Effect of Reforms on Tax Revenue Performance in Senegal[1]

Dr. Ameth Saloum Ndiaye
Department of Economics and CREA
University Cheikh Anta Diop of Dakar, Senegal
ameth.sndiaye@gmail.com – ameth.sndiaye@ucad.edu.sn

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Abstract

This paper investigates whether and how positive externalities in terms of increased tax revenue performance may result from the tax and institutional reforms undertaken in Senegal in the period 1970 to 2014. The country implemented massive reforms in this period, but little is known about the performance of those reforms in terms of tax revenue mobilization. The empirical literature on the determinants of tax revenue has indeed paid little attention to reform as a determinant of revenue collection performance, and particularly to administrative reform. Considering various aspects of reforms in the tax administration including tax-related reforms and institutions-related reforms, and using both a descriptive approach and an econometric analysis with various techniques, we find that reforms have been important to increase significantly tax revenue performance. This result is robust to changes in econometric estimation techniques. The key implication is that more tax-related reforms and more institutions-related reforms are needed to sustainably improve revenue mobilization.

JEL Classification: E02; H11; H20

Keywords: Tax revenue; reforms; tax reforms; institutional reforms; Senegal

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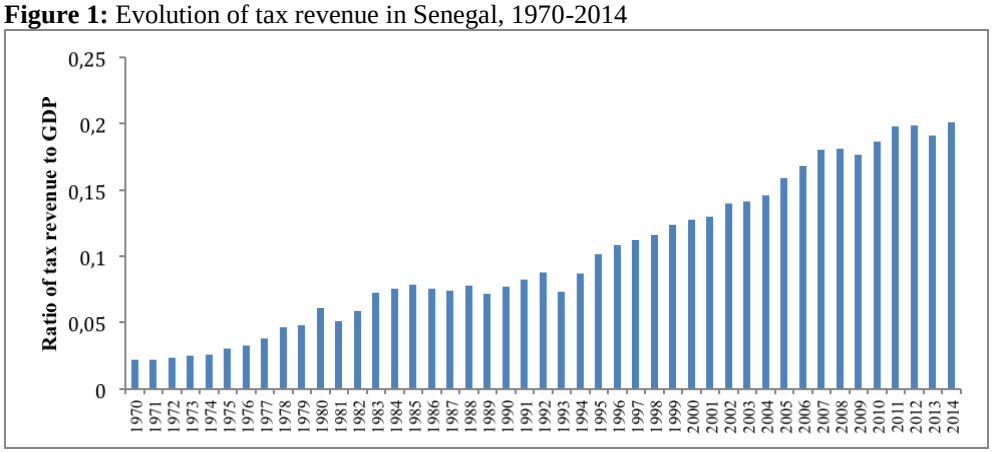
1. Introduction

There is a renewed interest and growing awareness that domestic tax revenue in developing countries must be the primary financing source for development, with foreign aid playing essentially a supporting role (Fossat and Bua, 2013).

The issue of tax revenue mobilization is a great concern for policymakers in Senegal, as the country is not rich in natural resources. The Government has thus considered the modernization of the tax administration and the rise in tax revenue as a priority defined in the new growth strategy called *Plan Sénégal Emergent (PSE)* which was unveiled in February 2014, and which aims at making Senegal an emerging economy by 2035[2]. According to the IMF (2014a), the PSE reaffirms the need to preserve fiscal sustainability, and therefore endeavors to keep the fiscal deficit on a downward trend. The reduction of the fiscal deficit and the additional investment envisaged under the PSE would require revenue mobilization efforts (IMF, 2014a). This explains why one of the main objectives defined in the context of the seventh review under the Policy Support Instrument for Senegal by IMF in July 2014 is to increase tax revenue in order to create more fiscal space to finance priority spending (IMF, 2014a).

The motivation for this study is twofold. First, there is a remarkable increasing trend of tax revenue in Senegal, as shown in Figure 1 below. Indeed, in the period 1970 to 2014, episodes of decline in tax revenue in the country are very few, only 9 times compared to 35 episodes of increase in the entire period. The African Development Bank (2010) argues that Senegal, which is lacking in important natural resources, succeeds to mobilize public resources for the same level than countries yet benefiting from important mining resources. The Bank finds that the level of tax revenue in Senegal is high compared to the non-mining African Least Developed countries (LDC) belonging to the Franc Zone or to the non-Franc Zone, and that generally, compared to African LDC or non-African LDC, Senegal is doing roughly better, around 1 point of GDP, and this is the same compared to Low Income Countries (LIC)[3]. The African Development Bank (2010) finds that Senegal has succeeded to mobilize in a satisfactory way its potential of public resources and has realized important progresses.

Figure 1: Evolution of tax revenue in Senegal, 1970-2014



Source: Author's computations using data from: BCEAO's *Economic and Financial Database*.

[2] The *Plan Sénégal Emergent (PSE)* has been realized by the international agency McKinsey.

[3] According to the African Development Bank (2010), the same finding applies in terms of public resources generally.

Second, in the same period, Senegal has implemented massive tax and institutional reforms in the tax administration, notably the reforms of the General Tax Code and of the Customs Code, which have been revised many times in the period. There have been several changes in the corporate taxes and the individual income taxes. Reforms have also been associated with the simplification of the tax procedures and with the modernization of the tax administration. The Government of Senegal has strong political will to improve the performance of the system of public financial management, which is shown continuously since 2003 by studies to evaluate the performance of its public financial management based on several approaches including the Country Financial Accountability Assessment (CFAA), the Country Procurement Assessment Report (CPAR), and the Public Expenditure and Financial Accountability (PEFA) developed by international technical and financial partners.

Based on the remarkable increasing trend of tax revenue in the 1970-2014 period combined with the massive tax and institutional reforms implemented in the same period, this paper intends to explore the role of those reforms in understanding such performance of tax revenue in Senegal.

Past papers on the relationship between reforms and tax revenue considered only limited dimensions of reforms. The importance of administrative reforms has been relatively little explored in the economic literature (Morisset and Izquierdo, 1993; Das-Gupta and Gang, 2000; Usui, 2011). The first contribution of our paper is then to take account of various aspects of reforms in the tax administration in Senegal, including tax-related reforms and institutions-related reforms since 1970 to 2014 (See Table A.1 in the appendix for more details). The relatively little attention that administrative reforms have received in the literature reflects measurement problems (Morisset and Izquierdo, 1993). The second contribution of our article is therefore to fill this gap by measuring reforms as the number of tax reforms by year, the number of institutional reforms by year and the number of all reforms by year, from 1970 to 2014, and not consider dummy variables. Although Senegal implemented massive reforms in this period, little is known about the performance of those reforms in terms of tax revenue mobilization. The third contribution of our study is thus to provide an empirical evidence of the impact of massive reforms on revenue mobilization, which has not yet been explored for the case of Senegal, to our knowledge.

The rest of the paper is organized as follows. Section 2 investigates the revenue administration institutions, the reforms background and the tax revenue performance, and provides quantitative measures of reforms in Senegal. Section 3 reviews past evidence on the effect of reforms on tax revenue performance and presents empirical evidence on that issue for Senegal using an econometric analysis. Section 4 concludes the paper and discusses the policy implications.

2. Revenue administration institutions, reforms background and tax revenue in Senegal

2.1. The revenue administration institutions in Senegal

The revenue Directorates in Senegal are the Directorate-General of Tax and Lands (DGID), the Directorate-General of Customs (DGD), and the Directorate-General of Public Accounting and Treasury (DGCPT). The DGID is in charge of tax rolls and billing, and of the land registry and state lands management. The DGD collects customs fees and indirect taxes, and the DGCPT collects fiscal and non-fiscal revenue. Table 1 indicates the specific missions of these revenue directorates. The revenue administration process in Senegal is in line with the WAEMU guidelines, which recommend separation of responsibility for billing and collections (World Bank, 2003). In terms of organization chart, these directorates are within the Ministry of Economy and Finance. According to the World

Bank (2003), the fund transactions are not recorded until the funds are received, suggesting that accounting for both central and local government revenues is cash based. The Bank indicates that revenues collected in the region of Dakar are deposited at the *Recette Générale du Trésor (RGT)* which is a Treasury revenue account, while revenues collected in the other regions are deposited in regional Treasury accounts. All revenue deposits are registered in the Central Bank (BCEAO) account managed by the Treasury, which has now a single account (IMF, 2014b).

Table 1: Missions of revenue Directorates in Senegal

Revenue Directorates	Missions
Directorate-General of Tax and Lands (DGID)	Tax base, liquidation and control missions; Recovery missions; Missions for verification of accounting, personal tax situation and investigations; Missions for design, for preparation of laws and regulations, of international tax conventions and of litigation; Missions for control, verification, and animation of tax services and staff; State-owned, land and cadastral missions; Missions for staff training and improvement.
Directorate-General of Customs (DGD)	Tax mission: Collection of customs duty and recovery of VAT. Economic mission: provide a favorable environment for production activity, and for the promotion of licit trade. Mission to provide assistance other administrations by the application of particular regulations on behalf on them. New mission for securing and facilitating the international supply chain, which implies a rigorous control of goods at all levels, from the production to the final destination via transport.
Directorate-General of Public Accounting and Treasury (DGCPT)	Produce the texts on the regulation of public accounting; Prepare instructions and circulars related to the implementation of the operations of public accountants; Ensure a permanent balance of the state treasury of the local authorities; Control and centralize the operations made on behalf of the Treasury and public organizations by the Treasury special Accountants; Monitors the compliance of the accounts of the Treasury senior Accountants with those of the regulator; Manage the Treasury single account at the Central Bank of the West Africa Countries (BCEAO); Stamp the financial statements of public institutions that are designed to the Court of Auditors; Ensure during the year, the monitoring of the execution of financial transactions of the Accountants of public institutions; Promote, coordinate and monitor the activities of its departments and services.

Source: World Bank (2003), Diallo (2011), and various websites notably: www.impotsetdomaines.gouv.sn, www.douanesenegal.com, www.tresor.gouv.sn

2.2. Understanding reforms background in the tax administration in Senegal

The revenue directorates in Senegal are faced with institutional deficiencies. The Country Financial Accountability Assessment (CFAA) realized in 2003 revealed that the institutional framework for public financial management is weakened by the shortage of human and financial resources, which hinders its capacity to perform (World Bank, 2003). Indeed, according to the 2003 CFAA, the revenue directorates lack sufficient human and material resources to undertake field surveys or monographs on the main sectors of the economic activity in Senegal. Such constraints lead to real difficulties in grasping the extent of fiscal potential, mask the actual current performance of tax collection services, and maintain the existing tax burden (World Bank, 2003). The 2003 CFAA recommended then the reform of the Senegalese Tax Administration.

In fact, several reforms in the tax administration have been implemented in Senegal since the end of the 1970s[4] (see Table A.1 in the appendix). Between 1970 and 1978, no tax reforms have been

[4] The tax system bequeathed by the colonial Administration in Senegal did not fundamentally change in its structure up to the end of the 1970s.

implemented. The first tax reform in Senegal was undertaken in 1979, consisting in the introduction of value-added tax (VAT) and the simplification and the relief of the tax structure with the homogenization of customs duty.

Thereafter, since 1986 there have been several reforms, notably the reforms of the General Tax Code and of the Customs Code which have been changed many times, associated with several changes in the corporate taxes and the income taxes, with the simplification of the tax procedures, with the modernization of the tax administration and the signature of performance contracts by the Directorate-General of Tax and Lands (DGID) and by the Directorate-General of Customs (DGD) each with the Ministry of Economy and Finance, respectively in 2009 and in 2011. These contracts induce performance objectives to be achieved in terms of services of quality for users as well as in terms of grasping the tax base and of control and recovery. The objective of raising tax revenue at more than 20% of GDP is also defined in these contracts. In return, the working conditions of these two revenue directorates should be improved by the Ministry of Economy and Finance, mainly on the issue of increasing the human and material resources of the revenue directorates.

Recently, a new General Tax Code and a new Customs Code were adopted in Senegal in 2013 and in 2014 respectively. According to the IMF (2014a), to safeguard fiscal revenue in Senegal, a number of tax administration measures are currently being taken as a vital complement to the recent reform of the General Tax Code. For the tax directorate (DGID), the measures involve: structural reform through the setting up of functional directorates (responsible for the preparation of strategies) and operational directorates (responsible for measures to secure tax revenues and broaden the tax base); reform of the system to assess staff performance; increased staffing; efforts to conduct tax audits and collect tax arrears; an audit of VAT credits followed by action to deal with cases of fraud; efforts to expand the tax base through more active use of available information and closer cooperation with customs services based on the single taxpayer identification number (NINEA).

In relation with reforms, the Government of Senegal was engaged for the first exercise to evaluate the performance of its public financial management based on the PEFA (Public Expenditure and Financial Accountability) approach developed by international technical and financial partners in 2007, and for the second exercise in 2011.

2.3. Measuring reforms in the tax administration in Senegal

We use two measures of reforms in the tax administration in Senegal: number of reforms by year, and reforms as measured using the PEFA indicators[5].

Number of reforms by year

With this first measure, reforms are measured as the number of reforms by year. As indicated in Table A.1 in the appendix, there are two components of reforms in the tax administration in Senegal, which are tax-related reforms and institutions-related reforms. We thus take account of the number of tax

[5] In addition to these two measures, we introduced another measure of reforms called reforms duration that is the sum of the number of reforms in a given year and the number of reforms in the previous years. Although this additional measure helps capture the dynamic character of reforms, the problem is that it is difficult to believe that a reform that took place 30 years ago for instance is still having an impact today. Moreover, it is difficult to know when each reform took end.

reforms by year, the number of institutional reforms by year and the number of all reforms by year (see Table 2).

Table 2: Number of reforms in the tax administration in Senegal, 1970-2014

	Tax reforms	Institutional reforms	All reforms
1970-1978	0	0	0
1979	2	0	2
1980-1985	0	0	0
1986	4	1	5
1987	1	0	1
1988	0	0	0
1989	1	0	1
1990	3	0	3
1991	0	0	0
1992	1	0	1
1993	0	0	0
1994	4	0	4
1995-1997	0	0	0
1998	2	0	2
1999	0	0	0
2000	1	1	2
2001	0	0	0
2002	1	1	2
2003	0	2	2
2004	1	0	1
2005	1	0	1
2006	0	0	0
2007	0	1	1
2008	0	1	1
2009	0	2	2
2010	0	2	2
2011	0	3	3
2012	0	4	4
2013	1	0	1
2014	5	6	11

Source: Author's computations using several documents including: various versions of the General Tax Code; various versions of the Customs Code; Fall and Sène (2010); CEPOD (2004); various IMF's country reports on Senegal, etc.
Note: The columns "tax reforms", "institutional reforms" and "all reforms" refer to the number of tax reforms by year, the number of institutional reforms by year and the number of all reforms by year, respectively.

Reforms as measured using the PEFA indicators

The second measure of reforms in the tax administration in Senegal is based on the PEFA indicators between 2007 and 2011, as reported in Table 3. The PEFA indicators are notably: Transparency of taxpayer obligations and liabilities (PI-13), Effectiveness of measures for taxpayer registration and tax assessment (PI-14), and Effectiveness in collection of tax payments (PI-15). These main indicators include 3 components each, as indicated in Table 3 that shows ordinal scores as well as numerical scale ratings. Ordinal rankings are A; B^+; B; C^+; C; D^+; D. The score A is the best ranking, meaning the best performance of the tax administration; while the score D is the worst ranking, suggesting the worst performance of the tax administration. These ordinal rankings are converted into numerical scores from 7 to 1, as follows: A=7; B^+=6; B=5; C^+=4; C=3; D^+=2; D=1.

The results reveal that in 2007, the best main indicator is the transparency of taxpayer obligations and liabilities (PI-13) with the note B=5, while the second one is the effectiveness of measures for

taxpayer registration and tax assessment (PI-14) with the note C^{+}=4. In 2011, the results indicate an improvement in the effectiveness of measures for taxpayer registration and tax assessment (PI-14) with a note of B=5 compared to the note of C^{+}=4 in 2007, while the performance of the transparency of taxpayer obligations and liabilities (PI-13) has not changed in 2011. Regarding the components of PI-13, the results show an improvement only for the existence and functioning of a tax appeals mechanism (PI-13iii) with a note of C=3 in 2007 compared to the note B=5 in 2011. The performance of the two other indicators (Clarity and comprehensiveness of tax liabilities (PI-13i), and Taxpayer access to information on tax liabilities and administrative procedures (PI-13ii)) has not changed. For the components of PI-14, there is an improvement only for the controls in the taxpayer registration system (PI-14i) with a note of C=3 in 2007 compared to B=5 in 2011; the performance of the two other indicators (Effectiveness of penalties for non-compliance with registration and declaration obligations (PI-14ii), and Planning and monitoring of tax audit and fraud investigation programs (PI-14iii)) being unchanged. With respect to the components of PI-15, there is no change in the performance of the effectiveness of transfer of tax collections to the Treasury by the revenue administration (PI-15ii) and that of the frequency of complete accounts reconciliation between tax assessments, collections, arrears records and receipts by the Treasury (PI-15iii). However, the best performance of the tax administration in Senegal between 2007 and 2011 is the effectiveness of transfer of tax collections to the Treasury by the revenue administration (PI-15ii) with the best score of A=7. In the same time, the collection ratio for gross tax arrears, being the percentage of tax arrears at the beginning of a fiscal year, which was collected during that fiscal year (average of the last two fiscal years) (PI-15i) has the lowest performance with the lowest note of D=1 in 2011, followed by the effectiveness in collection of tax payments (PI-15) with the low score of D^{+}=2 in 2011. Therefore, Table 3 shows good performance of the tax administration in Senegal as a whole.

Table 3: Reforms in the tax administration in Senegal based on the PEFA indicators, from 2007 to 2011

PEFA Indicators	Ordinal scores		Numerical scale ratings		Variation
	2007	2011	2007	2011	
Clarity and comprehensiveness of tax liabilities (PI-13i)	B	B	5	5	0
Taxpayer access to information on tax liabilities and administrative procedures (PI-13ii)	B	B	5	5	0
Existence and functioning of a tax appeals mechanism (PI-13iii)	C	B	3	5	2
Transparency of taxpayer obligations and liabilities (PI-13)	**B**	**B**	**5**	**5**	**0**
Controls in the taxpayer registration system (PI-14i)	C	B	3	5	2
Effectiveness of penalties for non-compliance with registration and declaration obligations (PI-14ii)	B	B	5	5	0
Planning and monitoring of tax audit and fraud investigation programs (PI-14iii)	C	C	3	3	0
Effectiveness of measures for taxpayer registration and tax assessment (PI-14)	**C+**	**B**	**4**	**5**	**1**
Collection ratio for gross tax arrears, being the percentage of tax arrears at the beginning of a fiscal year, which was collected during that fiscal year (average of the last two fiscal years) (PI-15i)	-	D	-	1	-
Effectiveness of transfer of tax collections to the Treasury by the revenue administration (PI-15ii)	A	A	7	7	0
Frequency of complete accounts reconciliation between tax assessments, collections, arrears records and receipts by the Treasury (PI-15iii)	B	B	5	5	0
Effectiveness in collection of tax payments (PI-15)	**-**	**D+**	**-**	**2**	**-**

Source: EU and ADE (2011), and Author's computations using data from: BCEAO's *Economic and Financial Database*.

2.4. Tax revenue performance in Senegal

Figure 1 above presents the evolution of tax revenue in Senegal in the period 1970 to 2013. As indicated above, this figure shows a rising trend of tax revenue with very few episodes of decline, only 9 times in the entire period. The 9 episodes of fall in tax revenue in Senegal are noted in: 1971, 1981, 1986, 1987, 1989, 1993, 2008, 2009, and 2013. The fall in tax revenue in 1971 can be associated with unfavorable circumstances in Senegal, which has experienced a terrible drought at the early 1970s, and with an unfavorable international environment characterized by a doubling of the barrel of oil between 1970 and 1973.

In 1981, the Government has experienced the negative effect of the 1979 tax reform that consisted in a relief of the tax structure, and which then led to a fall in tax revenue. In 1986, Senegal was engaged in a first attempt of trade liberalization aiming to reduce the contribution of taxes on external trade to public resources (Berg and Krueger, 2003). This liberalization has led to a decline in the customs duty. The tax liberalization component of the trade policy has then caused important tax revenue losses in 1986 up to 1987, and which were not compensated by the mobilization of other tax revenues. At the end of the year 1987, Senegal has adopted a customs code that has contributed to increase tax revenue in 1988[6]. However, one year later in 1989, tax revenue has fallen again, despite the increase of 5 points in the rates of customs duty. This decline may be attributed to the continuous adverse effects of the trade liberalization policy since 1986. These significant tax revenue losses have motivated the Authorities to renounce, at the early 1990s, to the tax liberalization policy (African Development Bank, 2010).

Despite the revision of the general tax code in 1992, tax revenue has decreased in 1993 probably because this revision has not been fully implemented in 1993 as it was just at its first year of adoption. After the devaluation of Franc CFA in 1994 there was a full revision of indirect taxes (generalized decline in customs duty, fall in the number of the rates of VAT). And simultaneously to these falls in indirect taxes, internal tax revenues have been developed with a simplification of taxes, a widening of tax base by the withdrawal or the revision of all conventions providing tax exemptions, protections or particular advantages to some enterprises that are important in the economy. This has led to a long rising revenue trend from 1994 to 2012, interrupted by various shocks in 2008 and 2009, notably international price shocks, shocks in the management of public expenditures, negative impact of public arrears, that have adversely affected public resources mobilization in Senegal (African Development Bank, 2010). This rising revenue trend was also interrupted by the 2008 international financial and economic crisis (IMF, 2014a).

Senegal experienced tax revenue shortfalls in 2013. According to the IMF (2014a) and *Direction de la Prévision et des Etudes Economiques* (DPEE, 2014), this disappointing performance is largely attributable to value-added tax (VAT) and individual income tax. The decline in the latter was greater than expected. The fall in VAT revenue is in part a reflection of the recent tax reform, specifically the elimination of the VAT withholding applied by the government agencies to large enterprises. IMF (2014a) argues that revenue shortfalls in 2013 reflect also slower economic activity, excessive optimism on the yield of certain taxes, and larger-than-expected accumulation of tax arrears by SENELEC (*Société Nationale d'Electricité du Sénégal*), the power utility. Only a fraction of the revenue shortfalls seems attributable to the 2013 tax reform due to the fact that the adoption of this

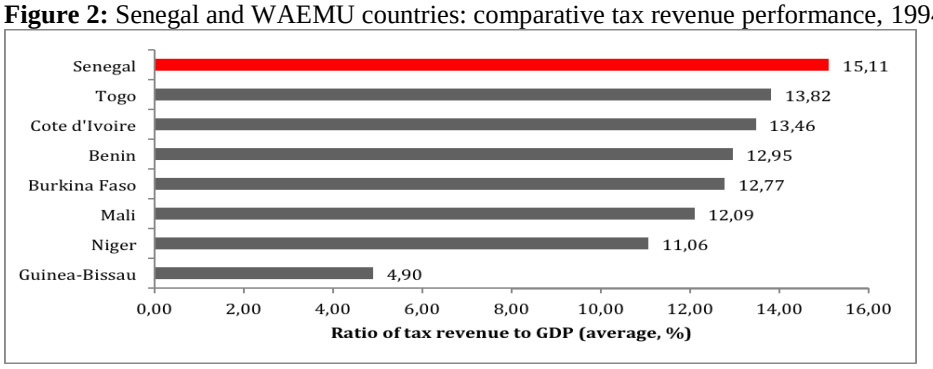
[6] The customs code was adopted on 28 December 1987 in Senegal.

new general tax code induced major difficulties in terms of practical implementation, while the measure related to the fall in individual income tax was implemented immediately since January 2013.

Tax revenue performance in Senegal has improved in 2014, and this improvement is related to the new Tax Code in 2013 that is bearing fruit as reflected in better than expected revenue performance in 2014 (IMF, 2015).

Figure 2 presents tax revenue performance for Senegal and for other West African Economic and Monetary Union (WAEMU) countries in the period 1994-2014. This figure shows that Senegal collects higher tax revenue than other WAEMU countries.

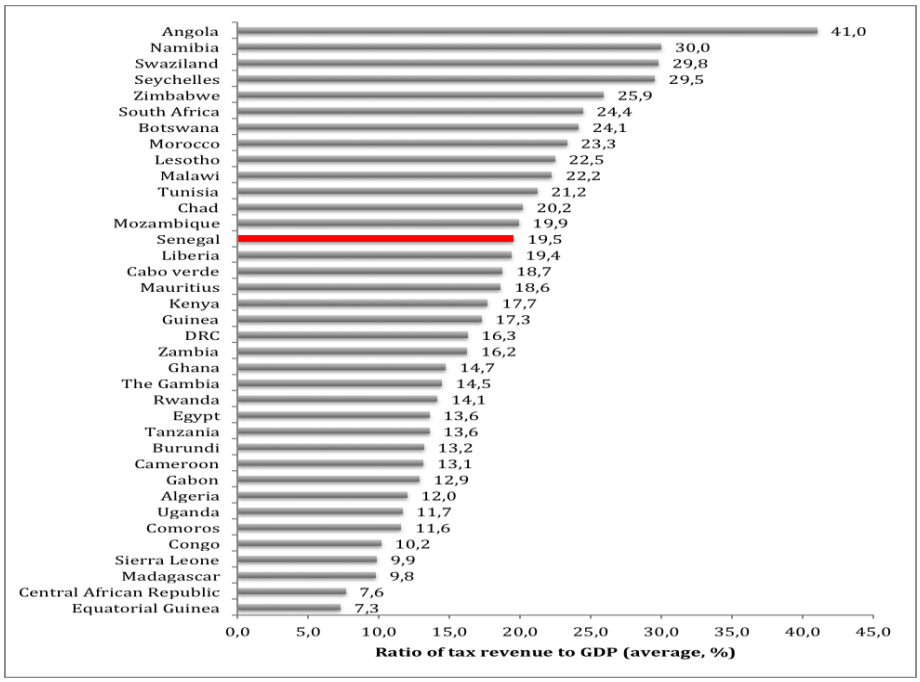
Figure 2: Senegal and WAEMU countries: comparative tax revenue performance, 1994-2014



Source: Author's computations using data from: BCEAO's *Economic and Financial Database*.

Figure 3 compares tax revenue performance for Senegal and for other sub-Saharan African countries in the period 2010-2014. This figure reveals that Senegal is doing well in terms of tax revenue collection, compare to many other sub-Saharan African countries. Indeed, on average, Senegal is the 14th country with the largest ratio of tax revenue to GDP among 37 sub-Saharan African countries, including countries that are yet rich in natural resources.

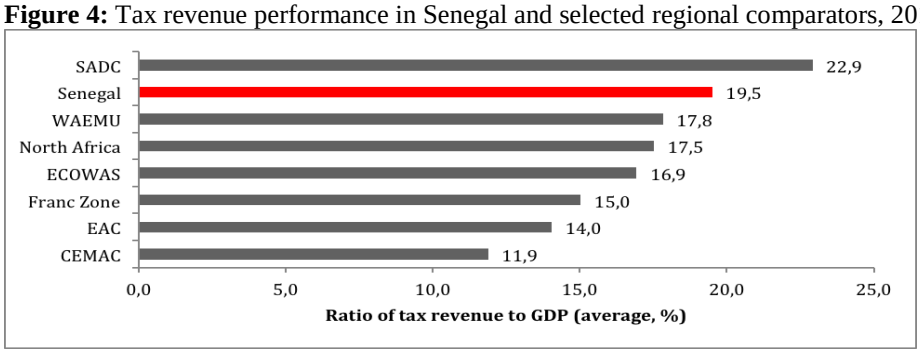
Figure 3: Senegal and Africa: cross country comparison of tax revenue performance, 2010-2014



Source: Author's computations using data from: BCEAO's *Economic and Financial Database* for Senegal, and various IMF's country reports for all other countries.

Figure 4 reports tax revenue performance for Senegal and for selected regional comparators, in the period 2010-2014. The figure indicates that, on average, except for the Southern African Development Community (SADC), Senegal mobilizes higher tax revenue than regional comparators including the West African Economic and Monetary Union (WAEMU), North Africa, the Economic Community of West African States (ECOWAS), the Franc Zone, the East African Community (EAC) and the Economic and Monetary Community of Central African States (CEMAC).

Figure 4: Tax revenue performance in Senegal and selected regional comparators, 2010-2014

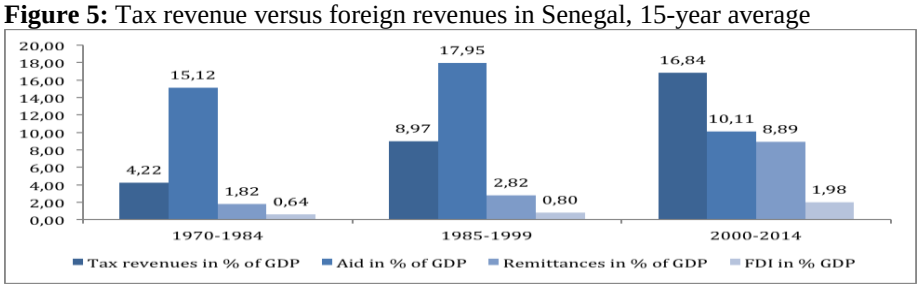


Source: Author's computations using data from: BCEAO's *Economic and Financial Database* for Senegal and WAEMU, and various IMF's country reports for all other countries.
Note: The West African Economic and Monetary Union (WAEMU) member states are: Benin, Burkina Faso, Côte d'Ivoire, Guinea Bissau, Mali, Niger, Senegal and Togo. The Economic Community of West African States (ECOWAS) member states are: Benin, Burkina Faso, Cabo Verde, Côte d'Ivoire, The Gambia, Ghana, Guinea, Guinea Bissau, Liberia, Mali, Niger, Senegal, Sierra Leone, and Togo. I have excluded Nigeria from ECOWAS due to a lack of data. The Economic and Monetary Community of Central African States (CEMAC) member states are: Cameroon, Central African Republic, Chad, Republic of Congo, Equatorial Guinea and Gabon. The Franc Zone includes the WAEMU countries, the CEMAC countries and Comoros. The East African Community (EAC) member states are: Burundi, Kenya, Rwanda, Tanzania and Uganda. North Africa includes: Algeria, Egypt, Morocco and Tunisia. I have excluded Libya and Djibouti from North Africa due to a lack of data. The Southern African Development Community (SADC) member states are: Angola, Botswana, Democratic Republic of Congo, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Tanzania, Zambia and Zimbabwe.

Figure 5 makes a comparison between tax revenue and foreign revenues in Senegal, for a 15-year average basis, in the period 1970-2014. Figure 5 supports the increasing trend of tax revenue in the whole period 1970-2014, as shown in Figure 1 above. Figure 5 shows indeed that the performance of tax revenue has almost doubled on the one hand between 1970-1984 and 1985-1999, and on the other hand between 1985-1999 and 2000-2014. We find that for the periods 1970-1984 and 1985-1999 foreign aid is ahead, while in the period 2000-2014 tax revenue is higher than all other sources of revenues. Indeed, foreign aid has significantly declined, while tax revenue has almost doubled, standing at 16.84% of GDP in 2000-2014 compared to 8.97% of GDP in 1985-1999 and 4.22% of GDP in 1970-1984. This very large increase in tax revenue versus all other sources of revenues from 2000 to 2014 is related to the fact that Senegal has experienced a political change in 2000, and a new President, Abdoulaye Wade, was elected in March 2000. The new administration that took office in April 2000 inherited a legacy of weak implementation and ownership of the structural reform program (IMF, 2001). The new authorities have thus decided to strengthen revenue collection (IMF, 2001), and to rely less on foreign sources of revenues. A series of reforms has then been implemented (see Table A.1 in the appendix). The new government has launched the modernization of the financial administration in 2000. On 31st March 2001 the authorities have implemented a single taxpayer identification number in all revenue-collecting agencies. At the same time, the government completed a study detailing the revenue impact of tax and customs exemptions, and on 1st May 2001 the national assembly approved a law setting up a VAT at a single rate of 18% with limited exemptions and effective implementation of the new law. This revenue collection effort has been sustained, with the

implementation of several other reforms in 2000-2014 (see Table A.1 in the appendix). More reforms have been indeed implemented in 2000-2014 with 33 reforms in total compared to 17 reforms in 1985-1999 and to only 2 reforms in 1970-1984, as shown in Table 4.

Figure 5: Tax revenue versus foreign revenues in Senegal, 15-year average



Source: Author's computations using data from: BCEAO's *Economic and Financial Database*; World Bank's *World Development Indicators*.

Table 4: Number of reforms in the tax administration in Senegal on a 15-year average basis, 1970-2014

Period	All reforms	Tax revenue (% of GDP)
1970-1984	2	4.22
1985-1999	17	8.97
2000-2014	33	16.84

Source: BCEAO's *Economic and Financial Database*; Author's computations using several documents including: various versions of the General Tax Code; various versions of the Customs Code; Fall and Sène (2010); CEPOD (2004); various IMF's country reports on Senegal, etc.
Note: The column "all reforms" refer to the total number of all reforms on a 15-year basis.

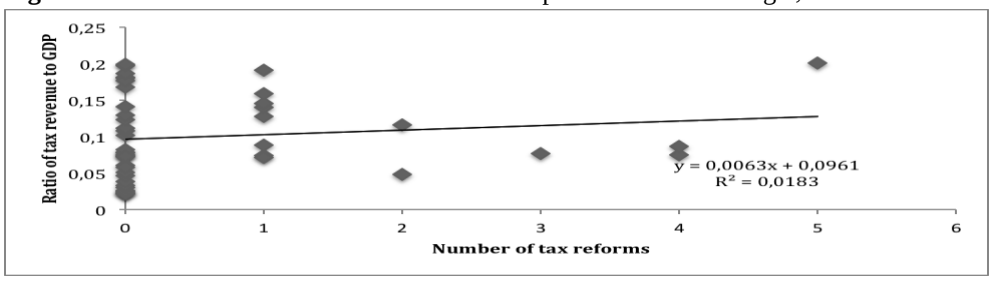
2.5. Linking reforms and tax revenue performance in Senegal

In this section, we investigate the potential link between reforms and tax revenue performance, using the measures of reforms above, notably in turn the number of reforms and reforms as measured using the PEFA indicators.

Number of reforms and tax revenue performance

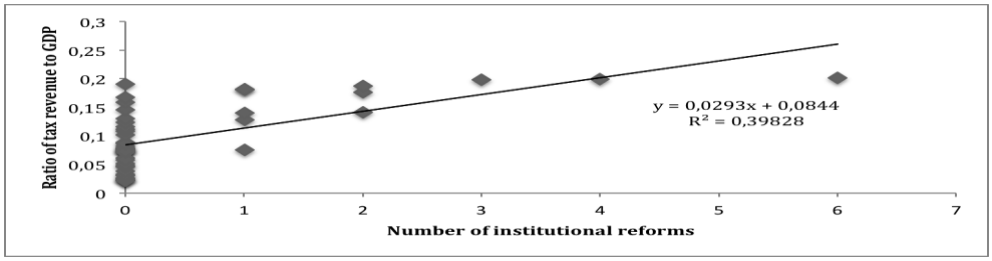
Figures 6, 7 and 8 present the relationship between tax revenue performance and the number of tax reforms, the number of institutional reforms and the number of all reforms, respectively. Irrespective of the type of reforms, the results indicate a positive link between reforms and tax revenue, suggesting that reforms that are implemented in the tax administration in Senegal are conducive to higher tax revenue performance.

Figure 6: Number of tax reforms and tax revenue performance in Senegal, 1970-2014



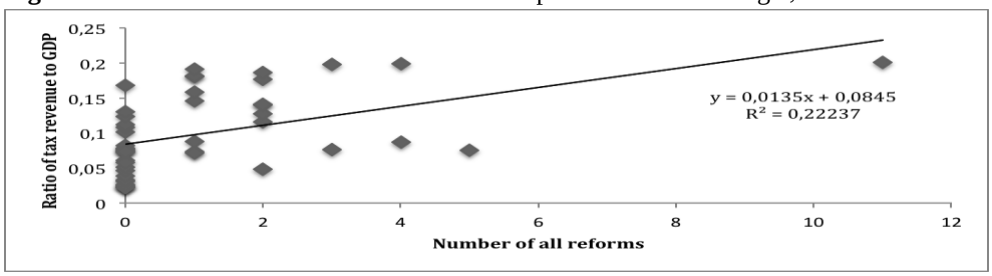
Source: Author's computations using data from: BCEAO, *Economic and Financial Database*; Author's compilations using several documents including: various versions of the General Tax Code; various versions of the Customs Code; Fall and Sène (2010); CEPOD (2004); various IMF country reports on Senegal, etc.

Figure 7: Number of institutional reforms and tax revenue performance in Senegal, 1970-2014



Source: Author's computations using data from: BCEAO, *Economic and Financial Database*; Author's compilations using several documents including: various versions of the General Tax Code; various versions of the Customs Code; Fall and Sène (2010); CEPOD (2004); various IMF country reports on Senegal, etc.

Figure 8: Number of all reforms and tax revenue performance in Senegal, 1970-2014



Source: Author's computations using data from: BCEAO, *Economic and Financial Database*; Author's compilations using several documents including: various versions of the General Tax Code; various versions of the Customs Code; Fall and Sène (2010); CEPOD (2004); various IMF country reports on Senegal, etc.

Table 4 above supports also the positive link between reforms and tax revenue performance as it shows that more reforms seem to be associated with an increase in tax revenue.

Table 5 below shows the years during which reforms have been implemented and the years for which no reforms have been undertaken, in the whole period 1970-2014. We can then make a decomposition of tax revenue based on the existence of reforms. Table 5 shows tax revenue for the years with reforms and tax revenue for the years without reforms. We compute the average ratio of tax revenue to GDP for the years with reforms and for the years without reforms. The results in Table 5 indicate that, in the period 1970-2014, on average, tax revenue with reforms stands at 13.6% of GDP, while tax revenue without reforms accounts for 6.8% of GDP. These results show thus that tax revenue performance with reforms is higher than tax revenue performance without reforms, supporting therefore the idea that reforms have contributed to increase tax revenue performance in Senegal, as found above.

Table 5: Tax revenue performance with and without reforms in the tax administration in Senegal, 1970-2014

	Number of all reforms	Tax revenue performance (% of GDP)	
		With reforms	Without reforms
1970	0	-	2.2
1971	0	-	2.2
1972	0	-	2.3
1973	0	-	2.5
1974	0	-	2.6
1975	0	-	3.1
1976	0	-	3.3
1977	0	-	3.8
1978	0	-	4.6
1979	2	4.8	-
1980	0	-	6.1
1981	0	-	5.1
1982	0	-	5.8
1983	0	-	7.3
1984	0	-	7.5
1985	0	-	7.8
1986	5	7.6	-
1987	1	7.4	-
1988	0	-	7.8
1989	1	7.1	-
1990	3	7.7	-
1991	0	-	8.2
1992	1	8.8	-
1993	0	-	7.3
1994	4	8.7	-
1995	0	-	10.2
1996	0	-	10.8
1997	0	-	11.2
1998	2	11.6	-
1999	0	-	12.3
2000	2	12.8	-
2001	0	-	13.0
2002	2	14.0	-
2003	2	14.1	-
2004	1	14.6	-
2005	1	15.9	-
2006	0	-	16.8
2007	1	18.1	-
2008	1	18.1	-
2009	2	17.7	-
2010	2	18.7	-
2011	3	19.8	-
2012	4	19.9	-
2013	1	19.1	-
2014	11	20.1	-
Average	**1.2**	**13.6**	**6.8**
Total	**52**	**-**	**-**

Source: Author's computations using several documents including: BCEAO's *Economic and Financial Database*; various versions of the General Tax Code; various versions of the Customs Code; Fall and Sène (2010); CEPOD (2004); various IMF's country reports on Senegal, etc.

Reforms as measured using the PEFA indicators and tax revenue performance

Table 6 as well seems to support the previous findings on the positive link between reforms and tax revenue in Senegal. Indeed, considering in Table 6 only the PEFA indicators from Table 3 above

whose variation between 2007 and 2011 are different from zero, we find that a positive variation in reforms is associated with a positive variation in tax revenue. This suggests that an improvement in the existence and functioning of a tax appeals mechanism (PI-13iii), an improvement in the controls in the taxpayer registration system (PI-14i), and an improvement in the effectiveness of measures for taxpayer registration and tax assessment (PI-14), seem to be associated with an increase in tax revenue mobilization. This implies that better reforms in the tax administration leads to greater performance of tax revenue in Senegal.

Table 6: Reforms based on PEFA indicators and tax revenue performance in Senegal, from 2007 to 2011

Indicators	Variation in reforms	Variation in tax revenue
Existence and functioning of a tax appeals mechanism (PI-13iii)	2	
Controls in the taxpayer registration system (PI-14i)	2	
Effectiveness of measures for taxpayer registration and tax assessment (PI-14)	1	
Ratio of tax revenue to GDP		0.01

Source: EU and ADE (2011), and Author's computations using data from: BCEAO's *Economic and Financial Database*.

3. Effect of reforms on tax revenue performance

3.1. Past evidence on the effect of reforms on tax revenue performance

Reforms in the tax administration have been considered as one of the most important and a major ingredient to economic development of a nation (Sohota, 1961). Generally, reforms in the tax administration in developing countries involve broad issues of economic policy as well as specific problems of tax structure design and administration (Musgrave, 1987). The mobilization of domestic resource depends on the level of political commitment (Bhattacharya and Akbar, 2013), showing how important is political will to implement the needed reforms for higher revenues. It may also depend on the change in macroeconomic policies, as a rapid change may induce a much more difficult situation for tax reforms to have important and identifiable revenue effects (Tanzi, 1988).

In many developing countries, the immediate reason for reforms in the tax administration has been the need to enhance revenue (Rao, 2000). Increasing revenue is a major consideration in reforms in the tax administration (Morrissey, 2013b). Reforms measures in the tax administration are mainly undertaken in order to, among others, restore buoyancy to revenues (World Bank, 1990).

Reforms in the tax administration may indeed induce an increase in tax revenue. Reforms related to changes in tax legislation, tax administration and minimal tax evasion are among the main factors contributing to an improved revenue performance (Morrisset and Izquierdo, 1993). Increasing tax-to-GDP ratio requires growth in the tax base combined with reforms to improve tax administration (Morrissey, 2013a). Weak tax administration tends to be associated with low tax revenue collection (IMF, 2011; Morrisset, 2013a; Bhattacharya and Akbar, 2013), suggesting that reforms to strengthen the tax administration contribute to raise revenues.

Empirically, experience from various countries shows that reforms can have both positive and negative effects on tax revenue. Such effects depend on the type of reforms implemented on whether an immediate impact or a long-term analysis is considered, on how reforms are measured and on the methodology used either descriptive or econometric. For instance, reforms based on reduced tax rates without de facto and de jure broadening the tax base and on tax exemption have caused a drop in tax

revenue mobilization in Tanzania in fiscal years 1992/1993, while tax administration-related reforms have contributed to a more efficient tax administration, which is capable of collecting a significantly higher amount of revenues in both absolute and relative terms, in that country (Fjeldstad, 1995).

However, in most cases, the effect of reforms on tax revenue has been found to be positive. Asaolu et al. (2015) concluded that tax reforms had significantly contributed to revenue generation in Lagos State of Nigeria, with Ordinary Least Squares (OLS) regressions and time series quarterly data in the period 1999-2012. Generally, they indicate that the large size of Nigeria's tax gap suggests that increasing the country's tax effort requires reforms of both tax policy and tax administration. Using the analysis of variance method and the Scheffe's multiple comparison techniques for the same country, Aminu and Eluwa (2014) concluded that each of the tax reform policy objectives – i.e. enhancement of the principles of good tax system, improvement in the tax administrative structure, removal of disincentives to tax compliance and promotion of investment opportunities - significantly increase the personal, company and custom duty tax revenues.

Osei and Quartey (2005) found that the tax-to-GDP ratio in Ghana has more than doubled, and this performance has been accompanied by a changing structure of the tax system.

Muñoz and Cho (2003) revealed that reform in Ethiopia that consisted of replacing sales tax with a value-added tax (VAT) in January 2003, has brought about higher revenues.

There have been many studies on the effect of tax reforms on tax revenue for Kenya. The main tax reform in Kenya that occurred under the Tax Modernization Programme (TMP), started in the late 1980s. The TMP-related reform, which aimed at broadening the tax base, has led to an important increase in tax revenue (Karingi and Wanjala, 2005). Indeed, they found that tax revenue to GDP during the post-tax modernization programme period in 1983/1984-2000/2001, which averaged 21.975%, is higher than tax revenue to GDP during the pre-tax modernization programme period in 1963/1964-1982/1983, which averaged 15.2%. Using OLS regressions for the period 2003/2004 to 2012/2013, Kanyi and Kalui (2014) have also revealed evidence of significant increase in tax revenue attributed to the TMP-related tax reforms in Kenya. Computing elasticities and buoyancies for the pre-reform period (1973-1985) as well as the post-reform period (1986-1999) in Kenya, Muriithi and Moyi (2003) found evidence that reforms had a positive impact on the overall tax structure and on the individual tax handles. Employing regression analysis and using annual time series data for the period 1963 to 2010, Omondi et al. (2014) showed that the reforms undertaken in Kenya, through the Revenue Administration Reform and Modernization Programme (RARMP) and the TMP, had positive effect on both tax buoyancy and elasticity, then on revenue generation. Using the Proportional Adjustment Method (PAM) in capturing the effects of tax reforms on discretionary tax measures and tax productivity in Kenya for the period 1973–2003, Kieleko (2006) showed that there had been a considerable improvement of the tax revenue productivity and that the reforms made in this period had significant effect on the responsiveness of the tax system. The result of the study by Wang'ombe (1999) for the Kenyan tax system for the period 1989–1998, came up with buoyancy estimates of the total tax system as 1.26 while elasticity was 1.27. The study thus concluded that the tax system in general was both elastic and buoyant, implying that tax reforms had greatly improved productivity.

Hellevig et al. (2014) found that tax reforms in Russia based on lower tax rates and simplified procedures, has skyrocketed tax revenue. Indeed, in 1999, the year prior to the onset of the tax reforms, Russia collected a mere US dollars 9 billion in corporate profit tax, but in 2012 the country raked in US dollars 76 billion, representing an increase of more than 8 times compared to the year

prior to the onset of reforms. The introduction of the 13% flat tax on personal income resulted in 2012 in a 15-times increase in revenue on this tax to US dollars 76 billion from the US dollars 5 billion of the year 1999. Revenue on various sorts of taxes on natural resources filled state coffers with US dollars 79 billion in 2012, whereas the corresponding figure for 1999 was a mere US dollars 2 billion.

Morrisset and Izquierdo (1993) assessed the contribution of reforms based on changes in tax administration to the evolution of tax revenues in Argentina over the 1983-1992 period. Changes in tax administration include increasing tax penalties, new technologies and administrative reforms. Those reforms were implemented during the 1989-1992 years. After the poor performance of the Argentina tax system during the 1980s, tax revenues increased significantly from 12.7% of GDP in 1989 to 22.5% of GDP in 1992, due to improvements in tax administration and tax legislation. They place the administrative dimension of tax reform at the center of the success of the reforms program in Argentina, as the administrative dimension of the tax reform explains to a large extent revenue increase since March 1991. In absence of such effort, the increase in tax revenues observed would have been limited to 34%, which is much lower than the observed increase of 108% with such effort. Exploring the causal relationship between reforms and tax revenue, they found that a more efficient tax administration and an improvement in taxpayers compliance levels appear to precede rather than to follow increases in tax revenues.

Fossat and Bua (2013) found that the major tax administration reforms that have been implemented in the Francophone countries of sub-Saharan Africa since the early 1990s, have contributed to an increase in revenues.

On the other hand, the effect of reforms on tax revenue has been found to be negative in few cases. According to IMF (1992), the drop in tax revenue experienced in Tanzania in fiscal years 1992/1993 (Fjeldstad, 1995) is not unique as experience from other developing countries shows that structural economic reforms often entail short-run revenue losses. With OLS regressions for the period 2000-2009, Gachanja (2012) found that tax reforms, measured as a dummy variable, have negatively contributed to tax revenues in Kenya. Tax reforms initiated in India since 1991 caused an immediate loss of revenues as there was a significant decline in tax rates and no commensurate increase in the tax base (Rao, 2000). The tax-to-GDP ratio, which was 16% in 1990-1991, declined sharply to less than 14% in 1993-1994. Caminada and Goudswaard (1996) found that a tax reform, characterized by base broadening in exchange for rate reduction, has a negative effect on revenue. Using microtax model of the Central Planning Bureau, they found that the Dutch income tax revenue elasticity declined by 17%, which caused an additional revenue loss of 0.6% in 1990, due to the implementation of the Dutch tax reform in that year. On the basis of the introduction of China's seven main measures in tax reforms experienced respectively in 1953, 1958, 1973, 1980, 1983, 1984 and 1994, Zeng et al. (2013) used methods as descriptive statistics, multi-segment linear regression model and principal component analysis, and found that every tax reform showed a clear impact on the tax structure, while the impact on total tax revenue is diminishing over time. Chipeta (1998) revealed that in the context of Malawi, tax reforms that consisted of increasing tax rates, extending existing taxes to new activities and introducing new taxes, are not sufficient for raising buoyancy of the tax system, which is found not to be tax elastic.

Finally, the effect of reforms on tax revenue has been found mitigated in some studies. Das-Gupta and Gang (2000) found that the Indian reform episode did lead to initial tax revenue gains, which could not be sustained over time. The magnitude of the gains from the reform was limited and failed to significantly curtail losses from tax evasion. Usui (2011) indicates also that the 2005 tax reform in

Philippines based on tax rate adjustments and on tax administration measures, has induced revenue gains, but which were not sustained. Eissa and Jack (2009) indicate that in the years immediately following the introduction of the TMP in Kenya, revenues gradually increased, reaching 24.6% of GDP 1995-1996, after which they stabilized at around 23% until the end of the decade. In 1999-2000 revenues fell below 20% of GDP, and this decline continued until they reached a low of 17.8% of GDP in 2001-2002. Since then there has been a slow increase to 20% of GDP in 2004-2005. The tax reform Act in the United States has the immediate effect of changing state tax revenue; most states will enjoy an increase at current rates, while some will lose revenue (Courant and Rubinfeld, 1987). Abdella and Clifford (2010) showed that tax reform in Ethiopia has increased government revenue since its introduction in 2003. Although the absolute amount of taxes collected during the post-2003 reform is higher than the pre-2003 reform, the percentage in proportion to GDP has fallen.

While several past papers used a descriptive approach or the model of tax elasticity and buoyancy (Sohota, 1961; Prest, 1962; Larvin, 1968; Chelliah, 1971; Mansfield, 1972; Ole, 1975; Wilford and Wilford, 1978; Osoro, 1993; Ariyo, 1997; Chipeta, 1998; Wawire, 2000, 2003, 2006; Muriithi and Moyi, 2003), our paper uses both descriptive analysis and various econometric techniques, and considers broader dimensions of reforms, both tax-related reforms and institutions-related reforms.

3.2. Empirical evidence on the effect of reforms on tax revenue performance in Senegal

3.3. Methodology

In this section, we present the econometric analysis of the role of reforms in tax revenue performance in Senegal in the time period 1970 to 2014.

Specification of the model

The specification of the tax revenue model draws on the literature. The model allows specifically for various aspects of reforms, notably reforms related to tax, reforms related to administration or institution, and all reforms in the tax administration (Morrisset and Izquierdo, 1993; Usui, 2011; Kanyi and Kalui, 2014; Asaolu et al., 2015). The specification of the econometric model takes the form of the following equation:

$$\mathrm{TRG}_t = \boldsymbol{\delta_0} + \boldsymbol{\delta_1}\mathrm{TRG}_{t-1} + \boldsymbol{\delta_2}\mathrm{Reform}_t + \mathbf{X}_t\boldsymbol{\theta} + \boldsymbol{\varepsilon_t} \qquad (1)$$

Where TRG denotes the ratio of tax revenue to GDP; Reform stands for, in turn, tax reforms, institutional reforms, and all combined reforms in the tax administration; X is the control variables; ε is the error term.

Tax reforms, institutional reforms, and all reforms in the tax administration are measured as respectively the number of tax reforms by year, the number of institutional reforms by year and the number of all reforms in the tax administration by year, from 1970 to 2014 (See Table 2 above).

The control variables are those that have been identified as important determinants of tax revenue in the literature, including: the share of agriculture sector in GDP; the share of industrial sector in GDP; the ratio of foreign aid to GDP; the degree of openness of the economy measured as the ratio of exports plus imports to GDP; per capita GDP (Leuthold, 1991; Tanzi, 1992; Ariyo, 1997; Edwards, 1998; Frankel, 1999; Brautigam and Knack, 2004; Gupta, 2007; Lucotte, 2010; Drummond et al.,

2012; Benedek et al., 2014). Table A.3 in the appendix provides the sources of all regression variables to be used in the research and their definitions.

Econometric techniques for estimation

As we are using time series data, the stationarity test for the variables in the model is carried out using the Phillips and Perron method. The results, indicated in Table A.2 in the appendix, show that agriculture, industry, foreign aid, and per capita GDP exhibit a unit root (I(1)), while only the degree of openness of the economy is stationary or integrated of order 0 (I(0)).

To estimate the effect of reforms on tax revenue, we firstly use ordinary least squares (OLS) method without caring about endogeneity problems. We secondly use the instrumental variable two-stage least squares method (IV-2SLS) to account for possible endogeneity of regressors, notably reforms. We instrument endogenous variables by using their lagged values. We thirdly use the iteratively reweighted least squares (IRLS) as an additional robustness check to account for possible outliers. The results of the estimations are discussed below.

3.4. Discussing the regression results

The econometric results of the effect of tax reforms, institutional reforms and all reforms in the tax administration on tax revenue performance in Senegal are reported in Table 7. We find that tax reforms are positively and significantly related to tax revenue, irrespective of the econometric technique used. This result suggests robust evidence that tax reforms, which were implemented in the country, were conducive to higher performance of tax revenue.

The OLS and 2SLS results show positive and significant effects of institutional reforms on tax revenue, implying that institutional reforms undertaken in the country have contributed importantly to increase tax revenue performance. However, the result is not significant when we account for possible outliers (IRLS). This suggests that other determinants of tax revenue dominate the potential accelerator effects of institutional reforms on tax revenue.

With respect to all reforms in the tax administration, the estimated coefficients are positive and significant in the OLS, IRLS and 2SLS results. The results suggest that there is robust empirical evidence that massive reforms in the tax administration serve as a signal of strong efforts and greater political will of policymakers, which increase tax revenue performance in Senegal. The results support thus the observation that tax revenue in Senegal has accelerated in the period of the study, during which the country experienced massive reforms in the tax administration. The finding of a positive relationship between reforms and tax revenue is consistent with results from Morrisset and Izquierdo (1993), Usui (2011), Kanyi and Kalui (2014), Asaolu et al. (2015).

The results hold true after controlling for several other variables. Among them, the most important variables that affect significantly tax revenue mobilisation in Senegal are: the share of agriculture in GDP, the ratio of foreign aid to GDP, the degree of openness of the economy, and per capita GDP. The results indicate a negative and significant relationship between agriculture share and tax revenue in Senegal. The agriculture share is thus strongly detrimental to tax revenue collection in this country. One potential explanation of this result may be related to the fact that the agriculture sector in Senegal is largely informal and thus hard to tax. Previous empirical works such as Ebeke (2014) and Dioda (2012) have supported this finding.

We find a negative and significant effect of foreign aid on tax revenue. This shows that foreign aid is not provided to support reforms in the tax administration and then tax revenue collection efforts in Senegal, as reported in Gupta et al. (2003).

The degree of openness of the economy has positive and significant coefficients. This suggests that the openness of the economy provides a great opportunity for raising tax revenue in Senegal. This is consistent with findings from Rodrik (1998), Gupta (2007), Ebeke (2010).

The results show significant and positive coefficients of per capita GDP, implying that higher per capita GDP is conducive to higher tax revenue performance. This result is consistent with the theoretical literature, which explains that the tax revenue share rises with the level of economic development as indicated by per capita income (Chelliah, 1971; Bahl, 1971; Tanzi, 1992). Indeed, an increase in per capita income is supposed theoretically to generate a higher capacity to pay taxes.

The effects of the other control variables on tax revenue are not significant. We find that there is no evidence that the increasing trend of the performance in tax revenue mobilisation in Senegal is a predictor of continued rising performance in tax revenue collection in the future, as the coefficients of the lagged dependent variable are insignificant in all regressions. This result is at odds with findings from Ebeke (2014). The regression coefficients of the share of industrial sector in GDP are also not significant, suggesting that the industrial sector in Senegal does not contribute importantly to raise taxes. This result, which may be explained by the existence of high informality, does not support previous findings from Ajaz and Ahmad (2010).

Table 7: Effect of reforms on tax revenue in Senegal, 1970-2014

VARIABLES	OLS			IRLS			2SLS		
	Tax reforms	Institutional reforms	All reforms	Tax reforms	Institutional reforms	All reforms	Tax reforms	Institutional reforms	All reforms
Tax reforms	0.003*			0.003**			0.002**		
	(0.001)			(0.001)			(0.0008)		
Institutional reforms		0.004*			0.0007			0.004**	
		(0.002)			(0.0009)			(0.002)	
All reforms			0.001**			0.001*			0.001**
			(0.0006)			(0.0007)			(0.0006)
Tax revenue (lagged first difference)	0.259	0.046	0.124	0.202	-0.12	0.002	-0.013	0.055	0.128
	(0.235)	(0.170)	(0.177)	(0.159)	(0.145)	(0.143)	(0.151)	(0.161)	(0.183)
Agriculture (first difference)	-0.314***	-0.326***	-0.324***	-0.323***	-0.343***	-0.358***	-0.319***	-0.335***	-0.325***
	(0.077)	(0.092)	(0.089)	(0.075)	(0.088)	(0.082)	(0.078)	(0.08)	(0.077)
Industry (first difference)	-0.018	-0.105	-0.052	-0.073	-0.174	-0.142	-0.061	-0.117	-0.053
	(0.125)	(0.154)	(0.138)	(0.145)	(0.169)	(0.157)	(0.117)	(0.132)	(0.118)
Foreign aid (first difference)	-0.103***	-0.067**	-0.088***	-0.109***	-0.066**	-0.086***	-0.064**	-0.083**	-0.090***
	(0.031)	(0.027)	(0.022)	(0.027)	(0.025)	(0.026)	(0.032)	(0.034)	(0.033)
Openness	0.033**	0.023*	0.030**	0.039***	0.029***	0.034***	0.028***	0.025**	0.03***
	(0.013)	(0.013)	(0.012)	(0.009)	(0.010)	(0.01)	(0.01)	(0.011)	(0.01)
Per capita GDP (first difference)	0.0001**	0.0001**	0.0001**	0.0001**	0.00008	0.0001*	0.00008*	0.0001**	0.0001**
	(0.00005)	(0.00005)	(0.00005)	(0.00005)	(0.00006)	(0.00006)	(0.00004)	(0.00005)	(0.00005)
Constant	-0.021**	-0.013	-0.018**	-0.025***	-0.015**	-0.020***	-0.016***	-0.014*	-0.019***
	(0.009)	(0.008)	(0.007)	(0.007)	(0.007)	(0.007)	(0.006)	(0.007)	(0.006)
Observations	33	33	33	33	33	33	33	33	33
R-squared	0.555	0.537	0.543	0.678	0.574	0.638	0.578	0.530	0.543

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: The dependent variable is the first difference of the ratio of tax revenue to GDP. Reforms are measured as the number of reforms by year. The period of the regressions is 1970-2014.

4. Conclusion and policy implications

Several reforms in the tax administration have been implemented in Senegal since the end of the 1970s, and recently, a new General Tax Code and a new Customs Code were adopted in Senegal in 2013 and in 2014 respectively, and a number of tax administration measures in the country are currently being taken as a vital complement to the recent reform of the General Tax Code.

In the same period, Senegal has known good performance of tax revenue with a rising trend, increasing above peers in WAEMU, with a level higher than that of several sub-Saharan African countries and that of many regional comparators. The performance of tax revenue in Senegal is even higher than external sources of revenue, notably foreign aid, remittances and foreign direct investment.

This paper investigated whether and how positive externalities in terms of increased tax revenue mobilization may result from the reforms undertaken in the country. Using both a descriptive approach and an econometric analysis with various techniques, the results revealed that the reforms undertaken in the country in the period of the study have contributed to increase significantly tax revenue performance, irrespective of the type of reforms (tax reform, institutional reform, and all combined reforms) and the econometric technique used. These results are widely consistent with empirical findings from the literature.

This suggests that more reforms are needed to sustainably improve revenue mobilization. The key implication of these results is that both tax and institutional reforms are crucial for a sustained increase in tax revenue performance. Therefore, there is a strong need for the Government to sustain its efforts with respect to the implementation of needed tax and institutional reforms in the tax administration.

For instance, currently, the Government is implementing on-line filing and on-line payment of taxes but only for taxpayers in the Dakar region. The necessity to pursue reforms and to sustain increased tax revenue calls then for the need to roll out this practice for all taxpayers in all regions of Senegal, and not only Dakar. Another example is that the Government needs to continue its current reform of the system to assess staff performance and increased staffing in order to have sufficient qualified human resources to undertake regularly field surveys or monographs on the main sectors of the economic activity and identify regularly new needed reforms in the tax administration.

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Annex A: Table A.1: Reforms in the tax administration in Senegal

Year	Tax reforms	Year	Institutional reforms
1979	Introduction of VAT; Simplification and relief of the tax structure with the homogenization of customs duty.	1986	Modernization and computerization of the Customs Administration.
1986	Fall in the customs duty; Withdrawal of certain forms of tax exemptions; limitation and strict control of other tax exemptions; Extension of internal VAT to the informal sector	2000	Modernization of the Financial Administration.
1987	Reform of the Customs Code.	2002	Engagement of Senegal for several exercises to evaluate the performance of its systems of management of public finance by international institutions.
1989	Increase of 5 points in the customs duty rate.	2003	Engagement of Senegal in a process of reforms of the management of public finance through the validation of the action plans of CFAA (Country Financial Accountability Assessment) and CPAR (Country Procurement Assessment Report).
1990	Reform of the General Tax Code with among others: Unique rate of 35% for corporate taxes; Simplification of taxes on revenue from salaries and of taxes on non-trading revenue with the introduction of IRPP (*Impôt sur le Revenu des Personnes Physiques*); An upper limit of 50% for the marginal rate on physical persons.	2007	Engagement of Senegal for the first exercise to evaluate the performance of its public financial management based on the PEFA (Public Expenditure and Financial Accountability) approach developed by international technical and financial partners.
1992	Revision of the General Tax Code.	2008	Elaboration and adoption of the PCRBF (*Projet de Coordination des Réformes Budgétaires et Financières*) based on the diagnostic of PEFA and incorporating the CFAA action plans.
1994	After the devaluation of Franc CFA, full revision of indirect taxes: generalized decline in customs duty; simplification of taxes; fall in the number of rates of VAT; widening of tax base by the withdrawal or the revision of all conventions providing tax exemptions, protections or particular advantages to some enterprises that are important in the economy.	2009	Signature of a performance contract between the Directorate-General of Tax and Lands (DGID) and the Ministry of Economy and Finance; Greater coordination and centralization of the attribution of the NINEA (*Numéro d'Identification National des Entreprises et des Associations*) Code.
1998	Income tax cannot exceed 50% of taxable revenue; Simplification of the categorization of products from 7 to 4 with a reduction in the ceiling of the maximum level of customs duty.	2010	Transfer of the functions of collection to the Directorate-General of Tax and Lands (DGID); Adoption of GAINDE which includes electronic systems of collection of documents (ORBUS) and of electronic payments (CORUS).
2000	Adoption of the WAEMU common external tariff by the Government of Senegal	2011	Signature of a performance contract between the Directorate-General of Customs and the Ministry of Economy and Finance; Acceptance by the Government of a regional advisor in tax administration in Senegal from IMF's Fiscal Affairs Department; Engagement of Senegal for the second exercise to evaluate the performance of its public financial management based on the PEFA (Public Expenditure and Financial Accountability) approach developed by international technical and financial partners.
2002	Adoption of a unique rate VAT of 18% by the Government of Senegal	2012	Achievement by Senegal of the transposition of the WAEMU directives on the management of public finance; Adoption by the National Assembly of Senegal of several reforms such as law on Revenue Court, law creating OFNAC (*Office National Anti-Corruption*), Transparency Code.
2004	Reform of the General Tax Code, with among others a fall in corporate taxes from 35% to 33%.	2014	Law on the declaration of assets; For the tax directorate (DGID), structural reform through the setting up of functional directorates and operational directorates, reform of the system to assess staff performance, increased staffing, action to deal with cases of fraud, efforts to expand the tax base through more active use of available information and closer cooperation with customs services based on the single taxpayer identification number (NINEA).
2005	Decline in corporate taxes from 33% to 25%.		
2013	New General Tax Code, with among others an increase in corporate taxes from 25% to 30%.		
2014	New Customs Code; Roll out on-line filing and on-line payment of taxes for all taxpayers in the Dakar region; efforts to conduct tax audits; efforts to collect tax arrears; an audit of VAT credits.		

Source: Author's compilations using several documents including: various versions of the General Tax Code in Senegal; various versions of the Customs Code in Senegal; Fall and Sène (2010); CEPOD (2004); various IMF country reports on Senegal, etc.

Annex B: Table A.2: Phillips-Perron test for unit root

Variable	T-statistic	Prob value	Decision
Ratio of tax revenue to GDP	0.892	0.9930	
D.Ratio of tax revenue to GDP	-7.375	0.0000***	I(1)
Share of agriculture sector in GDP	-1.705	0.4284	
D.Share of agriculture sector in GDP	-8.743	0.0000***	I(1)
Share of industry sector in GDP	-1.879	0.3421	
D.Share of industry sector in GDP	-7.983	0.0000***	I(1)
Ratio of foreign aid to GDP	-2.279	0.1787	
D.Ratio of foreign aid to GDP	-10.980	0.0000***	I(1)
Degree of openness of the economy	-3.473	0.0087***	I(0)
Per capita GDP	-1.427	0.5694	
D.Per capita GDP	-8.184	0.0000***	I(1)

* significant at 10%; ** significant at 5%; *** significant at 1%

Annex C: Table A.3: Definition and sources of variables

Variables	**Definition**	**Sources**
DEPENDENT VARIABLES		
Tax revenue	Ratio of tax revenue to GDP	BCEAO, *Economic and Financial Database* (Online Edition)
VARIABLE OF IMPACT		
Reforms	Number of tax reforms by year; number of institutional reforms by year; number of all reforms by year (see Table A.1 in the appendix).	Author's compilations using several documents including: various versions of the General Tax Code; various versions of the Customs Code; Fall and Sène (2010); CEPOD (2004); various IMF country reports on Senegal, etc.
CONTROL VARIABLES		
The level of economic development	Per capita GDP	World Bank, *World Development Indicators* (Online Edition)
Tax base	Share of agriculture sector in GDP, share of industrial sector in GDP, degree of openness of the economy (ratio of exports plus imports to GDP)	World Bank, *World Development Indicators* (Online Edition); IMF, *Direction of Trade Statistics* (Online Edition)
External environment	Ratio of foreign aid to GDP	World Bank, *World Development Indicators* (Online Edition)