

Senegal: Making Domestic Resource Mobilization Work to Sustain Growth and Improve Service Delivery

Birahim Bouna Niang and Ahmadou Aly Mbaye

Abstract

Senegal's recent economic performance is impressive. For the first time, Senegal has achieved a GDP growth rate of more than 6 percent for three consecutive years (2015–2017), and per capita GDP has increased at an annual average of 4.1 percent. In parallel, progress in fiscal revenues has been recorded, with the ratio of average revenues to GDP increasing by 5.7 percentage points between 2000-2002 and 2014-2017, placing Senegal above the regional average of 15 percent.

Notwithstanding, the performance of the Senegalese tax system is limited by the country's narrow tax base, largely attributable to a sizable informal sector. Despite accounting for more than half of GDP, Senegal's informal sector makes up less than 3 percent of total tax collection. Revenue collection is also limited by the fast-growing array of exemptions, and by tax expenditures. These special dispensations mainly went to multinationals with local branches in Senegal. Tax expenditure more than doubled between 2010 and 2014, from 18.4 percent of tax revenues and 3.4 percent of GDP to 40 percent of tax revenues and 7.8 percent of GDP. According to some estimates, the cumulative costs are close to 18 percent of annual GDP. Other factors deterring effective domestic resource mobilization include poor governance and the limited technical capacity of the tax administration, failures of the information system, and weak system transparency. Expenditures are often ineffective, particularly in the education and health sectors.

Improving the state of public finances requires reforms to strengthen technical and institutional capacities and to adapt the management framework in view of Senegal's entry into the hydrocarbon era. This might include setting up a public finance monitoring committee, adopting new budgetary rules consistent with those set by the West African Economic and Monetary Union, building relevant tax administration capacities. On the expenditure front, actions are needed to improve the targeting of support programs for vulnerable groups, and to implement capacity-building programs for government officials in charge of project evaluation, including in the Planning Directorate and in technical ministries. Lastly, a systematic ex ante and ex post evaluation of public investments is needed.

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Foreword

Senegal is one of the few countries in sub-Saharan Africa that has grown rapidly in recent years as well as has witnessed an increase in revenue collections. For example, its tax-to-GDP ratio has grown by over 3 percentage points of GDP since early 2000s. Senegal's both direct and indirect taxes have expanded in relation to GDP, suggesting a gradual broadening of its tax bases.

Notwithstanding the above successes, Senegal is not fully realizing its tax potential. Either because of poor policy design or because of poor compliance with taxes, Senegal is estimated to be losing 10 percent of GDP in tax revenues every year. A large proportion of revenue loss stems from weak VAT collections. In addition, tax concessions to private entities including multinational enterprises have grown and continue to drain the exchequer. These concessions constitute a high proportion (40 percent) of current tax collections. The identity of beneficiaries of tax concessions is not known. Unfortunately, these concessions are not inducing greater foreign investment.

Despite the recent spurt in growth and associated increases in property prices, Senegal generates little revenue from taxation of property. This is worrying because property taxes are progressive in nature and can generate revenues to support urbanization. The country continues to struggle with the taxation of the vast informal sector, creating gross inequities among individuals who are placed in similar circumstances.

There are concerns on the spending side as well. Senegal spends 6 percent of GDP on education—a high number—but outcomes are relatively meager. Enhancing efficiency of spending programs including that implemented by the capital budget can free up as much resources as through increased mobilization of domestic revenues. Improvements in service delivery should have a positive impact on tax compliance.

This study carried out by Professors Niang and Mbaye is one of the five country studies commissioned by the Center of Global Development to delve into revenue performance of five countries, four of which are in sub-Saharan Africa. This study highlights the political and administrative constraints behind Senegal's weak revenue performance. The authors provide a range of options that would not only generate more resources domestically but also help enhance spending and improve social and economic outcomes. We are confident that their recommendations would stimulate a policy debate in Senegal as well as in other countries facing similar challenges. They should be of immense help to the Senegalese authorities.

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1. The General Macroeconomic Context

For quite a while, the Senegalese economy has been characterized by low and erratic gross domestic product (GDP) growth, hardly exceeding the demographic growth. From the mid-1990s on, there was a reversal of this trend that resulted from the effects of the 1994 devaluation of the CFA franc, a more favorable international environment and the reform package then implemented by the government. Over the 2000-2007 period, GDP grew at an annual average of 4.3%, while the per capita GDP growth stood at 1.75%. The 2007-2009 international shocks (food, energy, economic and financial crises) led to a slowdown in growth, particularly in 2009 (2.1%). Favorable rainfall conditions and the continuation of the reforms with the adoption of a new development strategy, the PSE (Plan Sénégal Émergent – Emerging Senegal Plan) in 2014 have triggered a surge in economic growth. As a consequence, for the first time in Senegal's economic history, a GDP growth rate of more than 6% has been recorded for three consecutive years between 2015 and 2017, and per capita GDP has increased at an annual average of 4.1%. However, this impressive growth performance should not lead one to overlook the structural problems the Senegalese economy is facing (IMF, 2018). The economy is indeed still mainly driven by agriculture and services. Agriculture, which is still mostly rainfed, has a low level of productivity (mainly due to unskilled labor, lack of access to inputs, land and finance). The services sector is mostly dominated by informal activities (trade, transport, and the like). On the demand side, growth is driven by private consumption and public investment, respectively fueled by remittances and public debt.

In addition, economic growth has been mostly jobless beyond having a minimal impact on poverty reduction, with the number of people under the poverty line being stable at around 46.7%. Despite some progress on the export diversification front, the persistence of serious competitiveness challenges are impeding value chain development. Thus, the current account deficit stands out at above the 5% of GDP limit, which is the norm set by the West African Economic and Monetary Union (WAEMU) convergence criteria.

Senegal, which benefited from the Multilateral Debt Relief Initiative (MDRI), has embarked on a program of public infrastructure development that has led to a rapid increase in public debt. The debt ratio to GDP, which was less than 25% in 2006, exceeded the 60% threshold in 2017, despite a reevaluation of GDP of nearly 30% in 2014 due to the rebasing of national accounts. Thus, despite the relatively strong growth, the evolution of the primary deficit, the interest rate and the exchange rate have been such that the debt ratio has risen steadily. The double deficit (government budget and current account) having been financed mainly by the external debt rather than the implementation of an accommodating monetary policy, the recorded inflation is relatively low.

Table 1 presents a few macroeconomic indicators from 2000 to 2017. A striking feature of the Senegalese macroeconomic feature it depicts is the low level of inflation, despite relatively high levels of current account and budget deficit, again underscoring the role ODI and sovereign debt are playing. Moreover, Senegal's affiliation to UEMOA precludes any possibility of fiscal deficit monetization.

Table 1. Macroeconomic indicators, 2001–2017

Indicators	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
GDP per capita (USD, PPP)	1910,5	1948,7	1911,9	1987,3	2049,3	2107,7	2102,5	2147,4	2166,2	2157,4	2184,0	2158,2	2187,2	2196,0	2218,6	2293,9	2379,5	2470,6
Real GDP per capita growth (percent)	0,7	2,0	-1,9	3,9	3,1	2,9	-0,2	2,1	0,9	-0,4	1,2	-1,2	1,3	0,4	1,0	3,4	3,7	3,8
Real GDP growth (percent)	3,2	4,6	0,7	6,7	5,9	5,6	2,5	4,9	3,7	2,4	4,2	1,8	4,4	3,5	4,1	6,5	6,7	6,8
Inflation (percent)	1,9	2,6	3,3	0,5	0,5	2,5	4,0	5,3	6,9	-1,7	1,8	4,1	2,5	-2,3	-1,0	0,3	1,1	2,5
Current Account Balance (percent GDP)	-5,6	-4,0	-4,7	-5,0	-5,0	-6,1	-7,3	-9,2	-11,1	-5,3	-3,6	-6,4	-8,6	-8,2	-6,8	-5,3	-4,2	-7,2
Official Development Aid (percent GNI)	9,4	8,8	8,5	6,8	13,4	8,1	9,4	7,7	8,0	8,1	7,3	7,5	7,7	6,8	7,4	6,6	5,2	5,2
General Government Gross Debt (percent of GDP)	78,0	74,6	66,0	54,8	47,5	45,8	20,9	23,7	23,9	32,7	35,0	39,9	42,3	45,2	42,1	43,8	47,2	47,7
General Government Overall Deficit (percent GDP)	-0,2	2,8	0,1	1,8	2,4	2,8	4,6	3,5	4,6	5,0	5,2	6,7	5,9	5,5	5,1	4,8	3,3	3,7

Source: World Development Indicators; Ministry of Economics and Finance

2. Recent Revenues and Expenditures Trends

2.1 Evolution of Revenues

Since 2000, Senegal has recorded important progress in fiscal revenues, as table 2 shows. The ratio of average revenues to GDP has increased by 5.7 percentage points between 2000-2002 and 2014-2017 (Table 2). Over the same period, the ratio of tax revenues to GDP has increased by 4.1 percentage points to reach a mean value of 15.35% over the 2014-2017 period. This progress is remarkable because, on the one hand, the level of tax/GDP ratio exceeds slightly the average for sub-Sahara African countries, which stands at 15% (Coulibaly and Gandhi, 2018; Gupta and Tareq, 2008). On the other hand, it has been empirically found that countries that reach this 15% threshold of the tax-to-GDP ratio tend to experience higher growth (Gaspar et al., 2016). However, this ratio falls short of the target level of 20%, set forth by UEMOA convergence criteria. In addition, Senegal's ratio is lower than that of emerging countries (Petit and Jalles, 2018).

The share of non-tax revenues in government budget has also increased between the early 2000s and the mid-2010s, to such extent that the share of tax revenues in total resources decreased by 7.7 percentage points of total revenue between these two periods.

Income tax revenues, as a ratio of GDP, increased by 1.8 percentage point and as a ratio of total tax revenues by 4.2 percentage points, from 18.31 to 22.71% of total tax revenues, over the same period. This improvement in income tax collection is due in part to the establishment of a unit exclusively dedicated to large taxpayers which are the main contributors of corporate income tax.

Property taxes remain very low and are less than 0.5% of GDP despite rapid growth in urbanization. This reflects the shortcomings of the current cadastre system which does not allow effective application of property taxes

In reality, the performance of the Senegalese tax system is very much limited by the country's narrow tax base, mainly explained by the relatively large size of the informal sector. The informal sector, which accounts for more than half of the GDP, is taxed far below its potential, despite several the reforms implemented to facilitate tax collection from this sector such as the adoption of the single general contribution (UGC) which consolidates all levies on informal activities into one single synthetic rate, and the facility granted to informal actors as regards license payment. While corporate tax rates are relatively reasonable (MCC 2017), the number of taxes private firms need to file are very high, amounting to a total of 58, according to several estimates (Benjamin and Mbaye 2012). In addition, it is estimated that the required time to file and pay taxes amounts on average to 600 hours per year (WB Doing Business 2016). Given the low level of education of most informal actors and the inexistence of any credible financial records on their financial accounting; the standard procedures for filing and paying taxes by informal actors have been sizably simplified and streamlined, as has been extensively discussed further below. Hence, informal businesses, unlike formal

ones are only required to pay a presumptive lump-sum amount of tax, in lieu of the regular business tax which would be impossible for them to implement. This was also intended to improve the level of tax compliance among informal enterprises.

As is well known, fiscal expenditures correspond to revenues forgone, due to tax administration deliberate renunciation, in favor of some particular agents or operations. In Senegal, tax expenditures have been subjected to various assessments since 2008. As a result, three hundred twenty-seven (327) tax expenditure measures have been identified, including : total or partial, temporary or permanent exemptions, abatements, presumptive tax schemes, allowances and deductions. This total includes a share of 52% which were granted to various enterprises, 21% to households, 11.3%, to other public entities, and the remainder, jointly to firms and households (MEF, 2014). Among private enterprises these special dispensations mainly went to multinationals with local branches in Senegal (which benefitted CFA 39 billion), firms in the mining sector (28 billion), special economic zones (13 billion), those covered by the investment code (11.7 billion), and those covered by the petroleum code (6 billion). Multinationals operating in the mining sector, thus have the lion's share of these preferential treatments. Beyond being only subjected to a license fee (as the only levy applicable to them), they take advantage of two additional dispensations. For the whole duration of the investment phase, they have full tax exemption. And these benefits are prolonged even in the operational phase of the concession and may cover a wide array of taxes, including: VAT, duty, real estate, and various registration fees (ONG 3D, 2019). Although the identity of the beneficiaries is not disclosed, the clientelist nature of the Senegalese politics makes it very hard to completely rule out the role cronyism might play in the provisions of such dispensations.

Due to data unavailability, only 52.6% of the measures were evaluated for the years 2010, 2011 and 2012, and 68% in 2014 (Ministère de l'Économie et des Finances, 2014, 2016). Incomplete coverage of the measures identified means that the assessment of the fiscal cost of tax expenditures is mostly on the lower bound. As shown in table 3, the real costs are relatively high, having more than doubled between 2010 and 2014, from CFA F 220 billion (18.4% of tax revenues and 3.4% of GDP) to CFA F 588 billion (40% of tax revenues and 7.8% of GDP). According to some estimates, the cumulative costs for the 2008-12 period is about CFA 1375 billion, which is close to 18% of annual GDP (ONG 3D 2019).

The costs associated with these tax expenditures are even more worrisome when matched against their impact on foreign direct investment, which is still, below 2.5% of GDP over the 2000-2010 period (Petit et al., 2012). The same trend has also been observed over the more recent period (2015-2017).

The Senegalese tax system has undergone a stream of reforms since the end of the 1990s with a view to improving its performance and furthering Senegal's economic integration with the rest of WAEMU and Economic Community of West African States (ECOWAS) countries. A common external tariff (CET) applied in WAEMU entered into force in 2000, and was extended to the ECOWAS area in 2015. Besides, the corporate tax rate in Senegal went from 33% to 25%, and then to 30% in recent years.

Observed tariff reduction, coupled with the adoption of single VAT tax rate have led to some kind of tax and customs transition, with the weight of domestic revenue increasingly outpacing that of import duties. Thus, tax revenues come mainly from levies on goods and services, notably VAT, whose relative share amounts to about 33% of total revenue and nearly 40% of tax revenue over the period 2014-2017. Regardless, the administration of the VAT turns out to be very bureaucratic and ineffective. VAT is an indirect tax which is supposed to be borne by the consumers. Formal firms receive tax credits from VAT paid on their inputs, they can hardly use to settle liabilities vis à vis the tax administrations. Different modalities for such deductions have been tried to ease this constraint on formal enterprises, as has been spelled out by Petit and Godbout 2013). However, the average processing time for VAT credits settlements are still abnormally long. It achieves 97 days, and varies from one week to one year (Petit et al., 2012).

When we look at import duties, they represent 12.4% of total revenues and 14.1% of tax revenues over the 2014-2017 period. The reduction in the weight of customs duties was more than offset by the rise in domestic tax revenues.

Table 2. Evolution of public resources

	In Relation to GDP (%)		In Relation to Total Revenue (%)	
	2000-2002	2014-2017	2000-2002	2014-2017
	Mean	Mean	Mean	Mean
Total Revenue	11.81	17.52	100.00	100.00
Tax Revenue	11.25	15.35	95.32	87.66
Income Tax Revenue	2.17	3.98	18.31	22.71
PIT	1.21	2.53	10.18	14.42
CIT	0.96	1.45	8.14	8.30
Payroll Taxes		0.17		0.99
Property Taxes	0,32	0.28	1,81	1.58
Goods & Services Taxes	6.81	7.52	56.51	42.94
VAT	4.55	5.77	37.49	32.96
Excises	1.08	1.06	8.87	6.07
Trade Taxes	2.10	2.17	17.36	12.40
Other Taxes	0.30	0.97	1.62	3.73

Sources: Ministère de l'Économie, des Finances et du Plan; World Development Indicators; International Monetary Fund

Table 3. Estimate of tax expenditures

Years	Amount (billion current FCFA)	% of Tax revenues	% of GDP
2010	220	18.4	3.4
2011	258	20	3.8
2012	280	20.7	3.8
2014	588	40	7.8

Source: Ministère de l'Économie, des Finances et du Plan

2.2 Evolution of Public Expenditures

In Senegal, the public expenditure mechanism is framed by standards set forth within WAEMU as part of its multilateral surveillance arrangement. Regardless, their evolution reflects the structural characteristics of the Senegalese economy and are consequences of the political options made by the Senegalese government. Expenditures on goods and services increased by 1.3% of GDP between 2000-2002 and 2014-2017 (Table 4). However, their relative share of total spending declined by almost 3% over the same period. Social security spending rose from 3.2% to 5.3% of GDP. However, their share of total expenditure fell by 5%.

The level of expenditures on social contributions is lower in Senegal than in emerging countries (IMF, 2018). This is mainly explained by the low level of social coverage, as revealed by the results of the national survey on jobs and labor force conducted in Senegal, in 2015 (ANSD, 2018). According to this survey, only about 16% of employees benefit from a retirement plan, 14.3% from health insurance and 11.9% from maternity leave. This observed weak level of social protection has a lot to do with sheer size of the informal sector in total employment. One of the challenges facing the Senegalese authorities is to implement a comprehensive policy reform likely, encompassing at the same time : an extended social protection coverage, creation of decent jobs while boosting competitiveness of private firms, in particular of SMEs.

Expenditures related to public debt servicing, as a ratio of GDP, have increased by about 1 percentage point between 2000-2002 and 2014-2017. They grew precipitously, to more than double over the same period. Hence, their share of total expenditures has increased by more than 5%. Even though Senegal's public debt is deemed still sustainable, the pace at which public debt increases is alarming. The public debt profile has dramatically changed, with a significant increase in the share of non-concessional debt, combined with an apparent interest rate of the public debt which has risen sharply (Niang, 2018).

Public investment spending, as a ratio of GDP, rose from 4.3% to 9.1%, over the period under review. Its relative share of total public expenditures also increased by 0.7 percentage points. Public investment is thus one of the main drivers of growth in Senegal, which for more than a decade has experienced a sustained level of public investment. One of the problems with this growth model is that debt is rising very fast, while efficiency is still a big challenge. The investment effort should be shared by the government and the private sector to remove the specter of debt overhang.

According to an assessment by the IMF (IMF, 2016), WAEMU countries are lagging far behind sub-Saharan Africa (SSA) comparator countries in many areas of infrastructure development, including road, electricity, and telecommunications. Using a DEA methodology, the report finds that WAEMU countries are scoring rather low in terms of investment efficiency at only 0.84, comparing unfavorably to African comparator countries (0.93) and to Asian comparators (0.94). For the specific case of Senegal, IMF (2018) emphasizes the need to improve efficiency in infrastructure management, in order to achieve fiscal sustainability. Lastly, the IMF-PIMA's assessment of Senegal's public investment efficiency, rates Senegal with a score of 0.67 on a scale of 0-1; which is above the SSA average, which is 0.64, but below that of emerging countries (0,73).

Table 4. Expenditure Trends

	In Relation to GDP (%)		In Relation to Total Expenditure (%)	
	2000-2002	2014-2017	2000-2002	2014-2017
	Mean	Mean	Mean	Mean
Outlays on goods and services	2.09	3.43	20.78	16.18
Compensation of employees	3.21	4.99	31.25	23.65
Interest payments	0.58	1.61	5.64	7.65
Social benefits	0.27	0.25	1.27	1.18
Capital expenditures	4.35	9.09	42.33	43.01
Other outlays		2.11		9.99

Sources: Ministère de l'Économie, des Finances et du Plan; World Development Indicators; International Monetary Fund

3. Fiscal Potential and Political and Institutional Constraints to Increasing Domestic Revenues

3.1 An Assessment of the Fiscal Potential

The evaluation of the fiscal potential has been the subject of much work in the literature as a result of Lotz and Morss (1967), Aigner, Lovell and Schmidt (1977), Gupta (2007). The approach is to try to answer the following question : what is the amount of additional revenue that can be recovered in a country at a given time? (Langford and Ohlenburg, 2016). This question can be answered using several methodological approaches. Some works, based on panel data (Brun, Chambas and Combes, 2006), estimate the tax effort from the residue whose mean is zero. The tax effort of each country is compared to the country sample average. A positive tax effort indicates that the recovery level is above the average while the opposite is the case where the deviation from the average is negative. This approach is relative and has the disadvantage of not indicating the maximum recovery level. Alternative methods, mainly non-parametric, use the (Data Envelopment Analysis) approach. These models do not specify a production function and the distance to the frontier is considered to represent the inefficiency.

Stochastic frontier models escape criticism from previous models. In particular, the residue reflects both technical inefficiency and tax policy inefficiency.

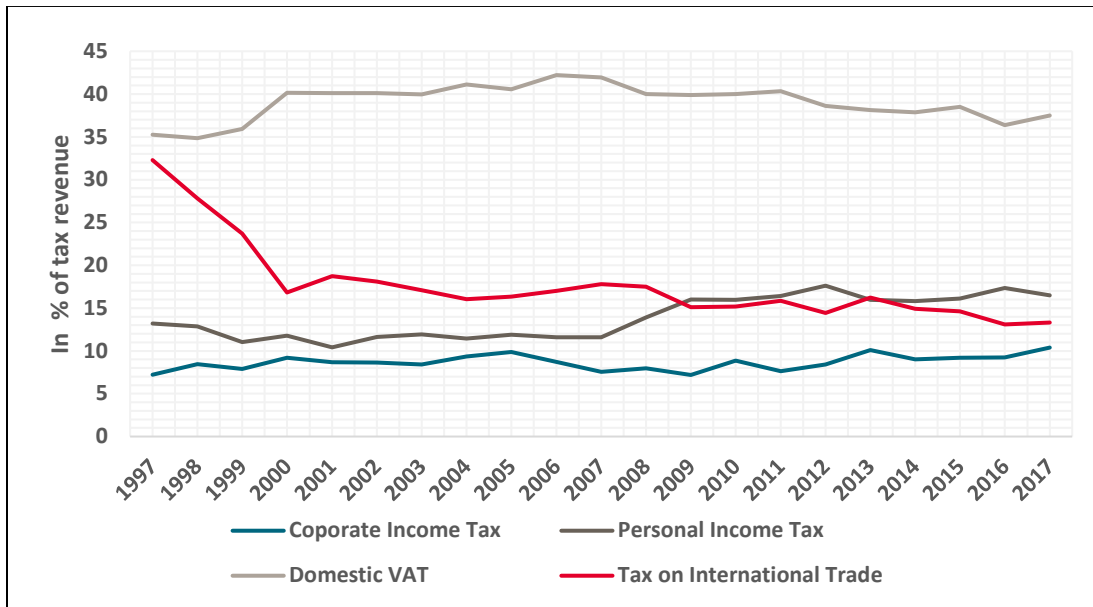
The Senegalese fiscal potential has been estimated following the stochastic frontier method.

Considered types of taxes involve:

- corporate tax;
- personal income tax;
- domestic VAT;
- import duties and VAT on imports

Figure 1 shows the evolution of the revenue lines derived from the model.

Figure 1. Evolution of tax revenue (% GDP)

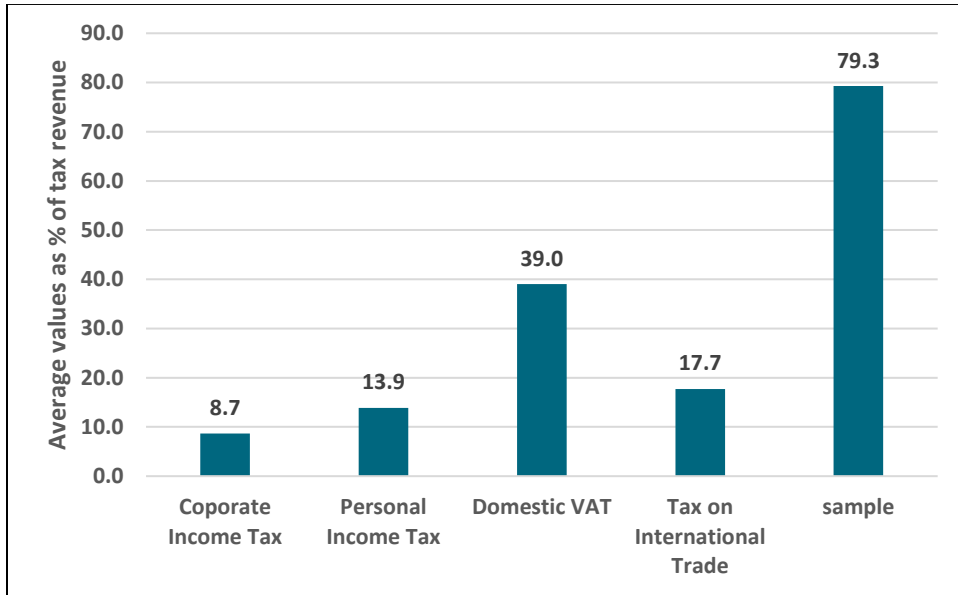


Source: Direction Générale de la Comptabilité Publique et du Trésor

Over the study period (1997-2017), domestic VAT represents the largest source of tax revenue mobilization. Since 2009, it has been observed that personal income tax contributes to the mobilization of tax revenues more than import duties and VAT. The corporate tax ranks fourth in the mobilization of tax revenues.

The choice of these lines of taxes is due to their weight in total tax revenues. The total taxes included in the estimation of the stochastic efficiency frontier represent 79.3% of tax revenues, on average, over the period 1997-2014 (Figure 2).

Figure 2. Weight of revenues included



Source: Direction Générale de la Comptabilité Publique et du Trésor

The behavior of the variables related to the general economic environment, included in the model suggests that to significantly improve the performance of the tax system, it is important to address the challenge of structural transformation (increasing the contribution of manufacturing activities to GDP at the expense of agriculture) and of governance.

The estimation results suggest the possible improvement potential in terms of collection, for the various tax lines (table 5).

Table 5. Coefficients of technical inefficiency

Revenue lines	Average improvement potential (% GDP)
Corporate tax	2.502
Personal income tax	3.103
Internal VAT	3.159
Import duties and VAT on imports	2.081
Total	10.845

Source: Author's calculation

It shows that over the period from 1997 to 2017, the tax revenue foregone, due to the inefficiency of the tax system amounts to 10.8% of GDP. This estimate is not very far from that of the DPEE (DPEE, 2019), which evaluates the efficiency gap over the period 2000-2017 to an amount equivalent to 10.15% of GDP.

On average over the period from 1997 to 2017, if all technical inefficiencies were duly corrected :

- the contribution of corporate tax, as a ratio of GDP, could increase by up to 2.5 percentage points ;
- that of personal income could increase by 3.10 percentage points ;
- additional revenue from domestic VAT and import duties, as a share of GDP, would amount to 3.16% and 2.1% of GDP respectively.

3.2. Political and Institutional Constraints to the Mobilization of Domestic Resources

The assessment of the fiscal potential and effort (see 3.1) revealed the inefficiency of the Senegalese tax system. Multiple political and institutional factors concur to explain this poor performance, which are summarized below.

The political economy of tax reforms: tax reforms are not neutral with regard to interest groups. We observe opposition from interest groups to preserve their vested interests. For example, the various tax reforms applicable to the informal sector have proved ineffective because of the lack of cooperation from the large informal firms, which, despite the relatively high revenues they generate, remain under-taxed (See Benjamin and Mbaye 2012, for a broader description of large informal firms and how they operate to avoid taxes). No administration has so far proven enough determined to address this important challenge, which not only undermines the tax system, but also underscores the lack of equity of the tax system, since many taxpayers end up paying more than informal actors whose incomes are higher. The low level of tax compliance is the testimony to both a weak state enforcement capacity and greater influence from informal actors. It is common knowledge that only few business operators (mainly the formal ones) are identified and taxed, while the bulk of informal ones evade taxes. The Senegalese government only has limited leverage on informal business operations. On the other hand, large informal businesses meet all the necessary conditions to become formal (in particular they sometimes have higher levels of annual turnover than their formal counterparts), but chose to remain informal, due a very hostile business environment that manifests itself in the form of high factor costs, cumbersome regulations and failing public infrastructure. For example, Gelb et al (2017) show that unit labor costs are much higher in Africa than other developing countries, and Senegal exemplifies that. Both formal and informal firms need relationships of trust to secure inputs, get credit and market their products. When formal institutions fail to provide effective property rights, firms can, to some extent, internalise these relationships of trust if they are large enough. Sometimes, becoming 'large enough' can take the form of informal religious

and ethnic networks. These can substitute for official institutions that should (but often fail to) support arms-length trading in the formal sector.

Business law in Senegal as in other francophone Africa is governed by the Organization for the Harmonization of Business Law in Africa (OHADA: *Organisation pour l'Harmonisation en Afrique du Droit des Affaires*) treaty. Increasingly, its regulations are being modified to be more relevant to the informal sector. From both an accounting and legal perspective, this treaty has introduced a number of provisions to promote formalization of SMEs and better manage the informal sector. Despite all these well-intentioned and seemingly appropriate reforms, there is little indication of their effectiveness. There are two main tax regimes that apply to businesses in Francophone Africa: the regular business income tax system and the presumptive lump-sum tax regime. The regular business tax regime is contingent on the availability of reliable financial statements that enable taxation assessment based on objectively verifiable documents such as systematic accounting and financial statements. This regime also imposes certain obligations on eligible companies. In the regular business tax regime, both for ordinary and large companies, credible financial statements are required for tax assessment in contrast to the presumptive tax regime applied to informal firms. The presumptive tax regime is based on the assumption that eligible companies do not have the institutional and organisational capacity to prepare reliable financial statements that can be used as a basis for tax assessment. The businesses concerned are therefore only required to keep a ledger summarizing receipts and expenditure. They are taxed on a lump-sum basis, in which a single payment discharges all tax liabilities, based more on the assumed level of their activities than on objectively verifiable accounting data. Needless to say, the highest levels of direct tax collection in Senegal are obtained from the minority of enterprises subject to the regular business income tax regime, and especially those subject to the large company regime. Benjamin and Mbaye (2012) findings show that the informal sector accounts for less than 3 percent of tax revenues in Senegal, despite accounting for around half of total GDP. A breakdown of this contribution shows that it is only 1.1 percent in the secondary sector. Even though this contribution does not account for various alternative levies on informal transactions (such as the withholding at source on all transactions with informal entities), it provides a rough estimate of the magnitude of tax evasion by the informal sector. The informal sector is usually seen as a security valve, providing livelihoods to people lacking capital and adequate training. Despite its overall negative effects in terms of revenue collection, and unfair competition to the formal sector, it is generally accepted that trying to formalize informal firms might not be a good policy option. Instead, assisting them to ensure a smooth transition to a status where they can grow and generate more revenue seems to make more sense.

Tax exemptions: tax expenditures have followed an upward trend and reached a high level (40% of tax revenues and 7.8% of GDP in 2014). This significantly reduces the tax base and increases the tax burden for taxpayers that cannot escape tax. Tax expenditures should be streamlined. In this perspective, they should be systematically subjected to a cost-benefit analysis, and accelerated depreciation, which constitutes one of the most appropriate exemption instruments (Tanzi and Zee, 2001, Gupta 2018). These exemptions are found to have many drawbacks in developing country economies, which need to be mitigated. To do

so, Gupta (2018) finds as an important starting point, subjecting them under a regular scrutiny so as to clearly assess and make public their expected social costs and benefits.

Governance of the tax administration: the deficit of good governance pulls down the performances of the tax system. Income tax is thus collected on the basis of the targeting of large taxpayers (large companies), employees of the modern sector, "State taxes" (tax on profits, VAT, customs duties) to the detriment of local governments' taxes. Local taxation is practically nonexistent and the property tax, which has considerable potential due to the rapid urbanization and the real estate boom, generates very little proceeds in terms of tax revenue (Petit and Jalles, 2018). The cadastral services are defective in so far as few residential dwellings are registered. In the bilateral agreement signed between the tax administration and the ministry of finance (MEF 2018), an increased use of IT solutions to harness efficiency in all rungs of the tax administration is specified. According to the IMF evaluation (IMF (2019) significant progress has been made in the implementation of the Hackaton related project, in particular the implementation of the "*Mon Espace Perso*" tax platform. Likewise, increased interconnected interactions through IT-based solutions are being experimented. Notwithstanding, Senegal still has a long way to go regarding the use of IT to improve tax collection efficiency. On a related issue, the administration of VAT poses a number of problems (length of time for processing cases and refunding credits). VAT is the biggest item of tax expenditures (265 billion FCFA, 46% of the total in 2014);

The technical capacities of the tax administration: the tax services suffer from a shortage of qualified personnel to ensure the proper administration of taxation. In particular, there is a lack of evidence generating research, capable of informing decision-makers on the effects of tax policy and its potential influence on economic and social outcomes;

Information system failures: a good tax administration requires the availability of information, allowing for an accurate identification of taxpayers and assessment of their capacity to pay tax (economic activities, income generated, etc.). The challenge regarding identification of taxpayers is one of the main obstacles to effective tax collection in the informal sector and effective taxation of land and real estate. Requiring tax information as a condition to get connection to public infrastructure services (water, electricity, etc.) and a better urban planning are possible ways to circumventing these difficulties and improving the performance of the tax system. In principle all firms should have a tax identification number which should be used in their relations with all public administrations. In practice, however, many do not have and even those who do, are not necessary paying their taxes.

Fiscal citizenship, willingness to pay taxes and the strategy of offering services: with the low level of human capital (low adult literacy rate and secondary school enrollment), the issue of Tax citizenship is challenging in Senegal. The average citizen is not aware of the stakes and the role of taxation in economic and social development. As a result, they strive to avoid taxation. In addition, the high level of perception of corruption limits the willingness to pay tax. One solution is to adopt a service delivery strategy (technical capacity building program, access to finance, etc.) to act positively on the willingness to pay of the SME / SMI tax, and the informal sector;

High dependency on official development assistance: Senegal is one of the most assisted countries in the world, with Official development assistance (ODA) accounting for half of public investment and one-quarter of the State budget (World Bank, 2012). Several factors contribute to explaining the smooth relationship between Senegal and the donor community. Senegal is one of the most stable democracies in Africa, with fair elections, ethnic harmony and religious tolerance. The country is well situated on the coast of West Africa to access markets in Europe and North America. Its limited resource endowment has shielded it from the “resource curse” of economic distortion, corruption and violence associated with mineral rents. Furthermore, its long standing pro-western policy regime has allowed him to develop well entrenched ties with most traditional donors, which has not precluded good relationships with emerging donors like China. This creates risks of a crowding out of taxes, (including local taxes) by ODA. These risks are accentuated by the political economy problems of fiscal policy, which call into question the implementation of bold reforms that attack the privileges of interest groups (traders, import substitution industries).

3.3 Skills Gap and Capacity Building Requirements

The main technical capacity building program that the Senegalese tax administration has benefited from in the recent period is offered by the IMF and AFRITAC. This involves putting in place a mechanism to reduce the fiscal gap, continue the digital transformation of the General Directorate of Taxes and land management (Direction Générale des Impôts et Domaines - DGID) and implement a medium-term revenue mobilization strategy (SMRT).

Recent actions targeted to reduce the fiscal gap (by limiting tax evasion) have allowed the government to collect additional taxes amounting to 37.6 billion FCFA, or 0.3% of GDP in 2018. However, as far as VAT is concerned, the difference between resources actually recovered and potential revenue based on current legislation is 35% (IMF, 2018).

The DGID has a computer park composed of several systems and applications to trigger a digital transformation process:

- ***SIGTAS (Standard Integrated Government Tax administration System)***: it is a system for automating the main tax functions (registration, collection, tax control, litigation);
- ***etax***: on-line tax filing and payment application to secure revenue and improve taxpayer service;
- ***SQL Server***: data warehouse (internal and external) for the automation of the collection, storage and exploitation of data from public administrations and bodies;
- ***Mon espace Perso***: application to improve the transparency of the DGID and the dematerialization of the relationship with the taxpayer;
- ***SAP Business Objects***: Business Intelligence environment to improve the quality of data and tax audits;
- ***Web Help Desk***: application for recording and tracking user (taxpayer) requests for improved service to taxpayers and partners.

The first results of the digitization program are encouraging, as revealed by the results of the user survey (IMF, 2018).

The SRMT proposes to accompany the PSE (Senegal Emerging Program) by correcting the weaknesses of the tax system. It is articulated around the following four components:

- the definition of a target and roadmap for medium-term revenue mobilization (4-6 years) by building consensus around the level of revenues needed to finance public expenditures;
- the design of a comprehensive reform of the tax system (political, administrative and legal aspects);
- a strong and sustainable political commitment to improving tax collection, and the establishment of reform management structure to ensure their smooth implementation over several years;
- Securing resources to support the implementation of the strategy.

However, the implementation of the SRMT requires technical support from partners in areas where the tax administration is not sufficiently endowed with human resources:

- forecast tax revenues,
- analysis of tax expenditures,
- management of international taxation,
- risk management of tax non-compliance.

3.4 Outlook for the Evolution of the Tax System

The discovery of important oil reserves in Senegal in 2014 opens a new outlook for the tax system and fiscal policy. Proven reserves amount to 563 million barrels of oil and 1,300 billion cubic feet of gas. The beginning of hydrocarbon exploitation is planned for 2022 for a period of 30 years. The share of resources that will be drawn from hydrocarbons is estimated at around 5% of GDP per annum.

These new limited resources in size and time horizon do not make Senegal a "*country rich in natural resources*", the share of these resources in total tax revenue is estimated at 6% against at least 20% for countries responding to this qualification of the IMF.

The entry into the oil and gas era requires the adaptation of the public finance management framework. Therefore, it is of paramount importance of answering such crucial questions as the choice of the fiscal instrument for the taxation of natural resources (through *royalties on the value of production, rent tax*), the distribution of resources between consumption and savings, to ensure intergenerational equity. The experience of countries recognized for their good practices in this area (e.g., Norway, and Botswana) can inspire Senegalese public authorities. Among the measures that can be implemented to make better use of hydrocarbons and avoid the adverse effects of natural resources, there are:

- the adoption of new budget rules (tax floor, cap ceiling of the debt ratio, budget-target deficit, etc.);
- partial de-budgetization of (petrol and gas) resources through transfers to a sovereign wealth fund to allocate resources in favor of public investment;
- the establishment of a public finance supervisory committee responsible in particular for:
 - independent forecasting;
 - highlighting the government's choices regarding tax policy;
 - monitoring compliance with budgetary rules;
 - budget risk analysis;
 - promoting budget transparency and the sustainability of public finances.

4. Management and Quality of Public Expenditure

Senegalese public expenditures are subject to WAEMU budgetary rules, which set a ceiling on the wage bill, the stock of debt and the budget deficit, as a ratio of GDP, and a minimal threshold for investment financing from internal resources. The public expenditure management system, including government projects, has been substantially reformed (4.1). The quality of public expenditures has been assessed in the sectors on which information is available (4.2).

4.1 The Public Expenditure Quality Management System

A new planning system was setup in the late 1980s. It, by and large, revolved around the following items:

- bringing greater coherence between the national strategy and the sectoral policy letters;
- realizing feasibility studies for investment projects;
- estimating required costs, in terms of time allocation and financial resources to be devoted to investment;
- better supervision of enforcement procedures.

However, it has been widely acknowledged that the practice has moved far away from this road map (Issoufou et al., 2018). This was obvious from the following observations:

- the production of project sheets containing a summary description and a summary of costs in lieu of feasibility studies is still a reality;
- cost overruns and huge delays in project execution that raise budget credibility issues are still common practices;
- the lack of criteria for prioritization and eligibility of projects due to the fact that the selection committee which is supposed to formulate them is not operational.

Hence, growth remains vulnerable despite big observed performances in recent years.

On Thus, ex ante project studies are rarely carried out and ex post studies of major projects are not systematic. Even more worrisome, we are increasingly witnessing what is termed as "spontaneous offers", which means implementing public investment projects without subjecting them to the normal procedures of registration in the three-year investment program (PTIP). An evaluation of the quality and efficiency of public investments was conducted on a sample of 71 countries, including 40 low-income countries (Dabla-Norris et al., 2012). Senegal, which is part of the sample, has an overall score of 0.94 (out of 4), occupying the 61st place. The calculated overall index is broken down into four sub-indices: project preparation, selection, evaluation and implementation. With regard to evaluation, Senegal scored zero, which means that over the period under review, completed projects were not evaluated. In addition, the system does not make good use of public-private partnerships, because it lacks safeguards and a monitoring mechanism to manage the risks inherent in this type of financing (Taiclet et al., 2019).

Senegalese government spending, which main components are investment and wages, followed an upward trend from 23% to 29% of GDP between 2004 and 2014. The wage bill, which accounted for 40% of domestic revenues in 2014, is relatively higher than that of countries with comparable GDP per capita (Jalles and Mulas-Granados, 2018). Thus, it seems to crowd out non-wage spending and negatively affect the supply of public services. While the investment effort is commendable, a serious grievance one can have is related to the lack of maintenance of public infrastructure, even though no standard methodology for determining maintenance and major maintenance requirements exist in the literature (Taiclet et al., 2019).

Capital expenditures are usually highly associated with important recurrent costs, particularly in the primary and secondary sectors (Niang, 2016b). For instance, Tables 7 and 8 show that the gross fixed capital formation (GFCF) content of capital expenditures was only 25% and 37% for the secondary and primary sectors, respectively, over the period 2010-2015. The GFCF content of public investment for all sectors was approximately 54%.

Table 6. GFCF investment rate by sector (%)

Sectors	2010	2011	2012	2013	2014	2015	Average 2010-2015
Primary	38.5	33.1	39.7	45.0	44.7	20.5	36.9
Secondary	17.2	13.8	21.2	31.6	26.3	40.7	25.1
Tertiary	66.5	84.2	76.5	47.4	50.4	55.7	63.5
Quaternary	64.3	60.3	54.9	62.4	70.3	66.4	63.1

Source: Niang (2016b)

Table 7. Change in GFCF content of investment spending by all sectors (%)

2010	2011	2012	2013	2014	2015	Average 2010-2015
55.5	59.1	52.9	50.2	54.5	50.2	53.7

Source: Niang (2016b)

Public investments are also marked by their geographical concentration. The administrative region of Dakar region receives more than half of the infrastructures while it houses less than a quarter of the population (World Bank, 2012). Which is a serious issue when we consider the need of an equitable access to public services, which mostly from rural and disadvantaged population who are mostly excluded.

4.2 The Quality of Spending by Sectors

Government expenditures are mainly concentrated in the following sectors: education, health, infrastructures, agriculture and energy (World Bank, 2012). Due to data unavailability, we only assess the quality of public expenditures in the following sectors: education and health on the one hand and social protection on the other.

Education and Health

Education and health expenditures that contribute to human capital accumulation are among the priority expenditures and their share of total spending is relatively high. Education spending represents 6.8% and 8% of GDP for 2011 and 2014, respectively, and 26% of total expenditure in 2014. In 2014, it employed 93,000 people (60% of public employment), and represented 56% of government wage bill (Jalles and Mulas-Granados, 2018). Expenditures on education and health suffer from serious efficiency challenges. It has been shown that despite having one of the highest level of education expenditure, by comparison with comparator countries, the average number of years of education in Senegal is much lower than its comparators (Jalles and Mulas-Granados 2018). With a comparable level of education spending, Colombia, Morocco and South Africa achieve 11, 10 and 12 average years of schooling to their labor force, compared to only 7 for Senegal (World Bank, 2012). Another international comparison of expenditure spending efficiency (Petit and Jalles, 2018) leads to similar conclusions: despite its higher than average levels of spending, Senegal had lower indicators in terms of literacy, secondary school enrollment, and life expectancy.

The inefficiency of spending in the health and education sectors is partly due to the problem of mostly allocating resources to operating costs (especially wages) at the expense of investment and purely pedagogical activities in the case of education. Hence, in this latter sector, completion rates are particularly low, while the analysis of the coefficient of internal efficiency for the three levels of education (primary, middle and secondary) reveals that

nearly two-thirds of the resources allocated to education are wasted because of repetitions and dropouts (World Bank, 2012).

Level 1, 2 and 3 hospitals, which receive most of the public resources allocated to health facilities, face acute efficiency problems (Niang, 2016a). Over the period 2010-2013, the average efficiency score was 0, 849, that is to say that, on average, hospitals could, on average, improve their performance by at least 15% while keeping constant their levels of resources. Those among them which have the status of university hospital recorded very low scores (0.539) and could improve their performance by 46%.

Social Protection

Social protection brings together different support programs for vulnerable groups:

- social assistance (cash transfers, student grants, school canteens, nutrition program);
- emergency and shock response programs;
- social insurance programs (retirement pensions, health insurance).

Many programs aimed at improving the situation of disadvantaged segments of the population are either irrelevant in their design or are not well targeted. Thus, only one quarter of social protection expenditures (excluding social insurance) reach the poorest or food insecure populations (World Bank, 2017).

Agricultural subsidies: Subsidies to agricultural inputs and equipment have benefited mainly "large producers", which include politicians, marabouts and senior government officials (IPAR, 2015). According to the results of the IPAR survey, most of the poorest households in quintiles 1 and 2 did not receive subsidies (53% for quintile 1 and 56% for quintile 2). For the richest households, 52% of quintile 4, and 48% of quintile 5 received subsidies. In addition, the lack of an information system and the lack of transparency make it impossible to combat the trafficking of subsidized inputs to neighboring countries, thus squandering public resources.

The national family safety net program (programme de bourse de sécurité familiale) :

This program consists of a conditional cash transfer to the poorest households. Beneficiaries receive a lump-sum of 100,000 FCFA per year subject to the following conditions: i) enrollment and retention of children aged 6 to 12 years in school, ii) vaccination of children under 5, iii) registration of all children, iv) participation in awareness-raising sessions organized by the program. The number of beneficiaries has now reached 300,000 people. For that program, it seems that weak targeting is less an issue than the regularity of the disbursement of the funds to the beneficiaries, due to the lack of resources expected from technical and financial partners. On a related matter, the mechanism put in place to encourage beneficiary households to invest in the human capital of their children is not operational. Indeed the government has very limited leverage to monitor how these family meet their commitment to keep children at school, on which their eligibility was conditional.

Student scholarships: The higher education scholarship policy has not been designed to encourage excellence or some training or to enhance equity among students. Rather, it is universal in its scope (World Bank, 2017). Thus, the results of the ESPS II survey show that 70% of higher education scholarships benefit the two richest quintiles.

School canteens: this program suffers from the modesty of allocated resources. Indeed, the low amounts per beneficiary (2,419 FCFA for one of the components) does not allow the achievement of the objective of providing a meal per day and per student throughout the year. This program is doomed to failure if the necessary adjustments are not made.

4.3 Budget Reforms and Capacity Building

The main capacity building program dealing with public expenditures is supported by World Bank and German Cooperation (GIZ). This program is managed by the Ministry of Economics and Finance through the PCRBF (Programme de Coordination des Réformes de Finances Publiques). The main objective of this program is to improve credibility, transparency and responsibility in management and use of public resources. The specific objectives are :

- promoting the medium term expenditure framework,`
- developing and implementing a management strategy of public debt,
- improving budget execution process,
- improving information systems on public finance management,
- strengthening internal audit mechanisms,
- improving parliamentary control.

A convention has been signed between the Ministry of Economics and Finance and a high public school, ENA (Ecole Nationale d'Administration) to implement this capacity building program. This convention revolves around :

- 1) implementation by ENA of training activities in favor of targeted structures,
- 2) adaptation of training modules to the new WAEMU harmonized framework of public finance

Even though the target in terms of people trained has been reached the evaluation of the program reveals weak scores in several areas of transparency.

4.4 Outlook for Improving the Quality of Spending

Improving the quality of public spending will require the implementation of economic and social policy measures, particularly in the following areas:

streamlining current expenditures to allocate more resources to capital expenditures and increase the supply of public services;

improving the investment management system by better selecting the projects admitted to the three-year investment program (PTIP) and systematically carrying out the ex-ante and ex-post evaluation of public projects;

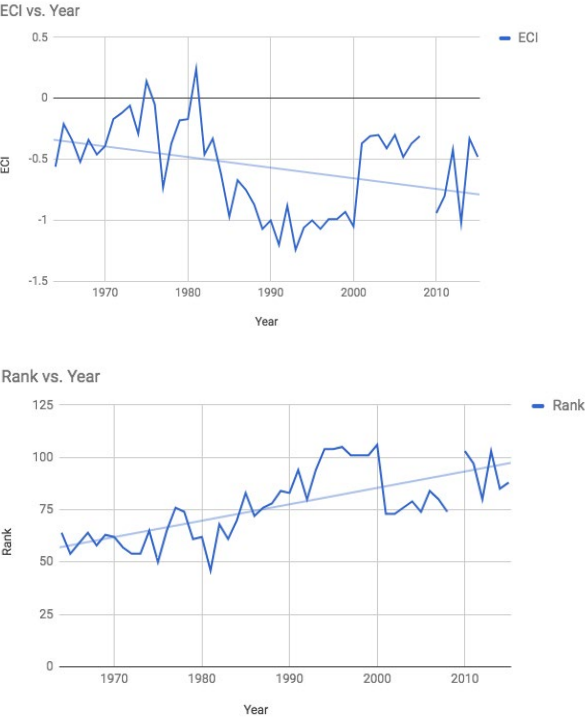
improving the targeting of support programs for vulnerable groups by using appropriate tools, such as using the universal national register which provides a better identification of the target population;

the partial disconnection from the state budget of resources generated by hydrocarbon deposits and their transfer to a sovereign fund subject to rigorous control.

5. Supply-Side Constraints to DRM

An increasing consensus has developed on the importance of output and export growth and diversification as a way to broaden the tax base, and improve collection. On the other hand, the relationship between DRM and GDP/export growth and structure also plays out the other way around : A well designed DRM system has huge potential to spur growth and export diversification. As in many African countries, growth in Senegal has been mostly jobless, being mainly driven by commodities with limited spill-overs on jobs, poverty and revenue collection. Senegal's exports have grown much more slowly than global trade or even African trade. Senegal's share of African exports has plummeted from about 3% to 0.5% between 1962 and 2014 despite the fact that Africa's share of world exports itself fell by about half over this period (Golub and Mbaye 2018). In addition, we observe a sharp decline in Senegal's declining complexity index (ECI) since the 1960s, with the country having steadily dropped in the ECI country ranking over time, as other countries raised their complexity while Senegal lagged, as can be seen in figure 3 below.

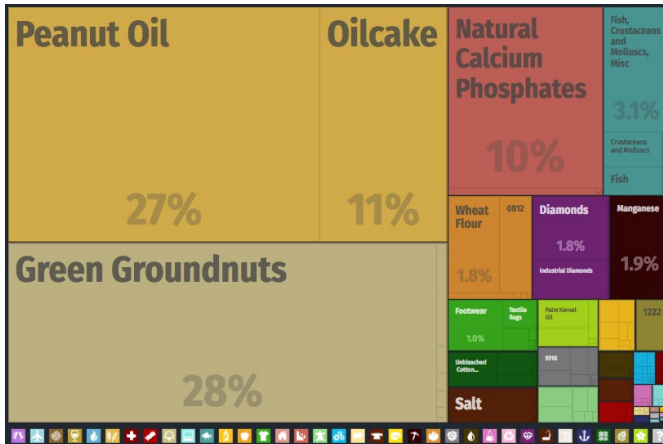
Figure 3. Senegal’s Economic Complexity Index (ECI) Score and Rank over Time



Source: Golub and Mbaye 2018

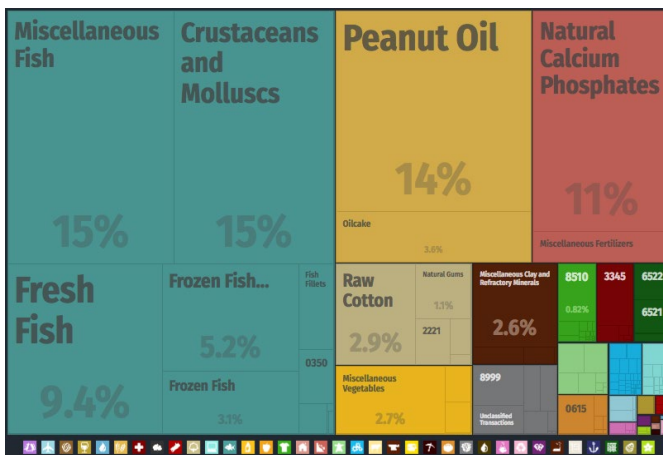
Overall, Senegal’s exports show very limited level of diversification since independence. In the 1960s, they were dominated by groundnut products including peanut oil, edible peanuts, and oilcake (Figure 4). While this sector remained important throughout the next 50 years, it is currently experiencing various challenging threatening its very existence. Other exports, including cocoa beans, coffee, and diamonds, are also characterized by low levels of complexity. By the mid-1960s phosphate mining and related chemical industries increased in importance, significantly outpacing traditional exports. In the 1980s, fishing experienced rapid growth in Senegal, and by the 90s, became the single most important export sector and continued to constitute 40-50% of all exports until the early 2000s (figure 5).

Figure 4. Senegalese export composition in 1966



Source: Golub and Mbaye 2018

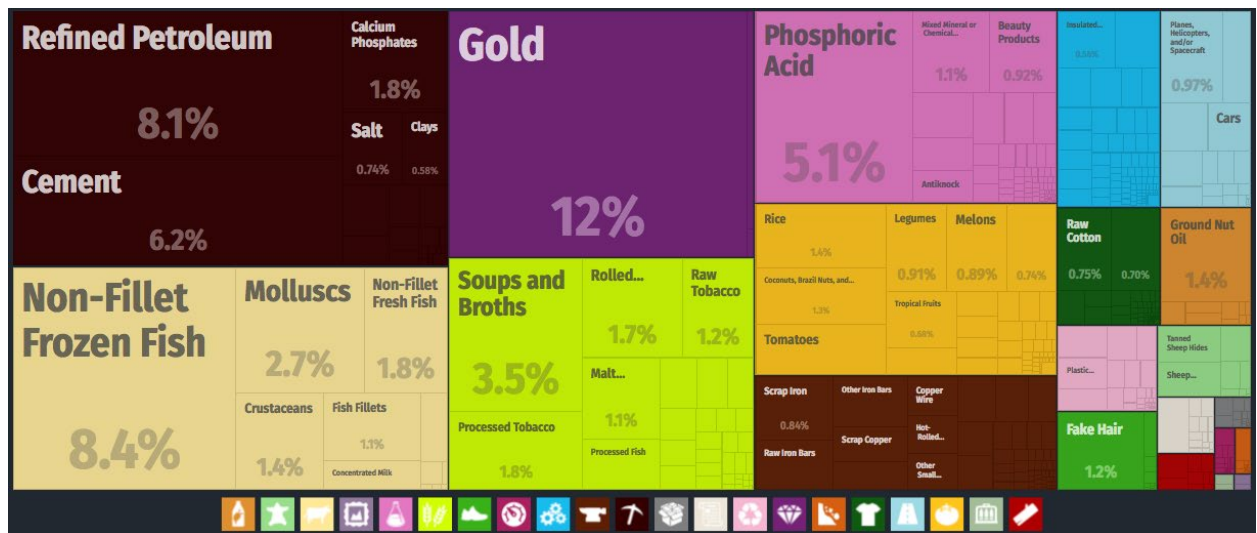
Figure 5. Senegalese export composition in 1993



Source: Golub and Mbaye 2018

In the mid-2000s the fishing sector started dwindling, as processed food, cotton, tobacco, cement, and gold started gaining momentum. And in the last decade, Senegal was able to further diversify its exports (figure 6), with gold, cement, hides, tobacco products, cotton, and various foods including nuts, legumes, vegetables, and food products. Meanwhile, Senegal continues to import a wide range of goods including machinery, electronics, fabrics and clothing, medicaments, rice, and other food products.

Figure 6. Current export composition (2014)



Source: Golub and Mbaye 2018

Despite substantial opportunities to expand its export baskets, most candidate industries which can play important roles to achieve this goal, like fishing, groundnuts, horticulture and clothing, face significant constraints, impeding their upgrading. Realize their growth and export potential, significant measures will need to be taken in order to address them. These include infrastructure service level of quality and costs, government failure to provide technical assistance to firms in meeting quality norms, or to sanction illegal behavior such as overfishing; and burdensome labor market regulations. Improving infrastructure and governance would boost competitiveness of existing firms and attract new foreign and domestic investors.

6. Conclusion and Policy Implications

The performance of the Senegalese tax system has improved over the last fifteen years. The ratio of tax revenues to GDP has exceeded the critical threshold of 15% but has been below 20%, and the recorded performances are lower than those of emerging countries. The collection of domestic resources is hindered by factors mainly related to:

- the political economy of tax reforms;
- tax expenditures that reach high levels;
- the quality of governance and the limited technical capacity of the tax administration;
- failures of the information system;
- the deficit in tax compliance and the supply of services that negatively affect the willingness to pay tax;
- high dependence on official development assistance.

The property tax is weakly collected and the tax potential is found to be underutilized. The gap of not collected tax resources was estimated at 10.8% of GDP. Government spending has grown rapidly, driven by payroll, investment, and interest on debt. The quality of the expenditure is low due to poor targeting and the questionable relevance of support programs for vulnerable groups.

Improving the state of public finances requires reforms to strengthen technical and institutional capacities and to adapt the management framework in view of Senegal's entry into the hydrocarbon era:

- setting up a public finance monitoring committee;
- adopting new budgetary rules consistent with WAEMU ones;
- increasing material and human resources of the tax administration and adoption of a new tax collection strategy: identification of different taxpayers through better cooperation between public services (water, electricity, telephone), increase in supply services to act positively on the willingness to pay tax;
- improving targeting mechanisms of support programs for vulnerable groups by using the single national register;
- implementation of a relevant capacity building program for government officials in charge of project evaluation, including in the Planning Directorate and in technical ministries,
- systematic ex-ante and ex-post evaluation of public investment projects.

With respect to taxing the informal sector, the government should establish a tax collection policy, accounting for the heterogeneous nature of the informal sector. A more forceful policy should be implemented with regard to large informal businesses, while at the same time supporting smaller ones to grow. This support should be developed with a view to strengthening worker training and business service programs, so as to improve the capacity of vulnerable participants and should not aim at formalizing or taxing them. To limit the scope of tax evasion, the government should strive to address fraudulent behaviors both within the large informal sector and the formal sector.

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Appendix I. Estimation Results of the Tax Potential

This study makes use of the stochastic frontier method. The log-linear specification of the stochastic frontier function is as follows:

$$\log(Y_{it}) = \beta_0 + \sum \beta_i \log(X_{it}) + v_{it} - u_{it} \quad (1)$$

with:

Y_i : tax revenues as a percentage of GDP

X_i : vector of explanatory variables of the revenue lines

v_{it} : the random error term

u_{it} : inefficiency term

Considered types of taxes involve:

- corporate tax;
- personal income tax;
- domestic VAT;
- import duties and VAT on imports.

For the corporate income tax line, we consider non-agricultural GDP, as tax base. Personal income tax is explained by disposable income. Final consumption of households is considered as the base for the domestic VAT. Import duties and import VAT are estimated from imports of goods and services. In addition, we also include variables related to the overall economic environment, and which are likely to influence the tax potential and the tax effort. Those are related to : the share of agriculture in GDP, the level of corruption, the size of informal GDP, and the share of manufacturing in GDP.

Stochastic Efficiency Frontier Estimation Results

Dependent variable: Tax revenue collection (1997-2017)		
<i>Explanatory variables</i>	<i>Coefficients</i>	<i>P-value</i>
Tax base	0.338***	0.000
Informal GDP	-0.032*	0.087
Agricultural GDP	-0.238*	0.086
Manufacturing industry	0.254***	0.005

Index of Corruption	-0.773	0.286
Likelihood ratio test	23.16	

Note: ***, **, *: Significant at 1%, 5% and 10%, respectively. The overall significance of the model is tested by the likelihood ratio test.

The value of the likelihood ratio test (23.16) indicates that the estimated equation is overall significant. The coefficient of the tax base is positive (0.338) and statistically significant at the 1% level of significance. The tax lines considered in the model (domestic VAT, income tax, corporation tax, import duties and import VAT) have a positive impact on the level of tax revenue collection. Moreover, the level of tax collection is positively influenced by the chosen tax base. This result is consistent with the assumptions of the tax potential.

The coefficient of the share of the informal sector in GDP as well as that of the share of agricultural GDP are negative as expected, at the significance level of 10%. This result means that these two sectors, both characterized by the inexistence of sincere accounting and the difficulty of tax collection are pulling down tax performance.

The coefficient associated with the manufacturing sector is positive (0.254) and statistically significant at the 1% level. In other words, the development of this sector has a positive effect on the performance of the tax system. However, the coefficient associated with the level of corruption, despite having the expected sign (negative), is not statistically significant. This could be explained by the quality of the indicator used as proxy of the level of corruption (corruption index published by the World Bank).

A. Estimation of the panel data model

True fixed-effects model (truncated-normal)		Number of obs =		84		
Group variable: id		Number of groups =		4		
Time variable: annee		Obs per group: min =		21		
		avg =		21.0		
		max =		21		
		Prob > chi2 =		0.0000		
Log pseudolikelihood = -59.9442		Wald chi2(4) =		12021.80		
(Std. Err. adjusted for 4 clusters in id)						
recette	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf. Interval]	
Frontier						
assiette_f	.3389011	.0150244	22.56	0.000	.3094538	.3683484
pib_infor	-.0323998	.0304063	-1.07	0.087	-.0771955	.091995
pib_agri	-.2383009	.1386649	-1.72	0.086	-.5100791	.0334774
indus_manu	.2544314	.0898218	2.83	0.005	.078384	.4304788
ip_corrup	-.7731228	.4502962	-1.72	0.286	-1.655687	.1094416
Mu						
recette	-1.030005	.0821096	-12.54	0.000	-1.190937	-.8690734
assiette_f	.3616643	.	.	.	.	.
iq_regle	-1.760007	1.059196	-1.66	0.097	-3.835994	.31598
indus_manu	.3364166	.	.	.	.	.
Usigma						
_cons	-3.61106	.	.	.	.	.
Vsigma						
_cons	-3.425515	.	.	.	.	.
sigma_u	.1643873	.	.	.	.	.
sigma_v	.1803678	.	.	.	.	.

B. Margins of improvement of tax revenues by year (% GDP)

Years	Corporate tax	Income tax	Internal VAT	Import duties and import VAT	Total tax base
1997	2.536	3.136	3.245	2.152	11.069
1998	2.588	3.188	3.297	2.193	11.267
1999	2.485	3.085	3.164	2.101	10.835
2000	2.558	3.158	3.237	2.185	11.137
2001	2.603	3.203	3.302	2.215	11.322
2002	2.544	3.144	3.245	2.129	11.062
2003	2.515	3.115	3.193	2.108	10.931
2004	2.435	3.035	3.109	2.028	10.606
2005	2.488	3.088	3.174	2.096	10.846
2006	2.296	2.896	2.986	1.907	10.085
2007	2.255	2.855	2.931	1.897	9.938
2008	2.454	3.054	3.200	2.106	10.813
2009	2.531	3.131	3.290	2.029	10.981
2010	2.494	3.094	3.227	1.966	10.781
2011	2.464	3.064	3.139	1.958	10.624
2012	2.641	3.241	3.319	2.155	11.356
2013	2.530	3.130	3.230	2.074	10.964
2014	2.554	3.154	3.269	2.064	11.041
2015	2.552	3.152	2.951	2.169	10.825
2016	2.546	3.146	2.930	2.116	10.739
2017	2.485	3.085	2.901	2.049	10.519

Average	2.503	3.103	3.159	2.081	10.845
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