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The Effects of Fiscal Policy on Inequality and Poverty in Senegal♦

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Abstract

This paper applies a comprehensive tax-benefit incidence analysis to estimate the distributional effects of fiscal policy in Senegal in 2015. With a poverty rate still well above 40 percent, the challenge for policy makers is to accelerate and sustain growth while making it more inclusive. The role of fiscal policy and social spending in this respect can be key. The overall effect of the system on poverty and inequality is positive as it is both equalizing and poverty reducing: the net effect of Senegal's tax/transfer system leaves fewer individuals impoverished relative to the number of fiscal gainers, and the magnitude of monetary fiscal gains is significantly higher than that of fiscal impoverishment. Nevertheless, the poverty reducing impact of the system is small, as the amounts redistributed are marginal, even compared internationally. Therefore, three policy-relevant results emerged, highlighting important pathways for reforms. First, while taxation is very progressive and equalizing, the burden of it almost entirely falls on the top decile, generating equity concerns as currently a big chunk of the non-poor (from 5th to 9th decile) is benefitting from transfers but not contributing to revenues. Second, while basic education expenditure is equalizing, its distribution is not pro-poor, which is particularly concerning considering the very low literacy and enrolment levels as well as the high returns on primary education. Finally, direct transfers programs are both equalizing and poverty reducing, however their impact can be significantly increased by improving targeting and reallocating resources from less poverty–reducing measures, such as indirect subsidies to electricity.

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1. Introduction

As a result of its prolonged weak economic growth, monetary poverty in Senegal remains high, while inequality stagnates. GDP growth in Senegal has been relatively low until the mid-90s, and rather volatile thereafter. As a result, in 2014 the level of per capita GDP was the same as at independence. Furthermore, as a consequence of the weak long term growth performance compounded by the high population growth, poverty in the country was still high in 2011, at 47 percent [1], while still 14 percent of the population couldn't feed themselves properly. Inequality was also relatively high, with a Gini index of 0.40, implying that the top 10 percent of the distribution controls more than five times the wealth of the bottom 10 percent. Interestingly, while poverty was reduced significantly between 2001 and 2005 thanks for growth in poverty-reducing sectors (such as agriculture) among other factors, inequality has stagnated since 2001.

Progress in non-monetary dimensions of welfare has been uneven, underscoring the importance of pro-poor social spending to trigger inclusive growth. While the situation has generally improved since the 2000s, such as in access to water and electricity, in other areas it is still lagging behind. Particularly worrisome is the weak and inequitable education system, as the country still displays some of the worst results in terms of access in Sub-Saharan Africa (SSA) with a net primary enrolment stagnating slightly above 60 percent and gross primary enrolment increasing slightly to 83.9 in 2014 (compared to 98.4 and 104.9 percent respectively in SSA and Lower Middle Income Countries)[2]. The very low adult literacy rate and the limited progress made to increase the size and quality of the human capital of the youth compounded by poor labor market dynamics, prevent the country from leveraging its emerging demographic dividend, on the one hand, and triggering inclusive growth on the other. Another area that is lagging behind relates to the health sector, despite relatively good internationally monitored indicators, access to health services remains problematic for the poor and vulnerable, including women, the main obstacles being the cost of health care and the lack of transport, pointing to supply side constraints.

Only faster and more inclusive economic growth can significantly reduce poverty by 2030, and fiscal policy can be a key contributor to this goal. For the first time since 2003, the Senegalese economy expanded faster than 6 percent in both 2015 and 2016, owing to low oil prices, favorable climate conditions as well as incipient structural improvements resulting in increase in productivity. Growth alone, however, will not be enough to make a dent on poverty. Simulations indicate that an annual real growth of at least 4.6 percent in mean consumption for the bottom 40 percent would be necessary to eradicate poverty, as measured by the 1.90 USD / a day[3]. This implies that the trend started in 2015 has to be sustained, while growth drivers need to become pro-poor. The fiscal system can help to make progress in this sense, typically through the right mix of pro-growth measures and redistribution via taxation and social expenditures.

To address Senegal's economic and social challenges, in 2014 the Government has launched a new development plan, the Emerging Senegal Plan (Plan Senegal Emergent, in French). The first phase of the new plan, implemented between 2014 and 2018, has the goal of reaching a growth rate of 8 percent by 2018 and making of the country an emerging economy

[1] 38 percent when measured with the international poverty line of 1.9USD (2011 PPP).
[2] World Bank, World Development Indicators 2015.
[3] Systemic Country Diagnostics for Senegal. Concept note, May 2016, The World Bank.

by 2035. In order to achieve this objective, a five-year Action Plan has been developed, focused on three priority areas: i. structural transformation; ii. wellbeing improvements and inequality reduction, and iii. good governance, peace and security. Besides investments in energy and transport infrastructure and agriculture, the action plan contains priority interventions in the domain of education (10.9 percent of total budget), with the strengthening of tertiary education and Technical and Vocational Training (TVET), as well as basic education; health (5.3 percent of the budget), with the strengthening of the quality of the service provided in Dakar to make of the city a medical hub in the country and region; and social protection (less than 2 percent), with the creation and scaling up of the national Conditional Cash Transfer *Program of Bourses Familiales* and the launch of the universal health coverage initiative (*Couverture Maladie Universelle*), both aiming at providing safety nets to the most vulnerable. While the current action plan is under evaluation, the new one will be elaborated in 2018 and will cover the period for 2019-2023.

This study makes use of a comprehensive tax-benefit incidence analysis to estimate the effects of selected public social spending and tax interventions on poverty and inequality in Senegal. The system as it existed in 2015 was simulated using administrative records for the same year, applied on household-level data from 2011. The choice of the year was dictated by the availability of administrative records, while the 2011 survey is the latest poverty survey available for the country. Specifically, the analysis assesses the concentration and, when relevant, the incidence of several selected fiscal instruments in Senegal —including direct and indirect taxes, contributory pensions, direct social transfers, indirect social subsidies, and in-kind government social transfers in the form of health and education— to address the following five questions: First of all, does the fiscal system in Senegal reduce poverty and inequality? More specifically, who bears the burden of taxes? O the expenditure side, are transfers and subsidies poverty and inequality reducing? In particular, who receives the benefits? And finally, how does Senegal compared to other countries? While it was possible to include in the analysis more than 50 percent of total revenue, only 25 percent of expenditure were included: although this risks providing an unbalanced picture of the effect of the fiscal system, it is important to note that all social expenditures are included, which are those that are meant to have the biggest equalizing and poverty reducing effect.

This paper contributes to the empirical fiscal incidence literature and policy debate in Senegal in four important ways. First, it applies the Commitment for Equity methodology which is standardized, allowing the results to be compared across countries and to benchmark Senegal's redistributive performance with peer and aspirational countries. Secondly, such comprehensive analysis had never been conducted in the case of Senegal, including the computation of innovative measures related to income-based poverty and inequality, such as "fiscal impoverishment" (Higgins and Lustig, 2016), "marginal contributions" to poverty and inequality (Enami, Lustig and Aranda, 2017) and "poverty reducing efficiency" indicators. Finally, the paper present relevant results in a moment in time when the government can strategically make use of them, as the evaluation of the current Action Plan is ongoing while the preparation of the next one will start shortly. Such results include evidence on the unequal burden of taxation on the top decile, the non-pro-poor distribution of education expenditure, and the limited effect of agricultural subsidies on poverty when compared to more efficient measures to redistribute wealth and reduce poverty, such as conditional cash transfers.

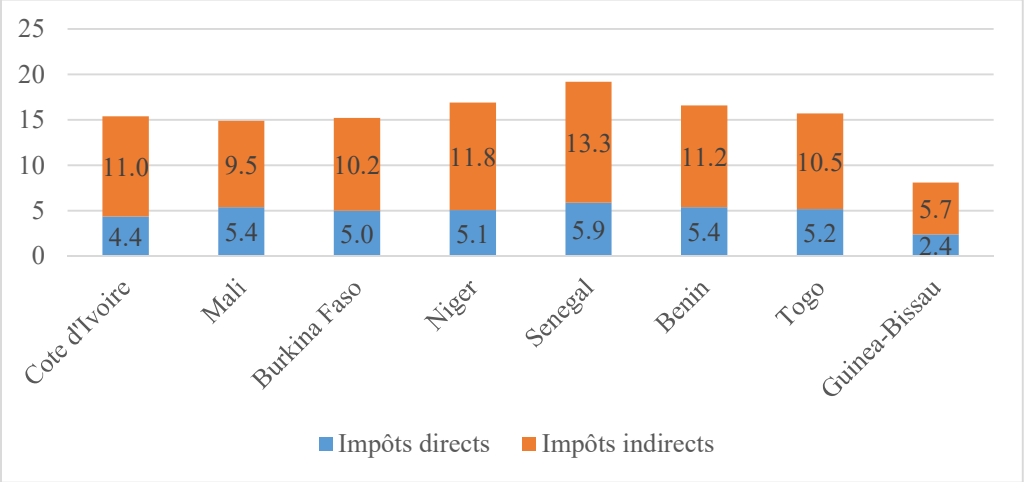
The remaining part of this paper is structured as follows. Section 2 provides a brief description of Senegal's tax systems and social spending and the main interventions included in the incidence analysis. Section 3 describes the data sources exploited, the methodology, and the assumptions made in estimating the benefits received and the taxes paid by individuals. Section 4 presents the main results and, finally, the concluding remarks are presented in Section 5.

2. Taxes and Social Expending in Senegal

In this section, we describe the main features of tax policy and social expenditure in Senegal, including the interventions comprised in the analysis. On one hand, based on the information available, the taxes analysed in the study are equivalent to 53 percent of total public revenues (see Table 1). On the other hand, the social expenditure including the public expenditure on health, education, social protection, direct transfers and indirect subsidies, including agriculture and electricity subsidies, represents close to one quarter of the total budgetary expenditure (see Table 2).

Most of the tax revenue comes from indirect taxes, which are dominated by the Value Added Tax and import taxes. In 2015, the year for which the incidence analysis is carried out, indirect taxation represented the biggest share of revenue collection in Senegal (70 percent) against 30 percent of direct taxes, reflecting a common situation in Sub-Saharan Africa as illustrated in Figure 1 below. Within indirect taxes, the Value-Added Tax (VAT) is the most important, accounting for close to 40 percent of tax revenue. This tax has a general statutory rate of 18 percent, a reduced rate of 10 percent for selected products and sectors, and important groups of exempted goods. One important feature of the Senegalese tax system is that it is still reliant on import taxes, representing 20 percent of the total tax collection and ranking second after the VAT. The collection of import taxes has been reducing since 1997, when they represented more than 30 percent of tax revenues. Finally, within indirect taxes, there are several excises on consumption goods, like tea, coffee, tobacco, spirits, beverages, oil products, vegetable oil, which collectively capture less revenue than import taxes.

Figure 1: Composition of fiscal revenue for Senegal and WAEMU countries (in percentage of GDP)



Source: Administrative record for Senegal and IMF Article four statistical Annexes.

Although increasing in recent years, direct taxes are still marginal in total revenue. The share of personal income tax represented 15 percent of total revenue in 2015 and has been increasing since 2000, partially because of a better performance in its collection compared to other taxes. In Senegal, the personal income tax is collected following different regimes, depending on the income source: land revenue, capital income, profits of commerce and industry, agricultural and professional benefits as well as income from wages, pensions, and others. On the other hand, corporate income tax, which has similar regimes as personal income tax, is less important in terms of revenue collection (7 percent of total revenue). According to the IMF (2017), the relatively high statutory rates combined with high tax expenditures have introduced not only unfair treatment of different taxpayers but they have also resulted in a poor performance of income tax collection, with limited controls over its narrow tax base. Finally, tax on property and payroll taxes are less significant than income tax.

The tax base for social security is also narrow, pointing to the existence of a small, privileged group of citizens with access to health care and pensions. Social security, that has three different regimes in Senegal, collects close to 1percent of GDP. These regimes include the *Caisse de Sécurité Sociale* (CSS), which is the social security fund providing health insurance to formal private sector employees, the Pension Institute of Senegal (IPRES), which is an old-age pension scheme for private companies' workers, and the National Pension Fund (FNR), which is the pension scheme for civil servants. Despite the relatively high rates of social contributions, the tax base is narrow, as for income tax, due to the very small size of the private formal sector and public administration.

Table 1: Structure of Senegal's government revenues, 2015

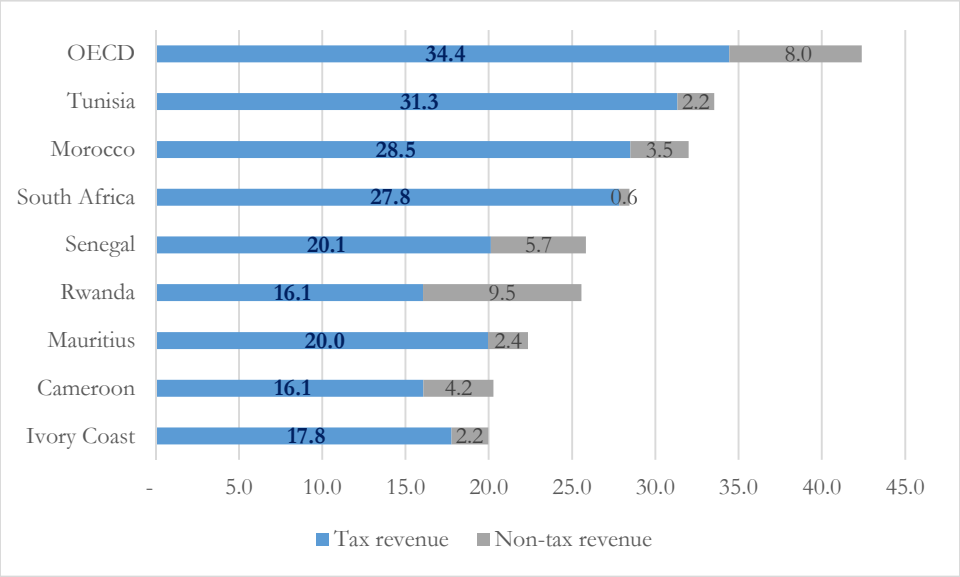
Taxes	Included in Analysis	2015Millions CFA	percentage of total	percentage of GDP	Allocation method
Total Revenue		**2,026.0**	**100 %**	**21.0**	
Taxes		**1,602.1**	**79 %**	**19.6**	
Direct Taxes		455.7	22 %	5.4	
Personal Income Tax	Yes	257.9	13 %	3.2	Simulation
Payroll Tax	Yes	20.3	1 %	0.3	Simulation
Corporate Income Tax	No	147.2	7 %	1.8	-
Other Direct Taxes	No	30.3	1 %	0.4	-
VAT and Other Indirect Taxes		1,142.3	56 %	14.1	Simulation
VAT	Yes	617.0	30 %	7.6	Simulation
Excises on Alcoholic Beverages	Yes	9.3	0 %	0.1	Simulation
Excises on Non-Alcoholic Beverages	Yes	0.9	0 %	0.0	Simulation
Excises on Tobacco	Yes	22.9	1 %	0.3	Simulation
Excises on Oil Derivates	Yes	61.5	3 %	0.8	Simulation
Excises on Fatty Foods	Yes	2.4	0 %	0.0	Simulation
Excises on Comestic Products	Yes	2.5	0 %	0.0	Simulation
Tax on Financial Activities	No	47.7	2 %	0.6	-
Import Taxes	No	297.0	15 %	3.7	-
Royalty on Telecomunications	Yes	20.2	1 %	0.3	Simulation
Other Indirect Taxes	No	81.1	4 %	1.0	-
Other Taxes	No	4.1	0 %	0.1	-
Contributions to social security	Yes	81		1.0	Imputation
TOTAL	Part	2,026.0		21.0	

Source: Author's elaboration based on the 2015 revenues provided by the Ministry of Finance.

Compared to other countries, the tax burden of Senegal is close to the average of Latin American and the Caribbean countries (21.7 percent of GDP), but is far from OECD countries mean (34.4 percent). Using comparable figures, Senegal's tax GDP ratio ranks midway when compared with African countries included in an OECD (2016) study (see Figure 2). This report classifies countries in two groups: one between 16 percent and 20 percent of GDP, where Senegal was included, and the rest with higher taxation, with around 28-31 percent

of GDP[4]. However, the ongoing GDP rebasing exercise generated an increase by 30 percent in GDP and a consequent decrease in the revenue-to-GDP ratio to 16 percent, much more in line with other Sub-Saharan countries[5].

Figure 2: International benchmarking of Government Revenues, percentage of GDP (2014)



Source: OECD (2016)

Social spending is quite limited in total public expenditure, and is dominated by education spending. On the expenditure side, public social spending, which corresponds to the sum of social protection, education, and health, as defined by the CEQ methodology[6], accounted for almost 7 percent of the country's GDP and only 23 percent of total expenditures in 2015 (**Error! Reference source not found.**). While social assistance only accounts for 3 percent of social expenditure (0.2 percent of GDP), indirect social transfers represent 97 percent, education alone representing 82 percent of the total (and almost 7 percent of GDP). If we

[4] In the first group of countries are Cameroon, Ivory Coast, Mauritius and Rwanda. In the second group include South Africa, Tunisia and Morocco.
[5] In 2017 the National Agency for statistics conducted a rebasing exercise for GDP, change the base year from 1994 to 2014. The exercise included the addition of new economic sectors and other methodological changes. All the modifications resulted in an increase of GDP of 30 percent. New GDP numbers are only preliminary and will become final in 2019.
[6] See other studies and methodology in www.commitmentoequity.org.

include also subsidies, the spending included in this study accounts for 25 percent of total expenditure and just over 7 percent of GDP. The inclusion or exclusion of specific interventions falling within the range of those included under the CEQ methodology mostly relates to administrative data availability.

Table 2: Structure of Senegal's government spending, 2015

Expenditure	Included in the analysis	2015Millions CFA	percentage of total expenditure	percentage of GDP	Allocation Method
Total Expenditure (Dépenses totales et prêts (net))		2,413	100%	29.3%	
Social Spending		**561**	**23.23%**	**6.8%**	
Social Assistance *of which*		**16**	**0.67%**	**0.2%**	
Conditional or Unconditional Cash Transfers		15	0.62%	0.2%	
Programme National de Bourses de Sécurité Familiale	Yes	15	0.62%	0.2%	Simulation
Non-contributory Pensions	No		0.00%	0.0%	
Near Cash Transfers		1	0.06%	0.0%	
Cantines scolaires	Yes	0.75	0.03%	0.0%	Simulation
Contribution to CMU	Yes	0.608	0.03%	0.0%	Simulation
Transfers in-kind		**544**	**22.56%**	**6.6%**	
Education *of which*	Yes	457	18.93%	5.5%	
Pre-school	Yes	0.582	0.02%	0.0%	Imputation
Primary Secondary	Yes	335	13.86%	4.1%	Imputation
Tertiary	Yes	122	5.04%	1.5%	Imputation
Health *of which*	Yes	88	3.63%	1.1%	
General Health	Yes	81	3.36%	1.0%	Imputation
CMU Programs	Yes	**7**	0.27%	0.1%	Simulation
Enfants de moins de 5 ans	Yes	3	0.12%	0.0%	Simulation
Césariennes	Yes	0.969	0.04%	0.0%	Simulation
Personnes âgées de 60 ans et plus (Plan Sésame)	Yes	1	0.05%	0.0%	Simulation
Other CMU expenditure	Yes	1	0.05%	0.0%	Simulation
Subsidies *of which*		**51**	**2.12%**	**0.6%**	
Electricity	Yes	15	0.62%	0.2%	Simulation
On Inputs for Agriculture	Yes	36	1.50%	0.4%	Imputation

Source: Author's elaboration based on the 2015 executed budget provided by the Ministry of Finance, Education, and Health.
Notes: The figures shown do not necessarily coincide with those published by multilateral organizations due to differences in concepts and definitions. It is important to note that in 2015 the subsidy to electricity was zero. For simulation purposes, the most recent figure available was used and this was for 2013.

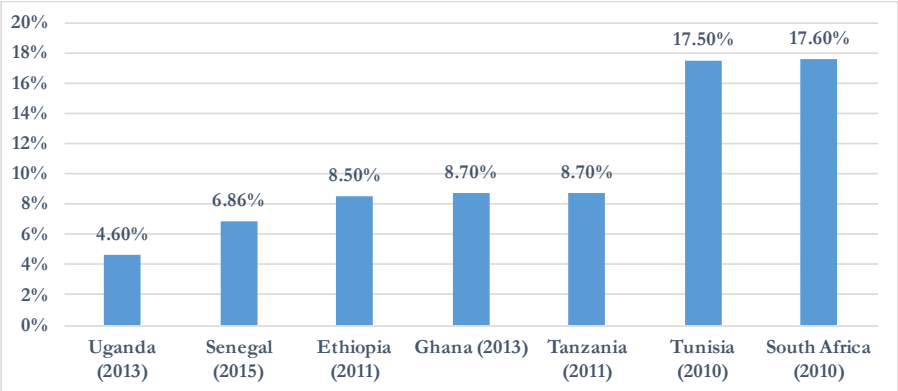
Social protection, which includes the main cash and near cash transfers of Senegal, accounts for only 0.2 percent of the national budget. The most important conditional cash transfer program of the Country is the *Programme National de Bourses de Sécurité Familiale* (PNBSF) and represents 0.6 percent of the total government expenditure. This program was launched in 2014 and provides vulnerable families with 100,000 FCFA per year (close to 170 USD) to strengthen their livelihoods. The conditionality is meant to provide an incentive to keep children in school, hence strengthening households' human capital, while parallel specific, productivity enhancing activities aim at increasing the earning capacity of the poor. *Cantine Scolaire,* the

national school feeding program for combating malnutrition and the subsidised contribution to the Universal Health Insurance (*Couverture Maladie Universelle* - CMU) launched in 2015, both account for 0.03 percent of total expenditure and 0.01 percent of GDP. Individuals should be required to pay 7,000 CFA annually (approximately 11 US dollars) to be affiliated to the CMU, but this contribution is subsidized by 50 or 100 percent, depending on whether the individual is an informal worker or is a beneficiary of the PNBSF, respectively.

Transfers in-kind are the biggest share of social spending, representing almost 23 percent of the total public spending. Within this category of expenditure, education is the most important in terms of size, accounting for 19 percent of total expenditure, in comparison with 4 percent for health. In relative terms, subsidies gather a considerable share of the budget, representing almost 2 percent of public spending and 0.6 percent of GDP, equal to three times the share of social assistance. The electricity sector receives a supply-side subsidy, covering the share of the total costs of the utility (Senelec) that cannot be covered by the revenues of the company due to the regulated tariff structure. Hence, the amount of this compensation is determined by international oil prices and the differential between the cost of electricity production including a reasonable mark-up and its regulated price. Agriculture has been subsidized since the colonial period and continues to receive important support from public policies, including through demand-side subsidies. These subsidies, accounting for two thirds of total subsidies, are directed primarily towards the purchase of seeds, fertilizers and agricultural equipment by producers.

Social spending in terms of GDP is lower in Senegal, when compared with peer countries in Africa. The standardized CEQ methodology allows for international comparisons across the world or across regions. When compared with other African countries where a CEQ study has been conducted (Ethiopia, Ghana, South Africa, Tanzania, Tunisia and Uganda), at 6.9 percent Senegal's social expenditure to GDP is lower than the average (8.6 percent). This average is influenced by South Africa and Tunisia, where social spending is 17.5 percent of GDP or above. If those countries were to be excluded from the benchmarking, the average would be closer to Senegal (see Figure 3).

Figure 3: Social expenditure in CEQ African countries



Source: Ethiopia: Hill et al., forthcoming; Ghana: Younger et al., 2015; Uganda: Jellema et al., 2016; South Africa: Inchauste et al., 2016; Tanzania: Younger et al., 2016; Tunisia: Shimeles et all., 2016.

Data shown here is administrative data as reported by the studies cited and the number not necessarily coincide with the IADB bases (or other multilateral organization).

The evaluation of the effect of the fiscal system on poverty and inequality may potentially be biased by the fact that not all expenditure nor revenues are included in the exercise. As mentioned above, the study was able to cover 53 percent of revenue but only 25 percent of expenditure (due to the small share of social expenditure in total budget as well as data availability), which could lead to a lop-sided view of the effects of policies, as the overall effect on poverty and inequality may reflect most of the tax burden but not all of the benefits. Still, all social expenditures (as defined by the CEQ methodology) are included in the study, and these are the expenditures that, among all, are the most likely to have an equalizing and poverty reducing effect.

3. Data and Methodology

3.1 Data sources

The simulations produced in this study have been conducted based on the latest available household poverty survey. The main source of information for this study is the Poverty Monitoring Survey 2011 (ESPS - *Enquête de Suivi de la Pauvreté au Sénégal*- by its name in French). This survey was collected by the National Agency for Statistics and Demographics (ANSD, *Agence Nationale de Statique et de la Démographie*) between August and November 2011 and covered 20,250 households. However, the complete questionnaire including the consumption module was applied to only 5,953 households (including 55,017 individuals). ESPS contains, among others, data on income, expenditures, auto-consumption, and the use of educational and health services. It is representative at national and regional levels, Dakar, Other cities, and rural areas. Finally, administrative data were obtained from Ministry of Economy, Finance and Planning, and the sectorial ministries of Basic and Higher Education, Health and Social Protection.

The simulations reproduce the fiscal system as it was in 2015, the most recent year in terms of availability of administrative data. As the objective of this study was to assess the effect of the current fiscal system on poverty and inequality, we used data on expenditure and transfers from the 2015 executed budget, the latest available at the time of writing, while on the tax side we used statutory rates for the year 2015. We then used the same methodology as Aristy, et.al. (2015) to apply the tax and expenditure structure of 2015 to the 2011 ESPS household survey. Only in the case of electricity we used administrative records from 2013, as in 2015 there were no electricity subsidies due to the low international oil prices.

Senegal in 2011 was different from Senegal in 2015 in many aspects such as population, prices, expenditure, tax regulations, social programs that were in place, and consumption patterns, among others. These differences bring methodological challenges for allocating fiscal interventions based on administrative data of 2015 into the household survey of 2011. While the explanation of how these challenges were addressed for allocating each fiscal intervention appears in detail in the following section, the main methodological adaptations included:

- *Population difference*: the number of beneficiaries of programs were expressed in percentage of the population in 2015, and the same share was applied to 2011 data
- *Price difference*: spending in 2015 was adjusted to 2011 prices
- *Social programs coverage*: The most recent programs including the CCT *Programme national de bourses de sécurité familiale* (2014) and the subsidy to the contribution for the *Couverture Maladie Universelle (2015)*, were added to total consumption from 2011 to construct the 2015 equivalent disposable income;
- *Consumption structure differences*: it was assumed to be unchanged between 2011 and 2015.

3.2 CEQ Methodology

The fiscal incidence analysis conducted in this study follows the standard CEQ methodology. This methodology, described in Lustig & Higgins (2013) and Lustig, ed. (2017), consists of constructing income concepts allocating, in a methodologically sound way, taxes, social contributions, subsidies and public social spending to individuals included in the household survey. Thus, income and income-based measures of wellbeing can be compared before and after taxes and public transfers.

The CEQ methodology allows to have a more complete picture of the effect on poverty and inequality of the fiscal system, intended as revenue and expenditures, as well as of specific fiscal or social interventions or reforms. Additionally, since this methodology has been successfully implemented by a large number of countries, cross country comparisons can also be conducted. As with every methodology, it is important to point out that this one as well has its limitations: first, as mentioned before, not all interventions are included in the analysis because of methodological constraints[7] or because of lack of data; second, the analysis does not include long-term effects as it does not consider changes in people's behavior. The technical note in the Box n.1 describes the main limitations.

Box 1: Methodological limitations

The CEQ methodology does not incorporate behavioral or general equilibrium effects. It is a first-order approximation that measures the average incidence of fiscal interventions. However, it is important to note that the economic incidence assumptions, such as the question of who bears the burden of taxes, are based on general equilibrium theory. Additionally, it is point-in-time rather than lifecycle which limits the ability to capture the long-term effects of fiscal policy on welfare indicators (Lustig, ed. 2017).

In the case of Senegal, household consumption is used as a proxy of disposable income. According to Higgins and Lustig (2017), if the household survey only includes consumption data, it is assumed that consumption equals disposable income. The valuation of consumption

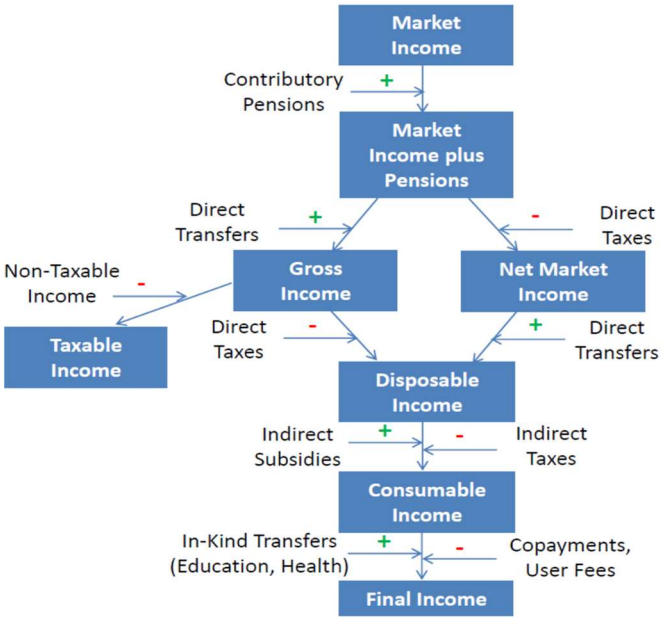
[7] For instance, the effect of public investments in public goods such as public infrastructure is not included in the analysis, nor is corporate taxation. Methodological research on these topics is currently ongoing to find the best way to study these specific dimensions.

is more reliable than income in the ESPS 2011 survey, as is often the case in countries where informality is high and auto consumption is important. Therefore, our starting point for the construction of the income concepts is disposable income. It is important to note that among the direct transfers included in the present analysis only the school feeding program, *cantines scolaires,* was already implemented in 2011 (the year of the survey), therefore households' consumption from the survey was raised for the simulated beneficiaries by the other two direct transfers --PNBSF and subsidy to CMU contributions.

The analysis presented here consider contributory pensions as deferred income. Contributory pensions of a pay-as-you-go system have a special treatment in the CEQ Methodology since there is no agreement in the fiscal incidence literature. Contributory pensions can be treated either as a government transfer, or as deferred income —i.e., treated as part of the market income pensions. Please note that for simplicity, we refer to "market income plus pensions" as "market income", i.e. every time we refer to market income implies that the contributory pensions are considered in that income.

In order to construct market income and net market income, a "reverse engineering" process from disposable income is implemented. Direct transfers are simulated and deducted from disposable income in order to obtain net market income. Then direct taxes and social contributions are simulated based on fiscal rules and added to net market income in order to obtain market income. Consumable income, equals disposable income minus indirect taxes plus subsidies. Finally, in-kind transfers, education and health, are added to consumable income to arrive at final income (Figure 4).

Figure 4: Scheme of CEQ Income Concepts



Source: Lustig & Higgins (2013)

3.2.1 Methods of allocations

The CEQ methodology allows for different methods for allocating benefits, taxes and social security contributions to the household survey. The main methods include: i) *Direct identification*, which is used when the survey reports who receives the benefit (or who are the taxpayers) and the amount received (or paid); ii) *Imputation*, which is used when the survey reports who receives the benefit (or who are taxpayers), but does not report the amount received (or paid); iii) *Simulation*, which is used when the survey does not report who receives the benefit (or who are the taxpayers), and does not report the amount received (or paid). The selection of the allocation method depends mainly on the information available. The following section describes the method used to allocate the different fiscal interventions in the case of Senegal, while tables 1 and 2 above provide a summary.

Direct Taxes

Taxes on personal income: Senegal has several regimes depending on the source of income. These regimes include 1) land revenue, 2) capital income, 3) profits of commerce and industry, 4) agricultural benefits 5) professional benefits and 6) income from wages, pensions, and others. However, this study could only cover the regimes related to 3, 4, 5 and 6 based on the available information. The income tax paid by each wage earner was simulated based on the rules of regime 6, using its progressive tax grid and applying the corresponding deductions depending on the size and type of the household. The income tax paid by each self-employed and individual business was simulated using the rules pertaining to regimes 3, 4 and 5, its corresponding progressive tax rates as featured in the Tax Code[8] and conforming to the economic activities reported in the household survey, and classifying the tax payers into three different schemes: normal, simplified, and global regimes, based on their annual level of turnover or sales (see table 4 below).

Table 3: Regimes included in Income Tax for profits of commerce and industry

Regime	Threshold
Normal Regime: *Régime du bénéfice réel normal*	Above 100 million CFA
Simplified Regime: *Régime du bénéfice réel simplifié*	Between 50-100 million CFA
Global Regime: *Régime de la contribution globale unique*	Below 50 million CFA

Source: Tax Code

The burden of personal income taxes is assumed to fall entirely on labor in the formal sector (private and public administration), in the form of reduced wages. The definition that we used in this analysis defines as formal those workers who, based on the information

[8] See annex 1 for Detail.

from the household survey, contribute to the social security system, work for government in the public administration, or in a big financial or non-financial enterprise. We assume that informal workers don't pay taxes at all if they don't belong to the groups mentioned before. It is also important to mention that our working definition of informality is not related to low gross sales or with individual economic units that may be in Simplified or Global Regime. According to our estimations using the ESPS 2011 survey, around 80 percent of wage earners are informal, and in the first six deciles the percentage of informal is higher than 90 percent. Because in top decile informality falls to 55 percent, the bulk of the collection of personal income taxes come from this population. One important caveat about this simulation is the lack of access to the detailed information on the size of each regime collection[9].

Payroll taxes or contributions payable by employers: this is an annual flat fee charged to natural and legal persons as well as organizations that pay salaries. It is equivalent to 3 percent of wages, salaries, and allowances, with the exception of those who worked in mining and oil companies. The allocation method used is simulation. The main assumption is that the burden of payroll taxes is borne fully by labor in the formal sector, including those whose income is lower than the exemption threshold for personal income tax[10].

Social Security Contributions

The analysis included contributions to health and pensions. The health contribution is related to the Social Security Fund (*Caisse de Securité Sociale, CSS)* and the contributions to pensions are related to two systems: the Pension Institution of Senegal (*L'Institution de Prévoyance Retraite du Sénégal, IPRES*) covering the formal employees of the private sector, and the National Pension Fund (FNR, *Fonds national de retraite*) covering civil servants. The allocation method for the three regimes is imputation. In the case of CSS, the total contribution imputed included family allowances and health benefits, and the industrial accident insurance. The former has a rate of 7 percent, with an annual ceiling of CFA 756,000; while the latter has a 1 to 5 percent rate (higher for riskier economic sectors). For example, for low risk economic sectors the total rate is 8 percent (7 percent + 1percent). As far as pensions contributory regimes are concerned, the imputation of IPRES (for the private sector employees) was calculated based on the rules active in 2015[11], while the imputation for FNR (for Civil Servants) considered rates of 23 percent for employers and an additional 12 percent for employees. The main assumption is that the

[9] In case this information was released by the Tax Authorities the model could be improved.

[10] According to Fullerton & Metcalf (2002), "for the payroll tax, virtually all applied incidence studies assume that both the employee share and the employer share are borne by the employee (through a fall in the net wage by the full amount of payroll tax). This assumption has been tested and confirmed repeatedly, going back to Brittain (1971) who used a 1958 cross-section of 13 industries in 64 nations and found full burdens on labor. Gruber (1997) reviews other more recent empirical studies that use both cross-section and time-series data, consistently finding full burdens on labor."

[11] For General Regime, the applicable rate is 14 percent (8.4 percent employers + 5.6 percent employees) with a ceiling of 3 072 000 CFA, for those workers with ages from 18 to 50. There is also a supplementary regime for Managers, with an applicable rate of 14 percent (3.6 percent employers + 2.4 percent employees) and with a ceiling of 9 216 000 CFA.

burden of all contributions is borne fully by labor in the formal sector, including those whose income is lower than the personal income tax exemption threshold. The theory behind this assumption is that the proportion of contributions paid by the employer is transferred to workers in the form of lower wages[12].

Indirect Taxes

The indirect taxes included in the analysis are: value added tax (VAT) and excises on alcoholic beverages and liquids, on coffee, on tea and vegetable oil, on tobacco, on oil products and royalties on telecommunications. Taxes on financial activities are not included because of information limitations. All indirect taxes are simulated based on the information coming from the Tax Code and the burden of these taxes is assumed to fall entirely on the consumers in the form of increased prices.

The VAT has a general statutory rate of 18 percent and a reduced rate of 10 percent for accommodation services and catering owned by a licensed tourist accommodation. There is also an important list of exempted goods and services[13]. Tax evasion assumptions are not considered, however, because the scaling down methodology[14] was applied, tax revenue was adjusted according to effective rate of VAT.

Excises taxes were simulated based on the corresponding rate for each type of good. The excise tax rate for alcoholic beverages and liquids is 40 percent, and 3 percent for non-alcoholic beverages. Additionally, this excise tax includes a specific additional tax that depends on the alcoholic content of the beverage, this fraction of the tax was not considered in the analysis due to the lack of information in the survey. An *ad valorem* excise on consumption was applied to coffee, tea, and fatty foods[15]. The excise tax rate on tobacco is 40 percent on economy cigarettes and 45 percent on premium cigarettes. The survey does not provide information on the quality of cigarettes, therefore the maximum rate was applied.

Oil products have specific tax rates in FCFA. The simulation was carried out using the information on the structure of prices for superior and regular gasoline, gasoil, and navigation gasoline coming from the input/output matrix for 2014. The average implicit rate for each kind

[12] In the case of the public sector this hypothesis may sound weaker.

[13] Article 361 defines exempted items: Hospitalization benefits, including the transport, and medical care benefit; Medicines and pharmaceutical; Unprocessed food products and necessities listed is fixed by order of the Minister of finance; school education or University; water and electricity supplies (consumption below social range); banking and insurance and reinsurance, which are subject to specific taxation; change of building, real estate rights and goodwill mutations imposed registration fees or taxation equivalent; deliveries, stamps for postage, stamps and other similar stamps. Unprocessed foods exempted from VAT according to Ministry of Finance are: cereals excluding rice of luxury; vegetables, plants, roots and tubers; peanut, soy, sesame and other legumes; meat and edible offal, fresh, chilled or frozen; eggs; unprocessed fish (fresh, dried, smoked, salted, refrigerated, or frozen); and unprocessed milk.

[14] This methodology consists in equalize the ratios of administrative accounts to the ratios of the household survey. For a detailed description of the scaling down procedure, see Higgins and Lustig (2017).

[15] For coffee and tea, rate is 5 percent. For fatty foods is 12 percent that are products of milk and 5 percent for other fatty foods. According to Article 429 of Tax Code, the tax on edible fats strikes all food fats, excluding peanut oils, fluid or solid, c rude, refined or purified, and edible oils containing at least 60 percent of groundnut oil. We include as taxable goods: palm oils, vegetable oils and other milk products

of carburant was calculated, however only the average rate for superior and regular gasoline was considered for the simulation. In consideration of the importance of these products for intermediate consumption, indirect effects of tax on oil products were estimated based on methodology proposed by Jellema and Inchauste (2017).

The royalty rate on telecommunications is set at 2percent of the amount of delivery charges paid to the operator. The basis of the fee is established by the amount excluding taxes paid by the households accessing or using the public telecommunications network.

Direct Transfers

Three programs of direct transfers are included in the analysis: the *Programme national de bourses de sécurité familiale* (PNBSF - CCT program), the subsidy to the contribution for the *Couverture Maladie Universelle (CMU),* and the school feeding program *Cantines scolaires* – for a brief description of these programs see section 2. The programs represent the bulk of social assistance interventions in the country. All direct transfers were simulated based on the rules of each of the programs. The *bourses de sécurité familiale* was simulated using the actual proxy mean test[16] and the geographic targeting used by the program[17]; household were ordered by department from the lowest to the highest based on their proxy mean test score, and beneficiaries with the lowest scores were selected up to the established quota by department. The subsidy to the contribution to CMU was simulated using categorical targeting. Beneficiaries were selected randomly among two groups: informal workers (subsidy of 50 percent) and beneficiaries of the PNBSF (subsidy of 100 percent). The school feeding program, *Cantine scolaire,* was simulated using categorical and geographic targeting, as foreseen in the program itself. Beneficiaries were selected randomly from the group formed by children who attend pre-school or primary public school, using the numbers of beneficiaries, their proportion over the target population and their current geographic distribution as coming out from administrative records.

Subsidies

The analysis includes the subsidy to agricultural inputs and to electricity–for a brief description of these programs see section 2. The subsidy to agricultural inputs was imputed, as the survey reports who receives the benefit and how much was the total expenditure on subsidized inputs. As each household represents a share of the total expenditure on subsidized inputs for 2011 (coming from the survey), the total government expenditure in subsidies for 2015 is allocated to households in the survey based on their share in the distribution in 2011. The subsidy to electricity is imputed as well, as the household survey reports who has a subscription to the utility Senelec as well as their consumption of electricity. The consumption on kilowatts per hour is calculated for each household dividing their consumption in FCFA by the corresponding tariff in the tariff grid. It is assumed that households who report having a fridge, television and washing machine are under the domestic medium power (DMP) category

[16] The PMT are differentiated between rural and urban households and include variables referring to households' demographics, dwelling characteristics, assets, and regional dummies.

[17] The program also includes a community-based targeting system. However, due to missing data the authors were not able to reproduce this targeting method and complement the previous two, as it currently happens in the program. This aspect could be improved in the future, when the data becomes available (beneficiaries' households' profiles from Unique Registry).

and those who do not have these assets are in the domestic small power (DSP) category. Then within each regime, the tariff depends on the level of consumption (three different tariffs are applied per regime). The resulting subsidy imputed is 5.6 FCFA per kwh. It is important to reiterate that for the year of the study (2015) the subsidiy to electricity was zero due to the low international price of oil. Thus, for the purposes of the exercise, the subsidy provided by the government in 2013 was considered. The rationale for doing so was to show the effect of such subsidy when international oil prices are high, a scenario that can very well concretize in the future, and the cost-opportunity of devoting funds to this intervention rather than to others, more poverty or inequality reducing.

Transfers in-kind

The analysis included all levels of education. The average education expenditure per capita was imputed by level, for preschool, primary and secondary education, and type of school (public or private)[18]. The total expenditure on tertiary education was disaggregated between scholarships and general expenditure. The latter was imputed to all tertiary education students in the survey. While the household survey reports who receives scholarships and the annual amount of the benefit, the reported number of students are few compared to the administrative data, therefore new beneficiaries were simulated. New beneficiaries were distributed by keeping the initial distribution of beneficiaries of the survey, 80 percent of students in public schools and 20 percent of students in private education. The amount imputed to these new beneficiaries was the average amount received by its corresponding quintile, according to the survey.

The analysis considers CMU and the general public health care system. CMU was simulated including the following programs: *plan sesame, gratuité pour les moins de 5 ans, gratuité de la césarienne* are considered. The beneficiaries of these programs are selected randomly from the potential beneficiary groups in the survey based on the rules of the programs and the total administrative numbers of beneficiaries. The average expenditure was imputed for each beneficiary by program. Potential beneficiaries include recipients of PNBSF, 60 years old or older for *plan sésame*, 5 years old or younger for the *gratuité pour les moins de 5 ans*, and 40 years old or younger with children younger than one year old for *gratuité de la césarienne*. The general public health care system was imputed. The total government expenditure was disaggregated in i) primary, ii) secondary, tertiary and quartier, and iii) others. Then, the use of the public system by quintile distinguishing among consultations at the primary level, consultations at the secondary, tertiary or quaternary level, and hospitalization was calculated based on the information reported in the survey. The expenditure was equally distributed among all the households that report having used the public system. This methodology risks making seem better-off households who experienced episodes of sickness. The reality of Senegal is such that households accessing health services are indeed wealthier (with those using private services being the wealthiest), as the poorest do not have the means to pay for health expenses and, generally, either do not seek medical advice, or use traditional healers.

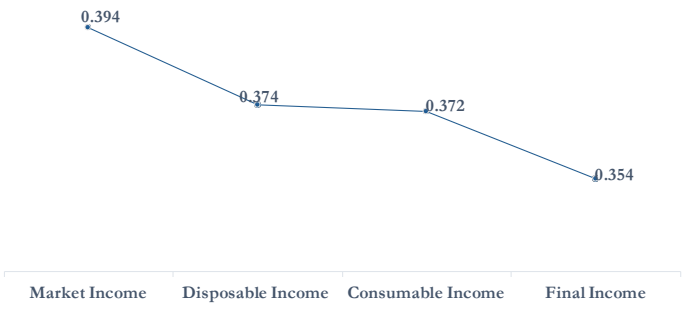
[18] The imputation methodology applied to education expenditure does not take into consideration the quality of education including, for instance, the ratio of students per teachers or the quality of the classrooms or equipment.

4. Main Findings

4.1 Is the fiscal system of Senegal equalizing and poverty reducing?

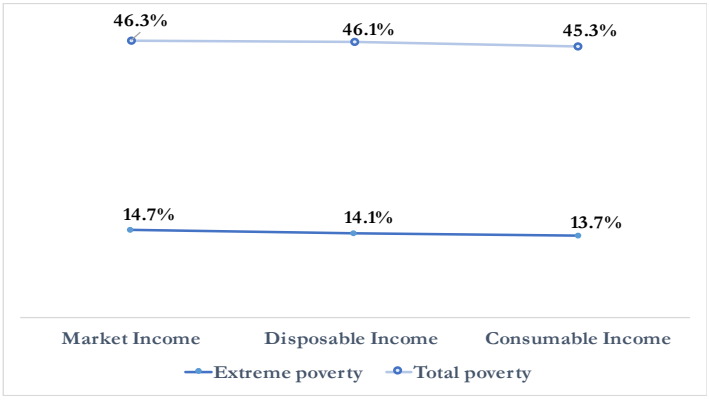
In general terms, it can be concluded that the fiscal system of Senegal is inequality and poverty reducing. Figure 5: Effects of fiscal interventions on income inequality 5 and 6 show that when moving from market income to disposable income the combined effect of direct taxes and transfers reduces inequality by 0.02 Gini points, and reduces extreme poverty by 0.6 percentage points. When moving from disposable to consumable income, the combined effect of indirect taxes and subsidies is also inequality and poverty reducing. While the reductions in inequality and extreme poverty are lower than the combined effect of direct taxes and transfers, only 0.002 Gini points and 0.36 percentage points respectively, the reduction in moderate poverty is higher, 0.78 percentage points, suggesting that some of the beneficiaries for these measures are positioned below but close to the poverty line. Finally, in-kind transfers in the form of education and health public expenditure further reduces inequality when moving from consumable to final income: the

Figure 5: Effects of fiscal interventions on income inequality



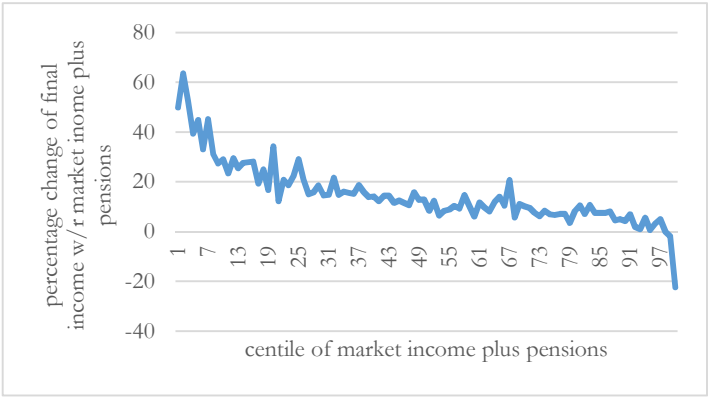
Source: Authors' estimates based on ESPS 2011.

Figure 6: Effect of fiscal interventions on poverty



Source: Authors' estimates based on ESPS 2011.

Figure 7: Fiscal incidence curve (final income with respect to market income



Source: Authors' estimates based on ESPS 2011.

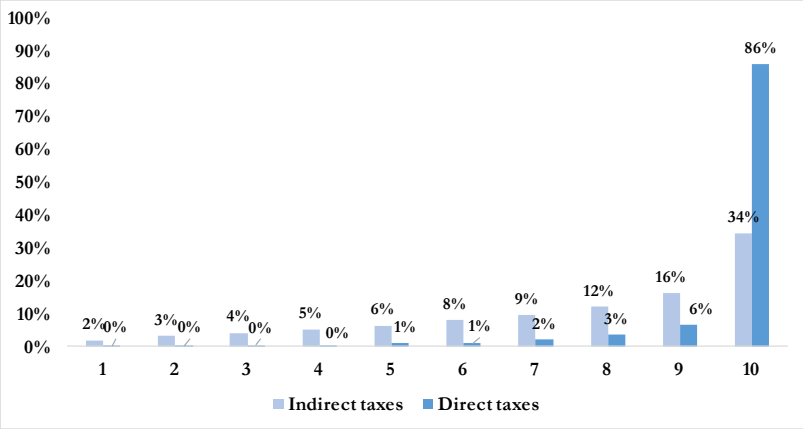
Gini coefficient reduces by an additional 0.02 Gini points[19].

Most of the population is a net beneficiary of the system as included in the study, particularly the bottom of the distribution, although at this stage it is not possible to identify the effect of each intervention. Figure 7 shows that fiscal policy benefits the bottom half of the distribution, and the bottom quintile in particular, while only top-income earners identified in ESPS 2011 are net payers. In order to better understand what are the specific effects of each fiscal intervention, Section 4.1 disentangles the effect of taxes and section 4.2 the effect of transfers and subsides.

4.2 Who pays the taxes in Senegal?

Most direct taxes are paid by the top decile of the population (86 percent) and all direct taxes are progressive (Figure 8). A tax is progressive(regressive) when the proportion paid as a percentage of market income increases (decreases) with income (see Box n.2). Because of the big size of the informal sector and the relatively high exemption threshold for the personal income tax, nobody pays this tax in the bottom forty percent of the distribution, and only few people do so between the fifth and the 9th deciles. For example, per our estimations using the ESPS survey, around 80 percent of wage earners are informal, and in the bottom six deciles the percentage of informal workers is higher than 90 percent. The fact that informality decreases to 55 percent for the top decile explains why the bulk of tax collection for personal income taxes come from this population, including formal private sectors workers and civil servants. Interestingly, only a quarter of the civil servants pay income taxes though, suggesting that the imposition threshold may be somehow too high. Besides, all benefits perceived by civil servant are exempted from income taxation. Finally, even though direct taxes are concentrated in the top decile of income, Figure 8 shows that almost everybody is paying some type of direct tax (less than 0.5 percent in the bottom deciles). The main reason behind this result is the fact

Figure 8: Direct and indirect taxes paid by each decile as a proportion of the total tax collection



Source: Authors' estimates based on ESPS 2011.

[19] The effect of in-kind transfers is not estimated for poverty, as these transfers do not directly increase the purchasing power of households. In other words, they do not represent a transfers of money from the government to the households.

that, as per our assumption, the burden of payroll taxes falls upon all formal employees, who, even though concentrated in the top of the distribution, are somehow present in all deciles.

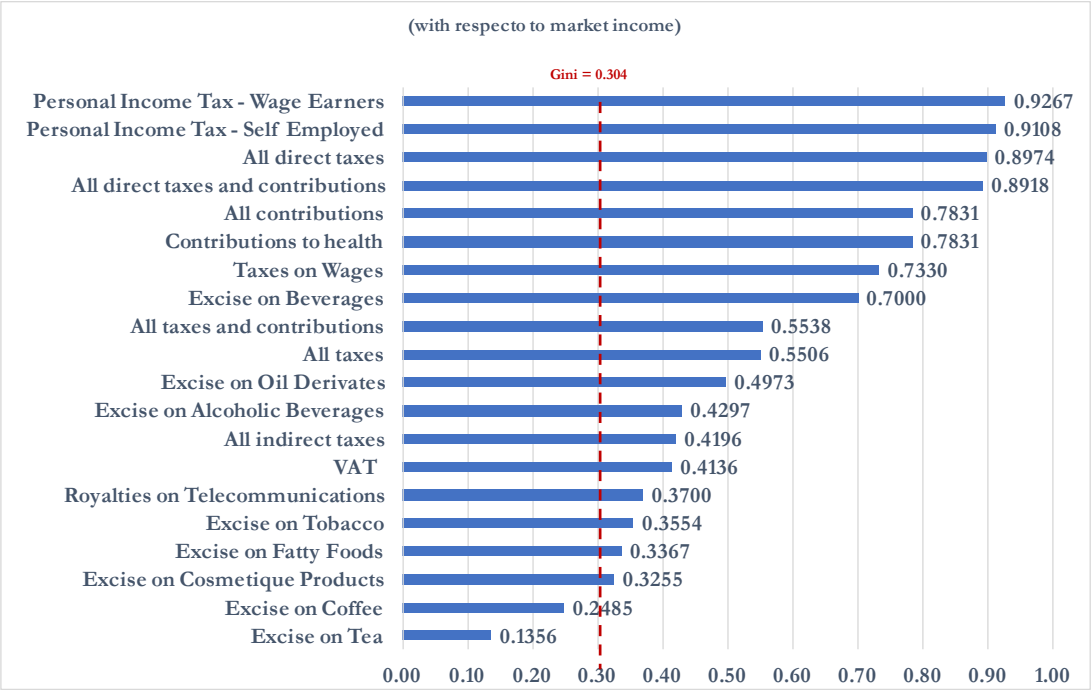
Although marginally progressive in total, indirect taxes are also paid by the poor. Regarding indirect taxes, 50 percent are paid by the two richest deciles while only 5 percent are paid by the two lowest deciles. Figure 9 shows that only two indirect taxes are regressive, excise taxes on coffee and tea. The VAT is slightly progressive and this can be explained by different factors, such as the exemptions of certain goods and the reduced tax rate.

Box 2: Progressivity/Regressivity of taxes

This analysis assesses whether a tax is progressive or regressive using the Kakwani Index, which is defined as the difference between the concentration coefficient of the tax and the Gini for market income. A tax will be progressive if the concentration coefficient of the tax is larger than the Gini for market income, this implies that the tax paid as a share of market income tend to increase with market income.

Note: the usage of the terms of progressive and regressive of this analysis is based on the CEQ Methodology terminology, where the progressivity or regressivity of a tax is assessed by analyzing whether the tax paid as a proportion of the pre-tax income increases or decreases with the pre-tax income. It is important to note that these terms do not tell whether the tax is equalizing, a tax can be regressive and yet equalizing as it is explained in detail in Enami et al (2017) and in Enami (2017).

Figure 9: Concentration coefficients



Source: Authors' estimates based on ESPS 2011.

4.3 Are taxes inequality and poverty reducing?

Taxes generally have a strong redistributive effect, although some of them also result into a slight increase in poverty. The main indicator that allows an analysis of the effect of each intervention on inequality and poverty is the Marginal Contribution (MC)[20], which calculates the difference in inequality (or poverty headcount) without and with a specific tax or transfer[21].

Direct income taxes have the strongest effect on reducing inequality, although their concentration[22] in the top decile raises equity concerns. Although direct personal income tax has a narrow base, their marginal contribution effect on inequality is considerable (Figure 10), as it is only paid by households with highest incomes, as indicated in the previous section.

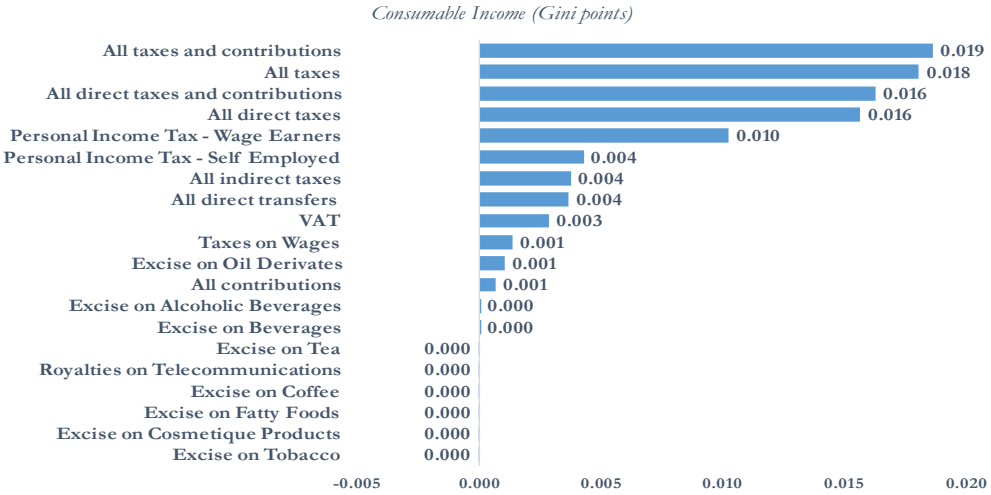
[20] Enami, Lustig and Aranda (2017)

[21] The marginal contribution of a tax (transfer) to inequality or poverty is calculated by taking the difference between the Gini coefficient or the poverty headcount of the relevant end income concept without the tax (transfer) and the Gini coefficient or poverty headcount of the relevant end income concept with the tax (transfer). Because of path dependency, the sum of the marginal contributions of each fiscal intervention will not be equal to the total change in inequality (Enami, Lustig and Aranda, 2017).

[22] Concentration coefficients are calculated in the same manner as the Gini coefficient, based on concentration curbs rather than Lorez curbs. Concentration curves are constructed similarly to Lorenz curves but the difference is that the vertical axis measures the proportion of the tax (transfer) under analysis paid (received) by each quantile. When the concentration coefficient is above the diagonal, the difference between the triangle of perfect equality and the area under the curve is negative, which cannot occur with the Gini for the income distribution by definition. (CEQ Handbook 2014, Update of February 2016).

It is essentially a tax on the few workers who are in the formal sector or, to a lesser extent, in the public administration, which in the case of Senegal are part of an elite. While the strong redistributive effect is welcome, the fact that most of the population is not contributing to the government revenue despite having the means to do so it worrisome, as it suggests that all the burden of taxes is concentrated among a small group of people while part of the rest is benefitting from expenditure without paying their fair share. In contrast, the payroll tax or wage tax does not have a significant effect on reducing inequality. This is because people of different income strata pay it (as few formal sector workers are present across the distribution), not exclusively those with higher income, as it is the case with personal income tax. Social contributions, on the other hand, having even more limited coverage than the income tax and having contribution ceilings, results in lower marginal effects on inequality.

Figure 10: Marginal contributions to inequality



Source: Authors' estimates based on ESPS 2011.

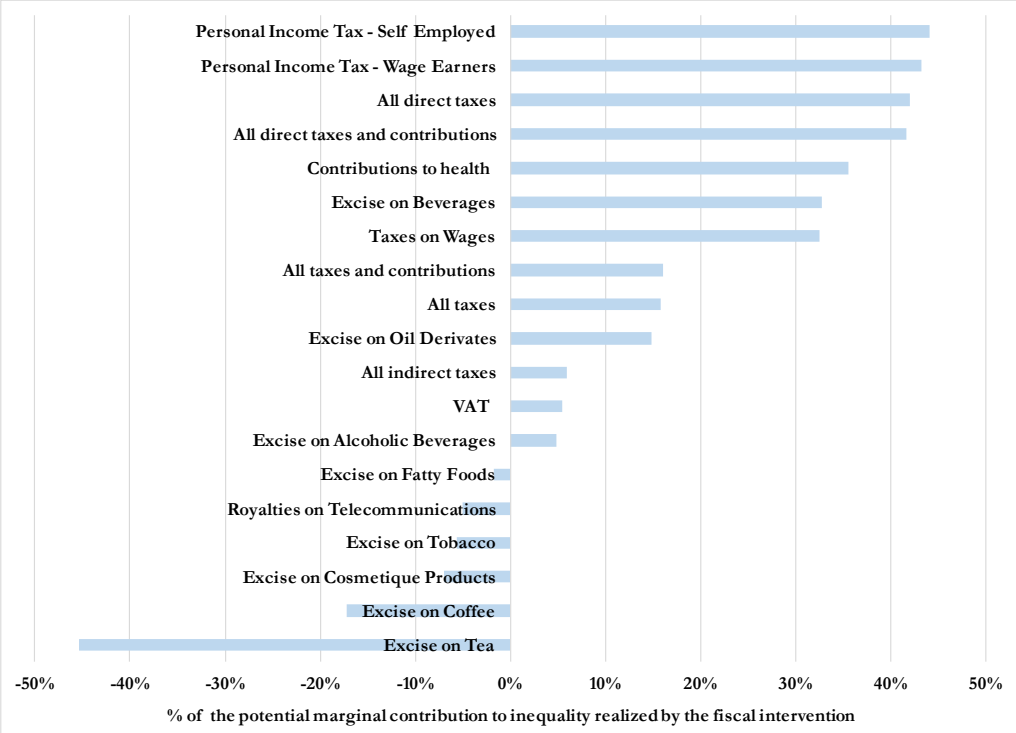
Indirect taxes are almost neutral in terms of redistribution. Unlike most countries where indirect taxes are generally regressive, as they are equally paid by all households based on their consumption and regardless of their income, in Senegal VAT has a very small and positive marginal effect on the reduction of inequality. In contrast, the group of excise taxes has no effect on inequality.

All in all, in term of inequality direct taxes, followed by contribution to health insurance, are the most efficient interventions, although more could be done to improve the equity of the system. The Inequality Impact Effectiveness Indicator[23] is defined as the ratio between the Marginal Contribution of a tax and the maximum possible Marginal Contribution if the same amount of the tax were distributed to maximize its equalizing effect. Thus, the graph below (Figure 11) shows that Personal Income Tax is the most effective tax in reducing inequality (measured by the Gini Index) relative to its maximum potential. This tax reaches about 44 percent of its potential, which is objectively not a lot. In contrast, almost all excise taxes are the

[23] Developed by Ali Enami in Enami (forthcoming).

interventions that currently realize the least of their maximum equalizing potential and excise taxes on beverages and oil derivatives actually increase inequality.

Figure 11: CEQ Inequality Impact Effectiveness Indicator



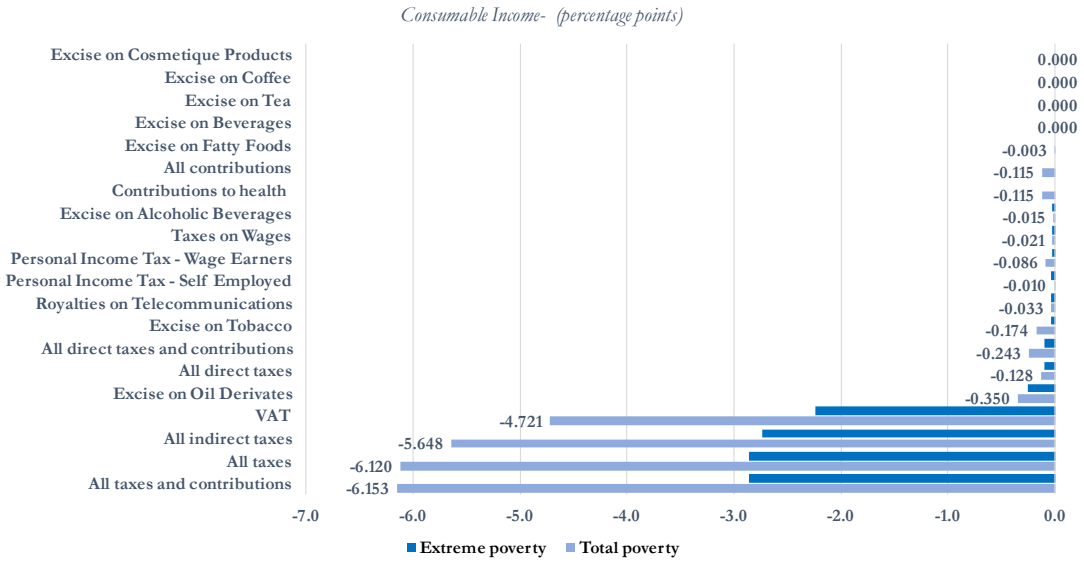
Source: own elaboration based on Enami (2017).
Notes:
The x axis is the CEQ Inequality Impact Effectiveness Indicator, which is defined as the ratio between the Marginal Contribution of a tax and the maximum possible Marginal Contribution if the same amount of the tax were distributed maximizing its inequality reducing impact.
This graph uses final income as *End Income* and the Gini Index as inequality measure.

Taxation increases poverty, although the effect is very heterogeneous across fiscal interventions. Some taxes do not have any (or have a very small) marginal effect on poverty (Figure 12). Direct taxation, such as personal income taxes and payroll taxes, have a small negative impact on consumption, as they happen to concern some of the poor, particularly the self-employed who pay lumps sums and whose exemption threshold is lower than for the wage workers, or the payroll tax for which there is no exemption threshold. However, the marginal effect is so limited that all direct taxation and contributions increase poverty by only 0.2p.p.. A second group of taxes having little effect are excise taxes, which also account for a small part of revenue in total. Even when their effect is negative, such as for the excise on alcoholic beverages,

it so small to be insignificant. On the other hand, the excise on oil products has a bigger effect, also because in this analysis it was possible to include the indirect effects of these taxes. In this case, the marginal effects on poverty are channeled through the consumption of goods and services other than petroleum derivatives.

The Value Added Tax increases poverty. Among indirect taxes, only VAT has an important marginal effect on poverty, increasing it by almost 5 p.p.. In fact, even if lower income households pay less VATs that those in higher deciles of the distribution, almost all the population of Senegal pays this tax as they all consume, and often pay at the general rate (18 percent).

Figure 12: Marginal contributions to poverty reduction



Source: Authors' estimates based on ESPS 2011.
Note: A positive marginal contribution to poverty reduction implies a reduction in the poverty rate, while a negative marginal contribution implies an increase in the poverty rate caused by the specific fiscal intervention.

4.4 Are transfers and subsidies inequality and poverty reducing?

Among transfers, only the Conditional Cash Transfers Program is significantly poverty reducing. The *Programme National de Bourses de Sécurité Familiale* has the largest positive impact on extreme poverty and inequality reduction, reducing poverty by 0.6 p.p and inequality by 0.004 Gini points. For its part, *Cantine scolaire*, and the subsidy to contributions to CMU are almost neutral for both poverty and inequality reduction (Figures 13 and 14).

Figure 13: Marginal contributions to poverty

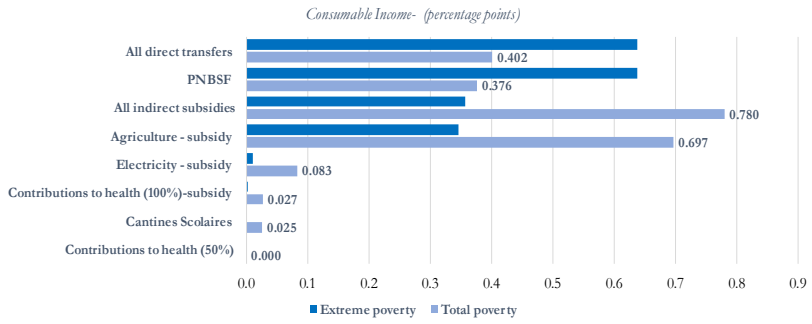
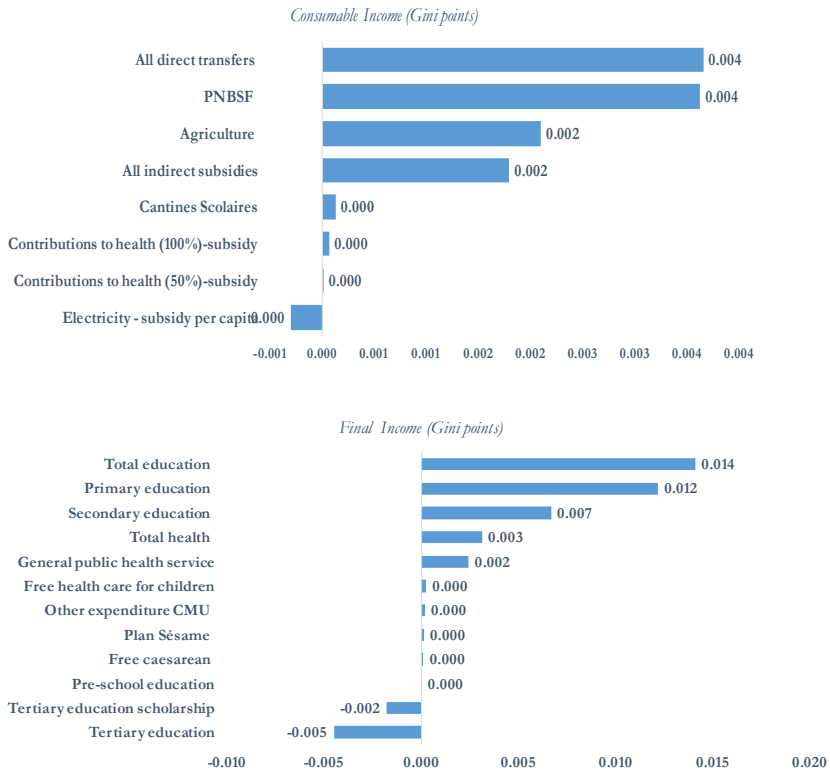


Figure 14: Marginal contributions to inequality



Source: Authors' estimates based on ESPS 2011.

The subsidy to agricultural inputs has a relatively strong effect on both poverty and inequality, while the subsidy to electricity slightly increases inequality. The subsidy to agriculture has the largest impact on moderate poverty reduction (almost 0.8 p.p), even larger than the CCT program, and ranks second in inequality reduction (-0.002 Gini points). In turns, the subsidy to electricity has a positive impact on moderate poverty reduction, while its effect is almost neutral on extreme poverty and slightly negative on inequality reduction, as indicated by their marginal contributions (Figure 13 and 14). This is explained by the very limited access to electricity by the extreme poor.

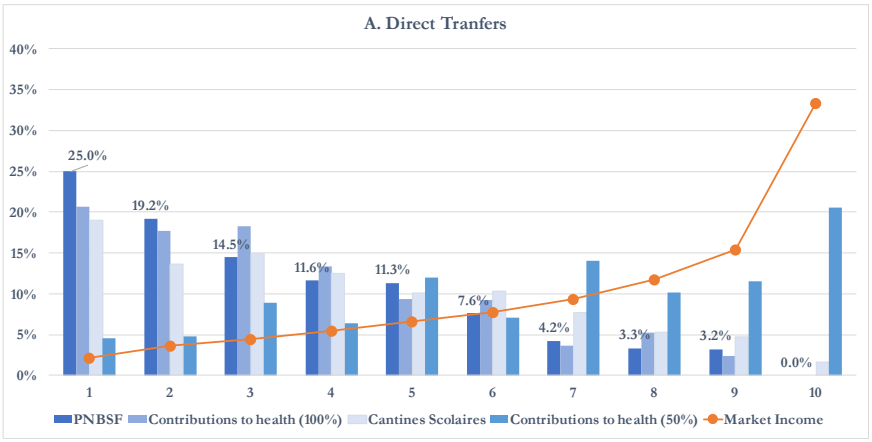
Regarding transfers in-kind, the effect of education expenditures is larger than the effect of health spending on inequality reduction. Within education, the largest positive impact is presented by primary education followed by secondary education, while spending on tertiary education increases inequality (Figure 14). Within health expenditure, the CMU present an almost neutral effect on inequality, while the general public health spending reduces it.

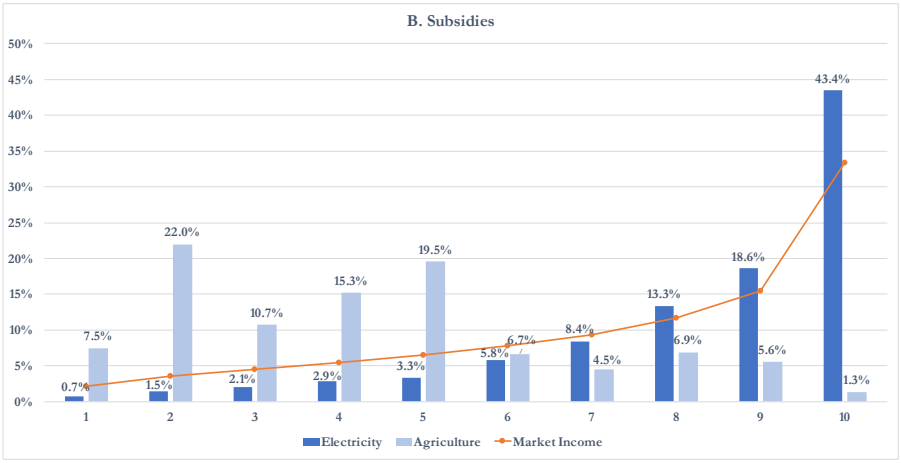
In summary, tertiary education and the subsidy to electricity are the only two programs that increase inequality. On the other hand, while no program increases poverty, only two programs reduce it (PNBSF and subsidies to agriculture), and the effect is rather small. All CMU programs and the school feeding program *cantines scolaires* almost have no effect on poverty and inequality. In order to better understand these results, we now look at the concentration of benefits across the distribution.

4.5 Who receive the benefits?

The CCT program is pro-poor, but targeting could be improved to increase its impact on poverty. The *Programme National de Bourses de Se□ curite□ Familiale* represents about 90 percent of the total expenditure on direct transfers. Its distribution is pro-poor as its concentration coefficient is negative (Figure 17). However, the program should be targeted to the extreme poor in the country, roughly corresponding to the bottom 2 deciles of the distribution. Figure 15 shows that the bottom 20 percent concentrates more than 40 percent of the benefits, and the bottom 40 percent concentrates 70 percent of them. While this results indicate that if not the extreme poor, the poor in general gather

Figure 15: Direct transfers and subsidies per deciles of market income as a share of the total expenditure of each program





Source: Authors' estimates based on ESPS 2011.

most of the benefits, still there is between 20 and 30 percent of them going to non-poor households, raising questions on the quality of the targeting[24]. It is important to note, however, that these results come from the simulation of the program coverage based on its targeting rules, so its actual coverage may be somehow different.

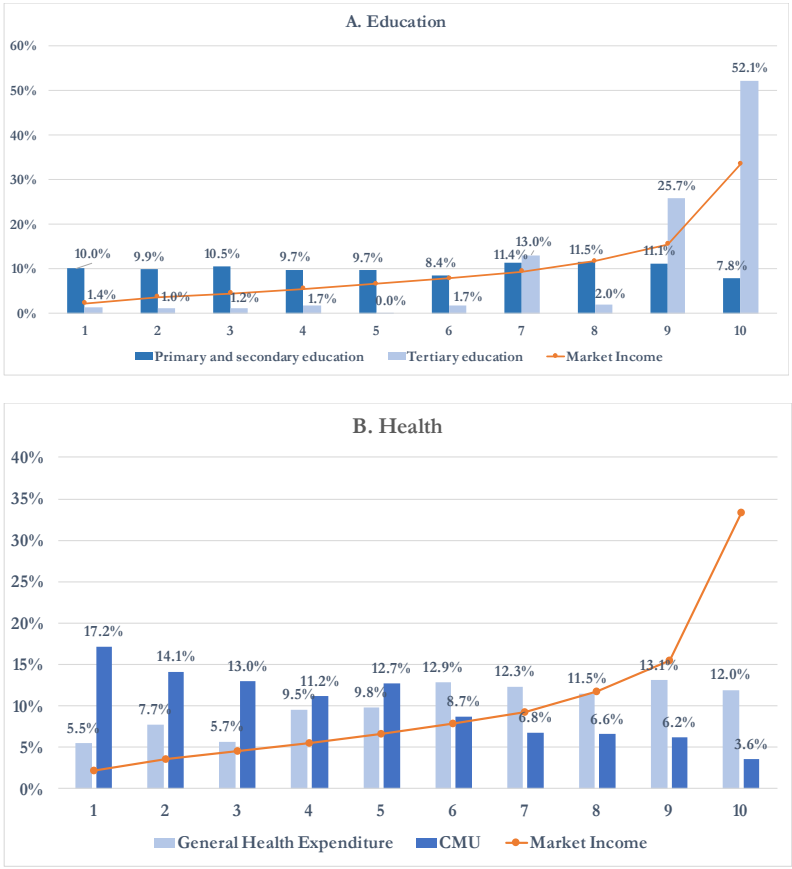
The Universal Health Insurance subsidies and the school feeding program are pro-poor. The subsidy of 100 percent to the contribution to CMU (going to the beneficiaries of the CCT program) and *Cantines scolaires* program are pro poor as well, as both have a negative concentration coefficient (Figure 16). Almost 50 percent of this benefits are received by the first 3 deciles. For its part, the subsidy of 50 percent to the contribution to CMU is not pro-poor, as it is mostly concentrated among the richest deciles, but it is still progressive, as its concentration coefficient is positive but lower than the Gini of Market Income.

The distribution of subsidies is heterogeneous, with the agriculture ones being pro-poor and the electricity one non pro-poor and regressive. Regarding indirect subsidies, the subsidy to electricity is regressive, as its concentration coefficient is positive and higher than the Gini of market income. Indeed, 75 percent of these resources are captured by the three richest deciles (Figure 15 – panel B). The recent reform of electricity prices implemented by the government in 2016 goes in the direction of reducing the regressivity of this subsidy, as the poorest consumers benefit now from lower prices. However, the equity problem related to electricity doesn't concern tariff, but rather access: in fact, up to 90 percent of the top quintile enjoys a Senelec connection, against only 19 percent in the bottom quintile. It is not surprising then that the subsidies to electricity consumption mostly benefit the wealthiest parts of the population. On the other hand, although untargeted the subsidy to agricultural inputs is pro-poor, as 75 percent of these sources goes to the bottom half of the distribution and 55 percent goes to the bottom forty, basically the poor. As in the case of the CCT program, figure 15 Panel B suggests that there is still a 25 percent of subsidies that go to non-poor households. It is important to note that this subsidy has never had the primary objective to reduce poverty and, as such, it is not targeted to the poor. It does have, nevertheless, the objective of supporting the production of small rural producers, who happen to be among the poorest in the entire population, as 62 percent and 47 percent of food and cash crop producers respectively are poor. In this sense, their impact on poverty may be increased through the introduction of some kind of targeting for smallholder farmers.

[24] As mentioned in the methodological section, this study was able to simulate only two of the three components of the targeting system currently in use: the Proxi means test and the geographical targeting. The team was not able to simulate the third component, the community base targeting, due to lack of information. This omission reduces the accuracy of the simulation.

Education expenditure also has a heterogeneous effect on poverty and inequality, depending on the level. Primary education is pro-poor, secondary education is progressive, and tertiary is regressive (Figure 17). The richest two deciles receive almost 80 percent of the total expenditure on tertiary education (Figure 16 Panel A). In this respect it is important to recall that expenditure on tertiary education also increases inequality, as shown in the previous section. As in the case of the electricity subsidy, this result is not surprising as only just above 5 percent of the population is enrolled in tertiary education, and most of it belongs to the top deciles of the distribution.

Figure 16: Transfers in-Kind per deciles of market income as a share of the total expenditure of each program

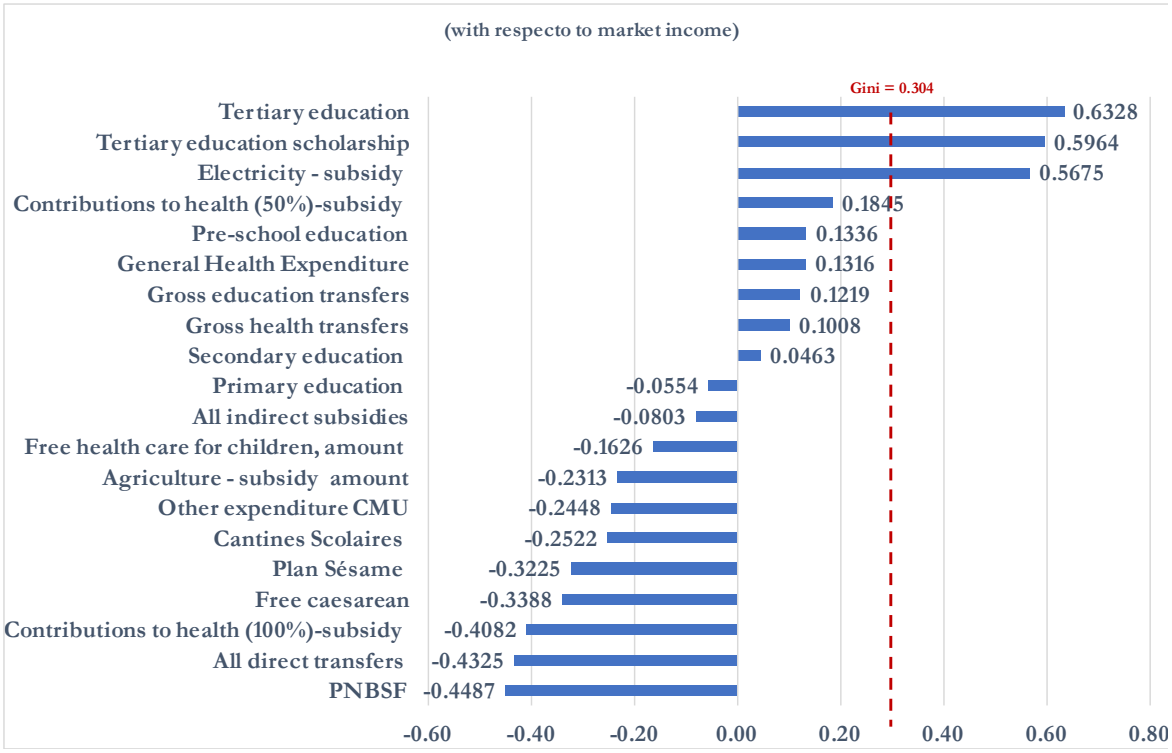


Source: Authors' estimates based on ESPS 2011.

Health expenditure is generally progressive, although not always pro-poor. On the health side, the expenditure on CMU-related programs is pro-poor, while the expenditure on the general public health service is not pro-poor, although it is still progressive (Figure 17). About 45 percent of the expenditure on CMU is received by the first 3 deciles, while almost 50 percent of the expenditure on general public health is received by the richest 4 deciles (Figure 16 Panel B), most likely because the poor do not have the means to seek for medical assistance[25], as revealed by DHS surveys for Senegal.

[25] DHS reveals that the poor generally lack the financial means to pay for medical assistance or event to afford transport to the closest facility.

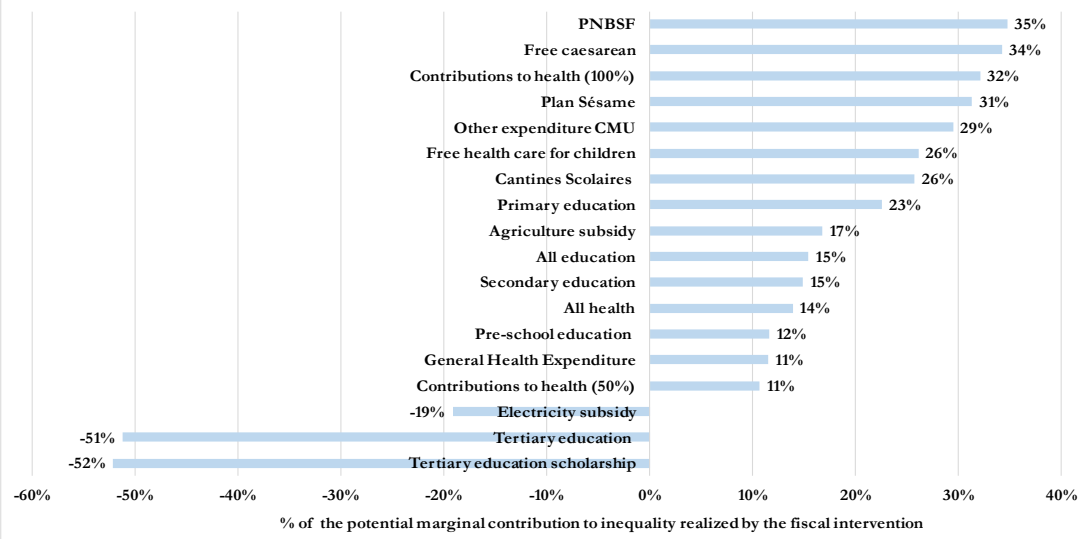
Figure 17: Concentration coefficients



Source: Authors' estimates based on ESPS 2011.

Among all social expenditures covered in this exercise, the *PNBSF* is currently the most effective program in reducing inequality (measured by the Gini Index) relative to its maximum potential. The Figure 18 displays the Inequality Impact Effectiveness Indicator and indicates that the CTT program reaches 35 percent of its potential, while the expenditure on the subsidy to electricity and on tertiary education, which increase inequality, are the programs that realize the least of their maximum equalizing power. As the case of taxation, this indicator reveals that much more could be done in terms of increasing the effectiveness of these interventions, particularly in terms of targeting.

Figure 18: CEQ Inequality Impact Effectiveness Indicator

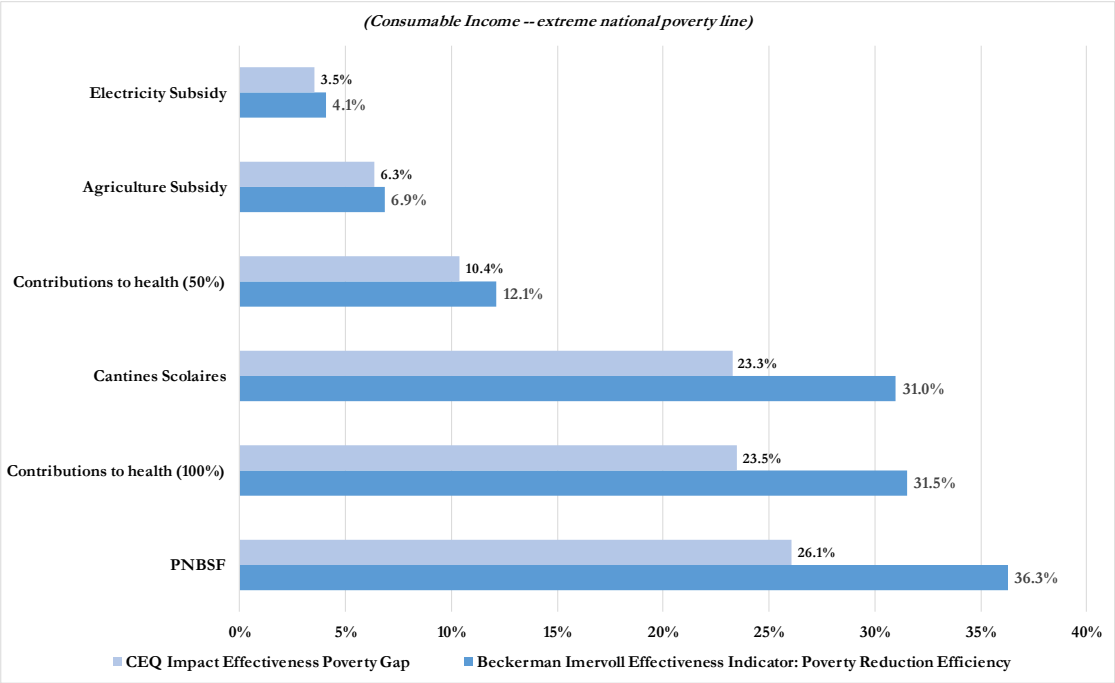


Source: own elaboration based on Enami (forthcoming).
Notes:
The x axis is the CEQ Inequality Impact Effectiveness Indicator, which is defined as the ratio between the Marginal Contribution of a transfer and the maximum possible Marginal Contribution if the same amount of the transfer were distributed maximizing its inequality reducing impact.
This graph uses final income as *End Income* and the Gini Index as inequality measure.

The CCT program is also the measure that reduces the most poverty intensity. Two indicators are used to come to this conclusion, the Impact Effectiveness Poverty Gap defined as the ratio between the Marginal Contribution of a transfer and the maximum possible Marginal Contribution if the same amount of the transfer were distributed to maximize its poverty reducing impact, and the Poverty Reduction Efficiency Indicator[26], which calculates the amount of the transfer that contributes to reducing the pre-transfer intensity of poverty measured by the poverty gap. Thus, the graph (Figure 19) below show that *PNBSF* is the most effective program lessening the intensity of poverty (measured by the poverty gap according to the extreme poverty line) relative to its potential. This program reaches 26 percent of its potential, while the subsidy to electricity is the program that realizes the least of its potential, as it only reaches 3.5 percent On the other hand, 36.3 percent of the expenditure on the PNBSF reaches the pre-transfer extreme poor contributing to diminishing their poverty depth, while only 4.3 percent of the spending on electricity does so.

[26] Developed by Ali Enami in Enami (forthcoming) and Developed by Beckerman (1979) respectively.

Figure 19: CEQ Poverty Impact Effectiveness Indicators



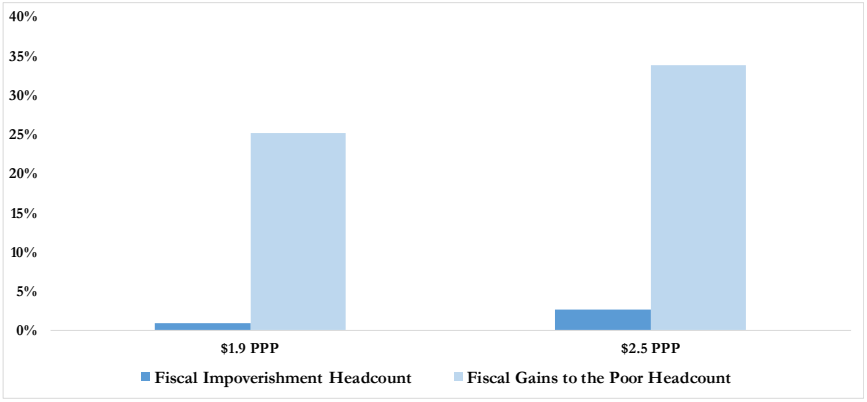
Source: own elaboration based on Enami (forthcoming), Beckerman (1979) and Higgins (forthcoming). This graph uses consumable income as *End Income* and the poverty gap as poverty measure.

Overall, the effect of fiscal interventions in Senegal is both equalizing and poverty-reducing, but to which extent such interventions hurt the poor? Higgins and Lustig (2016) developed a set of innovative measures called Fiscal Impoverishment (FI) and Fiscal Gain to the Poor (FGP) that allows to analyze whether the poor receive more benefits compared to how much they pay for taxes. The authors define an individual as *fiscal impoverished* if the individual is poor after taxes and transfers and the amount paid in taxes is higher than the amount received from transfers. *Fiscal gains to the poor* are present when the individual is poor before he pays taxes and receives transfers and the amount received from transfers is higher than the amount paid in taxes. In addition to calculating the headcounts, the monetary amounts of FI can be calculated as the sum of the fall in income for the pre-fiscal poor, plus the difference between the poverty line and the income (i.e., the poverty gap) for those pre-fiscal non-poor but post-fiscal poor. FGP can be computed as the sum of the increase in income for the pre-fiscal poor who remain poor after taxes and transfers, plus the pre-fiscal poverty gap for the pre-fiscal poor who escaped poverty after taxes and transfers.

The fiscal gains to the poor considerably outweigh fiscal impoverishment in the case of Senegal.

Figure 20 shows FI and FGP headcounts with respect to the country's population.

Figure 20: Fiscal Impoverishment and Fiscal Gains to the Poor Indicators



Source: Authors' estimates based on ESPS 2011.

Using both international poverty lines, $1.9/day and $2.5/day, the figure 20 shows that fewer individuals are impoverished in comparison to the number of fiscal gainers after the intervention of taxes, subsidies and direct transfers. Using the $1.9 /day poverty line, 1 percent of the population are impoverished, whereas 25.1 percent of the total population are fiscal gainers. If the $2.5/day poverty line is employed instead, the proportion of impoverished (2.6 percent of the total) is higher, yet still lower than that of the fiscal gainers (33.7 percent of the total).

4.6 How does Senegal compared to other countries?

When compared to other CEQ countries, the effect of fiscal policy on inequality in Senegal is above the average, but below the average for the effect on poverty.

We compared the performance of Senegal with other countries for which a similar exercise has been conducted, using the same CEQ methodology. These include Indonesia, Tanzania, Sri Lanka, Ghana, Armenia, Ethiopia, Jordan, Bolivia and South Africa.

The low effect on poverty might be due to several reasons including: i. the composition of social spending and ii. weak targeting of existing poverty reducing interventions. A relationship exists between the impact on poverty and the composition of the social expenditure. For example, Sri Lanka employs an effect on poverty above the average of the countries included in the benchmarking exercise, despite ranking third from the bottom in terms of social expenditure as a proportion of GDP, just below Senegal. However, the expenditure on direct transfers is larger in Indonesia, Tanzania, Senegal and Ghana, all countries with a lower poverty reducing effect than Sri Lanka. As shown earlier, direct transfers

Figure 21: Impact on inequality across countries

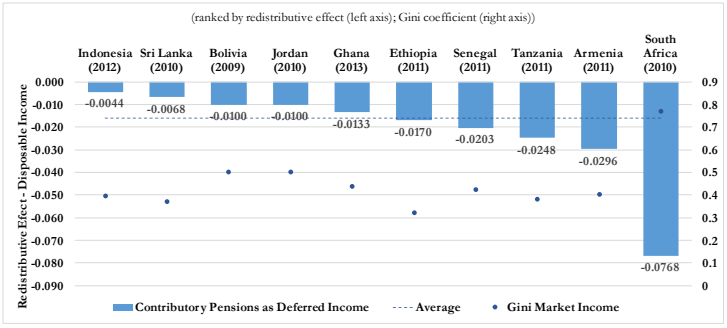


Figure 22: Impact on poverty across countries

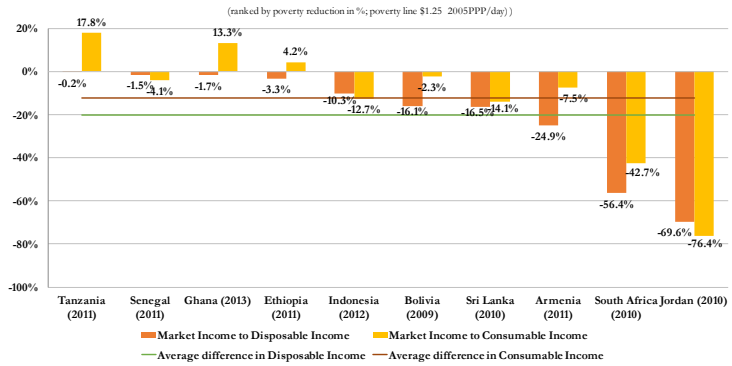
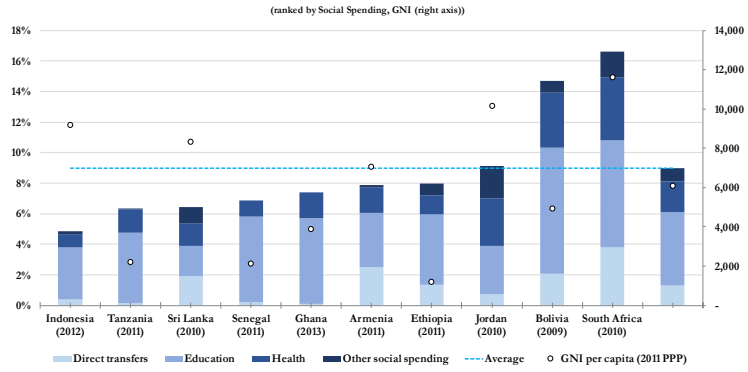


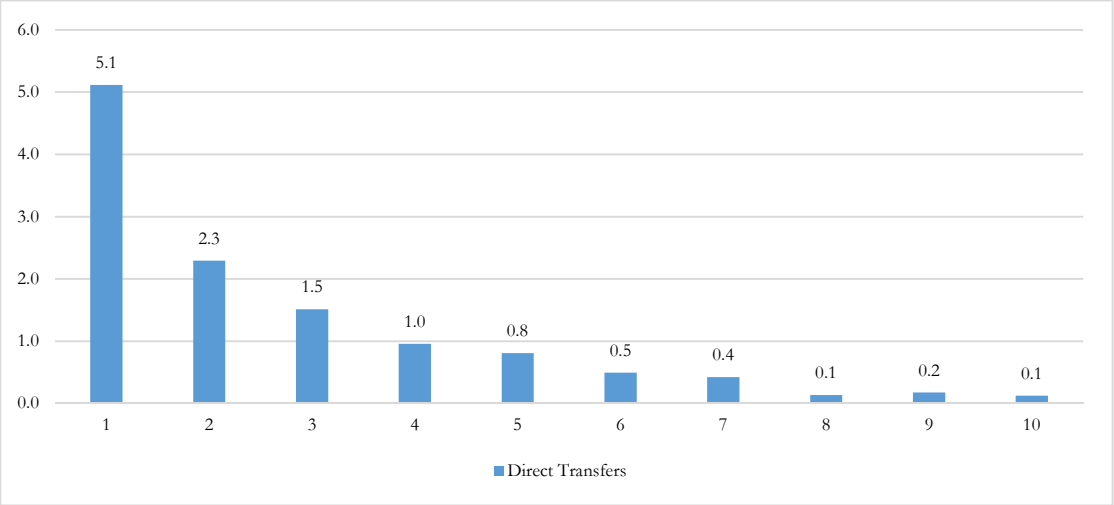
Figure 23: Social Expenditure



Source: Armenia: Younger and Khachatryan, 2014; Bolivia: Paz-Arauco et al., 2014; Ethiopia: Hill et al., forthcoming; Ghana: Younger et al., 2015; Indonesia: Afkar et al., 2016; Jordan: Alam et al., 2016; Senegal: ; South Africa: Inchauste et al., 2016; Sri Lanka: Arunatilake et al., 2016; Tanzania: Younger et al., 2016.
Data shown here is administrative data as reported by the studies cited and the number not necessarily coincide with the IADB bases (or other multilateral organization).

in Senegal only represent 0.2 percent of GDP and the most poverty reducing program, the CCT *Bourses Familiales*, 0.18 percent. Although the program intends to cover all the extreme poor in the country, which is commendable, the distributed amount seem to be very small, representing only 5 percent of the disposable income of the bottom decile. Finally, targeting seems to be an issue as well, as 30 percent of the benefits still go to non-poor households.

Figure 24: Incidence of direct transfers (percentage Market Income)



Source: Authors' estimates based on ESPS 2011.

5. Conclusions and policy implications

The fiscal system can be instrumental to make growth more inclusive, a necessary condition if the country wants to fulfil its vision to become an emerging economy by 2030. Recent economic developments are encouraging, as in both 2015 and 2016 the Senegalese economy expanded by 6.5 percent, unprecedented since the beginning of the years 2000, getting close to the objective of reaching 8 percent annual growth by 2018. However, evidence shows that growth alone is not enough to make a dent in poverty, particularly when inequality is high. Not only that, but under certain circumstances inequality (and poverty) can jeopardize the growth process itself, making the promotion of wellbeing and equality not only a social justice goal, but also smart economics and a political imperative (IMF 2014). The fiscal system can go a long way in the direction of increasing inclusiveness by implementing an equitable system where a fair contribution is requested from all who can afford it, while services and social assistance are provided in return, ideally to all but particularly to those who could not afford them otherwise.

The analysis conducted in this study reveals that the fiscal system, as it was in 2015, reduces inequality considerably, but its effect on poverty is much smaller. The comprehensive incidence analysis based on the CEQ methodology adopted in this study allowed an investigation of the effect of selected revenue and expenditure components of the fiscal

system on poverty and inequality, as well as of each intervention. Fiscal interventions bring Gini inequality down from 0.39 to 0.35, placing Senegal among the top performers in terms of redistributive effect, when benchmarked with other countries undergoing a similar CEQ exercise. The only two components of the system that increase inequality are the expenditure on tertiary education and the subsidy to electricity. On the other hand, the effect of the overall system on poverty is much smaller, with both poverty and extreme poverty going down by only 1 p.p.

The fiscal gains to the poor outweigh fiscal impoverishment. In the case of Senegal, while 1 percent of the population (or 2.7 percent of the post-fiscal poor as measured with the $1.9/day poverty line) are impoverished by the fiscal system, 25.1 percent of the total population (or 68.4 percent of the pre-fiscal poor) are fiscal gainers. In other words, the magnitude of annual fiscal gains (78 million dollars) is almost 26 times larger than that of FI (2.9 million dollars).

Despite the overall positive effect of the system, there is room for improvement to increase the poverty reducing effect of the fiscal system. The analysis identified possible areas of reform both on the revenue and expenditure side, which would increase the redistributive and poverty reducing effect of the fiscal interventions. In particular, three policy relevant messages emerged.

First, while taxation is the main contributor to inequality reduction, it also increases poverty, particularly due to indirect taxes. Direct taxation on personal income is virtually neutral on poverty, as more than 90 percent of its collection is concentrated in the top decile of the distribution, basically the formal workers of the private sector and a quarter of the civil servants, representing only 20 percent of the total labor force. This heavy concentration in the top decile also explains the big redistributive effect of this measure. On the other hand, the Value Added Tax does have an impoverishing effect increasing the headcount by almost 5 p.p, as it is paid by poor and non-poor households alike, based on their consumption. Altogether, taxation increases poverty by more than 6 p.p.

Therefore, an expansion of the tax base for personal income tax and a rebalancing of the system in favor of direct taxation would help increase the poverty reducing effect of the fiscal system, while further increasing its equity. In 2015, budget revenues were composed by indirect taxes at 71 percent of the total, direct taxes accounting for roughly 28 percent. This is a common situation in countries where informality is high, as in Senegal where the informal sector represents half of GDP while over 80 percent of waged labor is informal. However, this situation comes with a cost: not only is the VATs traditionally regressive, but the concentration of direct taxation in the top decile overburdens a small share of the population generating several disincentives, including to formalize. While the government has already gone a long way in trying to caution the regressivity of the VAT through granting reductions and exemptions to a broad range of products (to the point that this tax is marginally progressive in Senegal), more could be done in terms of expanding the tax base for direct taxation by revisiting the imposition threshold, tax civil servants' benefits, fighting fiscal evasion and reaching out to the informal sector. This would allow achieving two objectives: reducing the post-taxes poverty increase on the one hand; and increasing the equity of the system on the other.

Second, social spending could play a stronger redistributive role by being scaled up or better targeted. Direct transfers are the interventions that have the highest effect on both inequality (on the expenditure side) and poverty, yet, the latter is marginal. There are two reasons for this: first, direct transfers represent only 0.7 percent of total expenditure (0.2 percent of GDP). Countries who managed to achieve bigger impacts on poverty, such as Sri Lanka, devoted a larger share of their expenditure to direct transfers. Second, a considerable amount of these benefits go to non – poor households, between 20 and 30 percent in the case of the CCT program PNBSF.

To this end, a reallocation of funds based on the efficiency of the interventions could allow the scaling up of effective interventions, increasing the poverty reducing effect of the system. CCT *Bourses Familiales* and agricultural subsidies both present a positive marginal contribution to poverty reduction. While representing more in terms of both total expenditure (1.5 percent) and GDP (0.4 percent), the marginal contribution of agricultural subsidies is lower for moderate poverty but higher for extreme poverty. However, CCT *Bourses Familiales* is the most effective and efficient intervention to reduce poverty: one percent of GDP spent on CCT *Bourses Familiales* would potentially reduce poverty by 3.5 percent points, while one percent of GDP spent on the subsidy to agricultural inputs would potentially reduce poverty by almost 1 percentage points, but the same amount spent on electricity subsidies would potentially reduce poverty by only 0.06 percentage points. However, while agricultural subsidies mostly go to poor households (75 percent) and their efficiency could be further improved by introducing a targeting system which is currently absent, electricity subsidies by definition go to Senelec subscribers, which currently are concentrated among the top quintiles of the distribution[27]. It is important to mention two aspects related to electricity subsidies: first, even though subsidies to electricity increase inequality and present almost no effect on poverty reduction, some poor people are benefiting from them, therefore any reform to this (or any) subsidy needs to find ways to compensate for the welfare loss by vulnerable groups; second, electricity subsidies are triggered when international prices of oil are high. The government may take the opportunity of the current low price level to reform the system and re-orient resources.

Finally, in kind transfers significantly contribute to reduce inequality, although their impact would be greater if they were more pro-poor. Expenditure in education and health reduce inequality by 0.02 Gini points (from 0.37 to .035). On the health side, general expenditure on health is not pro-poor, as almost 50 percent of the expenditure on general public health is received by the richest 4 deciles, although still progressive, while expenditure on CMU special programs is strongly pro-poor and equalizing, although very small in terms of budgetary allocation. With the progressive unfolding of the CMU initiative the redistributive effect of health expenditure in favor of the bottom of the distribution is expected to increase. The effect of education spending on inequality depends on the level, with primary being pro-poor, secondary being not pro-poor but still progressive and tertiary being regressive. Tertiary education accounts for 27 percent of total education expenditure, while enrolling only 5 percent of the population. As a result, the top decile catalyzes more than 80 percent of the benefits. This

[27] For memory: this study uses data from 2013 to simulate the effect of electricity subsidies, as these subsidies were not distributed in recent years due to the oil international oil prices.

situation is particularly worrisome in the context of Senegal, where both net and gross enrolment rates in primary are low, the quality of the service provided is underwhelming and the rate of adult illiteracy is still very high. Considering the high opportunity-cost, and while recognizing the long-term effects of spending on tertiary education in terms of growth, productivity and long-term development, efforts should be made to increase the chances of the poor to enroll in tertiary education and to make sure that these expenditures results in the creation of the appropriate skills requested by the labor market.

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Annex 1

Taxation rules

In *Global Regime*, rates are different per economic sector. So, we select self-income employed per activities reported in hhd.

- For traders and producers:

Tranche	Rate	
0	10.000.000	1
10.000.001	37.000.000	2
37.000.001	50.000.000	2.8
Minimum payment	25,000	

Source: Fiscal Code

- For service providers:

Tranche	Rate	
0	500.000	4
500.001	3.000.000	5
3.000.001	10.000.000	6
10.000.001	37.000.000	7
37.000.001	50.000.000	8
Minimum payment	30,000	

Source: Fiscal Code

- For cement and food retailers

Tranche	Rate	
0 10.000.0	00 2	
10.000.001	37.000.000	3
37.000.001	50.000.000	3.8
Minimum payment:	25,000	

Source: Fiscal Code

It is applied a progressive rate to taxable income (gross income minus standard deduction of 40 percent (maximum 900,000 CFA)

Tranche		Rate
0	630.000	0 %
630.001	1.500.000	20 %
1.500.001	4.000.000	30 %
4.000.001	8.000.000	35 %
8.000.001	13.500.000	37 %
13 500 001	More	40 %

Source: Fiscal Code

- Reduction on taxes paid according to *number of parts* (see below).

Number of parts	Rate	Minimum	Maximum
1	0 %	0	0
1.5	10 %	100,000	300,000
2	15 %	200,000	650,000
2.5	20 %	300,000	1,100,000
3	25 %	400,000	1,650,000
3.5	30 %	500,000	2,030,000
4	35 %	600,000	2,490,000
4.5	40 %	700,000	2,755,000
5	45 %	800,000	3,180,000

Source: Fiscal Code

- Number of parts according to family composition

Marital Status	No. of Units
Single, divorced or widowed without children supported	1
Married without dependent children	1.5
Single or divorced with 1 child support	1.5
Married or widowed with one child care	2
Single or divorced with 2 children in care	2
Married or widowed with two children in care	2.5
Single or divorced with 3 children in care	2.5
Married or widowed with three children supported	3
Single or divorced with four children supported	3
Increasing half share per child borne by taxpayer (maximum 5)	

Source: Fiscal Code