assets. That is a misallocation of capital which leads to speculative investments, resulting in volatile asset prices followed by a contraction in economic activity. We note that the significance of each of these coefficients improved in the specification including PPP investment and had relatively higher impacts (see Figure 5.1 in appendix), all significant at the 1% level.

5.4 Concluding remarks

There are pervasive arguments in the economic literature that Public-Private Partnerships (PPP) investments yield more efficient economic and social benefits than conventional public investments, but there has been no empirical investigation of this premise in the case of many economies, especially those suffering from budgetary constraints. Obviously, the lack of convincing empirical proof, the superiority of PPP arrangements over the classic public in-

vestment in stimulating overall growth in the economy is very difficult to assert. That is why this study carried out a comparative analysis of the spillover effects of public-private partnerships (PPPs) and traditional public investments in 14 Sub-Saharan African countries. To achieve this goal, we first drew on game theory to show that cooperation between the government and the private operator guarantees a better allocation and management of risks associated with the provision of public infrastructure and services, and therefore improves the gains for each stakeholder. Second, we drew on [Iossa and Martimort \(2009\)](#) model to design a conceptual framework showing that PPP investments would produce greater benefits than pure public investments by providing incentives and transferring a number of risks to the private company, and the government itself taking on those risks for which it has the skills. And lastly, we have explored whether a higher level of debt matters for the growth stimulating effect of PPP investments.

Our paper leads to the following conclusions: the principal finding is that both PPP investment and pure public investment are key drivers and differently affect long-term rate of economic growth. In fact, PPP investment and public investment do not affect marginal productivity in the same way. Moreover, and perhaps more interesting for the debate on financing economies in countries with budgetary constraints, PPP investment plays an important and more powerful role than public investment in stimulating the growth process. Therefore, one can argue that the intuition according to which PPP investment would have a greater impact than traditional public investment is supported by empirical proof. As a follow-up, we also observe that a level of debt plays a distinctive role in the growth potential of PPP investments. And as long as this level remains below a certain threshold, there is a growth accelerating impact. In more precise terms, the growth enhancing impact of PPP investment is consolidated as the level of debt increases to a point where any favorable

impact could not be expected.

From the overall mix of these results, it is possible to draw some policy implications. One lesson is that PPPs are a credible alternative source of financing to traditional public investment. Therefore, PPPs are a way to overcome fiscal constraints, and a tool for carrying out public investments when governments lack the resources to finance infrastructure projects. Indeed, governments are required to create conditions that can attract private partners to public-private partnerships (PPP) investments. The aim is for the government to ensure cohesive political institutions, stable political environment, macroeconomic stability, a sound fiscal and legal base, and a strong litigation system, all of which are essential to attract PPP investment and make it successful. The hoped-for benefits of these policies of attracting private partners into PPP contracts are intended to produce growth-multiplying effects in the long term and improve social welfare of populations. However, for countries with high public debt, it is advisable to match increases in public investment with commensurate increases in public savings by mobilizing additional revenues, for example by raising taxes or switching spending priorities.

Another lesson concerns the consolidation of the macroeconomic and discipline framework established by the convergence criteria. Some have already begun to query the real impact of compliance with the convergence criteria on the population's well-being. With regard to the criterion that sets the ceiling of debt at 70% of GDP, our study opens the way for thinking about a possible re-examination of these convergence criteria that could create a fiscal space, especially in the current context of fiscal constraints, at least in the countries in our study. Above all, it is clear that PPP investments have a greater growth accelerating effect than traditional public investment, as they enhance the quality and efficiency of services, and are certainly an alternative source of financing

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for economic and social infrastructure.

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Appendix

Table 5.3: Benchmark models using PMG, MG, and DFE estimators

VARIABLES	Pure Public investment			PPP investment		
	PMG	MG	DFE	PMG	MG	DFE
Long-Run effects						
Investment variables	0.174*** (0.008)	-0.028 (0.964)	0.031 (0.766)	0.547*** (0.003)	5.013 (0.238)	0.004 (0.986)
Per capita GDP, year's lag	-0.004*** (0.000)	-0.082 (0.222)	-0.001 (0.155)	-0.007*** (0.000)	-0.041 (0.196)	-0.000 (0.109)
Private capital	0.215*** (0.000)	-0.235 (0.789)	-0.020 (0.823)	0.234*** (0.000)	0.240 (0.367)	-0.017 (0.814)
Government expenditure	-0.140** (0.011)	-0.049 (0.968)	-0.191* (0.095)	-0.215*** (0.000)	-1.481 (0.241)	-0.203* (0.094)
Population, annual growth	0.136 (0.609)	109.620 (0.266)	2.018*** (0.000)	1.014*** (0.000)	28.726 (0.136)	2.054*** (0.000)
Trade openness	0.023** (0.020)	0.171 (0.313)	0.051** (0.021)	0.028*** (0.006)	-0.065 (0.799)	0.050** (0.021)
Domestic credit	0.088** (0.038)	0.699 (0.180)	-0.054 (0.609)	0.129*** (0.001)	1.227 (0.157)	-0.063 (0.549)
Money stock	-0.047* (0.091)	0.128 (0.737)	0.106 (0.244)	-0.071*** (0.005)	-0.690 (0.247)	0.116 (0.203)
Short-Run effects						
Error Correction	-1.248*** (0.001)	-0.617 (0.642)	-0.987*** (0.000)	-1.152*** (0.000)	-1.115 (0.311)	-0.992*** (0.000)
Δ.Investment variables	0.078 (0.664)	0.139 (0.696)	0.072 (0.555)	-0.032 (0.990)	3.004 (0.522)	-0.271 (0.505)
Δ.Per capita GDP, year's lag	0.041 (0.247)	-0.164 (0.406)	0.002 (0.570)	0.031 (0.315)	-0.019 (0.878)	0.002 (0.519)
Δ.Private capital	-0.113 (0.251)	-0.067 (0.575)	0.018 (0.845)	-0.105 (0.331)	-0.100 (0.507)	0.020 (0.810)
Δ.Government expenditure	-0.122 (0.534)	0.240 (0.247)	0.016 (0.903)	0.165 (0.368)	0.512 (0.209)	0.028 (0.828)
Δ.Population, annual growth	13.530 (0.153)	-19.461 (0.395)	2.566* (0.078)	9.859 (0.290)	-23.344 (0.334)	2.608* (0.086)
Δ.Trade openness	0.015 (0.704)	-0.023 (0.492)	-0.018 (0.749)	0.002 (0.946)	-0.085** (0.043)	-0.019 (0.750)
Δ.Domestic credit	0.362 (0.330)	-0.110 (0.600)	0.062 (0.772)	0.375 (0.362)	0.918 (0.249)	0.071 (0.726)
Δ.Money stock	-0.148 (0.339)	0.058 (0.764)	-0.274** (0.029)	-0.202 (0.244)	-0.291 (0.138)	-0.271** (0.021)
Constant	0.230 (0.774)	-9.077 (0.823)	-5.763* (0.057)	1.317 (0.224)	3.838 (0.923)	-5.737** (0.043)
Observations	357	357	357	357	357	357
Number of id.	14	14	14	14	14	14
Hausman statistic	1.30	-	3.33	5.23	-	10.78
Pvalue	(0.9884)	-	(0.8534)	(0.7329)	-	(0.2143)

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Figure 5.1: Plots showing coefficients and spikes for confidence intervals

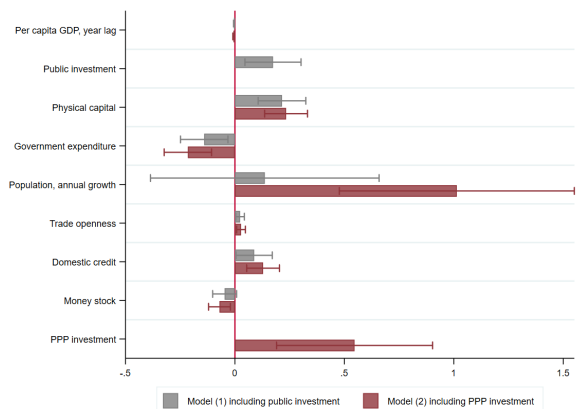


Table 5.4: Descriptive statistics of variables

Variables	Nb. Obs	Mean	Std.Dev	Min	Max
Growth in GDP per capita	392	0.95	4.26	-22.31	21.03
Per capita GDP, year's lag	378	1723.68	2432.38	272.99	11949.28
Pure public investment	392	4.46	3.19	0.16	26.34
PPP investment	392	0.49	1.17	0.00	10.13
Private capital	392	21.00	9.53	-2.42	77.89
Trade openness	392	64.82	24.82	20.72	156.86
Money stock	387	21.73	7.69	8.68	56.41
Population, annual growth	392	2.71	0.54	-0.44	4.63
Government expenditure	392	12.37	4.28	0.91	27.74
Domestic credit	387	12.24	7.10	1.60	41.16
Central government debt	391	63.41	42.52	7.28	270.18

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Table 5.5: PPPs investment ratio to Pure public investment in 14 SSA countries, 90 – 2017

Country	Pure public investment (% of GDP)	PPP investment (% of GDP)	Ratio of PPP investment to Public investment (%)
Benin	4,73	0,46	10,98
Burkina Faso	6,48	0,18	2,90
Cameroon	3,32	0,15	7,27
Congo, Rep.	8,82	0,45	8,85
Cote d'Ivoire	3,84	0,56	18,15
Gabon	3,97	0,45	13,71
Gambia, The	5,62	1,62	38,27
Ghana	3,62	0,54	15,64
Guinea	3,21	0,23	5,13
Mali	3,49	0,10	2,56
Nigeria	2,75	0,12	5,08
Senegal	4,63	0,58	10,75
Sierra Leone	3,19	0,11	2,25
Togo	4,79	1,30	34,66

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Table 5.6: Definitions and sources of variables

Variable	Unit of measurement	Definition	Sources
GDP per capita growth	Growth rate of real GDP per capita in %	Annual percentage growth rate of GDP per capita	World Development Indicators, Updated: 02/17/2021
Initial real GDP per capita	One year lag of real GDP per capita	GDP per capita is gross domestic product divided by midyear population.	
Pure public investment	GFCF (public) in % of GDP	General government investment (gross fixed capital formation), in billions of constant 2011 international dollars.	IMF Investment and Capital Stock Dataset, 2019
PPP investment	PPP investment in % of GDP	Public-private Partnerships (PPP) investment, in billions of constant 2011 international dollars.	
Physical capital	Gross Capital Formation in % of GDP	Gross capital formation (formerly gross domestic investment) in % of GDP	
Government expenditure	Government consumption in % of GDP	General government final consumption expenditure (formerly general government consumption) in % of GDP	
Population	Population, growth rate	Annual population growth rate, expressed as a percentage	
Trade openness	Trade (exports + imports) divided by GDP	Trade is the sum of exports and imports of goods and services measured as a share of GDP.	World Development Indicators, Updated: 02/17/2021
Domestic credit	Ratio of domestic credit to GDP	Financial resources provided to the private sector, expresses as a % of GDP	
Money Stock	Money supply M2/GDP	Broad money is the sum of currency outside banks includes notes and coins but also saving accounts and deposits in a savings account.	
Public debt	Ratio debt (central government) to GDP	Central government debt expressed as % of GDP	IMF Global Debt Database (GDD), December 2019

Chapter 6

Fiscal Fatigue, Public Debt Structure and Sustainability: A DSGE Model for the WAEMU Zone

Abstract

The present paper simulates several financing schemes for scaling-up public investment while stabilizing debt in WAEMU countries that exhibit fiscal fatigue. We build a DSGE model of a small open economy displaying the behaviour of four types of agents such as firms, households, government and Central Bank. It has included formal and informal firms producing tradable and non-tradable goods, and two types of households as savers and non-savers. As for the government, it has a debt structure made up of three tools, which are concessional, commercial and domestic debt, to ensure financing of public infrastructure. The economy is also endowed with natural resources that provide additional resources to the government. And finally, the Central Bank uses the interest rate policy based on the Taylor rule to account for possible shocks on the availability of domestic resources. The analysis conceives that when government faces fiscal fatigue, it can resort to debt for scaling-up public investments. Accordingly, to ensure debt sustainability in the long term, fiscal adjustments are systematically made by transfers and/or taxes, which can be capped by floors and ceilings, respectively. Simulations suggest that, in the case of natural resource revenues, scaling-up public investment is feasible using concessional borrowing only, or alternatively additional external commercial or domestic borrowings while keeping debt sustainable. Otherwise, external commercial debt appears more risky.

keywords: Fiscal Fatigue . Debt Structure . Debt Sustainability . DSGE . WAEMU.

JEL Codes: H63 . H68 . H69 . C69

6.1 Introduction

In recent years, economic financing issues have become more acute, in some developed countries and developing countries where the problem is very serious and urgent to be closely examined. It raises the issue of over-indebtedness, primarily in terms of vulnerability to public debt crises in developing countries, as well as that of the consolidation of public finances. Additionally, in response to the devastating economic crisis caused by the COVID-19 pandemic, governments around the world have taken unprecedented measures to counter the economic impact of the pandemic. Particularly, African economies have been experiencing real difficulties in financing public investments for many decades, making them vulnerable to public debt crises. In some regions, countries are facing rapid increase in debt levels, sometimes doubling every 10 years approximately. For example, the case of the WAEMU countries which have repeatedly benefited from HIPC initiatives aimed at reducing debt levels once it becomes unsustainable.

During the COVID-19 crisis, most regions of the world engaged in large-scale stimulus measures, using massive monetary and fiscal instruments. Unfortunately, many African economies have neither sufficient capacity nor similar instruments for the same. A summit¹ on the African economic financing was held in Paris with the aim of putting in place a very substantial financial support package to provide a much-needed boost to the African economies and

¹On 18 May 2021, a summit on the financing of African economies was held in Paris, bringing together nearly thirty African and European leaders (including fifteen heads of state), numerous representatives of international organisations such as the African Union and the United Nations, as well as many multilateral donors, notably the International Monetary Fund, the World Bank, the European Investment Bank, the African Development Bank and the French Development Agency. The purpose of this event was to catalyse the financial responses that can be provided to African countries. It was also an opportunity to assess the financing needs and the possibilities of meeting them. Finally, the implementation of a common framework for dealing with the public debt of countries experiencing difficulties has also been discussed.

resources for immediate investment needs, to improve the capacity of governments to support strong and sustainable economic recovery, and to strengthen private sector whose dynamism is a key factor for long-term growth. At this point, worries are arising about the capacity of African economies to rebound in the coming years, specially issues relating to the financing of public investments in a context of “fiscal fatigue” characterised by low economic growth, low tax revenue mobilisation, limited access to external financing, and Central Banks having restricted leeway. In this respect, the case of the WAEMU² is of particular importance to us and is the focus of this paper.

When is government debt deemed unsustainable? This occurs when the government is unable to meet its current and future payment obligations without exceptional financial assistance or default. As such, studies assessing the conditions for debt sustainability must match this objective with maintaining the required potential growth to underpin the risks of refinancing the borrowings. Consequently, proper analysis of debt sustainability must also account for the composition of public debt, including all types of debt that constitute a risk for a country’s public finances.

The sustainability of public debt is not a new issue in the economic literature. Several studies have already been undertaken on this issue since the 1980s or even before (e.g., [Hamilton & Marjorie, 1986](#); [Reisen et al., 1989](#); [Vegh, 1991](#); [Elbadawi et al., 1997](#); [Cohen, 1999](#); [Hjertholm et al., 2000](#)). But recently, given the increasing number of highly indebted countries and of high levels of public debt, this issue has been of great interest in the literature,

²WAEMU is an economic and monetary union of 8 French-speaking West African states, which share a single currency (CFA franc) and a common issuing institution called BCEAO. In accordance with Article 8 of its statutes, the BCEAO implements a common monetary policy for all Member States with the priority objective of price stability. For more, fiscal policies are the responsibility of each Member State but are regulated by the Convergence, Stability, Growth and Solidarity Pact (CSGSP) with a certain number of fiscal rules including: minimum tax ratio of 20% of GDP, public deficit to 3% of GDP and public debt to 70% of GDP.

as for example in studies by [Bohn et al. \(2008\)](#); [Panizza \(2008\)](#); [Reinhart et al. \(2012\)](#); [Beqiraj et al. \(2018\)](#); [Joy and Panda \(2021\)](#) among many others. Yet, despite the existence of a large body of theoretical and empirical evidence on the macroeconomic impacts of public debt and its sustainability, the composition and impact of changing strategy of public borrowing remains an outstanding issue. In other terms, there has been less attention in the literature to the structure of public debt and identifying the types of debt which would allow for the financing public investments without risking the sustainability of debt. So, this paper attempts to fill this gap by providing a comparative analysis of alternative sources of financing that could serve the public investment financing gap under the influence of short and long-term macroeconomic conditions, and simulating debt strategy scenarios that could potentially modify the trajectories of the public debt ratio, public investment and economic growth over the upcoming decades.

Our paper contributes to the literature in several ways. Firstly, it is part of the recent literature known as the new paradigm of open macroeconomics, which is based on structural macroeconomic models, particularly Dynamic Stochastic General Equilibrium (DSGE) models. One of the strengths of DSGE models is that they use microeconomic foundations to shape economic policies and allow to explicitly examine medium and long term implications of alternative fiscal policies. Recently, the use of these models has gained greater importance in the studies focusing on macroeconomic effects of both fiscal and monetary policies. Second, despite the increasing adoption of the DSGE model for macroeconomic policy analysis in developed and emerging countries, a number of studies have focused on debt analysis and have provided a framework for assessing debt sustainability (e.g., [Campos et al., 2019](#); [Pagano et al., 2012](#); [Liu et al., 2015](#); [Cavalcanti et al., 2018](#); [Kemp & Hollander, 2020](#); [Ganbayar, 2021](#); [Burriel Llombart & Shen, 2020](#)) while some

have additionally simulated different scenarios of public investment financing, such as [de Gregorio and Xiong \(2013\)](#) and many others, including those, based on the so-called Debt, Investment and Growth (DIG) models, have also considered the effect of different types of debt, for instance, [Buffie et al., 2012](#); [Melina et al., 2014, 2016](#); [Balma & Ncube, 2015, 2017](#), and [Berg et al. \(2015\)](#). To supplement this literature, our study analyses the composition of the debt of WAEMU Member States and the impacts of various financing scenarios on debt sustainability and macroeconomic aggregates, including public investment and economic growth paths.

In this paper, we rely on the model of [Buffie et al. \(2012\)](#) and extend it to simulate different types of debt stabilising public investment schemes, with an application to the WAEMU region. The primary contribution of our paper is the inclusion of Central Bank, which is a key player in economic financing, to account for the common monetary policy within the WAEMU region implemented by the BCEAO. We consider that the monetary authority follows a standard Taylor rule and is conservative, with a Central Banker with a status of inflation aversion, with objective of strict control of inflation to the monetary policy of the BCEAO. An additional change is that our model assumes that the WAEMU Zone can also draw revenues from natural resources to fill financing gaps, contrary to [Buffie et al. \(2012\)](#) which assumes that the economy is not endowed with natural resources. This contribution is based on the fact that WAEMU is one of the regions in Africa that is rich in natural resources, in particular mining³ resources. We calibrate the model to match the

³According to [Dembélé \(2015\)](#), the extraction and trade of mineral resources is the main economic activity of the member countries of the ECOWAS, a Zone to which all the WAEMU countries belong. For example, West Africa produces more than 27% of Africa's mineral production. Many countries in WAEMU are producers of very high grade gold (Burkina Faso, Côte d'Ivoire, Mali, etc.). In 2006 gold mining in Mali accounted for 15% of GDP and 70% of export earnings. In Burkina Faso, gold exports reached 180 billion CFA francs in 2009, putting this sector ahead of cotton, which accounted for 120 billion CFA francs. More than 34% of Africa's manganese is produced in West Africa. As regards oil, four African countries have significant

characteristics of WAEMU Zone, such that it include the interest rate policy set by the BCEAO, allows for resource revenues in the baseline case, as well as several important economic features making the analysis more relevant to the context of developing countries, including public investment inefficiencies, learning-by-doing externalities in the traded good sector, time-varying depreciation rate of public capital, and limited absorptive capacity constraints.

Unlike, the Debt, Investment and Growth (DIG) models previously mentioned, our study presents the behaviour of four types of agents such as firms, households, government and Central Banks. The model includes two types of firms, formal and informal producing tradable and non-tradable goods. It consists of an economy with two types of households, which are savers (including Ricardian and non-Ricardian) and non-savers. Government is considered in the model as a central administration, with various categories of debt, notably concessional external debt, commercial external debt, as well as domestic debt. Lastly, the model introduces the Central Bank in order to take into account the possible shocks on the availability of domestic resources through the monetary rule.

A number of implications emerge from the simulation results. First, the results show that up-scaling public investment is financially feasible, when fiscal adjustments may be triggered if necessary, to repay concessional loans and thus keep the total debt on a sustainable path. Second, in case of constrained on fiscal adjustments, by ceiling in tax jumps or floor in transfers cuts, and without relying on any natural resource revenues, scaling-up public investment is undertaken by supplementing concessional borrowing with other sources of financing, in particular commercial or domestic borrowings. But complementing with external commercial debt seems to be more risky than with domestic debt that guarantees the long-term debt sustainability. Third,

reserves under exploitation, two of which are in the WAEMU, such as Côte d'Ivoire and Niger. Oil is the main item in the region's trade transactions.

given the existence of additional revenues from natural resources, there is no risk of unsustainability to rely on commercial or domestic borrowing in closing the financing gap. On the contrary, public investment scaling-up could be much more ambitious while maintaining debt sustainable. Finally, the model also allows choosing appropriate level of public investment scaling, according to the given level of sustainable long-term debt, and from which the required fiscal adjustment is practically feasible in the light of country's economic conditions and tax system.

The remainder of this paper is organised as follows. Section 2 and 3 present the theoretical framework of the model and its calibration to the “average” WAEMU. This is followed by the quantitative results of the baseline model in Section 4. And, to analyze the debt sustainability and macroeconomic effects of public investment plans, Section 5 estimates the model under some alternative assumptions under various financing schemes. Finally, Section 6 concludes and derives some policy recommendations.

6.2 The Model

The framework employed in this paper is inspired by the work of [Buffie et al. \(2012\)](#) and [Balma and Neube \(2015\)](#) and includes the behaviour of four types of agents such as households, firms, government and Central Bank. It is a dynamic general equilibrium model of a small open economy composed of two standard sectors, notably formal and informal producing both tradable goods b_n and non-tradable goods b_x with a production function including private capital k and labor input L , augmented by public capital which accounts for government investment in infrastructure. We distinguish between two categories of consumers, respectively Ricardian savers with full access to financial markets and non-savers. Agents are assumed to consume domestic

products, imported goods which include market goods c_m and equipment E_m to produce industrial goods (private capital) and physical infrastructure (public capital). The government is considered as a central administration, with different types of public debt including concessional loans, commercial external and domestic debts. Last, the model includes the Central Bank in order to take into account possible shocks on available domestic resources through the monetary rule. Note that all quantitative variables are corrected for the trend effect by the magnitude $(1 + g)^t$ given that in the long run all variables, including real GDP, grow at the same exogenous growth rate g . An interesting advantage of this model is that it allows us to compare the macroeconomic effects of public investment by simulating different types of public debt while also making fiscal adjustments. As the analysis is based on a monetary union, we consider that this economy is driven by an exogenous interest rate. By following [Pagano et al. \(2012\)](#), we include number of nominal and real rigidities in the model, and therefore monetary policy is modelled exogenously through the interest rates set by the BCEAO.

6.2.1 The Households

We consider an economy with two types of private agents including savers and non-savers. To distinguish between them, the index s and h are respectively used for the former and the latter. The labour supply of the savers is fixed at L^s and at $L^h = \omega L^s$ for the non-savers with $\omega > 0$. Each household $i = s, h$ consumes a basket of goods combined with a constant elasticity of substitution (CES), consisting of tradable domestic goods $c_{x,t}^i$, imported tradable goods $c_{m,t}^i$ and non-tradable domestic goods $c_{n,t}^i$. Equation (6.1) and (6.2) below present respectively the basket of goods and the price index.

$$c_t^i = \left[\rho_x^{\frac{1}{\varepsilon}} (c_{x,t}^i)^{\frac{\varepsilon-1}{\varepsilon}} + \rho_m^{\frac{1}{\varepsilon}} (c_{m,t}^i)^{\frac{\varepsilon-1}{\varepsilon}} + \rho_n^{\frac{1}{\varepsilon}} (c_{n,t}^i)^{\frac{\varepsilon-1}{\varepsilon}} \right]^{\frac{\varepsilon}{\varepsilon-1}} \quad (6.1)$$

where the parameter ε is the intratemporal elasticity of substitution and the parameters ρ_x, ρ_m and ρ_n are CES distribution of goods in the basket such that $\rho_n = 1 - \rho_x - \rho_m$.

According to Equation (6.1), the demand functions for each good can be given by:

$$c_{j,t}^i = \rho_j \left(\frac{P_{j,t}}{P_t} \right)^{-\varepsilon} c_t^i$$

with $j = x, m, n$ and $i = s, h$ while the (relative) CPI associated with the basket is

$$P_t = \left(\rho_x P_{x,t}^{1-\varepsilon} + \rho_m P_{m,t}^{1-\varepsilon} + \rho_n P_{n,t}^{1-\varepsilon} \right)^{\frac{1}{1-\varepsilon}}$$

The price index for each household is given by:

$$P_t^i = \left(\rho_x P_{x,t}^{1-\varepsilon} + \rho_m P_{m,t}^{1-\varepsilon} + \rho_n P_{n,t}^{1-\varepsilon} \right)^{\frac{1}{1-\varepsilon}} \quad (6.2)$$

The model distinguishes savers from non-savers by their complete access to financial markets. Non-savers are the households with restricted access to financial markets owing to collateral constraints on borrowing. However, they spend all of their total income in the period in which it was received. This consumption behavior is typically often observed in low-income countries, and indeed describes the theory of Ricardian non-equivalence. One should primarily note that there is no difference between the utility function of savers and non-savers. As mentioned above, the latter consume all their income from remittances, transfers and wages each period. The consumption function is set so that consumption including value-added tax (V_t) equals the sum of remittances (R) plus transfers (T_t) and wages. Let ω being the parameter that governs the ratio of savers to non-savers in the economy. Thus, the non-savers'

budget constraint can be expressed as follow:

$$(1 + V_t)P_t c_t^h = \frac{\omega}{1 + \omega} (R + T_t) + w_t L_t^h \quad (6.3)$$

Savers are considered as utility maximizing agents. Their ability to freely access financial markets enables them to smooth their consumption over time by investing in tradable or non-tradable capital, or by borrowing on the national or foreign debt markets. We assume that savers can invest I_x and I_n amounts in private capital in both tradable and non-tradable sectors with a rate of depreciation δ , can bears user fees for infrastructure services according to μz^e , can purchase domestic bonds b_t^s at a real interest rate r_t and can get foreign debt b_t^{s*} that charges an exogenous real interest rate r_t^* . As for non-savers, the utility function is the same for savers but they are subject to three budgetary constraints. Thus they solve the following intertemporal problem

$$\text{Max} \sum_{t=0}^{\infty} \beta^t \frac{(c_t^i)^{1-\frac{1}{\tau}}}{1-\frac{1}{\tau}}$$

subject to

$$P_t b_t^s - b_t^{s*} = r_{x,t} k_{x,t-1}^s + r_{n,t} k_{n,t-1}^s + \frac{R}{1 + \omega} + \frac{T_t}{1 + \omega} + w_t L_t^s - \frac{1 + r_{t-1}^*}{1 + g} b_{t-1}^{s*} + \frac{1 + r_{t-1}}{1 + g} P_t b_{t-1}^s - P_{k,t} (I_{x,t}^s + I_{n,t}^s + AC_{x,t}^s + AC_{n,t}^s) - P_t c_t^s (1 + V_t) - \mu z_{t-1}^e - \gamma_t^s - \Phi_t^s, \quad (6.4)$$

and equations on capital accumulation

$$(1 + g) k_{x,t}^s = I_{x,t}^s + (1 - \delta) k_{x,t-1}^s \quad (6.5)$$

$$(1 + g) k_{n,t}^s = I_{n,t}^s + (1 - \delta) k_{n,t-1}^s, \quad (6.6)$$

where $\beta = 1/[(1 + \varrho)(1 + g)^{(1-\tau)/\tau}]$ represents the discount factor with ϱ the pure time preference rate; τ is the intertemporal elasticity of substitution; g is the trend growth rate of GDP per capita; Φ_t^s derives the profits for domestic firms, and

$$AC_{i,t}^s \equiv \frac{\nu}{2} \left(\frac{F_{j,t}^s}{k_{j,t}^s} - \delta - g \right)^2 k_{j,t-1}^s$$

with $\nu > 0$ measuring the adjustment costs incurred in changing the capital stock in each of the sector. $\gamma_t^s = \frac{\eta}{2} (b_t^{s*} - \bar{b}^{s*})^2$ is the portfolio adjustment costs associated to foreign liabilities capturing the level of financial account openness where \bar{b}^{s*} is the (initial) steady-state value of the private foreign liabilities. Following [Buffie et al. \(2012\)](#), for simplicity, we assume that the adjustment costs are zero when the capital stock grows at the rate g which implies that, as we ignore the trend in growth across models, the adjustment costs are equal to zero across steady states. These authors have also balance realism and flexibility by introducing portfolio adjustment costs to capture various degrees of integration of the private sector into world capital markets. The following equation implicitly defines a private demand for foreign debt,

$$\eta(b_t^{s*} - \bar{b}^{s*}) = 1 - \frac{1 + r_t^*}{(1 + r_t) \frac{P_{t+1}}{P_t}} \quad (6.7)$$

which can be explicitly expressed in log linearized form as:

$$r_t - r_t^* \cong \eta(b_t^{s*} - \bar{b}^{s*})$$

where the value of η controls the degree of capital mobility. For some emerging market economies, a low η may be appropriate reflecting an open capital market. Then, elastic capital flows keep the domestic rate close to the foreign rate. It should also be noted that in the LICs, where η remains relatively higher, the capital account is fairly closed, and the private agents

has limited ability to borrow from abroad.⁴

6.2.2 The Firms

There is a continuum of monopolistically competitive firms comprised of two sectors $j = x, n$ where x stands for the production of goods in tradable sector and n for non-tradable goods. The model also accounts for imported goods, i.e. tradable goods that are produced abroad and that can be either directly consumed or used to produce capital. Each representative firm uses Cobb-Douglas technologies with production factors including private capital $k_{j,t-1}$, labor $L_{j,t}$ and effective public infrastructure z_{t-1}^e , to produce output:

$$q_{j,t} = \Lambda_{j,t} (z_{t-1}^e)^{\theta_j} (k_{j,t-1})^{\eta_j} (L_{j,t})^{1-\eta_j} \quad (6.8)$$

where $\Lambda_{j,t}$ denotes a stationary technology shock capturing the productivity in the economy. The firm productivities for sectors $j = x, n$ can be expressed as follows:

$$\Lambda_{j,t} = \alpha_j \left(\frac{q_{j,t-1}^I}{\bar{q}_t^I} \right)^{\psi_j} (k_{j,t-1}^I)^{\varsigma_j} \quad (6.9)$$

In this equation, variables with the superindex I denoting sectoral quantities: a *static* externality associated with private capital accumulation $(k_{j,t-1}^I)^{\varsigma_j}$ and *learning-by-doing* externality that depends on the deviations of the lagged sector output from the steady state $\left(\frac{q_{j,t-1}^I}{\bar{q}_t^I}\right)^{\psi_j}$ for $j = x, n$.

The model also incorporates public capital into the production function which plays a key role, for example, when the stock of public capital increases, output increases and the efficiency of private capital and labor increases all

⁴From a technical point of view, the portfolio coast also ensure the stationarity of b_t^* . See (Schmitt-Grohé & Uribe, 2003) for alternative methods to ensure stationarity of net foreign assets.

things being equal. Nevertheless, an increase in public investment flows accelerates growth due to its complementarity with the private capital. We consider that competitive firms maximize their profits by equating the marginal value product of each input to its factor price. Two production inputs are used including private capital and labor. The input demand equations for sectors $j = x, n$ are:

$$P_{j,t}(1 - \alpha_j) \frac{q_{j,t}}{L_{j,t}} = w_t$$

$$P_{j,t} \alpha_j \frac{q_{j,t}}{K_{j,t-1}} = r_{j,t}$$

where the w_t denotes the wage, r_j is the rental rate of capital in sector j and P_j is the price of output in each sector j . Therefore, firms chose factors including labor and capital as productive inputs for maximizing their objective function according to the following equation:

$$\text{Max} P_{j,t} q_{j,t} - w_t L_{j,t} - r_{j,t} k_{j,t-1} \tag{6.10}$$

It should be noticed that the wage is not sector-specific but still remains the same among all sectors while labor is mobile across sectors.

6.2.3 The Government

In our model, Government is the main financial agent for public infrastructure. The economic literature concedes that public investment is a key driver of long-term productivity and economic growth. In fact, the growth of the public capital stock translates into an increase in the return to private capital and labor, resulting from the complementarity between public and private capital.

Our model allows for inefficiencies in public capital creation. Let us de-

fine I_z as public investment that produces an additional infrastructure z in accordance to the following equation:

$$(1 + g)z_t = (1 - \delta)z_{t-1} + I_{z,t} \quad (6.11)$$

Note that some of the infrastructures those are newly built may not be productive with economic utility, since *effectively productive* capital z_t^e which is actually used in technologies defined in (6.8), evolves given the following

$$z_t^e = \bar{s}z + s(z_t - \bar{z}) \quad (6.12)$$

with $\bar{s} \in [0, 1]$ and $s \in [0, 1]$ are parameters of efficiency at and off steady state respectively, and \bar{z} denotes the public capital at the steady state. Public capital equation is obtained by adding the two previous equations 6.11 and 6.12.

$$(1 + g)z_t^e = (1 - \delta)z_{t-1}^e + s(I_{z,t} - \bar{z}) + \bar{s}\bar{I}_z, \quad (6.13)$$

where $\bar{I}_z = (\delta + g)\bar{z}$ is the public investment in the steady state; I_t refers to public investment, and z^e is additional infrastructure generated by public investment. Such as we had notified that $s \in [0, 1]$, the second term of the equation (6.13) clearly indicates that one unit of the additional public investment does not necessarily yield into one unit effective productive capital (z_t^e). According to [Hulten \(1996\)](#) and [Pritchett \(2000\)](#), in low and middle income countries, infrastructure productivity is high but there is a penalty for reducing the return on public spending as public investment spending does not raise the productive capital⁵ stock.

⁵In the simulations, the values of the parameters of public capital at and off steady state \bar{s} and s are both set to 0.6, in line with the calibrations for LICs ([Buffie et al., 2012](#)) or for Sierra Leone ([Balma & Ncube, 2015](#)).

Furthermore, we assume that the economy is endowed with natural resources and consider that the production of resources and prices follow an exogenous process. Thus, resource production is set as exogenous, as Melina et al. (2016) argue that there is no substantial added value by explicitly modelling resource production endogenously, especially in case of low-income developing countries. The reason is that in such countries, resource production arises only from negotiations between foreign multinational firms and public authorities. It is also assumed that the WAEMU countries cannot control resource prices but rather bear the prevailing international market prices. Therefore, by considering p^o the relative price of resources, the resource revenues N_t^o collected each year is obtained by

$$N_t^o = \tau^o p^o e_t n^o y_t \quad (6.14)$$

where τ^o denotes a constant royalty rate that can vary over time, e_t is the real exchange rate, and n^o is the initial resources ratio to GDP.

The government has a range of financing options and is not obliged to present a balanced budget in every period. The government's expenditure consists of debt servicing, transfers to households and infrastructure investment while its revenue consists of user fees paid by users of public infrastructure ($\mu = f\delta P_{zo}$ with f being the recurrent cost), consumption VAT and resource fund. When revenues are lower than expenditures, a deficit arises that the government can finance through borrowing including concessional loan (d_t), commercial debt $d_{c,t}$ or domestic debt b_t . The government's budget constraint is defined in reference to its fiscal positions and can be written as follows:

$$P_t \Delta b_t + \Delta d_{c,t} + \Delta d_t = \frac{r_{d,t-1} - g}{1 + g} \Delta d_{t-1} + \frac{r_{dc,t-1} - g}{1 + g} \Delta d_{c,t-1} + \frac{r_{t-1} - g}{1 + g} P_t \Delta b_{t-1} + P_{z,t} I_{z,t} + T_t - V_o P_t c_t - G_t - N_t^o - \mu z_{t-1}^s \quad (6.15)$$

where d , d_c , G_t and N_t^o represent respectively concessional debt, external commercial debt, grants and natural resource revenue. $I_{z,t}$ denotes the infrastructure investment, T_t the transfers to households, r_d and $r_{d,c}$ are the real interest rates on concessional and commercial debt respectively. The interest rate on concessional debt is assumed to be constant $r_{d,t} = r_d$ while the interest rate on external commercial debt incorporates a risk premium that depends on the deviation of the external public debt ratio to GDP ($\frac{d_t + d_{c,t}}{y_t}$) from its (initial) steady-state value ($\frac{\bar{d} + \bar{d}_c}{\bar{y}_t}$) that is,

$$r_{dc,t} = r^f + v_g e^{\eta g} \left(\frac{d_t + d_{c,t}}{y_t} - \frac{\bar{d} + \bar{d}_c}{\bar{y}_t} \right), \quad (6.16)$$

with r^f that representing a risk-free interest rate, η denote the public debt risk premium parameter, v_g is the public debt risk premium which is assumed to be constant, and $y_t = p_{x,t} q_{x,t} + P_{n,t} q_{n,t}$ denote the GDP.

The model assumes that the infrastructure building and private capital are done by mixing one equipment/machine with α_z units of non-tradable goods. The relative price of non-tradable goods is rated $P_{n,t}$ while the relative price of imported equipment/machine is $P_{m,t}$. Then, the supply price of infrastructure and private capital are determined by the following equations:

$$P_{z,t} = P_{m,t} + \alpha_z P_{n,t} \quad (6.17)$$

$$P_{k,t} = P_{m,t} + \alpha_k P_{n,t} \quad (6.18)$$

The main purpose of the model is to grasp dynamic interactions of public investment, growth, recurrent costs and fiscal policy. The policy adjustment function is given by:

$$Gap_t = \frac{r_d - g}{1 + g} d_{t-1} - d_t + \frac{r_{t-1} - g}{1 + g} P_t b_{t-1} + \frac{r_{d_{c,t-1}} - g}{1 + g} d_{c,t-1} + P_{z,t} I_{z,t} + T_o - V_o P_t c_t - G_t - N_t^o - \mu z_{t-1}^s \quad (6.19)$$

Note that the expression $P_{z,t} I_{z,t}$ is public investment expenditure, including cost overspends resulting from the constraints of absorptive capacity. It is defined as

$$P_{z,t} I_{z,t} = H_t (I_{z,t} - \bar{I}_z)$$

There is a shortage of qualified administrators in low-income countries, due to which ambitious public investment programs are often affected by poor planning, lack of oversight and a plethora of coordination problems, all of which result in significant cost overruns during the implementation phase. To capture this, the amount of a new investment ($I_{z,t} - \bar{I}_z$) is multiplied by $H_t = (1 + \frac{I_{z,t}}{z_{t-1}} - \delta - g)^\kappa$, where $\kappa \geq 0$ captures the severity of the absorptive capacity in the public sector.

In the equation (6.19), Gap_t represents the government expenditures including interest rate payments on debt, minus revenue on concessional borrowing when transfers and taxes are respectively held at their initial value T_o and V_o . Starting from this definition, the budget constraint (6.15) of a given year can be rewritten as follows:

$$Gap_t = P_t \Delta b_t + \Delta d_{c,t} + (V_t - V_o) P_t c_t - (T_t - T_o) - (N_t^o - N_o^o) \quad (6.20)$$

It is assumed that in the (6.19) equation the Gap can be filled in the short or medium term by domestic and/or commercial borrowing $P_t \Delta b_t + \Delta d_{c,t}$, tax

adjustments $(V_t - V_o)P_t c_t$ and/or transfer adjustments $-(T_t - T_o)$, and by resource fund $-(N_t^o - N_o^o)$. For the purpose of drawing comparisons between the different types of borrowing in the forecasting scheme, we are particularly interested in the case where this Gap can be closed by either external commercial borrowing or domestic borrowing, but not with both simultaneously.

The primary aim is to propose a framework for public debt sustainability in a country's complex fiscal position. Thus, debt sustainability in the model requires that the VAT and transfers potentially adjust to cover the debt level of full gap i.e., $P_t \Delta b_t + \Delta d_{c,t} = 0$. We consider that policy makers have the possibility to allocate both transfers cuts and tax rise to withstand the adjustment burden. According to some reaction functions, the targets for the debt-stabilizing level of the values of transfers and VAT can be defined as follows:

$$V_t^{target} = V_o + (1 - \lambda) \frac{Gap_t}{P_t c_t} \quad (6.21)$$

and

$$T_t^{target} = T_o - \lambda Gap_t, \quad (6.22)$$

where λ corresponds to the policy parameter that splits the fiscal adjustment between taxes and transfers such that $\lambda \in [0, 1]$.

Taxes and transfers are determined according to the reaction functions that can be expressed in the following form:

$$V_t = Min\{V_t^r, V^u\} \quad (6.23)$$

and

$$T_t = Max\{T_t^r, T^l\} \quad (6.24)$$

where V^u represents a ceiling on taxes, T^l a floor for transfers, and V_t^r and

T_t^r are determined by the fiscal rules

$$V_t^r = V_{t-1} + \lambda_1 (V_t^{target} - V_{t-1}) + \lambda_2 \frac{(x_{t-1} - x^{target})}{y_t}, \quad \text{with} \quad \lambda_1, \lambda_2 > 0 \quad (6.25)$$

and

$$T_t^r = T_{t-1} + \lambda_3 (T_t^{target} - T_{t-1}) + \lambda_4 (x_{t-1} - x^{target}), \quad \text{with} \quad \lambda_3, \lambda_4 > 0 \quad (6.26)$$

with $y = P_n q_n + P_x q_x$ denoting GDP in a given year, and $x = b$ or d_c , depending on whether the rules respond to domestic or commercial debt. We note that the target for debt x^{target} is given exogenously. The ceiling V^u on taxes and the floor T^l on transfers can have discrete time jumps as well. To account for such jumps in the cap on taxes, we rewrite the rule as

$$V_t = \text{Min}\{V_t^r, V^u\} \quad \text{in} \quad \text{which} \quad V_t^u = V_o^u + \Delta V_t^u$$

where V_o^u denotes the initial cap and ΔV_t^u denotes the shock (discrete jumps) at time t which could be either temporary or permanent. In the reaction functions defined in (6.25)-(6.26), $\lambda_1 - \lambda_3$ represent the fiscal reaction parameters in policy instrument terms that undermine whether the policy adjustment is slow or fast while $\lambda_2 - \lambda_4$ correspond, to the fiscal reaction parameters in debt terms. It should be noticed that setting the fiscal reaction parameters in policy adjustment $\lambda_1 - \lambda_3$ requires a realistic appraisal of the country's fiscal adjustment capacity over time horizons. Consequently, we calibrate different values for the parameter λ_1 and then assess the macroeconomic impacts as well as debt sustainability.

6.2.4 The Monetary Authority

The WAEMU is a monetary union with a monetary authority that is the BCEAO, which is in charge of a common monetary policy for all countries in the area. The currency used is the FCFA (XOF) and pegged to the Euro by a fixed exchange rate regime. According to some studies, among which [Farhi and Werning \(2014\)](#) and [Rey \(2016\)](#), the linkage to the Euro did not prevent BCEAO to conduct an autonomous monetary policy, at least in the short term because of the control of capital that is carried out on all outgoing capital transfers from WAEMU countries, with the exception of short-term repayment loans and debt amortization. Furthermore, [Kireyev \(2015\)](#) has shown that there is no long-term relationship between the interest rate of the BCEAO and that of the European Central Bank (ECB), implying that the BCEAO may fix its own nominal interest rate according to [Frankel et al. \(2004\)](#). To be sure of these statements, we compare the monthly trends in inflation rates in the two Zones from January 1999 to December 2020. Consequently, in [Figure 6.9](#) in appendix, it is clear that the deviation between inflation rates could be put forward as evidence to confirm the interest rate differential between the two areas since the economies of the WAEMU can be affected by exogenous external shocks or shocks specific to the WAEMU.

The BCEAO uses the interest rates and the reserve requirements as key instruments for the implementation of monetary policy. In more specific terms, there are two main interest rates that are used, namely the minimum bid rate and the maximum lending rate. In addition, the BCEAO sets a unified ratio of reserve requirement that varies across countries until the late 2010s. Based on the existing literature on DSGE modelling, the Taylor rule was used to approximate the monetary policy. We introduce the interest rate policy and rely on [Taylor \(1993\)](#) to set a rule. We should point out that our model does not include the banking sector which is necessary to model the injection of liquid-

ity and reserve requirements, but to do so, we rely on the interest rate policy. However, we assume that the policy rate of the Central Bank is defined by:

$$\frac{r_t}{\bar{r}} = \left(\frac{r_{t-1}}{\bar{r}} \right)^{\Theta_r} \left[\left(\frac{\pi_t}{\bar{\pi}} \right)^{\Phi^\pi} \left(\frac{y_t}{\bar{y}} \right)^{\Phi^y} \left(\frac{e_t}{\bar{e}} \right)^{\Phi^e} \right]^{(1-\Theta_r)} \exp(\varepsilon_t^r) \quad (6.27)$$

where Θ_r corresponds to the interest rate smoothing parameter, r_t denotes the interest rate set by the Central Bank and \bar{r} is its steady state, Φ^π represents the level of reaction to inflation, Φ^y is the target of GDP growth, while Φ^e is the the policy responses to deviation of the nominal exchange rate, and ε_t^r is a random monetary policy shock common to members in the monetary union. Hence, π_t , y_t and e_t are inflation, output and nominal exchange rate respectively while $\bar{\pi}$, \bar{y} and \bar{e} denote their steady-states values. The model assumes that the Central Bank conducts an optimal monetary policy, so that the parameters of the Taylor rule are chosen to maximise a second-order approximation of the utility function of households under equilibrium conditions.

6.3 Calibration

The model is estimated on annual data for the WAEMU Zone over the period 2000-2019. The calibration is carried out on a subset of parameters under restrictions of long-run steady state, and by estimating further structural parameters including elasticities, adjustment cost parameters, a set of rates, etc., as well as the exogenous shocks persistency and standard deviation on the basis of annual macroeconomic and fiscal data. In practice, once the values of these parameters are set, the other parameters of the model can be linked by first-order conditions for solving the private agent's optimisation problems, budget constraints and several other constraints that have been defined. Nev-

ertheless, the parameters are calibrated in such a way as to correspond as well as possible to the specific estimates of the WAEMU Zone. But in the event that data are non-available for the Zone, we rely on values frequently used in literature on developing countries, most notably that of [Buffie et al. \(2012\)](#); [Balma and Ncube \(2015\)](#) or [Assemien et al. \(2019\)](#). The estimation of the model was carried out using the *Dynare* toolbox for *Matlab*. Table 6.1 reports the values of the parameters which are based on stylised facts and rough estimates.

CHAPTER 6. FISCAL FATIGUE, PUBLIC DEBT STRUCTURE AND SUSTAINABILITY: A DSGE MODEL FOR THE WAEMU ZONE

Table 6.1: Main parameters Calibration

Parameter	Description	Value
τ	Intertemporal elasticity of substitution	0.34
ε	Intertemporal elasticity of substitution between goods	0.60
Ω	Tobin's q-elasticity of investment spending	2.00
ρ_m	Distribution parameter for traded goods	0.37
ρ_n	Distribution parameter for non-traded goods	0.43
δ	Depreciation rate of capital	0.05
β	Discount factor	0.92
v	Capital adjustment cost parameter	7.69
α_x	Capital's share in value added in the traded sector	0.40
α_n	Capital's share in value added in the non-traded sector	0.55
ζ_x, ζ_n	Capital's learning externalities	0.00
ψ_x, ψ_n	Sectoral output learning externalities	0.00
φ_k, φ_z	Cost share of non-traded inputs in the production of capital	0.50
θ_x, θ_n	Elasticities of sectoral output with respect to infrastructure	0.17
μ	User fees parameter for infrastructure services	0.05
g	Trend growth rate	0.015
τ^o	Royalty tax rate on natural resources	0.6
Θ_r	Interest rate smoothing parameter	0.60
Φ^π	Inflation parameter in the Taylor rule	1.50
Φ^y	Output parameter in the Taylor rule	0.80
Φ^e	Exchange rate parameter in the Taylor rule	1.70
r_o	Initial real interest rate on domestic debt	0.10
r_o^*	Initial real interest rate on private external debt	0.10
r^f	Real risk-free foreign interest rate	0.04
r_d	Real interest rate on concessional loans	0.00
$r_{dc,o}$	Initial real interest rate on public commercial loans	0.06
η	The portfolio cost adjustment parameter	1.00
η_g	Public debt risk premium parameter	0.00
ν_g	Public debt risk premium	0.02
u	Private debt risk premium	0.04
R_o	Initial return on infrastructure	0.25
b_o	Initial public domestic debt ratio to GDP	0.20
d_o	Initial public concessional debt ratio to GDP	0.50
$d_{c,o}$	Initial public external commercial debt ratio to GDP	0.00
b_o^*	Initial private external debt ratio to GDP	0.00
T_o	Initial transfers ratio to GDP	0.131
V_o	Initial consumption VAT	0.091
Y.M. Isaac Amédan	Initial ratio of infrastructure investment to GDP	254 0.9524
n^o	Initial natural resources ratio to GDP	0.128
Rem_o	Remittances ratio to GDP	0.04
G_o	Grants ratio to GDP	0.023
M/GDP	Imports to GDP ratio	0.34
\bar{s}, s	Efficiency of public investment	0.60

The trend growth rate (g) is set to 1.5% which matches the average of GDP per capita growth over the period 2000 – 2019 calculated using data from World Development Indicators. The value of the intertemporal elasticity of substitution (τ) is 0.34 such as defined by [Buffie et al. \(2012\)](#) that corresponds to average estimate for LICs ([Ogaki et al., 1996](#)). Empirically, data on capital depreciation rates in developing countries are not readily available, so we set it at $\delta = 0.05$ relying on estimates for developed countries. Based on the literature ([Assemien et al., 2019](#)), we set the intertemporal elasticity of substitution between goods $\varepsilon = 0.6$ as well as parameters in the Taylor rule including the interest rate smoothing parameter $\Theta_r = 0.6$, the inflation parameter $\Phi^\pi = 1.50$, the output parameter $\Phi^y = 0.80$ and exchange rate parameter $\Phi^{er} = 1.70$.

The estimated values of the distribution parameters $\rho_m = 0.26$ and $\rho_n = 0.44$ making the ratio of imports to GDP around 34%, equal to the average value for WAEMU countries during 2000-2019 using WDI data, and the share of non-tradables in GDP about 50% which is the average shares of non-tradables for LICs computed by [Buffie et al., 2012](#) using 1998-2008 WEO data. Therefore ρ_x is calculated through the assumption $\rho_x = 1 - \rho_n - \rho_m$ (see Eq. 6.1), and we obtain $\rho_x = 0.30$. We also define the capital's share in value added by following ([Buffie et al., 2012](#)) who suggested to set $\alpha_n = 0.55$ and $\alpha_x = 0.40$ on the basis of the GTAP5 database for SSA that suggests a capital share of 35 – 40% in the tradables sector (agricultural and manufacturing sectors) and 55 – 60% in the non-tradables sector (including private services, trade and transport, construction and housing). The cost of non-traded inputs in the production of public capital ($\phi k, \phi z$) are set to 0.50 which corresponds to the ratio of imported machinery and equipment to aggregate investment

in SSA⁶. In the base case⁷, we do not incorporate any learning externalities, which leads us to set the capital's and output learning externalities parameters to 0 whether in the tradables or non-tradables sector, so that $\varsigma_x = \varsigma_n = 0.0$ and $\psi_x = \psi_n = 0.0$. The steady state value of discount factor β is set to 0.92.

To define the value of the elasticities of sectoral output with respect to the stock of infrastructure (θ_x, θ_n) the ratio θ_x/θ_n is set independently. We assume that the two elasticities are equal in the two sectors, which implies that the ratio $\theta_x/\theta_n = 1$. By assuming this, the value of the elasticities θ_x and θ_n thus depend on other parameters and variables in the calibration model through the magnitude

$$R_z = (\theta_x V A_x + \theta_n V A_n)(\delta + g)/i_z$$

where A_j denotes the share of sector $j = x, n$ production in GDP, i_z is the ratio of infrastructure investment to GDP, and $R_z = R + \delta$ represents the gross return on infrastructure. Therefore, the derived value for θ_n is 0.17.

The capital adjustment costs parameter (v) is related to the elasticity of investment with respect to Tobin's q (Ω) through the equation $\Omega = 1/(\delta + g)v$. We assigned the value, 2, as found in the literature for developed countries since there are no reliable estimates of such elasticity for developing countries. Then, we calculate the capital adjustment costs parameter by deriving the equation expressed as follows:

⁶We are using the values in the literature on SSA because we did not have access to the social accounting matrices of the WAEMU countries which are our primary concern. However, the mismatch bias of the values set is negligible given that WAEMU countries are developing or emerging economies and in the macroeconomic data comparisons are most of the time in the average of SSA countries.

⁷In alternative runs, [Buffie et al. \(2012\)](#) have allowed for learning effects and have set the capital learning externalities ς_x and ς_n to 0.08 so that the return of capital in the the traded sector is about 30% higher than the private return. The steady value of the net social return to capital is given by $(r + \delta)(1 + \varsigma_j/\varphi_j) - \delta$. To set ς_j such that the social return is equal to 30% above the private one, the problem that should be solved is $(r + \delta)(1 + \varsigma_j/\varphi_j) - \delta = (1.30)r$ for ς_j .

$$v = \frac{1}{\Omega(\delta + g)}$$

where δ is the depreciation rate of capital equal to 0.05. Since g is 0.015, we set Ω equal to 2, and then we obtain $v = 7.69$ ⁸.

Furthermore, due to the absence of certain data specific to WAEMU countries, certain parameters have been taken from literature, in particular from the work of [Buffie et al. \(2012\)](#) and [Balma and Ncube \(2015\)](#). For example, the real interest rate on domestic debt (r) and the real return on private capital are equivalent to $[(1 + \varrho)(1 + g)^\tau - 1]$ with ϱ denoting the subjective discount rate. The authors suggest to take ϱ jointly with g and τ so that the domestic real interest rate equal to 0.10. Then, we assign the same value for the interest rate on external private debt (r^*) for the base case since at the steady state equation (6.7) assumes that $r = r^*$. The risk-free foreign real interest rate (r^f) is also set to 0.04. Allowing for commercial debt or domestic debt accumulation, the fiscal reaction parameters in policy instrument terms are set so that $\lambda_1 = \lambda_3 = 0.25$, and in debt terms $\lambda_2 = \lambda_4 = 0.02$. The division of fiscal adjustment between transfers cuts and tax increases λ is set to 0 assuming that only consumption taxes bear the burden of adjustment across steady states. The real interest rates on concessional and non-concessional loans are respectively set to 0% and 6%. The portfolio adjustment costs parameter (η) is set to control the degree of openness of capital account and is set to 1.0 for reflecting the limited access of the private sector to foreign capital markets. The public risk debt premium (v_g) is assumed to be constant which implies that $\eta_g = 0.0$ under the equation (6.16). This parameter is calibrated as the difference between the interest rate on public commercial debt ($r_{d,c} = 0.06$) and the risk-free foreign interest rate ($r^f = 0.04$) so that in the initial steady

⁸[Buffie et al. \(2012\)](#) affirm that the results do not change significantly when Ω takes a value between 1 and 10.

equilibrium, we get $v_g = r_{d,c} - r^f = 0.02$. Similarly, the private risk premium (μ) is also defined as the difference between the domestic interest rate ($r^* = 0.10$) and the interest rate on public commercial debt ($r_{d,c} = 0.06$) which yields $\mu = r^* - r_{d,c} = 0.04$. At the initial steady state, the return on infrastructure R_o ⁹ is set to 0.25 which is presumed to be a high return scenario.

The infrastructure service user fees (μ) are a fixed multiple/split f of recurring costs $\mu = \delta f P_{zo}$. Knowing the depreciation rate of capital $\delta = 0.05$, we fixed $f = 0.05$ as in the base case calibrated by [Buffie et al. \(2012\)](#) and with $P_{zo} = 1/(1 - \varphi_z) = 1/(1 - 0.50) = 2$. Thus, the estimated value of user fees for infrastructure services is 0.05.

We use the data on Investment and Capital Stock Dataset, from the International Monetary Fund (IMF, 2019) to set the initial ratio of infrastructure investment ($\frac{I_{zo}}{y_o}$). This parameter is computed as the ratio of general government investment to gross domestic product. The figure assigned is 0.052, which refers to the average in the WAEMU over the period 2000 – 2017. This is closer to the figure set by [Buffie et al. \(2012\)](#) to 6% which is also close to the average of 6.09% in 2008 for LICs in SSA proposed by [Foster et al. \(2008\)](#). Similarly, in the base case, the consumption VAT has been set at the initial steady state to 9.14% which matches the average for the 2000 – 2018 period of indirect taxes from ICTD Government Revenue Dataset. The ratio of grants to GDP also comes from the same data source and is set with an average value of 2.3%.

Thereafter, we define the efficiency of public investment (s, \bar{s}) and the ab-

⁹The parameters θ_x and θ_n in the production function that drive R_o are given by the calibration of R_o knowing the other parameters in the model. Looking at the World Bank's Circa 2001 projects, this rate has a median value of 20% in SSA and would range from 15 to 29% for several sub-categories of investment in infrastructure. There are also estimates in the literature that indicate that the rate of return on infrastructure ranges from 15% to 30%, depending on the sectors in which the infrastructure investments have been made, including irrigation, water and sanitation, electricity and roads (see among them [Foster & Briceño-Garmendia, 2010](#); [Dalgaard & Hansen, 2005](#))

sorptive capacity parameter (κ). Following [Buffie et al. \(2012\)](#), we assume that public investment is quite efficient in such a way that $\bar{s} = 0.60$ with $s = 0.60$ and the absorption capacity parameter is $\kappa = 2$. The details on the calibration of the connections of s and \bar{s} and that with R_o and the parameters θ_x and θ_n of the production function are appended in the work of [Buffie et al. \(2012, p.46\)](#).

The next step is to estimate the steady value of the ratio of labor supply of non-savers to labor supply of savers (ω). To do this, we have set the ratio for the share of non-saving consumers at 60% which is close to the estimated figures in the LICs, and then, we get the ratio of labor supply of non-savers to labor supply of savers which is solution of the magnitude $[\omega/(1+\omega) = 0.60]$. Therefore, the value of this ratio is $\omega = 1.5$.

Let notice that the ratio of transfers to GDP (T_o), which guarantees the government's budget constraint, is set at 13.1% in the initial equilibrium state as a function of the other parameters. This figure includes a non-capital expenditures such as public wages and other taxes different from VAT given the definition of the fiscal variables defined in the model.

Some of the other values are taken from the WDI data of the World Bank. The ratio of imports to GDP, the ratio of natural resources to GDP, and remittances are respectively set at 34%, 7.69%, and 4%. The royalty tax rate (τ^o) is set to 0.6 which matches the ratio of resource tax revenue in total tax revenue, so that the resource revenue consist of all taxes collected on natural resource rents. The share of natural resources in GDP is calibrated such that the initial resource revenue to GDP being equal to 7.69. Then, it takes the value of 0.128 meaning that the share of natural resources in GDP represents in average approximately 13% in WAEMU countries¹⁰. The figures assigned are averages for WAEMU countries over the period 2000 – 2019.

¹⁰For example [Dembélé \(2015\)](#) shows that gold mining production in 2006 accounted for 15% of GDP in Mali.

As for the various debt ratios, we find difficulty to access public debt data in LICs, most importantly on the composition of debt stock. Even if data exist, they are not disaggregated properly to allow for analysing the link between public debt structure and debt sustainability. We have not, therefore, been able to access country-specific data on the composition of public debt stock in the WAEMU countries. In all cases, we note a high level of public debt in the WAEMU, because since the 1980s, fiscal constraints in the wake of financing needs have plunged countries into a situation that can be qualified as debt cycle. As an illustration, developing countries have benefited since 1996 from debt reduction program called HIPC¹¹ initiative. Nevertheless, WAEMU countries, approximately 10 years after debt relief, still have a level of debt roughly equivalent to that of before the relief. More, the whole of the 1990s was marked by strong absorption of GDP by debt in WAEMU Zone. As a matter of fact, until 2001, external debt accounted for more than 70% of GDP. Comparing the debt ratio limits as defined by the IMF, debt indicators in the Zone over the past decades reveal that WAEMU's debt became non-sustainable quite often which explains successive eligibility for HIPC initiatives. As such, debt ratios in the Zone are close to those of LICs. However, various debt ratios are set at the same values as in Buffie et al. (2012). Thus, at the initial equilibrium, domestic public debt (b_o) ratio is set at 20%, concessional debt (d_o) ratio to 50% according to the fact that total public debt ratio to GDP and the concessional debt ratio to total debt were respectively about 70% and 69% for LICs during 2007 – 2008. Concerning the private external debt, we set $b_o^* = 0$ and also assumes $d_{c,o} = 0$ meaning that the economy has

¹¹The HIPC program is known as the Heavily Indebted Poor Countries debt reduction initiative, which was initially launched in late 1996 by Bretton Woods Institutions (World Bank, IMF) and the Paris Club (bilateral official creditors) with the aim of making debt of heavily indebted LICs sustainable. By the first quarter of 2011, the WAEMU countries had reached their completion point under the HIPC Initiative and will be joined by Cote d'Ivoire in 2012. This initiative has enabled them to considerably reduce debt burden, which was becoming unsustainable.

no access to external commercial debt in the initial regime.

Table 6.2 presents the profiles of public infrastructure expansion, concessional loans and grants increases. All figures are in net terms and are reported in percent of initial GDP ($y_0 = 100$). The public investment scaling-up is priced at initial price level $P_{z,0} = 2$. As shows in the Table, the surge in public investment jumps from year 1 to 3.5% of initial GDP, then to 4.5% in year 2 and 3 before gradually declining to its permanent level of 1.6% of initial GDP. As for net concessional loans, it increases from 6% of initial GDP in year 2 and 3 and then falls progressively until year 12 at 2% of initial GDP meanwhile the repayment phase already started in year 10 and lasts until year 38. Grants increase by 0.4% of initial GDP in the first 8 years, then fall to 0.2% in year 9 and then keep at 0.1% in year 31. Thus, during the first 12 years, concessional borrowing and grants fuel about half of public investment scaling-up, while the remainder is financed by fiscal adjustments using taxes, or current expenditures or both (as in the baseline case) and also by other sources of borrowing such as domestic or external commercial borrowings as under the alternative assumptions.

Table 6.2: Shocks on public investment, concessional loans and grants

Year	1	2	3	4	5	6	7	8	9	10	11	12...	28...	40
<i>Public Investment</i> y_0	3.5	4.5	4.5	4.1	3.8	3.4	3.0	2.7	2.3	1.9	1.6	1.6...	1.6...	1.0
<i>Loans</i> y_0	0.0	6.0	6.0	5.3	5.0	5.0	4.0	4.0	3.6	3.5	2.5	2.0...	0.0...	0.0
<i>Grants</i> y_0	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.2	0.2	0.2	0.2...	0.2...	0.1

6.4 Quantitative results

6.4.1 Debt-stabilising fiscal adjustments under different financing scenarios

In response to the growing needs for financing public investment in WAEMU countries facing fiscal fatigue, several financing schemes can be explored. In the baseline model, we consider the case in which, given the increase in public investment and the path for concessional loans and grants, the government's fiscal constraint is satisfied by taxes and transfers that adjust continuously and freely. It also provides a framework for analysing riskier regimes that round out concessional loans with domestic or external commercial borrowings. Even so, at this stage of our analysis, we are assuming that the government may be unwilling or unable to incur non-concessional debt. And the other types of debt (commercial and domestic) take the values of their initial steady-state so that $d_{c,t} = \bar{d}_c = d_{c,o}$ and $b_t = \bar{b} = b_o$. Thus, adjustments are continuously made without bounds by taxes and transfers.

6.4.2 Fiscal adjustment assumptions under the baseline scenario

In the baseline scenario, we consider three types of adjustment based on reaction functions. These response functions describe the government's choices to target the level of taxes and transfers to stabilize debt. To fix this idea, we focus on equations (6.21) and (6.22), describing the level of taxes and transfers targeted by the government. The level of targeted taxes is given by the equation

$$V_t^{target} = V_o + (1 - \lambda) \frac{Gap_t}{P_t C_t}$$

while the level of targeted transfers is defined by

$$T_t^{target} = T_o - \lambda Gap_t$$

with λ the economic policy parameter which divides the adjustment between taxes and transfers so that in equations (6.21-6.22), given the fiscal reaction parameters which are set to $\lambda_1 = \lambda_3 = 0.25$ and $\lambda_2 = \lambda_4 = 0.02$, the parameter $\lambda = 0$, or $\lambda = 1$ or either $0 < \lambda < 1$.

Assumption (1): $\lambda = 0$, the adjustment is made solely by taxes and this implies that

$$V_t^{target} = V_o + \frac{Gap_t}{P_t c_t}$$

$$T_t = T_t^{target} = T_o$$

$$and \quad V_t^r = V_{t-1} + \lambda_1 (V_t^{target} - V_{t-1}) + \lambda_2 \frac{(x_{t-1} - x^{target})}{y_t}$$

Assumption (2): $\lambda = 1$, the adjustment is done only by transfers and implies that

$$T_t^{target} = T_o - Gap_t$$

$$V_t = V_t^{target} = V_o$$

$$and \quad T_t = T_t^r = T_{t-1} + \lambda_3 (T_t^{target} - T_{t-1}) + \lambda_4 (x_{t-1} - x^{target})$$

Assumption (3): $0 < \lambda < 1$, the adjustment is done on both sides i.e. through taxes and transfers so that

$$V_t^{target} = V_o + (1 - \lambda) \frac{Gap_t}{P_t c_t}$$

$$T_t^{target} = T_o - \lambda Gap_t$$

$$V_t^r = V_{t-1} + \lambda_1(V_t^{target} - V_{t-1}) + \lambda_2 \frac{(x_{t-1} - x^{target})}{y_t}$$

and

$$T_t^r = T_{t-1} + \lambda_3(T_t^{target} - T_{t-1}) + \lambda_4(x_{t-1} - x^{target})$$

6.4.3 Outcomes of the baseline scenario

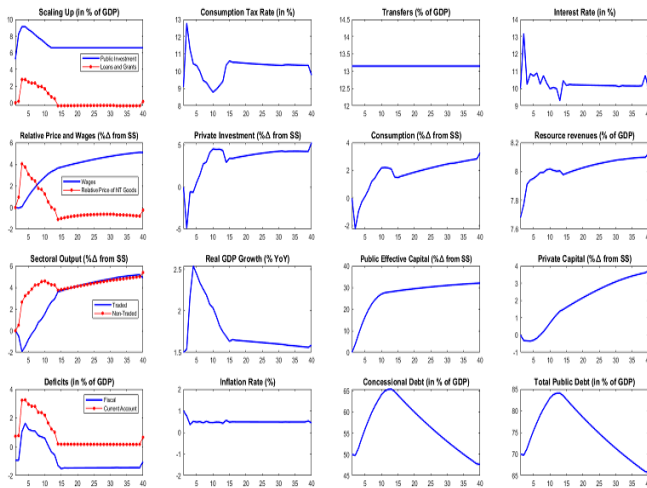
In this scenario, the simulation assumes that in absence of non-concessional borrowing, public investment is not fiscally possible unless the government decides to either aggressively increase tax on consumption, or drastically reduce transfers, or the combination of both. The following section discusses the effects of an upfront investment path that is jointly financed through concessional loans and grants combined with fiscal adjustments. With respect to fiscal adjustment, we assume that the government uses concessional borrowing ($x = d$) to close the fiscal gap when domestic and commercial borrowing are at their initial levels. In addition, the consumption tax rate ($\lambda = 0$) or transfers ($\lambda = 1$) or both ($\lambda = 0.5$)¹² are respectively used as adjustment tools that stabilize long-term debt.

Figures 6.1, 6.2 and 6.3 compare the effects of scaling-up public investment under different fiscal adjustments with concessional loans and grants. When looking at the figures, it can be seen that the results are similar for all timescales under consideration. Such similarities are related to the fact that the financing gap for public investment is primarily covered by grants and heavily concessional loans, which keep the economy unaffected by any of the

¹²In this case, we have chosen to adjust 50% on taxes and 50% on transfers sides. But this adjustment can also be up to 75% on taxes and then 25% on transfers or *vice versa* depending on the choice of the researcher. Nevertheless, the magnitude of the fiscal adjustment parameter λ , no matter which side it is done upon, does not produce any remarkable change in the results other than those that are presented in the this section. It is important to keep in mind that the adjustment in taxes would be smaller if the government slashes transfers or inversely.

three types of fiscal adjustment (taxes, or transfers, or a combination of both). Consequently, the interpretations given in the following lines are applicable to the three figures that can be interchangeable. The macroeconomic effects of public investment scaling-up financing, in the baseline model, can be distinguished in short, medium and long term effects.

Figure 6.1: Baseline — Concessional Loans with Unconstrained Tax Adjustment



CHAPTER 6. FISCAL FATIGUE, PUBLIC DEBT STRUCTURE AND SUSTAINABILITY: A DSGE MODEL FOR THE WAEMU ZONE

Figure 6.2: Baseline – Concessional Loans with Constrained Tax Adjustment

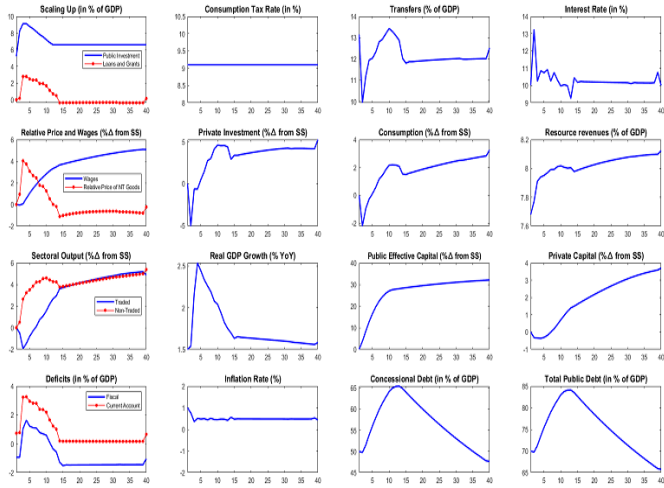
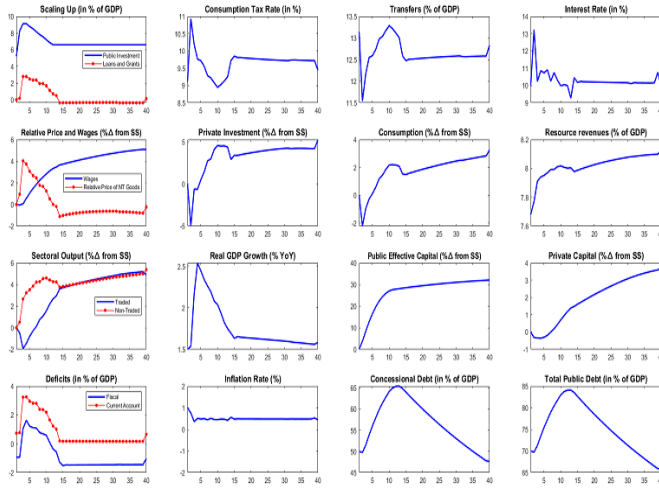


Figure 6.3: Baseline – Concessional Loans with Semi-Constrained Tax Adjustment



In the short term, there is an appreciation of the real exchange rate which proves to be a fundamental feature in the transmission channel in the scenario of increasing investment through concessional loans and grants and by expanding current expenditures. This is manifested by a fall in demand for tradable goods (in the export sector) over the first six years, which was more steep in the year 2. Accordingly, we assist in a shift of factors from tradable to non-tradable sector in which there is high demand for non-tradable goods owed to the increase in public spending. Along with the exchange rate channel, other price channels can also be identified, such as wages and the relative prices of non-tradable goods. In fact, the WAEMU is a monetary union with a fixed nominal exchange rate. As such, the hypothesis of an appreciation of the nominal exchange rate is ruled out in the scenario. But then, it is rather an

appreciation of the real exchange rate, i.e. the relative price of non-tradable goods by 4% from its steady state. In particular, the fall in tradable goods is of the 2% from its initial steady state over the first 3 years whereas non-tradable goods show an increase of 2.6% (or up from 4.6% at $t = 10$) and slowly increasing from year 15 to more than 5% of steady state in the last years. Further, the real exchange rate appreciation leads to a deterioration of the current account over the first years until $t = 4$ where current deficit gradually declines, following the path of the real exchange rate.

Similarly, it can also be pointed out that the government experiences lengthy fiscal hardships in the first years and this also results from the declining effects of the fiscal adjustment on private consumption and investment that can directly be associated with the transition path. On the one hand, we may note that savers do not have the possibility of resorting to foreign borrowing in order to smooth their consumption because of the imperfect mobility of capital. Thus, consumption smoothing is achieved through the Euler equation, notably by the movement of consumption tax and interest rate for a given level of elasticity of substitution. Moreover, the consumption of non-savers is drained both by wages and primarily by transfers. This means that any fiscal adjustment that increases the consumption tax and/or decreases current transfers automatically leads to a fall in the level of aggregate consumption (including that of savers and non-savers). From a theoretical point of view, the positive impact of increasing infrastructure stock in the coming years is expected to stimulate private investment in the short term. By contrast, under adjustments by taxes and/or transfers, the real interest rate increase in year $t = 2$ rather compels savers to cut down on investment in the short run. As a result, private investment and consumption fall by 5% and 2.2% respectively

from their initial steady state by year 2.

Looking further into the medium-term dynamics under the baseline scenario, the outcomes appear to be promising. More concretely, none of the three types of fiscal adjustments seems to be harmful to the long-term economy since the government relies entirely on concessional loans and subsidies to fuel the scaling-up of investments. This leads to higher private consumption starting from year 5, as transfers are increasing and/or the consumption tax rate is decreasing. In this respect, private consumption is 2% higher than its steady state. Likewise, private investment also increases in the long term driven by the onset of productivity gain and the interest rate which falls albeit slightly from its initial steady state, as the portfolio cost adjustment parameter ($\eta = 1$) implies strict capital controls and thus the private sector does not have access to borrow abroad. Meanwhile, private investment also increases after the sharp fall in the short term, until year 13, to be 4.5% higher than its steady state level, before remaining at more than 3% for the remainder of the forecast period.

Moreover, there are also some remarkable changes in public and private capital stocks, although in the short term, public capital jumps up while the private stock falls in year 2 and then stagnates until $t = 5$. Thereby, the capital stock is fast growing and becomes effective in the long run and as such stimulates the private capital to keep growing. For instance, by year 30, the effective public capital is at 30% while the effective private capital is 3% higher relative to their steady state. Likewise, as for the real GDP per capita, it increases to 2.5% before slowly falling to remain around 1.6% over the rest of the years but remaining close to long term growth rate which is 1.5%.

As for the primary deficit, it deteriorates under the effect of fiscal adjustment. The explanation belongs to the fact that, on the one hand, there is a cut in consumption tax when it is not possible to adjust through transfers (Fig.

6.1) and, on the other hand, there is an increase in transfers without any possible adjustment by taxes (Fig. 6.2) and finally when fiscal adjustment is made simultaneously half on taxes and transfers (Fig. 6.3). Also, resource revenues feed into transfers by means of the fiscal gap. So, in case of economy having natural resources, revenue funds are additional to the State's revenues, leading to higher level of current spending. As it can be seen from year 1, resource revenues increase by up to 0.4 percentage points by the end of period ($t = 39$) relative to the steady state, keeping transfers high once fiscal adjustments are triggered.

In this regard, once the adjustment occurs only on taxes, consumption tax jumps to 12.7% at $t = 2$ and 10.6% at $t = 15$. So, by year 2, the increase in taxes is linked to demands from public infrastructure scaling-up which is 4 percentage points higher than its initial steady state. Whereas the second increase is necessary to ensure the repayment of concessional loans that starts by year 10. In contrast, when adjustment is done exclusively on transfers side, these arguments can be put forward to explain the decrease in transfers, which first fall to 10% at $t = 2$ and after a run-up, start by going down again (see $t = 10$) to reach 11.8% in year 15 before staying close to 12% over the rest of period in order to satisfy concessional loans repayments until year 38. As for the last case in which the adjustment occurs on both taxes and transfers, taxes increase and transfers decrease concomitantly for the same reasons of meeting demands and paying down concessional debt. The only distinction is that, the magnitude of tax increase and transfers decrease are smaller than the previous two adjustments, since the latter combines 50% tax increase and 50% transfer decrease. However, long term conditions are still interesting for households given the low consumption tax of 9.8% and higher transfers of 12.5% beyond $t = 15$.

Overall, the trajectory of total public debt is very promising. The latter

follows the path of concessional debt sustainability as expected. Hence, public debt increased in the first years to a peak of 84% of GDP in year 13 as concessional borrowing increases in the first 12 years, before beginning to fall due to the repayment that began in year 10. Therefore, at the end of the 40th year, the total public debt stock stands at 65% of GDP. This sustainable path of total public debt is symptomatic of fiscal adjustment which excludes non-stabilized debt dynamics in the analysis, and strong economic growth rate that supports the whole economy during the repayment phase without any fiscal fatigue.

6.5 Alternative Assumptions

The baseline scenario assumed that, to achieve any upfront in public investment, the government has the only opportunity to significantly increase taxes, or significantly reduce current spending, or to combine these two measures, because, given the exogenous path of concessional loans and subsidies, no other form of borrowing was taken into account. However, in reality, countries are also using other forms of borrowing to scale up public infrastructure investment. Thus, we analyse under further alternative assumptions, the effects of front-loaded investment path financed by non-concessional borrowing such as commercial and domestic borrowing.

6.5.1 Scaling-up with external commercial borrowing

Under this assumption, we presume that the countries resort to external commercial borrowing to offset the fiscal gap. Hence, the path of commercial

debt is withdrawn from the government budget constraint according to equation (6.28)

$$d_{c,t} = P_{z,t}I_{z,t} + \frac{1+r_d}{1+g}d_{t-1} - d_t + \frac{1+r_{dc,t-1}}{1+g}d_{c,t-1} + \frac{r_{t-1}-g}{1+g}P_t b_o + T_t - V_t P_t c_t - G_t - N_t^o - \mu z_{t-1}^s \quad (6.28)$$

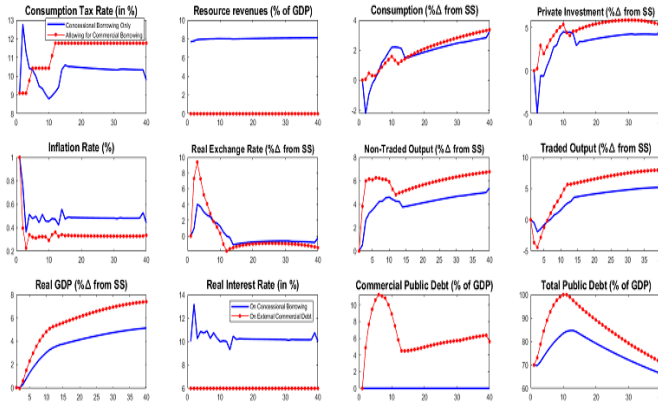
and relying on the reactions functions described in equations (6.23-6.26) with $x = d_c$ indicate the path of taxes and transfers. The trajectory of the concessional debt remains the same as in the baseline case while commercial borrowing are totally fulfilled such that $d_c^{target} = 0$. Additionally, the consumption tax rate is allowed to adjust for stabilizing long-term debt. For this purpose, transfers are kept constant at all times, meaning that $T_t = T_o$. Given the low level of tax collection in WAEMU countries, and even in developing countries in general, we set a ceiling for the consumption tax rate at $V^u = 11.1\%$ in the short-run and $V^u = 13.1\%$ from year 12, thereby allowing for a discrete jump of 2%. Under this scenario, we assume that there are no natural resources in the economy, and therefore resource revenues $N_t = 0$, so that the external commercial debt is fully repaid from taxes on consumption as all the adjustment falls into taxes. Fig. 6.4 compares the macroeconomic effects of concessional borrowing only and access to an additional source of financing such as commercial external borrowing. Public investment follows the same path as in the baseline scenario. Note for interpretations that the solid line refers to concessional borrowing only and the dotted line indicates commercial external borrowing.

According to the results, since external commercial borrowing provides additional resources for financing the scaling-up public investment, fiscal adjustment demands high tax burden for debt repayment as the government does not have any resource revenues under assumption. As a result, consumption tax rates start to rise in year 4 and then in year 10, holding steady at 11.8%

from year 12 when the repayment phase of the concessional debt begins. In sum, consumption tax is going to take 12 years to grow by 2.7 percentage points. Although in developing countries there are still many obstacles to mobilizing domestic revenue, such an increase may seem feasible. Unfortunately, it is not enough to meet the repayment and bring the debt down to a lower level than the baseline scenario. Compared to the baseline of concessional borrowing only, there is no decline in private consumption or private investment in the short term, due to the fact that the additional external resources that finance public investment scaling-up do not cause crowding out of private demand. Nevertheless, it can be emphasized that the appreciation of real exchange rate is more important than in the baseline and therefore there is a more pronounced diminishing impact in the tradable goods sector. By contrast, the latter, starts to pick up in the medium term and supports the uprising of non-tradable output, with lower interest rate and domestic inflation that contribute to high private consumption and investment, resulting in higher economic growth susceptible to keep the total debt on its sustainable path.

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Figure 6.4: Concessional Loans Only versus External Commercial Borrowing



The long-term fiscal situation appears to be more or less feasible. Ultimately, public investment has been scaled up without further widening public debt or raising taxes drastically. As consumption tax levels do not or slowly grows, commercial debt grows to 11.2% of GDP by year 6 before starting to drop and staying above 4.5% from year 13. This leads to an increase in the total public debt, which reached 100% of GDP in the year 10. Although the consumption tax rises progressively to over 11.8% by year 12, it remains from this year onwards above the case of concessional borrowing only, thereby making a repayment that reduces the total public debt to 71% at $t = 40$. Even if this scenario does not lead to an explosive debt projection with commercial borrowing, this form of borrowing is somewhat risky under the no natural resource endowment assumption, since total debt remains 1 percentage point higher than its steady state level.

6.5.2 Scaling-up with domestic versus external commercial borrowing

This scenario considers that the government can use domestic borrowing to finance an increase in investments instead of using external commercial borrowing. Accordingly, from the government budget constraint, we derive domestic debt as follows:

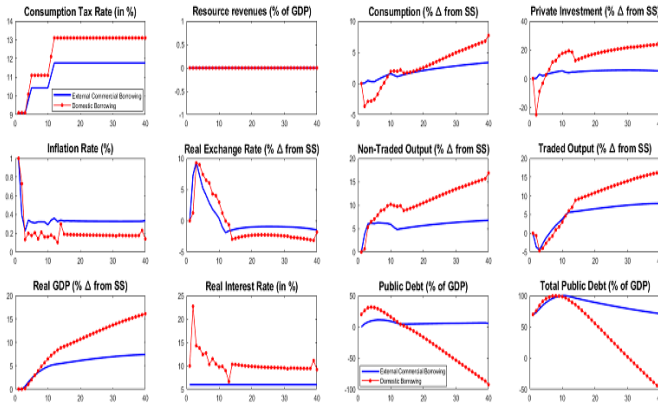
$$P_t b_t = P_{z,t} I_{z,t} + \frac{1+r_d}{1+g} d_{t-1} - d_t + \frac{1+r_{t-1}}{1+g} P_t b_{t-1} + T_t - V_t P_t c_t - G_t - N_t^o - \mu z_{t-1}^e \quad (6.29)$$

while the reaction functions described in equations (6.23-6.26) with $x = b$ still indicate the path of taxes and transfers. The path of concessional loans is the same as in the baseline case while domestic borrowings are totally repaid such that $b^{target} = 0.2$. As in the previous scenario, we assume that all fiscal adjustment burden goes into taxes so that transfers are kept constant at all times implying $T_t = T_o$, and there is no resource revenues in the economy, so $N_t = 0$. Given the above-mentioned reasons for difficulties in collecting taxes, we again assume the same ceiling on consumption tax as in the previous scenario. Fig. 6.5 shows a comparative macroeconomic perspective for scaling-up public investment through two alternative sources of financing such as external commercial and domestic borrowings. In this scenario, the solid line refers to external commercial borrowing while the dotted line indicates domestic borrowing.

It is important to note that domestic borrowing does not drain additional resources for public investment scaling-up as in the case of external commercial borrowing, but it instead shifts private sector resources to the public sector. As such, there is a crowding out of private demand due to the sharp spike in year 2 interest rates which crowds out private consumption and private invest-

ment contrary to the case of commercial borrowing where additional resources come from abroad and no crowd out of the private sector occurs. And yet, although domestic borrowing is more expensive than commercial borrowing from abroad (the interest rate differential between domestic and foreign commercial debt is 4 percentage points in the calibration), the total public debt appears more sustainable with domestic borrowing. This is attributed to the fact that in the medium term, there is an upturn in private demand which increases the output of both non-tradable and tradable goods, thereby generating more output to meet the public debt obligations. In this scenario, the simulation shows that due to a staggered tax ceiling and the speed at which taxes can keep rising, and without relying on natural resource revenues, it is more financially feasible to scale up public investments by combining concessional loans with domestic borrowing rather than borrowing on foreign market. So by means of the fiscal adjustment where cumulatively the consumption taxes jump up by 4 percentage points in the first 12 years to 13.1% until the end of the forecast period, as well as through a strong growth rate, government is able to repay the total public debt which had reached 99.6% at $t = 8$ as the domestic debt spiked to 31.7% by year 4. It would take about 30 years for the public debt to be fully repaid. At the end, the entire public debt is paid down and the government still has a fiscal space, indicating that debt can be sustained even if the initial investment scale-up is of a more high proportion. If such consolidation of public finances is achieved, it is obviously due to structural conditions of the economy, the speed of fiscal adjustment as well as the dynamics of growth. It should be further stated that the calibration is based on assumptions such as high efficiency, a rate of return on infrastructure and certainly a low proportion of public investment scaling-up.

Figure 6.5: Domestic versus External Commercial Borrowing

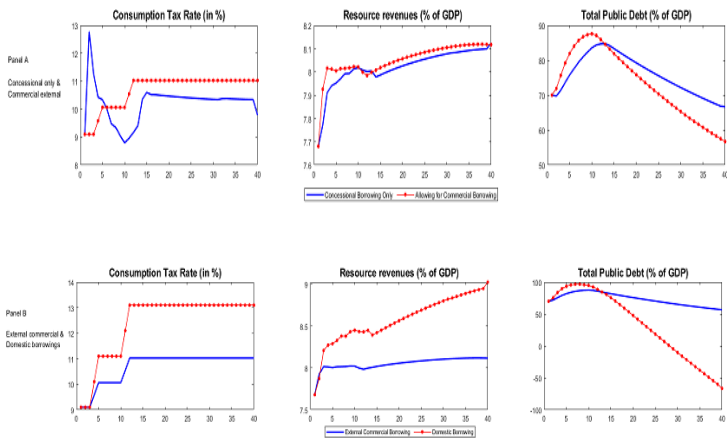


6.5.3 The role of natural resources revenues

This scenario repeats the same simulations in the previous two cases, but this time considering that the economy is endowed with natural resources and then government can use revenue resources to close the fiscal gap. All other assumptions are maintained, in particular the transfers are kept at their initial level and the fiscal adjustment is only made on the tax side. Thus Panel A refers to the case of concessional borrowing only against commercial external borrowing while Panel B refers to commercial external borrowing versus domestic borrowing (Fig. 6.6). The notable difference is that the public debt becomes more sustainable in the case of external commercial borrowing than that of concessional borrowing only when compared to the results of Figure 4 where it remains above 70% and after 40th year it remains above the debt of concessional borrowing. In this regard, it can be inferred that when the

country is endowed with natural resources, the government is able to provide guarantees against the risks associated with borrowing on the external market, and even that the resources collected make it possible to meet financing needs, particularly for increasing public investment. This claim is consistent with the fact that the government uses revenues from prospected natural resources as collateral to borrow commercially and thereby creates challenges in terms of ensuring fiscal sustainability and macroeconomic stability (Melina et al., 2016).

Figure 6.6: Closing the fiscal gap with borrowings plus resources revenues



Additionally, it is also observed that since the fiscal gap is proportional to the scale of resource revenues, the path of public investment requires a lower increase in consumption tax rate. As a result, consumption taxes only jump by about 2 percentage points from year 12 and beyond. As for total public debt, it peaks at 87.5% in year 10 before decreasing to 56.7% by the end of the projection period. On Panel B, the results are relatively consistent with those of alternative scenario 2 (Fig. 6.5) which compared the effects of closing the fiscal gap by commercial versus domestic borrowing in the absence of resource revenues. Further, in this additional scenario, the government is able to fund more public infrastructure development since total public debt is paid down and the additional fiscal space is larger proportionally to the change in resource revenues.

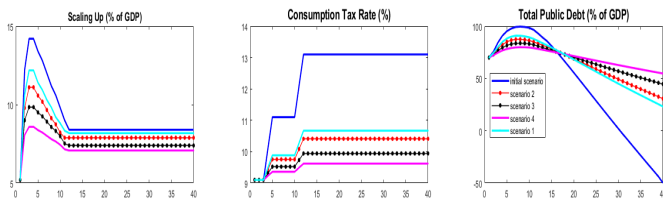
Clearly, when the government can rely on resource revenues, it can resort either to external commercial borrowing while maintaining debt sustainability, or to domestic borrowing with likely higher levels of scaling-up investment in infrastructure at the expense of short-term crowding-out private consumption and investment. Nevertheless, in the absence of resource revenues it is more financially sustainable for the government to ensure the public investment scaling-up by supplementing the concessional loans with domestic borrowing.

6.5.4 Various scales of scaling-up allowing for domestic borrowing

In this section, we simulate several scenarios of infrastructure scaling-up in order to identify the appropriate level of public investment for a long-term sustainable debt level with an easily conceivable fiscal adjustment. These simulations are compared with that in Section 6.5.2 in which, in the event of domestic loans, government was able to repay the entire debt at the end

of the 30th year, obviously because of the level of public investment scale and the fiscal adjustment that increased taxes by 4 percentage points from year 13. It turns out that, faced with a significant rise in the scale of large public investment, the scale of the tax jump is high and thus allows sufficient taxes collected on consumption of goods and services so that all the domestic debt was repaid and budget space is available. For the reason of comparison, the assumptions used in the scenario in Section 6.5.2 (in particular on the lack of revenue from resources, transfers kept at their initial level and fiscal adjustment falls on taxes) are maintained for each scenario in the different levels of public investment scaling-up. The idea of these scenario is to show how the model can identify the level of public investment scaling-up and the corresponding fiscal adjustment that stabilizes debt in the long-term.

Figure 6.7: Various scales of public scaling-up without resource revenues

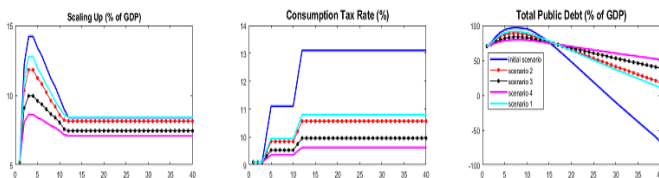


As can be observed in Fig. 6.7, different levels of public investment are scripted and scaled up. The blue line indicates the reference scenario to which the others are compared. We can clearly state that faster the public investment jumps, bigger the tax adjustment, and faster the debt will pay off. Thus, the government can choose what level of scale-up is appropriate for its fiscal capacity, since in practice the key question is whether the required tax adjustment is feasible. The results show that compared to the initial scenario, the

simulated scenarios consist of lower-scale climb levels that require small fiscal adjustments, with relatively higher debt levels. For example, in scenario 1, the climb to the peak scale at 12.1% in year 5 requires a tax jump to be 10.6% during the repayment phase (i.e. a jump of 1.5 percentage points) for a total debt of 23% at the end of the forecast period. On the other hand, scenario 4, which gives the lowest level of scaling-up, increases taxes by 0.5 percentage points to reduce the debt to 54% of GDP.

These forecasts do not change meaningfully when we replicate with assumption of availability of natural resource revenues in Fig. 6.8. Under scenario 1, total debt falls to 10.9% while it falls to 51% under scenario 4 of lower level of scaling-up. In both cases, the scale of the tax jump is relatively close to the cases where there is no resource revenues (Fig. 6.7).

Figure 6.8: Various scales of public scaling-up with resource revenues



Accordingly, the fact that the same tax adjustment scales are required for the same levels of scaling-up, but results in different levels of total debt depending on whether the government relies on natural resource revenues or not, supports the assertion that resources funds contribute to closing the fiscal gap. Therefore, when the economy is endowed with natural resources, while transfers are maintained at their initial levels, any change in natural resource revenues relative to its steady state level, serves to repay debts. As a result,

the total debt is paid down faster explaining the low level of total debt over the term of the forecast.

6.6 Conclusions and potential implications

In this paper, we simulated different scenarios of financing the scaling-up in public investment while pursuing debt sustainability in WAEMU countries. We rely on the stochastic dynamic models of general equilibrium (DSGE) which are part of the new techniques of macroeconomic modeling applied to the analysis of regularities of real cycles, for identifying the nature of shocks and assessing economic policies. More specifically, we developed a DSGE model of an small open economy with the behaviours of four types of agents such as government, firms, consumers, and Central Bank.

Our modelling is inspired by [Buffie et al. \(2012\)](#) model, which we expand to introduce the Central Bank in order to adapt our model to the context of countries belonging to a monetary union. This extension including the Central Bank is very useful and necessary in our case study, since in a monetary union, the Central Bank is responsible for the common monetary policy of the Member States, and therefore the parameters of the real economy are subject to possible shocks resulting from monetary decisions implemented. In this respect, we consider that the Central Bank conducts its monetary policy through the interest rate policy that we implemented through the [Taylor](#) rule. On top of that, WAEMU being one of the most resource-rich regions in Africa, our model takes into account the fact that the economy is endowed with natural resources and thus the revenue collected from resource rents contributes to filling the fiscal gap. Apart from these extension points, which are considered important to calibrate the model so that it matches the characteristics of WAEMU countries, the model exhibits most of the relevant characteris-

tics specific to developing countries including public investment inefficiencies, absorptive capacity constraints, depreciation rate of public capital and learning-by-doing externalities.

The model is designed to assess the macroeconomic effects of public investment scaling-ups while still maintaining the sustainability of debt. The purpose is to determine financing strategies for scaling-up public investment that still remaining consistent with debt sustainability. To meet this target, the model relies mainly on two financing tools, including budgets (taxes and transfers) and borrowings. However, several types of borrowing such as concessional, commercial and domestic debts are used to fill the fiscal gap in short and medium term and then fiscal adjustments are launched to sustain public debt in the long-term. Resource revenues also play an important role in fiscal adjustments by moderating the magnitude of the adjustment and by providing additional resources that contribute to closing the fiscal gap and allowing for scaling-up more public investment without the total debt jumping out of its sustainability path.

Our model is calibrated to the average of the WAEMU countries, and performs a simulation of the macroeconomic effects of rising public investment under different borrowing schemes. The results of the various simulations are summarized as follows. First, it is financially feasible for governments to scale up public infrastructure using concessional borrowing without any risk of unsustainability, as fiscal adjustments are made to provide additional resources to repay concessional borrowing and to bring the debt back on a sustainable path. Second, when the fiscal adjustment is constrained in increasing taxes or cutting transfers or even both, the government can close the fiscal gap by complementing concessional borrowing with external commercial or domestic borrowing for front-loading public investment scale-up. But relying on concessional borrowing alone is better than using external commercial

debt to supplement it, since in the latter case the scenario predicts a higher level of debt, albeit slightly, than the steady state level. As a result, it is more financially sustainable for the governments to rely on domestic borrowing, for which the simulation predicts a scenario with no debt sustainability problems. Moreover, in a resource-based economy, the governments can use that as collateral for borrowing on the external markets. In that instance, given the additional resources levied on natural resources, the scaling-up of public investment could be achieved without having long-term debt explosion either with concessional borrowing only, or by supplementing it with external commercial debt or with domestic debt. Besides, this scaling-up could be done in a more extensive scale without inducing risks of unsustainability. Lastly, the model permits to simulate different levels of scaling-up corresponding to a given level of long-term debt in accordance with the government's fiscal capacity to acquire additional resources, such as through a fiscal adjustment by tax increase or transfers cuts or by taxing natural resources.

Overall, the evidence suggests that debt sustainability is inherently linked to the structure of public debt as well as to the setup of alternative financing strategies for public investments. If unsustainable debt can be very harmful for an economy, it should be reminded that this is because there are potential risks associated with the different debt instruments, and thus the way the government gets into debt is much more important than what the debt finances even its level. But other requirements relating to the dynamism of the economy, the fiscal capacity of government as well as macroeconomic stability ensuring strong economic growth which is necessary to meet the debt obligations. In short, each government has to develop its fiscal capacity in such a way to generate additional domestic tax resources through measures to make VAT (or other consumption taxes) more efficient, as well as resource tax reforms that push marginal effective tax rates towards their optimal level in the

context of resource sector investment projects.

Alternatively, for further investigation insights, this modelling could be extended to introduce other public debt tools such as debts owing through Public-Private Partnerships (PPP), which are increasingly an alternative source of financing, and for scaling-up public capital stock in the well-known literature (Eggers & Startup, 2006; Guerguil & Keen, 2014 and Abiad et al., 2014 for example) have been significantly recurring in number of developing countries with fiscal constraints over the last years. Along with this, public debt can thus be structured into concessional loans, external commercial debt, domestic PPP debt, external PPP debt and domestic non-PPP debt.

Appendix

Box 1: The Speed of Fiscal Adjustment

Equation (6.25), which specifies the dynamic of the tax rate, can be written back as an Error Correction Model (ECM) as follows:

$$\Delta V_t = -\lambda_1 (V_{t-1} - V_t^{target}) + \lambda_2 \frac{(x_{t-1} - x^{target})}{y_t}, \quad (6.30)$$

in which the parameter λ_1 represents the speed of adjustment indicating how many percent of the tax rate deviation is adjusted each year from its target (V_t^{target}).

The lag in V signifies that the adjustment is carried out slowness. According to [Chiang \(1984\)](#), equation (6.30) indicates that tax rate moves slowly towards its target level at a constant speed ($-\lambda_1$) relative to its distance from V^{target} . So, under this consideration,

$$V_{t-1} - V^{target} \cong -\lambda_1 (V_o - V^{target})$$

or using the adjustment time t , we have:

$$V_{t-1} - V^{target} \cong -\lambda_1^t (V_o - V^{target})$$

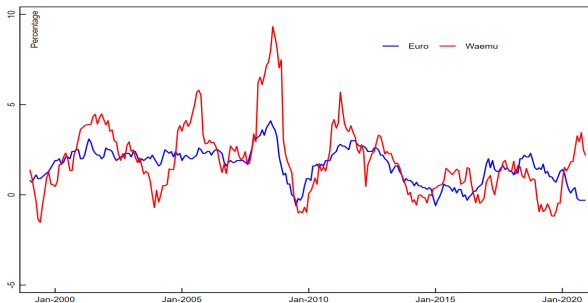
Let's define \tilde{a} the adjustment ratio such that $\tilde{a} = \frac{V_{t-1} - V_o}{V^{target} - V_o}$. Then, from equation (6.30),

$$\tilde{a} = \frac{V_{t-1} - V_o}{V^{target} - V_o} = \frac{(V_{t-1} - V^{target}) + (V^{target} - V_o)}{V^{target} - V_o} = 1 - \lambda_1^t$$

Hence, the time it takes to close \tilde{a} percent of the gap is given by $t = -\frac{\ln(1-\tilde{a})}{\lambda_1}$

For an adjustment speed $\lambda_1 = 0.25$, it takes two to three years to halve ($\tilde{a} = 0.5$) the gap between the current level of the tax rate and its target value. On the other hand, it would take one to two years to reduce by half when the adjustment is faster, for example $\lambda_1 = 0.45$.

Figure 6.9: Evolution of inflation rates in the WAEMU and Euro Zones



These charts show the trend in inflation rates in the WAEMU and Euro areas. Inflation is computed as annual percentage changes of HICP. Monthly data are available from BCEAO and ECB for the period Jan-1999 to Dec-2020.

Chapter 7

General Conclusion

In the WAEMU Zone, the configuration of the economic policy instruments used by public administrations (States and the Central Bank), including monetary and fiscal policies, limits the leeway of Member States in terms of economic and development financing. These traditional financing instruments have therefore become uneffective, so that countries are clearly facing real fiscal constraints in the context of low economic growth rates, economic and social infrastructure needs, a relatively high level of public debt limiting access to external borrowings, as well as a structurally low capacity to levy taxes, and finally, a central bank, the BCEAO with limited room for manoeuvre due to its monetary policy whose priority is to control inflation. The research work in this thesis addressed several issues related to innovative financing mechanisms that WAEMU countries can use to finance economic development while maintaining public debt at a sustainable level.

Chapter 2 revisits the functional relationship between economic growth and the size (tax revenue) of government. This relationship is illustrated by the postulate of an inverted U-shaped curve and confirms the existence of non-linear effects of taxation on growth. Thus, the optimal tax rate that would maximise economic growth in the Union is estimated at 20.6 percent of GDP, compared to an average tax rate over the period of 12.6 percent of GDP. Consequently, the tax resources mobilised by WAEMU countries have always been below their potential. The results clearly show the existence of additional fiscal space, implying that governments can mobilise additional tax revenues to finance productive public expenditure needs without this having a limiting effect on the growth of economic activity. However, given the structural determinants of growth that vary between countries, the optimal tax rate is far from being unique, and consequently the available fiscal space vary from one country to another. In this respect, it is not a question of governments multiplying taxes, or increasing those that already exist. Instead, they should

consider tax reforms to improve tax collection systems, as any policy decision that increases the tax burden without improving the efficiency of the tax system is likely to be counterproductive. Chapter 3 argues that the low level of tax resource mobilisation in WAEMU countries is attributable to the status of institutions and political regimes. Countries with strong institutions and democratic regimes mobilise a significant share of taxes, while authoritarian regimes struggle to collect taxes. However, the low levels of tax collection in WAEMU countries are due to the low quality of institutions and political regimes. Indeed, the weakness of institutions reflects the origin of the settlers amplified by the lack of political freedom and ethnic tensions. This statement is based on the history of societal organization in Africa in the form of empires prior to colonisation. Colonisers simply inherited the existing institutions, in which the majority of people served minorities in chiefdoms, and did not develop effective institutions that can allow the colonies to initiate economic development. As a result, for long period of time, institutions have not contributed significantly to increasing respect for the rule of law, reducing corruption, building a better bureaucracy or limiting the decision-making powers of the executives. Thus, addressing the problem of low tax resource mobilisation requires institutional, political and social reforms. These reforms consist of improving the quality of bureaucracy and governance, with a view to respect for the rule of law, reduce corruption, establish a fiscal social contract between taxpayers and governments, in the context of broader political freedom and ethnic consolidation. Chapter 4 demonstrates that WAEMU member States have a potential tax resource in terms of VAT and provides some key indicators on which they can build to improve the efficiency of their tax revenues in the future. Thus, this chapter estimates the VAT gap and its components and then identifies the determining factors that explain differences in the VAT gap between countries and over time. First, the VAT gap was esti-

mated and then decomposed into two sub-components: the compliance gap, which measures the impact of non-compliance with VAT rules, and the policy gap, which captures the effect of tax policy choices. The estimate showed that more than half of the potential VAT revenue is not being collected in the region. Nevertheless, revenue losses due to non-compliance with VAT obligations are reduced over time, while losses due to the implementation of the “current” VAT policy, does not improve over the period of the study. The results are symptomatic of the tax exemption policies for goods and services implemented in the countries, whose lists vary every year and often violates the rules framing the exemptions set by the WAEMU directives of VAT. The empirical analysis identified factors such as the share of final consumption of households and NPISHs in GDP and the tax burden in terms of VAT as determining factors of the VAT gap. According to the VAT gap analysis, VAT appears to be a force for mobilising additional domestic tax revenues. Chapter 5 proposes an alternative source of infrastructure finance for countries facing fiscal constraints. It shows that there is huge interest for countries to rely on public-private partnerships (PPPs) as a source of financing. Firstly, the use of PPPs allow for the mobilisation of significant financial resources towards the financing of public infrastructure, which is a key driver of the long-term growth potential of economies. A comparative analysis of infrastructure financing through traditional public and PPP investment reveals that PPP investment is more credible alternative financing source than that of traditional public investment. Indeed, PPPs offer better framework for managing and allocating risks between public and private actors, while improving the quality of infrastructure and services. Empirically, the impact of PPP investments is significantly higher than that of pure public investments. However, PPPs do not always avoid debt overhang in the long run. Therefore, PPPs investments are accelerating economic growth as public debt grows to a point be-

yond which there is no significant impact on growth. PPPs are most efficient, but countries are constrained in their debt bearing capacity. The last chapter (chapter 6) explores financing strategies that are consistent with public debt sustainability for the WAEMU Zone through general equilibrium model. Given their structural flexibility, DSGE models seem to be better suited to the analysis of the regularities of real cycles, the identification of the nature of shocks and the assessment of economic policies. Moreover, these DSGE models have the advantage of being based on microeconomic foundations to shape economic policies and to allow for explicitly examining the medium and long-term implications of alternative fiscal policies. The model consists of four agents such as firms, households, government and the Central Bank. It includes both formal and informal enterprises producing tradable and non-tradable goods, and two types of households as savers having full access to financial markets, and non-savers. The government has a debt structure consisting of three tools including concessional, commercial and domestic debts, and also taxes collected on consumption and natural resources, to finance public investment scaling-up. Our model is calibrated to the “average” of the WAEMU and simulates the macroeconomic effects of the scaling-up of public investment with different financing strategies including taxes and debts. The results suggest that scaling-up public infrastructure is financially feasible using concessional borrowing as long as tax adjustment via taxes or transfers are possible, and provide additional resources to pay down debts and keep it on a sustainable path. But when fiscal adjustment is limited by a ceiling on tax increases or a floor on transfer cuts, government can close the fiscal gap with domestic borrowing. Government may only rely on external commercial borrowing if natural resources are available and likely to provide additional revenues, implying that government can use natural resources as collateral to borrow on foreign markets. Thus, this chapter draws lessons for the WAEMU

countries on debt strategy that are compatible with public debt sustainability. As per objectives of this thesis, WAEMU countries must finance their public investment needs by using domestic tax resources. However, these domestic resources are not a panacea. Taking into account the complex economic vulnerabilities faced by these countries, the scope of development financing needs and the sharp constraints on their capacities, in particular in light of the public debt crises, the mobilization of domestic tax resources cannot only meet the enormous financing needs of public policies. As a result, these countries need multitude of financing modalities for development, and in this perspective, structuring that combines Public-Private Partnerships with active mobilisation of domestic tax and non-tax resources would constitute the best strategy.

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