

# Trade Liberalization and Tax Revenue Mobilization in ECOWAS Countries

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# Trade Liberalization and Tax Revenue Mobilization in ECOWAS Countries

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# Abstract

This study is an empirical assessment of the effects of trade liberalization on total tax revenues and their various components in the countries of the Economic Community of West African States (ECOWAS). The study uses data from a sample of 13 countries and covering the period 1990-2016. Using a fixed effects model, the study found that despite the decline in customs revenues caused by trade liberalization, this enabled the countries in the sample to increase both the domestic revenues and the total tax revenues. The study therefore recommends that the governments of the ECOWAS countries should adopt a policy of low tariffs and openness to international trade to strengthen their mobilization of domestic tax revenues. However, this trade liberalization policy must be accompanied with an appropriate macroeconomic policy capable of ensuring a stable economic environment, and good governance, if trade liberalization has to be credible as a policy.

Key Words: Tax revenues, Trade liberalization, Panel data, ECOWAS

Classification JEL: H2, F13, C23, N77

# 1. Introduction

Since the early 1990s, the issue of the relationship between trade liberalization and tax revenue in developing countries has been at the heart of debate on economic policy (Blejer and Cheasty, 1990; Devarajan and Panagariya, 1994; Ebril *et al.*, 1999; Busse *et al.*, 2004; Agbeyegbe *et al.*, 2004). This debate, guided by the current context marked by the setting-up of free-trade areas and customs unions, predicts a reduction in import duties (Blein *et al.*, 2004). This reduction is expected to negatively affect the total tax revenues of the African Caribbean Pacific (ACP) countries in general and of the Economic Community of West African States (ECOWAS) countries in particular, because the bulk of their tax revenues comes from revenue generated by the customs administration (Busse and al., 2004). Customs revenues are indeed of prime budgetary importance for the ECOWAS countries; they represent more than 20% of the total tax revenues, compared to 2.11% in the United States and 1.64% in the European Union (World Customs Organization, 2014).

Trade liberalization, through the recent implementation of the Common External Tariff (CET) and the future signing of the Economic Partnership Agreements (EPAs), will cause West African countries to further open their markets and to forgo further significant customs revenues. That is why it is important to analyse the effect these developments could have on the ECOWAS countries' tax revenues. In other words, does the reduction or elimination of import duties and taxes lead to a reduction in the ECOWAS countries' total tax revenues, both foreign and domestic revenues?<sup>2</sup>

The few studies that have been done on the impact of trade liberalization on tax revenues can be divided into two groups according to their findings. There are those that found empirical evidence confirming either a negative correlation between trade liberalization and tax revenues (Adam *et al.*, 2001; Khattry and Rao, 2002; Baunsgaard and Keen, 2005) or a positive one (Nwosa *et al.*, 2012; Immurana *et al.*, 2013), but there are also those that have reported contradictory results. The latter group has attributed the lack of consensus to the diversity of econometric methods and indicators used to measure trade liberalization (Agbeyegbe *et al.*, 2004; Ebrill *et al.*, 1999; Longoni, 2009; Pupongsak, 2009). However, none of those studies bore specifically on all the ECOWAS countries while using an estimation technique based on panel data.

This study aims to fill this gap by trying to empirically test, using a panel data approach, the effect that trade liberalization can have on the ECOWAS countries' total tax revenues. Specifically, the study aims to test the separate effect first on



the total tax revenues and then on the domestic taxes and import duties to better understand how trade liberalization affects the different components of tax revenues. This study is important because the ECOWAS countries have embarked on trade liberalization within the framework of regional agreements (Common External Tariff) and international agreements (Economic Partnership Agreements). Since their tax revenues are closely linked to their taxes on international trade (Mansour, 2014), it is important for them to anticipate the fiscal shock that is likely to be caused by trade liberalization so that they can take the necessary measures. This study's results will provide a more realistic perspective on issues about the impact of trade liberalization on tax revenues and, therefore, have the potential to influence governments' decisions regarding which liberal trade policies to adopt.

The remainder of this paper is structured as follows: section 2 is an overview of the background to trade liberalization and to the trends in trade and tax revenues. Section 3 is a review of the existing literature on the relationship between trade liberalization and tax revenues. Section 4 is the methodology, section 5 presents the results of the study's estimations, and section 6 concludes the paper and makes economic policy recommendations.

## 2. Background to trade liberalization and trends in trade and tax revenues within ECOWAS

Since its creation in 1975, the ECOWAS region set itself the goals of promoting cooperation and economic activity development to improve the living standards of the populations of its member states, of removing trade restrictions and creating a common market. In addition, the region's ambitions for an increased integration of its member states into the world economy prompted it to initiate liberal trade policies with other regions. However, if there is no change in their trade structure, the implementation of these policies will significantly adversely affect the ECOWAS countries' tax revenues.

### Liberal trade policies in the ECOWAS region

In the 1970s and 1980s, regional economic integration was advocated as the key strategy for Africa's development. This integration was seen by international institutions as the royal path out of poverty and under-development for countries which, if taken individually, would have enormous difficulties in achieving prosperity. That is why, taking advantage of the economic and financial crisis of the end of the 1970s, the International Monetary Fund (IMF) and the World Bank showed increasing interest in implementing, for those countries, Structural Adjustment Programmes (SAPs). As part of these SAPs, the participating countries were made to implement liberal trade policies, which consisted in removing the numerous and unnecessary obstacles that hindered the development of intra- and inter-regional trade. In particular, the countries had to reduce their rates of customs tariffs to streamline the tariff structure in the ECOWAS region, and to remove the bulk of non-tariff barriers. The trade liberalization measures taken since then have had a significant impact both at the regional and the international level.

At the regional level, it was particularly appropriate, through trade, to seek integration into a global context marked by the success of European, American and Asian integration. In this connection, an ECOWAS Trade Liberalization Scheme (ETLS) was launched, whose goal was the setting-up of a customs union with a Common External Tariff (CET). The two instruments (the ETLS and the CET) are thus the main instruments on which ECOWAS relies to consolidate its regional integration.

Through the ETLS, considerable progress has been made in achieving the ECOWAS's goal of setting-up a common market, thanks to the removal not only of

trade restrictions, but also of those on the movement of production factors. The ETLS mechanism ensures that there is free movement of merchandise; that is, without having to pay customs duties and taxes. The ETLS began as part of the SAPs in 1979 and concerned only agricultural produce, handicraft products and crude oil. It was not until 1990 that industrial products began to benefit from the same advantages offered by the ETLS. However, the tariff dismantling concerning industrial products within ECOWAS had to be done by considering each member State's level of development. The countries with higher incomes (Nigeria, Ghana, Côte d'Ivoire, and Senegal) were required to liberalize their trade faster than the lower-income ones. The schedule set for the ETLS also provided for compensation mechanisms to enable countries to face possible shortfalls in customs revenue. The ETLS also imposed the implementation of the "rules of origin" that help to distinguish the products that originate from the ECOWAS region.

The other instrument necessary for the integration of production systems and markets in the region is the ECOWAS Common External Tariff (CET), the process of adoption for which started in Niamey in January 2006. It was definitively adopted at the extraordinary Summit of Heads of State held in Dakar on 25th October 2013 and took effect from 1st January 2015. The CET is composed of a Tariff and Statistical Nomenclature that enables a distribution of various categories of products and a table where the duties and taxes applicable to these products are written. There are accompanying measures aimed at protecting the agricultural and industrial sectors, which often face unfair competition from imports. The CET, together with these complementary measures, are thus meant to help ensure that there is uniform taxation on the products imported from third countries and there is protection of the production fabric against unfair practices. The ECOWAS CET was built on the West African Economic Monetary Union (WAEMU) CET, which was adopted in January 2000. However, in addition to the four categories of products corresponding to the four tariff bands (of 0%, 5%, 10%, and 20%) in the UEMOA CET, a fifth category was introduced into the ECOWAS CET in 2009, with a tariff band of 35% (see Annex 1).

Despite the safeguard measures<sup>3</sup> put in place, the standardization of duties and taxes had a non-negligible impact on tax revenue mobilization within ECOWAS. The CET produced gains for some countries and losses for others depending on the initial structure of taxation on products. Countries such as Nigeria, and to a lesser extent Senegal, saw their customs duties reduce considerably. Their mean rates of tariff protection fell from 11.20% to 10.21% and from 9.38% to 9.12%, respectively, which means a difference of -0.99% for Nigeria and of -0.26% for Senegal. The mean rate of tariff protection for Côte d'Ivoire rose from 7.30% to 7.44% while that of Ghana rose from 9.89% to 10.96% (Adjovi, 2014). Besides their own processes of regional economic integration, the ECOWAS countries are also involved in international trade negotiations with regions such as the USA (in relation to the African Growth and Opportunity Act), China, and Europe in particular (in relation to the Economic Partnership Agreements).

The trade relations that link West Africa to the European Union had for a long time focused on offered agreements. Each time, from Yaoundé I to Lomé IV, through the successive Yaoundé II, Lomé I, Lomé II and Lomé III agreements, it is the EU that accorded trade opportunities to the ACP countries. In other words, these agreements were based on a preferential regime, which was not consistent with the WTO principle of reciprocity. To remedy the inadequacies of the previous agreements and thus put an end to that system of non-reciprocal trade preferences, which the ACP countries enjoyed on most of their agricultural and mining products, the Cotonou Agreement was signed on 23rd June 2000. This agreement provides for the transition from non-reciprocal trade preferences system to the Economic Partnership Agreements (EPAs).

One of the provisions of the EPAs is the gradual setting-up, in conformity with the WTO rules, of a free trade area between ECOWAS and the EU, enabling the latter to open 100% of its markets to West African countries and ECOWAS to progressively open 80% of its markets to the EU for a transitional period of 20 years. However, a number of negotiation issues, mostly related to the short-term compensation of ECOWAS countries for possible losses in tax revenues have delayed the signing of a regional EPA. However, this EPA was definitively approved by 15 ECOWAS Heads of State and Government in July 2014. But, while waiting for the signing of a regional EPA, the largest economies in the region, namely Nigeria, Ghana and Côte d'Ivoire, which are not among the Least Developed Countries (LDCs), are under the obligation to enter into a free-trade agreement for them to maintain access to the European preferential regime, otherwise they will have to pay customs duties on their exports to the EU, duties which in 2013 were estimated at 150 million euros (Berthelot, 2014). That is why Ghana and Côte d'Ivoire have signed interim EPAs with the EU, but ones which have not been ratified yet. For its part, Nigeria, which has made it clear that some of the provisions of the agreement are not in the best interest of its national economy, is still governed by the Generalized System of Preferences (GSP).<sup>4</sup>

As for the 11 LDCs in the ECOWAS region<sup>5</sup>, they still enjoy the advantages of the special regime known as "Everything But Arms" (EBA). That is, they have free access to the European domestic market for all their exports except for arms. They will, however, lose the customs duties levied on imports from the EU when the regional EPA is ratified. This confrontation between the LDCs and the non-LDCs is thus the main reason why the signing of the EPA for the West African region has not yet materialized.

In relation to the trade relations with the USA, they date back to 1974 and are based on a Generalized System of Preferences (GSP). Since the year 2000, the African Growth and Opportunity Act (AGOA) has provided trade links to the two regions. As part of this new strategy for trade policy, in addition to the trade advantages accorded by the USA, there are other opportunities related to cooperation and technical assistance. In other words, numerous restrictions which the ECOWAS countries were subject to under the GSP regime were removed by AGOA. The AGOA-linked advantages were initially to end on 30th September 2008 but were extended to 2015. This means that the ECOWAS countries eligible for AGOA were allowed to continue exporting, without customs duties or quotas, a number of products to

the American market up to 2015. The goal of such a removal of tariff and non-tariff barriers is mostly to foster competition among West African countries, especially in sectors such as the textile and clothing industries in which several West African members of ECOWAS are big producers. Currently, all the ECOWAS countries, with the notable exception of Côte d'Ivoire, are eligible for AGOA advantages. Côte d'Ivoire lost its eligibility status in 2005. It is also worth pointing out the increasing involvement of the Asian continent in general, and China in particular, in trade policies in the West African region.

The main goal of all those tariff reforms is not only to foster regional and international integration but also, and mostly, to boost trade in the region. Below follows an analysis of the trends in the trade between ECOWAS countries and their trading partners.

## Trends in trade between ECOWAS countries and their trading partners

The tariff and non-tariff reforms on which the ECOWAS region has embarked over the past few decades have helped to boost its trade. However, official 2015 UNCTAD statistics showed that the region was far from constituting a local market for its member States. The intra-ECOWAS trade was still at a relatively low level in comparison with that with other regions of the world. Despite the efforts made in terms of trade liberalization, this trade was still within a bracket of 8% to 15% compared with 60% of trade between the Organization for Economic Co-operation and Development (OECD) countries, with about 45% between the developing countries of Asia, and close to 20% between Latin American countries. Table 1 below provides information on the trends in ECOWAS exports and imports with its various trading partners between 1995 and 2015.

Table 1: Trends in ECOWAS exports and imports in %

	1995		2000		2005		2010		2015	
	Exports (%)	Imports (%)	Exports (%)	Imports (%)	Exports (%)	Imports (%)	Exports (%)	Imports (%)	Exports (%)	Imports (%)
Intra-ECOWAS	10.4	8.4	8.9	12.3	9.7	12.6	8.1	10.0	10.8	9.3
Africa outside ECOWAS	20.3	21.5	26.0	21.9	27.6	25.8	49.5	30.3	40.7	27.4
Rest of the world	69.3	70.1	65.1	65.8	62.7	61.6	42.4	59.7	48.5	63.3

Source: Compiled by the author based on 2015 UNCTAD data

The low level of intra-ECOWAS trade can definitely be attributed to the low levels of diversification that characterize ECOWAS countries' production. Indeed,

these countries are locked into the trap of cash crops and mining products, both of which represent more than 85% of the countries' total exports. In 2012, 40% of ECOWAS exports were destined for the American market, 28% for the European market, 16% for Asia, 9% for West African markets, and 7% for the rest of Africa.<sup>6</sup> In 2016, exports to the United States and to the rest of Africa fell to 5% and 6%, respectively, while those to the EU, Asia and ECOWAS countries increased by 2%, 4% and 2%, respectively. Nigeria is the engine of regional trade within ECOWAS; it represents 77% of regional exports. It is followed by Côte d'Ivoire with 10% and then by Ghana and Senegal with 4% and 2%, respectively. Mali represents 1.7% while Benin, Burkina Faso, Guinea, Niger and Togo represent each 1% of regional exports (ECOWAS, 2016).

The main supply sources for the ECOWAS region are Europe, where 40% of the imports come from (30% of which are from the European Union), Asia-Oceania with 29% of the imports, and the USA with 14%. Intra-ECOWAS imports represent 12% and those from the rest of Africa 5%.

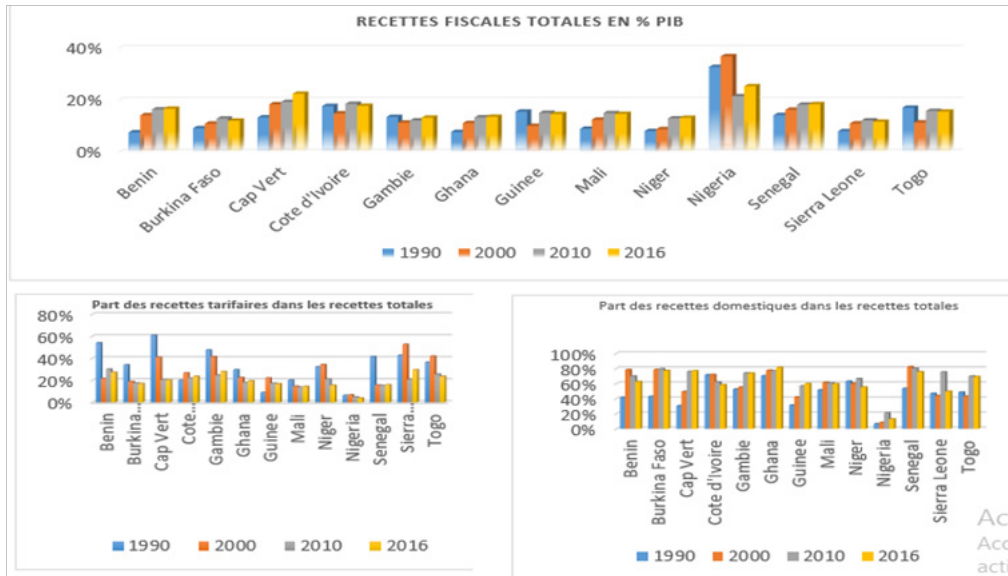
However, it should be noted that ECOWAS's imports from Asia are growing faster than those from the EU, which until 2012 was the region's main supplier with around 30%. Imports from Asia increased by 5.7% between 2013 and 2016 while those from the EU increased only by 3.8% over the same period. This significant share of Asian countries, in particular China and India, in ECOWAS imports has certainly led the EU authorities to want to speed up the process of signing the EPAs, which would give European products free access to the Western African market. In addition, intra-ECOWAS imports and those from the rest of Africa and the United States declined in 2016 to 11%, 3% and 8%, respectively.

It should be noted, though, that trade liberalization policies such as the Common External Tariff have not contributed to boosting intra-community trade, which is why the signing of future Economic Partnership Agreements with the European Union risks causing substantial losses in customs revenues considering the large share of imports from the EU. Yet, the ECOWAS countries' total tax revenues essentially come from import duties. An analysis of tax revenues done in the following paragraphs provides a clearer idea of the trends in the levels and structure of tax revenues for each ECOWAS country.

## Trends in levels and structure of tax revenues within ECOWAS

Tax revenues in the ECOWAS countries in this study's sample increased during the period 1990-2016, except for Nigeria. This good performance concerning tax revenues as a ratio of GDP reflects an increase in those countries' domestic tax revenues (direct taxes and indirect taxes) and a decline in their taxes on international trade. Figure 1 below illustrates this trend.

Figure 1: Trends in the total tax revenues (in %) and their components from 1990 to 2016



Source: Compiled by the author based on data from Foundation for Studies and Research on International Development (FERDI) ([www.ferdi.fr](http://www.ferdi.fr))

The total tax revenues for Benin, Côte d'Ivoire and Senegal represented 17%, 18% and 18%, respectively, of their GDP in 2016, against 7%, 17% and 14% in 1990. Nonetheless, these figures are still below the average of 20% set as ECOWAS region's norm. Only Cape Verde and Nigeria recorded a ratio greater than 20%. Burkina Faso, Gambia, Guinea, Mali, Sierra Leone and Togo lag far behind in their tax revenue mobilization effort; their rate did not exceed 15% during the entire study period (1990-2016). From the 2000s, the bulk of tax revenues for the different countries have come from domestic taxes (direct taxes and indirect taxes), which account for more than half of the total tax revenues, except for Nigeria. For their part, the foreign trade revenues have been on a downward trend from the mid-1990s, with Senegal seeing the biggest drop in foreign trade revenues. Indeed, the share of taxes on international trade in the total tax revenues has dropped considerably even if they are still significant (more than 20%) in the GDP of some countries, namely Benin, Gambia, Mali, Sierra Leone, and Togo. This means that some countries have succeeded in making up for the drop in foreign trade revenues by mobilizing more domestic revenues, even though these remain low for some of them.

In Nigeria, the total tax revenues relative to the country's GDP increased between 1990 and 2000, from 33% to 37%, before falling to 25% in 2016. This bad performance was caused by a predominance of revenues from natural resources, which are very unstable. The share of domestic tax revenues, excluding taxes on petroleum products, was low, compared to that of other countries in the region, despite the increase observed during the study period: domestic tax revenues represented 7% and 13%

of the total tax revenues in 1990 and 2016, respectively. Foreign trade revenues, for their part, decreased from 2% in 1990 to 1% of GDP in 2016.

In summary, Figure 1 above shows that the decline in customs revenues in ECOWAS countries was generalized. This suggests that the tariff reforms undertaken to promote regional and international integration adversely affected the region's foreign trade revenue component. This decline was accelerated in the mid-1990s and continued until the signing of the EU-ECOWAS Economic Partnership Agreements. However, the mobilization of domestic tax revenues enabled those countries to compensate, to a certain extent, for this loss, which reflects a phase of fiscal transition in the ECOWAS region. It should also be noted that, on average, an increase in tax revenue masks significant differences from one country to another: Senegal, Burkina Faso, Cape Verde, and Ghana derive the bulk of their income from domestic taxes, while Nigeria relies almost entirely on revenues from the extraction of its natural resources. Figure 1 also shows that the share of tax revenues in GDP was highest for Nigeria, but it also shows that the share of the other countries in the sample was of better quality because it was more stable (to the extent that it was not dependent on taxes on natural resources).



### 3. Relationship between trade liberalization and tax revenues: A review of literature

The rapid tariff dismantling in developing countries in the last two decades has led researchers to pay particular attention to the empirical analysis of the relationship between trade liberalization and tax revenue mobilization. However, there has been no agreement in their findings, even though those of a negative effect of trade liberalization on tax revenues seem to dominate in their reports.

Several studies on the fiscal impact of tariff reforms have concluded that the liberalization of foreign trade leads to a reduction in tax revenues (Farhadian-Lorie and Katz, 1989; Blejer and Cheasty, 1990; Mitra, 1992; Baunsgaard and Keen, 2005). The negative effect of lower tariffs on tax revenues was confirmed by Rao (1999) and by Khattry and Rao (2002); the latter examined the relationship on 80 countries (both developing and developed) using data covering the period 1970-1998. Using a fixed-effects model, they found that trade liberalization was negatively correlated with total tax revenues and import duties in developing countries. They attributed that effect to the cumulative drop in the countries' customs revenues and to their inability to mobilize domestic tax revenues. Baunsgaard and Keen (2005) studied a panel of 125 countries over the period 1975-2000 and found that the reduction in import duties translated into a significant reduction in tax revenues, with a limited effect for rich countries but a strong effect for poor countries. The authors were able to demonstrate that for every Euro lost, middle-income countries managed to recover 40 to 60 cents of it by increasing domestic taxes, while poor countries failed to do so or recovered only 30 cents at most. For his part, in his study on developing countries in Africa, entitled "Optimal taxation and tax reforms in developing countries", Gautier (2002) found that following the lowering of customs tariffs, 16 of the 18 countries in his study saw both their import duties and their tax burden (tax revenues/GDP) fall over the period 1980-1995. Only two countries (Kenya and Ghana) managed to increase theirs against a backdrop of decreasing taxes on international trade.

The Economic Commission for Africa (UNECA, 2004) also studied the fiscal impact of trade liberalization on African countries' economies. The study covered the period 1980-2002 and concerned all African countries except Eritrea, Liberia, Libya, the DRC, and Somalia. It used the Generalized Method of Moments (GMM) estimator proposed by Arellano and Bond and found that trade liberalization was a potential source of fiscal instability for African countries. But it also argued that the decline in tariff revenues could be offset by an increase in revenues from domestic taxes, especially if more and more countries had recourse to VAT collection.

Zafar (2005) studied the case of Niger and found that a reduction in tariff revenues during the 1980s and 1990s had a negative effect on the country's taxes on international trade. But he also found that an increase in the volume of imports, following trade liberalization, had enabled the country to partially offset its losses in customs revenues by broadening its tax base.

Another set of studies has shown that trade liberalization does not necessarily lead to losses in tax revenues. For some of these studies, the net effect of liberalization on tax revenues depends on a multitude of factors, among them whether liberalization is done gradually or quickly (Ebrill *et al.*, 1999; Fukasaku, 2003), the indicators used to measure trade liberalization (Agbeyegbe *et al.*, 2004; Pupongsak, 2009), the methodology used, etc.

Studying a sample of 22 Sub-Saharan African countries based on data covering the period 1980-1996, Agbeyegbe *et al.* (2004) measured trade liberalization using two indicators: the degree of economic openness and the amount of tariff revenue collected. Applying the Generalized Method of Moments (GMM) to a dynamic model, the authors found that the relationship between trade liberalization, tax revenue and its different components was sensitive to the indicator used to measure trade liberalization. Indeed, when this was measured by the amount of tariff revenue collected, it was found to have a positive and significant effect on the total and domestic tax revenues, while a negative and significant effect was found between trade liberalization and revenues from taxes on international trade. When it was measured by the degree of trade openness, it was found to have a positive and significant effect on all the components of tax revenues.

Pupongsak (2009) measured trade liberalization using three indicators: the degree of trade openness, the mean tariff rates, and the number of trade agreements. Using a mixed-effects model, the author found that trade openness had a positive and significant effect on all the components of tax revenues for 30 low-income countries. A negative and significant effect was found between the mean tariff rates and the revenues from taxes on international trade. Likewise, all the categories of tax revenues were negatively correlated with an increase in number of trade agreements.

Some authors have reported a positive and significant relationship between trade liberalization and tax revenues. For instance, using time series data covering the period 1980-2010 for the Ghanaian economy, Immurana *et al.* (2013) used the same trade liberalization indicators as Agbeyegbe *et al.* (2004). To take the short-term and long-term effects into account, they used an Autoregressive Distributed Lag (ARDL) model. They found that the two indicators used to measure liberalization had a positive and significant effect on the total tax revenues both in the short and the long term. They concluded that the strong price elasticity of the import demand in the Ghanaian economy was the cause of this positive effect in the short term and that this strong elasticity, complemented by fiscal reforms, caused this positive effect to continue into the long term. Nwosa *et al.* (2012) came to a similar conclusion after examining the effect of trade liberalization on trade revenues for the specific case of Nigeria. They found that trade liberalization positively influenced revenues from taxes on international trade and was the key determinant of tax revenues in Nigeria.

All in all, analysis of previous research has enabled this study to take into consideration the complexity of the relationship between trade liberalization and tax revenues. Previous research has shown that each form of trade liberalization affects trade revenues in developing countries. However, the magnitude of this effect, which can be positive or negative, depends on several factors. Among them are the initial structure of the customs tariffs in each country, the indicators used to measure trade liberalization, the econometric methods used, the tax reforms implemented in the country, etc. Analysis has also shown that no study has been done on the relationship between trade liberalization and tax revenues in relation to, specifically, all the ECOWAS countries and using an estimation technique based on panel data. This study aims to fill this gap by examining the effect of trade liberalization on tax revenues of the ECOWAS countries over the period 1990-2016. Unlike previous studies, this one uses a trade liberalization indicator that considers only taxable imports, in lieu of total imports, for a more precise estimation of customs revenue losses.

## 4. Methodology

To measure the effect of trade liberalization on the ECOWAS countries' tax revenues, this study used the econometrics of panel data, which has the advantage of taking into account unobserved individual and/or temporal differences (Baltagi, 2013). According to Baltagi, there are several methods of estimating panel data (estimation by the Ordinary Least Squares (OLS), estimation with a fixed-effects model, and estimation with a random-effects model), and the choice depends on the assumptions made regarding parameters and disturbances. However, tests have shown that, generally, fixed-effects or random-effects models provide a better fit because an estimation based on OLSs can be biased if the heterogeneity inherent in each country is overlooked. This section first presents the specification of the models used, then the explained and explanatory variables, and finally the data.

### Model specification and estimation technique

To test the effect of trade liberalization on tax revenues, this study followed the model generally used in studies on the tax effort (Stotsky and WoldeMariam, 1997). However, the traditional literature on the tax effort has ignored the role of other variables such as foreign aid, public debt, and institutional quality, which are potentially key determinants of tax revenue. These variables are included in this study's model, with specific reference to the research by Agbeyegbe *et al.* (2004) and that by Pupongsak (2009). The specification of the study's basic empirical model is as follows:

$$Y_{it} = \alpha + \sum \beta' X_{it} + \varepsilon_{it} \quad (1)$$

where  $i = 1, \dots, 13$  represents "individuals" (i.e. ECOWAS countries with the exception of Guinea Bissau and Liberia) and  $t = 1, \dots, 26$  refers to the study's temporal dimension (1990-2016);  $Y_{it}$  is the endogenous variable (total tax revenues/GDP) observed for country  $i$  at period  $t$ ;  $\alpha$  is a constant term;  $X$  is the vector of the explanatory variables;  $\beta$  represents all the coefficients of the various explanatory variables used in this study;  $\varepsilon_{it}$  is the error term.

The study first applied a simple linear regression (OLS) to equation (1) without considering either the particular nature of the data or that of the error terms. This is the “pooled” model. This model estimated a constant term common to all the countries in the sample, corresponding to the average levels of the dependent variable. Thus, the model estimated the coefficients for a single straight line for all the countries and for all periods, ignoring individual specificities. Estimating this model allowed the study to detect whether the level of its dependent variables could be related to the levels of its explanatory ones. The results of this regression (in Annex 2) can be interpreted as the long-term effects of the explanatory variables. However, it is worth pointing out the risk of performing a simple linear regression with panel data; using a “pooled” model leads to a significant loss of information by ignoring individual effects. Such a model disregards the panel dimension of the data in this study.

To effectively take the panel dimension of this study’s data into account, the first step consisted in verifying the homogeneous or heterogeneous specification of the process that generated the data. At the econometric level, this amounted to testing the equality of the coefficients of the model studied in its individual dimension, while on the economic level this amounted to determining whether the theoretical model studied was perfectly identical for all countries (pooled model) or if, on the contrary, there were specificities for each country (model with individual effects). The hypotheses to be tested are the following:

$$H_0^1: \alpha_i = \alpha \text{ and } \beta'_i = \beta'$$

$$H_1^1: \alpha_i \neq \alpha \text{ or } \beta'_i \neq \beta'$$

A Fisher statistic will be calculated to test these hypotheses. If the null hypothesis of homogeneity is not rejected, then we will obtain a completely homogeneous pooled model, but if it is rejected, then we will move to a second stage, which consists in determining whether the heterogeneity comes from the coefficients  $\beta'_i$ .

The second step will, therefore, consist in testing the equality of the coefficients for the explanatory variables for all the countries. The hypotheses to be tested are the following:

$$H_0^2: \beta'_i = \beta'$$

$$H_1^2: \beta'_i \neq \beta'$$

If the null hypothesis of homogeneity of the coefficients  $\beta_i$  is rejected, the panel structure will be rejected because at best only the constants  $\alpha_i$  can be identical between countries. If the null hypothesis of homogeneity of the coefficients  $\beta_i$  is not rejected, the panel structure will be maintained and, as a result, we will move to the third step to determine whether the constant  $\alpha_i$  has an individual dimension.

At the third step, we will test the equality of the individual constants on the assumption that the coefficients  $\beta_i$  are common to all the countries in the sample. The hypotheses to be tested are:

$$H_0^3 : \alpha_i = \alpha$$

$$H_1^3 : \alpha_i \neq \alpha$$

If the null hypothesis  $H_0^3$  of the homogeneity of the constants  $\alpha_i$  is not rejected, then we find a completely homogeneous panel structure. Otherwise, we will get a panel model with the presence of individual effects. The results of the different tests are summarized in Table 2 below.

Table 2: Results of the specification tests

Test	Calculated statistic	Probability	Result
F1	5.835	0.0000	$H_0^1$ is rejected at the 5% threshold.
F2	1.264	0.1941	$H_0^2$ is not rejected at 5% threshold.
F3	3.592	0.0004	$H_0^3$ is rejected at the 5% threshold.

Source: Computed by the author

The results of these tests lead us to use a heterogeneous model where the only source of heterogeneity comes from the constants. In other words, the model to be estimated differs by individual (ECOWAS country) only by the value of the constant.

With the presence of the individual effects having been confirmed, it is now necessary to determine how these effects are to be modelled. There are two possibilities: to use a fixed effect model (the individual effect is constant over time), and to use a random effect model (the constant term is a random variable). In the first case, individual heterogeneity takes the form of parameters to be estimated, while in the second case, it is considered to be random and is part of the error term. Hausman has proposed a hypothesis test that discriminates between fixed and random effects. Therefore, to choose between these two models, the study first estimated the fixed effects model. The calculated Fisher statistic confirmed the heterogeneity of individuals in the form of a fixed effect since the p-value associated with the test was below the 5% threshold (the Within estimator is more powerful than the ordinary-least-squares one). Then, the Breusch Pagan statistic obtained after estimating the random effects model indicated a p-value lower than 5%, thus attesting to the significance of the random effects (the generalized-least-squares estimator is more powerful than the ordinary least-squares one). Finally, the Hausman test was carried out to choose the best specification between the fixed-effects model and the random-effects one. This test provides information about

the independence or possible correlation of individual effects with the explanatory variables. The hypotheses to be tested are:

$H_0: E(\alpha_i/X_i) = 0$  Presence of random effects

$H_1: E(\alpha_i/X_i) \neq 0$  Presence of fixed effects

The Hausman test rejected the hypothesis of no correlation between the random term and the explanatory variables of the model because the p-value associated with the test was 0.0017; that is, less than 5%. Since the estimators of the random-effects model are biased, it is preferable to use those of the fixed-effects model, which are unbiased (see Annex 3). In other words, the fixed-effects model seems to be the most adequate to explain the effect of trade liberalization on the ECOWAS countries' tax revenues.

The final model to be estimated can be written as follows:

$$TPF_{it} = \alpha_i + \beta_1 \text{tarif\_moyen}_{it} + \beta_2 \text{ouvcom}_{it} + \beta_k X_{kit} + \varepsilon_{it} \quad (2)$$

$TPF_{it}$  is the ratio of the total tax revenues to GDP of country  $i$  in year  $t$ ;  $\text{tarif\_moyen}$  is the first indicator of trade liberalization through the trade-weighted average tariff rates;  $\text{ouvcom}$  is the second indicator of trade liberalization measured by the sum of exports and imports as a ratio of GDP; and  $X$  is the vector of the other explanatory variables. This study selected four groups of variables likely to capture the effects:

- a) of the country's economic structure;
- b) of the macroeconomic policies implemented in the country;
- c) of external financing; and
- d) of institutional quality.  $\alpha_i$  represents individual heterogeneity; that is, individual effects varying with countries and fixed over time.  $\varepsilon_{it}$  is the error term.

To better understand the effect of trade liberalization on the components of tax revenues, the study also tested its effect on domestic tax revenues and on customs duties. The specification of the empirical models is as follows:

$$TPFI_{it} = \alpha_i + \beta_1 \text{tarif\_moyen}_{it} + \beta_2 \text{ouvcom}_{it} + \beta_k X_{it} + \varepsilon_{it} \quad (3)$$

$$TPFE_{it} = \alpha_i + \beta_1 \text{tarif\_moyen}_{it} + \beta_2 \text{ouvcom}_{it} + \beta_k X_{it} + \varepsilon_{it} \quad (4)$$

where *TPFI* and *TPFE* are the respective ratios for the domestic tax revenues and customs duties to GDP.

## Presentation of the models' variables

Previous studies have always used the tax collection rate as a rough indicator of a country's fiscal performance. This rate is equal to the sum of the tax and non-tax revenue as a ratio of the country's GDP. However, this study took into account only tax revenues; the non-tax revenues were not included, not only because of their low level in the ECOWAS countries but also because of the non-availability of data about them in most of these countries. Several authors, among them (Khattry and Rao, 2002; Agbeyegbe *et al.* 2004; Longoni, 2009; Morissey *et al.* 2006 and West African Monetary Agency, 2011) have used the tax burden rate (tax revenues/GDP) to measure a country's fiscal performance.

Within ECOWAS, there is a convergence criterion which stipulates that the tax burden rate must be greater than or equal to 20%. This study, therefore, seeks to verify whether a greater liberalization of trade can hinder the achievement of this goal. In addition, tax revenue is broken down into external tax revenues (customs duties) and domestic tax revenues (direct and indirect taxes) to better measure the effect of trade liberalization on either component of tax revenues.

The study's variables of interest are the indicators used to measure trade liberalization. In this respect, the effective trade tax rate (revenues from external customs tariffs on the value of imports and exports), the collected tariff (ratio of import taxes to the value of imports), the degree of trade openness (ratio of exports and imports to GDP), the trade-weighted average tariff rates, and the number of free trade agreements are the main indicators of trade liberalization used in the empirical literature (Khattry and Rao, 2002; Agbeyegbe *et al.*, 2004; Longoni, 2009; Pupongsak, 2009). This study uses the trade-weighted average tariffs (*tarif\_moyen*) and the degree of trade openness (*ouvcom*) as indicators of trade liberalization. The trade-weighted average tariff is the average of the tariff rates effectively used, weighted by the shares of imports of products for each partner country.

The study chose to use this indicator to take into account genuinely taxable imports, for a more precise estimation of the loss of tax revenues. A drop in tariffs indicates low taxes on imports, and hence greater trade liberalization. However, given the elimination or lowering of tariffs, it is hypothesized that trade liberalization will negatively affect revenue from taxes on international trade but positively affect revenue from internal taxation (increase in the volume of imports and therefore in the tax base). Its impact on the total tax revenues can be positive or negative, though. Regarding trade openness, previous research has shown that a greater degree of openness of the economy leads to an increase in international trade. Yet, income



from international trade constitutes an easily taxable base (Agbeyegbe *et al.*, 2004; Pupongsak, 2009; Diarra, 2012). Based on this observation, it can be hypothesized that trade liberalization, through the indicator (ouvcom), improves the efficiency in tax revenue collection.

The first category of control variables includes those that are likely to capture the economic structure of countries. These variables are considered the traditional determinants of tax revenue. First, there is the level of economic development measured by the real per capita income (per capita GDP). Indeed, it is assumed that the higher a country's level of development is, the stronger the country's capacity to mobilize resources (Brun *et al.*, 2008). In line with this, many studies have found that the real per capita income has a positive impact on tax revenue (Attila *et al.*, 2009; Longoni, 2009; Agbeyegbe *et al.*, 2004), while a few studies have reported a negative relationship but without providing a clear economic explanation for this (Gupta *et al.*, 2003; Morissey *et al.*, 2006). Also, there are the sector-based shares in the product; these are usually the share of agriculture and industry and/or services in GDP. Most studies have found a negative relationship between tax revenues and the share of agriculture in the economy (Morissey *et al.*, 2006; Brun *et al.*, 2008; Mutascu and Danuletiu, 2013), which they have attributed to the fact that agricultural activities most often take place in rural areas and in the informal sector, and thus are difficult to tax. Other studies have also looked at the share of the industry and/or services in GDP but have reported mixed results, although a positive effect seems to be the dominating result (Mutascu and Danuletiu, 2013).

The second category of control variables is that of those having to do with macroeconomic policy. These are the real effective exchange rate, the public debt service, and inflation. For example, an appreciation or depreciation of the real effective exchange rate could lead to an increase or decrease in the volume of imports, which would directly affect the tax base. Several authors, among them Ebrill *et al.* (1999) and Agbeyegbe *et al.* (2004), incorporated this variable into their model and found that a depreciation of the real exchange rate had positive effects on tax revenues through an increase in VAT revenues. Regarding public debt, the authors emphasized that the servicing of it required a greater fiscal effort on the part of governments (Brun *et al.*, 2008).

The debate around the impact of debt on tax revenue mobilization does not seem to have been settled in the empirical literature. While some authors have found a positive effect of debt on countries' ability to raise tax revenues (Ouattara, 2006), others have found this effect to be negative (Gupta *et al.*, 2003). Debt service has been used to represent the effect of public debt. For its part, inflation has been considered in several studies as a macroeconomic variable, which has a negative effect on tax revenue mobilization (Agbeyegbe *et al.*, 2004); a high rate of inflation has been reported to have a negative and significant effect on tax revenue. However, Pupongsak (2009) and Diarra (2012) have reported a positive correlation. These authors argue that periods of high inflation must be associated with a higher fiscal effort to maintain the level of tax revenue.

The third category of control variables captures the effect of external financing. Few studies have tested the effects of external aid on tax revenue mobilization. A summary of those that did was done by Brun *et al.* (2008), who reported that the negative effect of aid on tax revenue appeared systematically in almost all the studies. But Immurana *et al.* (2013) found an ambiguous relationship between foreign aid and tax revenue, in the sense that the negative or positive impact of foreign aid on tax revenue depended on the nature of the aid.

The last category of control variables captures the effects of institutional quality. This was found to have a direct impact on a country's fiscal performance (Attila *et al.*, 2009). In developing countries, high levels of corruption, political instability, and the ineffectiveness of the institutions in charge of collecting taxes were found to be the causes of the difficulty in assessing and collecting taxes. Therefore, it is anticipated that there will be a positive relationship between tax revenue and effective institutions.

## Sources of data and statistical analysis

Annual data from 1990 to 2016 have been used in this study. They were collected from ECOWAS countries, with the exception of Guinea Bissau and Liberia, which were removed from the sample due to lack of reliable data from them.

The data used comes from different sources. First, the data on tax revenues and the real effective exchange rate were extracted from the database on tax revenues in Sub-Saharan Africa ([www.ferdi.fr](http://www.ferdi.fr))<sup>7</sup>. Domestic tax revenues consist of income taxes, corporate taxes, and goods and services taxes (VAT and Excise duties). External tax revenues refer to customs duties; that is, import and export duties. This category of taxes does not include the VAT and Excise duty revenues collected at the border on imports, since these are considered consumption taxes and therefore are included in the domestic tax revenues. As for the total tax revenues, these are the sum of domestic and external tax revenues and taxes on natural resources. The series on GDP, per capita GDP, imports, exports, inflation, public debt service, foreign aid and sector-based shares as a percentage of the product were taken from the World Bank (World Development Indicators) database 2016.

Finally, the variables used in this study in relation to institutional quality are 3 of the 6 governance indicators developed by Kaufman, Kraay and Mastruzzi (2010). These data are available in the Worldwide Governance Indicators database ([www.govindicators.org](http://www.govindicators.org)), but only from 1996. They have been assigned values between -2.5 (poor) and 2.5 (good) performance in governance. The three variables are:

- government effectiveness (*goveff*), which represents the perception of the quality of public services, the quality of public service, the degree of its independence vis-à-vis political pressure, the quality of statement of policies and their implementation, and the credibility of the government's commitment to the same policies (Nubukpo and Okey, 2003);

- control of corruption (ccorupt), which represents the perception of the extent to which public property is used for personal gain (Nubukpo and Okey, 2003);
- political stability (pstab), which represents the perception of the probability that the government will be destabilized or overthrown through unconstitutional or violent means, including political violence and terrorism (Nubukpo and Okey, 2003).

From a detailed descriptive analysis of these annual data, it was possible to obtain the information summarized in Table 3 below. The definitions of the different variables are given in Annex 4.

Table 3: Descriptive statistics for the period 1990-2016

Variables	Observations	Mean	Std. Dev.	Minimum	Maximum
Total tax revenues/GDP	351	14.510	5.234	5.369	39.687
Domestic revenues/GDP	351	8.193	3.314	2.210	18.752
Tariff revenues/GDP	351	3.523	1.704	0.951	10.023
Trade-weighted average tariff rate	351	11.916	6.374	5.259	112.570
Trade openness (X+M)/GDP	351	64.362	19.820	21.124	131.485
Level of development (GDP/POP)	351	713.120	650.386	139.315	3,670.429
Agriculture value added as a % of GDP	351	28.726	11.094	8.257	59.866
Industry value added as a % GDP	351	21.877	7.397	4.425	50.819
Inflation	351	8.092	13.430	-35.837	110.946
Real effective exchange rate	351	0.439	2.760	0.000	30.660
Public debt service as a % of GDP	351	1.136	0.925	0.026	6.245
Foreign aid as a % of GDP	351	10.648	6.524	0.375	34.305
Government effectiveness	234	-0.706	0.447	-1.553	0.366
Control of corruption	234	-0.559	0.520	-1.431	1.143
Political stability	234	-0.423	0.849	-2.400	1.219

Source: Compiled by the author based on data from Foundation for Studies and Research on International Development ([www.ferdi.fr](http://www.ferdi.fr)) and the World Bank (2016) World Development Indicators

Table 3 shows that the average tax revenues as a percentage of GDP were 14.51% between 1990 and 2016 in the ECOWAS region. The minimum value, 5.37%, was observed for Niger and the maximum value, 39.69%, for Nigeria. This high tax burden observed for Nigeria is attributable to taxes on the country's huge natural resources. Comparatively, the level of taxes was low for Côte d'Ivoire and almost non-existent

for the other countries in the sample. Regarding the components of tax revenues, the table shows that, on average, the share of customs revenues in GDP was 3.52% during the period 1990-2016. The minimum value (0.95%) was observed for Nigeria while the maximum value (10.02%) was observed for Cape Verde. The average domestic tax revenues as a percentage of GDP was 8.19% during the same period, with Cape Verde having the highest rate (18.75%) and Nigeria the lowest (2.21%).

Concerning trade liberalization indicators, the table shows that trade liberalization was at a relatively advanced level in the ECOWAS region during the period 1990-2016; an average tariff rate of 11.92% was applied to trade with the outside world. The minimum (5.26%) was observed for Côte d'Ivoire and the maximum value (112.57%) for Nigeria. The average trade openness rate was 64.36% of GDP, with Gambia recording the highest trade openness rate (131.48%) and Nigeria the lowest (21.12%).

## 5. Results of the estimations

In accordance with the results of the Hausman test, a regression analysis was done using the fixed effects method. Table 4 presents the results of the econometric estimation of equation (2).

Table 4 shows that trade liberalization, through the indicator of average tariffs, significantly influenced the total tax revenues except in the case of the regression analysis, including the variables of institutional quality (in column 4). The negative sign indicates a positive relationship, which means that a drop in tariffs applied to trade transactions was found to lead to an increase in total tax revenues. Specifically, a one-point reduction in tariffs led to an increase varying between 0.09 and 0.06 points in tax revenues (see columns 1 to 3). An economic interpretation of this positive and significant effect could be that the effect of the volume of imports outweighed the drop in customs tariffs. Indeed, an increase in imports caused by the fall in tariffs led to an increase in taxable sources, and, therefore, in tax revenues. This result confirms those obtained in several empirical studies (Agbeyegbe *et al.*, 2004; Pupongsak, 2009; Immurana *et al.*, 2013). The robustness of this result was confirmed as well, since by controlling the effect of trade liberalization on tax revenues by several variables and in various specifications, the positive relationship remained.

The second liberalization indicator, namely the degree of trade openness was (as had been hypothesized) found to be positively and significantly related to the total tax revenues; that is, a greater openness to world trade was found to be conducive to tax revenue collection in the ECOWAS countries regardless of the dimension of the control variables. Specifically, a one-point increase in the trade openness rate led to an increase in the total tax revenues varying between 0.07 and 0.05 points. This result confirms the suggestion that income from increased imports and exports is easier to tax.

Regarding the variables used to control for the effect of trade liberalization, the results show that the first category of control variables (namely those that capture the economic structure of countries) affected the total tax revenues differentially. For example, the level of economic development, captured by the per capita income, had a positive and significant effect on tax revenues (see columns 1 to 4). This result is in line with that reported in the empirical literature. In the ECOWAS region, a rise in the living standards was found to reduce the taxpayers' reluctance towards paying taxes.

Table 4: Results of the estimation of the model of the total tax revenues as a % of GDP

	[1]	[2]	[3]	[4]
	Total revenues/ GDP	Total revenues/ GDP	Total revenues/ GDP	Total revenues/ GDP
Tarif_moyen (Average tariff)	-0.091*** (0.000)	-0.068*** (0.009)	-0.070*** (0.007)	0.018 (0.847)
Ouverture commerciale (Trade openness)	0.073*** (0.000)	0.075*** (0.000)	0.072*** (0.000)	0.057*** (0.000)
Niveau développement (Level of development)	0.002*** (0.000)	0.001*** (0.001)	0.001** (0.011)	0.002*** (0.005)
VA agricole % PIB (Agriculture value added as a % of GDP)	-0.057 (0.140)	-0.064 (0.107)	-0.072* (0.072)	-0.013 (0.770)
VA industrie % PIB (Industry value added as a % of GDP)	0.089** (0.011)	0.104*** (0.003)	0.096*** (0.007)	0.116*** (0.009)
Inflation		-0.035*** (0.009)	-0.037*** (0.007)	-0.034 (0.243)
Taux de change réel (Real exchange rate)		-0.034 (0.607)	-0.034 (0.611)	-0.009 (0.983)
Dettes publiques % PIB (Public debt as a % of GDP)		-0.169 (0.395)	-0.098 (0.630)	-0.793*** (0.002)
Aide extérieure % PIB (Foreign aid as a % of GDP)			0.058 (0.123)	0.102* (0.067)
Efficacité gouvernance (Government effectiveness)				2.163* (0.064)
Contrôle corruption (Control of corruption)				-1.439 (0.218)
Stabilité politique (Political stability)				-0.567 (0.124)
_cons	9.424*** (0.000)	9.513*** (0.000)	10.842*** (0.000)	8.361*** (0.002)
N	351	351	351	234
R <sup>2</sup> Within	0.271	0.291	0.296	0.217
F-Stat	24.817	16.927	15.374	4.830
Prob > F	0.000	0.000	0.000	0.000
Fixed effects for countries	Yes	Yes	Yes	Yes

\* p &lt; 0.1, \*\* p &lt; 0.05, \*\*\* p &lt; 0.01

Notes

1. The endogenous variable is the share of the total tax revenues in GDP.
2. The estimated probabilities appear between brackets, while the notations (\*\*\*), (\*\*) and (\*) indicate the significance levels for the variables at the respective thresholds of 1%, 5% and 10%.
3. The definitions and sources of the variables are provided in detail in Annex 6.
4. Data relating to institutional quality (goveff, ccorrupt and pstab) are available only from 1996. That is why there were only 234 observations for the regression analysis including these variables.

In terms of sector-based shares in GDP, the results show that the agricultural sector correlated with a negative and significant effect on tax revenues (column 3), while a positive and statistically significant relationship was found between tax revenues and the industrial sector (columns 1 to 4). The latter sector, considered a high value-added one, significantly contributes to an increase in the ECOWAS countries' tax revenues, unlike the agricultural sector, which is mainly informal and thus difficult to tax.

The variables related to macroeconomic policy variables, namely inflation, public debt and the real effective exchange rate, were found to have a negative effect on the ability of countries to raise their tax revenues. For the first two, the effect was significant while for the real exchange rate it was not. This result shows that an increase in the general price level and a high debt level are obstacles to tax revenue mobilization in ECOWAS countries.

Foreign aid had a positive and significant effect on tax revenue mobilization (column 4). This result contradicts that obtained by Brun *et al.* (2008) who found a negative effect of foreign aid on tax revenue. In the ECOWAS region, foreign aid is not used as a substitute for revenue, but rather as a source of funding that complements tax revenue mobilization.

Institutional quality, captured by the effectiveness of public governance, was found to have a positive and significant effect on the total tax revenues. This confirms the previous finding that in West Africa, the credibility of government contributes to improving tax revenue collection (Attila, Chambas and Combes, 2009). In other words, good public service reduces the taxpayers' reluctance to pay taxes. No significant effect was observed for the variables control of corruption and political stability.

Despite their robustness, the results reported above provide no information on the relationship between trade liberalization and the different components of tax revenues. That is why, for a better analysis of the effect of trade liberalization, this study has broken down the total tax revenues into external tax revenues (customs duties) and domestic tax revenues. The results of the econometric estimations of equations (2) and (3) are given, respectively, in Annex 4 and 5.

Annex 4 shows that trade liberalization, captured by the average tariff indicator, was found to have a significant effect on foreign trade revenues (column 4); the positive sign for the coefficients indicates a negative relationship. In other words, a reduction by one percentage point of the tariffs applied to international trade led to a 0.09-point decrease in revenues from international trade. This result confirms this study's research hypothesis and corroborates those obtained by several authors (Ebrill *et al.*, 1999; Pupongsak, 2009; Khattry and Rao, 2002; Agbeyegbe *et al.*, 2004; Longoni, 2009). It should be noted, however, that the significant effect was only observed in the regression analysis that included the variables related to institutional quality. This underscores the point that non-corrupt institutions and good governance are needed to control the implementation of tariff cuts. The degree of trade openness was found to positively and significantly influence foreign trade revenues (columns 2 and 4), which is consistent with economic theory according to which trade liberalization enables countries to increase their trade volumes, which in turn increases their customs duties.

Concerning the other explanatory variables, those capturing countries' economic structure were found to be negatively and significantly related to foreign trade revenues. The negative relationship between a country's level of development and its customs duties suggests that ECOWAS countries tend to reduce their dependence on foreign trade revenues as the living standards of their populations increase. The same observation can be made about the variables related to macroeconomic policy: an increase in inflation and in public debt was found to negatively affect tax collection on international trade. Similarly, an increase in foreign aid negatively affected the collection of customs duties. As for the variables related to institutional quality, they were found not to have any significant effect.

Annex 5 shows that trade liberalization significantly influenced domestic tax revenues (columns 1, 2 and 3). In the regression that included the institutional-quality variables (column 4), the effect was not significant; the negative sign for the coefficients indicates a positive correlation. This means that in the ECOWAS region, a drop in the tariffs on imports stimulates the collection of domestic tax revenues. The positive relationship between trade openness and domestic taxes also suggests that openness contributes to increased collection of domestic taxes; indeed, greater openness to international trade increases the flow of goods and services into countries, which increases the profits made by local businesses, and hence the tax base for the countries concerned.

The other explanatory variables, namely the level of development, the share of industry in GDP, foreign aid, and government effectiveness were found to have a positive and significant effect on the mobilization of domestic tax revenues. The share of the agricultural sector, a high inflation, and high levels of public debt were found to be obstacles to the collection of domestic revenues.



## 6. Conclusions and economic policy implications

The debate on the effect of trade liberalization on the developing countries' tax revenues has been at the heart of trade negotiations in recent years, and yet much uncertainty remains on the topic. While some studies have reported a negative effect of trade liberalization on tax revenues, others have reported a positive one related to an enhanced tax revenue mobilization within a country, resulting from implementation of a certain trade policy instrument. In view of this debate, this study's main objective was precisely to analyse the effects of trade liberalization on tax revenues by taking as a sample the ECOWAS countries, whose revenues largely depend on tariff revenues. Specifically, the study aimed to test the effect of trade liberalization on the total tax revenues, and on their components (foreign trade revenues and domestic revenues). To achieve these objectives, the study used a methodology based on a fixed-effects model applied to panel data.

The results of this study's estimations show that the effect of trade liberalization on the ECOWAS countries' tax revenues is sensitive to the measurement indicator used; when measured by the average tariff rates, trade liberalization was found to have a positive and significant effect on the total tax revenues and on the domestic tax revenues, while a negative and statistically significant relationship was found between low tariff rates and tax revenues from international trade. However, when trade liberalization was measured by the degree of trade openness, the effect was positive and significant for all categories of tax revenues. These results are largely in line with those reported in the empirical literature (Agbeyegbe *et al.*, 2004; Pupongsak, 2009).

In view of those results, it must be admitted that the fiscal shock induced by trade liberalization does not constitute the cataclysm predicted by some people (from both the research community and civil society), although it is true that the effect of trade liberalization should not be ignored. In the ECOWAS region, a reduction in the tariff rates applied to imports and a greater openness to international trade (despite the fact that this latter causes a drop in customs revenues) stimulate the mobilization of domestic tax revenues (both direct and indirect taxes) and, by extension, the total tax revenues. This study postulates that reforms aimed at trade liberalization seem to benefit ECOWAS countries better than the policies aimed at protecting their economies. It, therefore, recommends to the respective governments of the region to initiate and encourage trade liberalization policies to improve the efficiency of tax revenue collection.

However, to be able to take full advantage of trade liberalization and opening

process, the study suggests that the ECOWAS countries take steps to put in place taxation policies focused more on the domestic economy. In other words, they must speed up the fiscal transition scheme already in place since 1996 to replace the declining customs revenues with domestic tax revenues. This fiscal transition scheme must be implemented in conjunction with an appropriate macroeconomic policy capable of ensuring a stable economic environment. Governments must focus on reducing the inflation rate and reducing the level of public debt to preserve the gains made from domestic tax revenue mobilization. They must also ensure that activities in the industrial sector progress more rapidly than those in the agricultural sector. In addition to a stable macroeconomic environment, governments should ensure that their policy implementation is credible and that they are capable of implementing the decisions they have taken, if they have to succeed in mobilizing tax revenues once they have taken measures to reduce tariff rates and to open their countries' economies to international trade.

# Notes

1. Cheikh Anta Diop University  
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2. In the remainder of this paper, the term “total tax revenues” refers to the sum of revenues from the various categories of taxes in force in the country (direct taxes, indirect taxes, taxes on natural resources and taxes on international trade). The sum of direct taxes (personal income taxes and corporate taxes) and indirect taxes (VAT and excise duties) constitute domestic tax revenues. For its part, the sum of foreign revenues is that of revenues from customs duties (import duties and taxes and export duties and taxes). The latter category does not include the VAT and excise duty collected at the border on imports because these are considered indirect taxes and, hence, are included in domestic tax revenues.
3. The Regressive Protection Tax was instituted to correct competitiveness differentials when the level of protection offered by the ECOWAS Common External Tariff was not deemed to be enough to protect domestic products against competition from imported products.
  - The Safeguard Tax was instituted to protect domestic products against fluctuations in external prices.
  - The ECOWAS compensatory levy was instituted to mitigate the harmful effects caused by the high levels of subsidies enjoyed by the exporters from competing countries in the region. The compensatory levy does not appear in the UEMOA CET.
4. As part of this system, customs duties are removed on non-sensitive products and are reduced for sensitive ones. There is also a special regime, referred to as GSP+, meant to stimulate sustainable development and good governance. As part of it, customs duties are removed on almost all products (both sensitive and non-sensitive ones) for the countries that promote good governance and sustainable development.
5. Benin, Burkina Faso, Gambia, Guinea, Guinea Bissau, Liberia, Mali, Niger, Senegal, Sierra Leone, and Togo.
6. According to the 2012 Annual Report, the rest of Africa refers to the economic communities of southern and central Africa.
7. Described in detail in Mansour. 2014. “A tax revenue dataset for Sub-Saharan Africa: 1980–2010”.

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# Annexes

Annex 1: Architecture of the ECOWAS Common External Tariff

Categories	Products	Customs duties
0	Essential social goods	0%
1	Basic commodities, basic raw materials, capital equipment, select inputs	5%
2	Inputs and intermediate products	10%
3	End consumption goods and all other products not mentioned elsewhere	20%
4	Specific goods for economic development	35%

Source: Compiled by the author based on ECOWAS data

Annex 2: Result of the regression of the pooled model: Estimation by the OLSs

. reg tpf ttm ouvcom ndev vaagri vaindus inf sd tcer apd goveff ccorrupt pstab

Source	SS	df	MS	
Model	3320.41539	12	276.701283	Number of obs = 234
Residual	2114.11229	221	9.56611895	F( 12, 221) = 28.93
				Prob > F = 0.0000
				R-squared = 0.6110
				Adj R-squared = 0.5899
Total	5434.52768	233	23.3241531	Root MSE = 3.0929

tpf	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
ttm	.2778458	.0951599	2.92	0.004	.0903088	.4653827
ouvcom	.0443518	.0118565	3.74	0.000	.0209854	.0677181
ndev	.0041385	.0004131	10.02	0.000	.0033243	.0049527
vaagri	.0353919	.0289055	1.22	0.222	-.0215738	.0923576
vaindus	.2664949	.0402477	6.62	0.000	.1871765	.3458134
inf	-.1030586	.0342381	-3.01	0.003	-.1705335	-.0355837
sd	-.4334439	.2952465	-1.47	0.144	-1.015303	.1484149
tcer	-1.197881	.4857254	-2.47	0.014	-2.155127	-.2406342
apd	.0147745	.0534776	0.28	0.783	-.0906167	.1201658
goveff	3.23692	1.043607	3.10	0.002	1.180224	5.293616
ccorrupt	-3.162579	.9997675	-3.16	0.002	-5.132877	-1.192281
pstab	-.767141	.4101966	-1.87	0.063	-1.575538	.0412564
_cons	.3954532	1.928527	0.21	0.838	-3.405204	4.196111



## Annex 3: Choice between the fixed-effects model and the random-effects model

## ➤ The fixed-effects model and Fisher's exact test

```
. xtreg tpf ttm ouvcom ndev vaagri vaindus, fe
```

```
Fixed-effects (within) regression      Number of obs   =      351
Group variable: pays                  Number of groups =      13

R-sq:  within = 0.2715                Obs per group:  min =      27
      between = 0.3347                avg =      27.0
      overall  = 0.3131                max =      27

                                          F(5, 333)      =      24.82
corr(u_i, Xb) = 0.0705                Prob > F       =      0.0000
```

tpf	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
ttm	-.0909909	.0247184	-3.68	0.000	-.1396149	-.042367
ouvcom	.0726279	.010698	6.79	0.000	.0515838	.093672
ndev	.0016487	.0004182	3.94	0.000	.0008261	.0024712
vaagri	-.0568149	.0383737	-1.48	0.140	-.1323003	.0186705
vaindus	.0892371	.0349322	2.55	0.011	.0205215	.1579528
_cons	9.423759	1.964249	4.80	0.000	5.559859	13.28766
sigma_u	3.6631746					
sigma_e	2.6059078					
rho	.66398373	(fraction of variance due to u_i)				

```
F test that all u_i=0:      F(12, 333) =      32.87      Prob > F = 0.0000
```

➤ The random-effects model and the Breusch-Pagan Lagrange multiplier test

```
. xtreg tpf ttm ouvcom ndev vaagri vaindus, re
```

```
Random-effects GLS regression           Number of obs   =       351
Group variable: pays                    Number of groups =        13

R-sq:  within = 0.2694                  Obs per group:  min =        27
        between = 0.4007                                     avg =       27.0
        overall = 0.3546                                     max =        27

Wald chi2(5) = 132.74
corr(u_i, X) = 0 (assumed)              Prob > chi2     = 0.0000
```

tpf	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
ttm	-.0843392	.0249907	-3.37	0.001	-.13332	-.0353585
ouvcom	.0702098	.0106382	6.60	0.000	.0493593	.0910604
ndev	.0019498	.000408	4.78	0.000	.0011501	.0027495
vaagri	-.0406014	.0356027	-1.14	0.254	-.1103814	.0291785
vaindus	.119552	.0338387	3.53	0.000	.0532294	.1858746
_cons	8.156437	1.998244	4.08	0.000	4.23995	12.07292
sigma_u	2.5478123					
sigma_e	2.6059078					
rho	.4887289	(fraction of variance due to u_i)				

```
. xttest0
```

Breusch and Pagan Lagrangian multiplier test for random effects

$$tpf[pays,t] = Xb + u[pays] + e[pays,t]$$

Estimated results:

	Var	sd = sqrt(Var)
tpf	27.39994	5.234495
e	6.790755	2.605908
u	6.491348	2.547812

Test: Var(u) = 0

chibar2(01) = 762.48  
 Prob > chibar2 = 0.0000

➤ The Hausman test to discriminate between fixed and random effects

```
. hausman fe re
```

	Coefficients		(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
	(b) fe	(B) re		
ttm	-.0909909	-.0843392	-.0066517	.
ouvcom	.0726279	.0702098	.0024181	.001129
ndev	.0016487	.0019498	-.0003012	.0000915
vaagri	-.0568149	-.0406014	-.0162135	.0143175
vaindus	.0892371	.119552	-.0303149	.008672

b = consistent under Ho and Ha; obtained from xtreg

B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

$$\begin{aligned} \text{chi2(5)} &= (b-B)'[(V_b-V_B)^{-1}](b-B) \\ &= 19.23 \end{aligned}$$

Prob>chi2 = 0.0017

(V\_b-V\_B is not positive definite)

## Annex 4: Results of the estimation of the model for customs duties as a % of GDP

	[1]	[2]	[3]	[4]
	Revenues from foreign trade/GDP	Revenues from foreign trade/GDP	Revenues from foreign trade/GDP	Revenues from foreign trade/GDP
Tarif_moyen (average tariff)	0.008 (0.377)	0.002 (0.815)	0.004 (0.696)	0.093*** (0.001)
Ouverture commerciale (trade openness)	0.006 (0.111)	0.007* (0.076)	0.006 (0.165)	0.009* (0.059)
Niveau développement (level of development)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)
VA agricole % PIB (Agriculture VA as a % of GDP)	-0.065*** (0.000)	-0.062*** (0.000)	-0.058*** (0.000)	-0.049*** (0.001)
VA industrie % PIB (Industry VA as a % of GDP)	-0.030** (0.018)	-0.024* (0.062)	-0.020 (0.126)	-0.013 (0.331)
Inflation		-0.016*** (0.001)	-0.016*** (0.002)	-0.014 (0.112)
Taux de change réel (real exchange rate)		-0.024 (0.324)	-0.024 (0.326)	-0.132 (0.318)
Dettes publiques % PIB (public debt as a % of GDP)		-0.075 (0.297)	-0.115 (0.118)	-0.137* (0.089)
Aide extérieure % PIB (foreign aid as a % of GDP)			-0.033** (0.017)	-0.004 (0.814)
Efficacité gouvernance (government effectiveness)				-0.062 (0.863)
Contrôle corruption (control of corruption)				-0.320 (0.378)
Stabilité politique (political stability)				-0.169 (0.141)
_cons	7.490*** (0.000)	7.508*** (0.000)	6.762*** (0.000)	5.510*** (0.000)
N	351	351	351	234
r2-within	0.201	0.238	0.251	0.323
F-Stat	16.713	12.873	12.248	8.295
Prob > F	0.000	0.000	0.000	0.000
Fixed effects for countries	Yes	Yes	Yes	Yes

\* p &lt; 0.1, \*\* p &lt; 0.05, \*\*\* p &lt; 0.01

\* p &lt; 0.1, \*\* p &lt; 0.05, \*\*\* p &lt; 0.01

## Notes

1. The endogenous variable is the share of the total tax revenues in GDP.
2. The estimated probabilities appear between brackets, while the notations (\*\*\*), (\*\*) and (\*) indicate the significance levels for the variables at the respective thresholds of 1%, 5% and 10%.
3. The definitions and sources of the variables are provided in detail in Annexe 6.
4. Data relating to institutional quality (goveff, ccorrupt and pstab) are available only from 1996, which is why there are only 234 observations for the regression analysis, including these variables.

Annex 5: Results of the estimation of the model for the domestic tax revenues as % of GDP

	[1]	[2]	[3]	[4]
	Domestic tax revenues/ GDP	Domestic tax revenues/ GDP	Domestic tax revenues/ GDP	Domestic tax revenues/ GDP
Tarif_moyen (average tariff)	-0.029* (0.080)	-0.039** (0.026)	-0.032* (0.051)	0.018 (0.847)
Ouverture commerciale (trade openness)	0.073*** (0.000)	0.076*** (0.000)	0.070*** (0.000)	0.057*** (0.000)
Niveau développement (level of development)	0.003*** (0.000)	0.003*** (0.000)	0.002*** (0.000)	0.002*** (0.005)
VA agricole % PIB (Agriculture VA as a % of GDP)	-0.017 (0.519)	-0.029 (0.270)	-0.049* (0.058)	-0.013 (0.770)
VA industrie % PIB (Industry VA as a % of GDP)	0.015 (0.525)	0.025 (0.281)	0.007 (0.757)	0.116*** (0.009)
Inflation		-0.025*** (0.005)	-0.028*** (0.001)	-0.034 (0.243)
Taux de change réel (real exchange rate)		-0.049 (0.275)	-0.048 (0.262)	-0.009 (0.983)
Dettes publiques % PIB (public debt as a % of GDP)		-0.114 (0.394)	-0.285** (0.030)	-0.793*** (0.002)
Aide extérieure % PIB (foreign aid as a % of GDP)			0.140*** (0.000)	0.102* (0.067)
Efficacité gouvernance (government effectiveness)				2.163* (0.064)
Contrôle corruption (control of corruption)				-1.439 (0.218)
Stabilité politique (political stability)				-0.567 (0.124)
_cons	1.380 (0.295)	1.233 (0.348)	4.437*** (0.001)	8.361*** (0.002)
N	351	351	351	234
r2-Within	0.464	0.478	0.527	0.217
F-Stat	57.760	37.768	40.653	4.830
Prob > F	0.000	0.000	0.000	0.000

\* p < 0.1, \*\* p < 0.05, \*\*\* p < 0.01

Notes

- 1 The endogenous variable is the share of the total tax revenues in GDP.
- 2 The estimated probabilities appear between brackets, while the notations (\*\*\*) (\*\* and \*) indicate the significance levels for the variables at the respective thresholds of 1%, 5% and 10%.
- 3 The definitions and sources of the variables are provided in detail in Annexe 4.
- 4 Data relating to institutional quality (goveff, ccorrupt and pstab) are available only from 1996, which is why there are only 234 observations for the regression analysis including these variables.

## Annex 6: Definitions and sources of the variables

Variables	Definitions	Sources
TPF	Ratio of the total tax revenues to GDP (%)	Database on tax revenues in SSA ( <a href="http://www.ferdi.fr">www.ferdi.fr</a> )
TPFI	Ratio of the domestic tax revenues to GDP (%)	Database on tax revenues in SSA ( <a href="http://www.ferdi.fr">www.ferdi.fr</a> )
TPFE	Ratio of the external tax revenues to GDP (%)	Database on tax revenues in SSA ( <a href="http://www.ferdi.fr">www.ferdi.fr</a> )
ttn	Trade-weighted average tariff rate (%)	World Development Indicators 2016
ouvcom	Degree of trade openness (X+M)/GDP in %	World Development Indicators 2016
ndev	Level of economic development (GDP/Pop)	World Development Indicators 2016
inf	Inflation rate (%)	World Development Indicators 2016
apd	Net official development assistance as a % of GDP (%)	World Development Indicators 2016
detpub	Public debt service as a % of GDP	World Development Indicators 2016
ccorrupt	Control of corruption: it takes values between -2.5 (poor) and 2.5 (good) governance performance	Worldwide Governance Indicators (WGI) ( <a href="http://www.govindicators.org">www.govindicators.org</a> )
goveff	Government effectiveness: it takes values between -2.5 (poor) and 2.5 (good) governance performance	Worldwide Governance Indicators (WGI) ( <a href="http://www.govindicators.org">www.govindicators.org</a> )
pstab	Political stability: it takes values between -2.5 (poor) and 2.5 (good) governance performance	Worldwide Governance Indicators (WGI) ( <a href="http://www.govindicators.org">www.govindicators.org</a> )
vaagri	Agriculture value added as a % of GDP	World Development Indicators 2016
vaindus	Industry value added as a % of GDP	World Development Indicators 2016
tcer	Real effective exchange rate	Database on tax revenues in SSA ( <a href="http://www.ferdi.fr">www.ferdi.fr</a> )

Source: Compiled by the author



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