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Is the Moroccan Fiscal System Progressive ? A Shapley Decomposition

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Abstract/Résumé

Public policies, particularly those related to tax policy and subsidies, should help reduce poverty and inequality. However, the combination of the components of these two systems, as implemented, leads sometimes to an increase in poverty and/or inequality without this being necessarily visible. In this paper, based on data from the 2019 wave of the ONDH Household Panel Survey from Morocco, we first highlight the ifluence of taxes and subsidies on household incomes. We then derive the income variations relating to the tax burden and gains from subsidies for the different population groups. We then characterize taxes and subsidies in terms of their progressiveness and regressiveness. Finally, using a Shapley decomposition, we determine the contribution of each tax and subsidy to poverty and inequality measures. This analysis is done separately for rural and urban areas, useful to formulate recommendations on this basis. Our results show that the tax and subsidy system, taken all together, is redistributive. We can also conclude unambiguously that this system reduces poverty and inequality. However, the value-added tax (VAT) is regressive in its current form, unlike income tax, which is progressive. Finally, subsidies for primary and secondary education are highly progressive, while those for higher education are regressive,benefiting the wealthiest quintiles.

Les politiques publiques, notamment celles liées à la politique fiscale et aux subventions, devraient normalement contribuer à réduire la pauvreté et les inégalités. Cependant, la combinaison des différentes composantes dans leur mise en œuvre, conduit parfois à une augmentation de la pauvreté et/ou des inégalités sans que cela soit nécessairement visible. Dans cet article et sur la base des données de la vague 2019 de l'Enquête Panel des Ménages de l'ONDH au Maroc, nous mettons d'abord en évidence l'influence des impôts et des subventions sur les revenus des ménages. Nous dérivons ensuite les variations de revenus relatives à la charge fiscale et aux bénéfices des subventions pour différents groupes de population. Nous caractérisons ensuite les impôts et les subventions en termes de progressivité et de régressivité. Enfin, à l'aide d'une décomposition de Shapley, nous déterminons la contribution de chaque impôt et subvention aux mesures de la pauvreté et de l'inégalité. Cette analyse est effectuée en distinguant les zones rurales et urbaines afin de formuler de meilleures recommandations.

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Nos résultats montrent que le système d'impôts et de subventions, pris dans son ensemble, est redistributif. Nous concluons également sans ambiguïté que le système fiscal réduit la pauvreté et les inégalités. Cependant, la taxe sur la valeur ajoutée est régressive dans sa forme actuelle, contrairement à l'impôt sur le revenu qui est progressif. Enfin, les subventions à l'enseignement primaire et secondaire sont fortement progressives, alors que celles à l'enseignement supérieur sont régressives et profitent aux quintiles les plus riches.

Keywords/Mots-clés: Fiscal system ; Poverty ; Inequality ; Shapley decomposition ; Morocco / Fiscalité ; Pauvreté ; Inégalités ; Décomposition de Shapley ; Maroc

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1 Introduction

One of the main social and economic roles of governments is to improve and maintain the standard of living of their populations. To do this, they aim to put in place efficient redistribution systems. These are based on direct and indirect taxation combined with systems of subsidies and cash transfers designed to provide the population with totally or partially free public services (e.g. education and health). However, the overall effectiveness of these systems in fighting poverty and reducing inequality is neither guaranteed nor proven. Indeed, some combinations of all the components of these systems could even increase poverty and/or deepen inequality.

Lustig and Higgins (2012) showed that the impact of the income tax on individuals combined with the different transfers on poverty and inequality could differ from one country to another. Moreover, it is shown that increasing public spending of various kinds, including direct and indirect transfers, is neither certain, nor necessarily efficient, nor sufficient to reduce poverty and inequality. From this literature, it appears that, at least at the theoretical level, an exhaustive diagnosis of the situation must be done before any tax reform is carried out, as well as the analysis of its impact on the population.

In Morocco, the *Third National Assises of Fiscality* were held in May 2019.[1] At each of these *Assises*, the reform of VAT was on the agenda, in particular to make it a coherent, sustainable and neutral tax. Furthermore, during the drafting of each *Finance Law* and during the sessions of the *Social Dialogue* between the different partners, this reform as well as that of the income tax are discussed systematically alongside the adoption of some small measures. Moreover, the reform of the social protection system has become a national priority for the country. This has been recognized at the highest level of the Moroccan government, which considers that the social protection system is an effective way of fighting poverty and improving the living conditions of the most vulnerable households. The explicit objective is to reduce inequality, particularly in terms of wages, while maintaining the purchasing power of the population and strengthening the middle class.

In this article, we examine the effectiveness of fiscal policy in Morocco and we characterize its progressiveness and its pro-poor nature. We update the research of Abdelkhalek and Ejjanoui (2018) and Ehrhart et al. (2020), by conducting, in the first part of the study, a punctual analysis based on the usual poverty and inequality measures by exploiting the 2019 wave of the *Observa-*

[1] The two previous ones being held in 1999 and 2013.

toire National du Développement Humain (ONDH) Household Panel Survey. We enhance this work by conducting a distributional analysis based on density comparisons, stochastic dominance, incidence curves, and the impacts between counterfactual *Market income* and *Observed income*, both constructed for each household in the survey. We therefore focus on the progressive nature of tax revenue collection and social expenditure. Finally, the main contribution of this paper is to assess the impacts of different tax components (taxes and subsidies) to the variation in welfare measures (poverty and inequality) between the two incomes (*Market* and *Observed*). To do so, we use the Shapley decomposition method developed by Shorrocks et al. (2013) and implemented by Azevedo et al. (2012a).

We show that the tax/subsidy system in Morocco is pro-poor. Between a *Market income* and the *Observed income*, poverty decreases at the national level as well as in both rural and urban areas, as does inequality. Furthermore, income taxes appear to be progressive whereas the value added tax (VAT) is clearly regressive, increasing poverty and inequality. However explicit subsidies on some products (flour, butane gas, and sugar) reduce poverty, although they are not pro-poor in the sense of Kakwani et al. (2000). *A contrario*, the implicit subsidies relating to education (primary and secondary) are clearly pro-poor. The analysis obtained from the Shapley decomposition method shows that the subsidies dedicated to primary and secondary education contribute strongly to the reduction of poverty and inequality, while the subsidy for higher education does not.

In the Section 2, we briefly present the tax and subsidy system in force in Morocco. The methodology used is then presented in Section 3.1 followed by a brief description of the 2019 wave of the ONDH Household Panel Survey (Section 3.2). In Section 4, we discuss the results obtained in terms of punctual analysis of poverty and inequality. We also present a detailed distributional analysis and the contributions of each tax and subsidy components to the variation in welfare measures, before concluding and making some recommendations (Section 5).

2 About the Moroccan Fiscal System

During the 1980s, Morocco undertook a major reform of its fiscal system. Its objective was to develop a modern, coherent, efficient, and more universal fiscal system. Since then, several measures have been introduced through successive finance laws. The main taxes in force in

Morocco are set out in the *Code général des impôts* (CGI)[2] and the *Loi sur la fiscalité locale* (LFL)[3]. Other parafiscal taxes are also covered by special laws. The Moroccan tax system is divided into two main categories: direct and indirect taxes. The direct taxes include income tax (IT), corporate tax (CorpT), and other taxes. The value added tax (VAT) and the domestic consumption tax (DCT) are indirect taxes. In addition to these taxes, there are customs duties, registration and stamp duties and the special annual tax on vehicles (SATV).[4] The two principal taxes considered in this article are the income tax (IT) and the VAT supported directly or indirectly by households.

The IT applies to the income of individuals and legal entities that have not opted for corporate tax. According to the CGI, the types of income concerned by this tax are professional income, income from agricultural holdings, wage income and assimilated income, income and profits from real estate, and income and profits from transferable capital. The IT is calculated on the annual global income of taxpayers in the category of professional, salary or property income according to a progressive tariff. Other types of income are either exempted or treated in a special way.

Table 1: *Income tax scale - 2019*

Net taxable income range	IT rates	Deduction
Until 30,000MAD	Exemption	–
From 30,001 to 50,000MAD	10%	3,000MAD
From 50,001 to 60,000MAD	20%	8,000MAD
From 60,001 to 80,000MAD	30%	14,000MAD
From 80,001 to 180,000MAD	34%	17,200MAD
More than 180,000MAD	38%	24,400MAD

Source: Royaume du Maroc (2022)

This scale is based on progressive rates ranging from 0% to 38% applicable to annual income ranges from 30,001 to more than 180,000 dirhams, with an exemption threshold from 0 to 30,000 dirhams (Table 1). For each interval, a deduction is granted and the rates are applied by step. Value added tax (VAT) is a major indirect tax that came into force in Morocco in 1986. It generates the most tax revenue for the government, affecting both domestic and imported products. VAT is defined on the basis of expenditure and its coverage is very broad. Nevertheless, some sectors remain outside this taxation, especially the agricultural sector. Some retail sales and services or products are exempt by law. In 2019, the VAT rates applied in Morocco are 0% for some basic goods, 7%, 10%, 14%, and 20%. It is then proportional and

[2]See the Code général des impôts.

[3]See the Loi sur la fiscalité locale.

[4]For a detailed review of the fiscal system in Morocco, see the Ministère des Finances and Abdelkhalek and Ejjanoui (2018) ; Ehrhart et al. (2020).

affects the entire population in the same way.

In terms of subsidies, to fight poverty and reduce inequality, Morocco has implemented social policies based on direct and indirect transfers. A compensation system has been set up to maintain the prices of some commodities at given levels through subsidies. The latter seek to contain price increases and thereby preserve the purchasing power of the population. These subsidies are determined by the difference between the cost price of each product and its selling price to the population as set by the government. Since December 2015, fuel prices have been liberalized, leaving sugar, national soft wheat flour and butane the only subsidized goods. Table 2 summarizes the key information on the three subsidized commodities that directly benefit households for 2019.

Table 2: ***Subsidies by product - 2019***

	Flour	**Sugar**	**Butane gas**
Subsidy (MAD/kg or liter)	1.55	2.85	3.75
Total compensation cost (in millions of MAD*)	1,008	3,407	9,472

* The exchange rate in 2019 fluctuated between 10.60 and 11 MAD to 1 Euro.
Source: Ministère de l'Economie, des Finances et de la Réforme de l'Administration (2022); Cours des Comptes (2020).

In this paper, we mainly considered official reports published by the various government departments concerned for subsidies to primary, secondary and higher education, as well as healthcare. These include annual budgets as well as the numbers of relevant beneficiaries.

3 Methodology and Data

As previously noted, we adapt the approach developed in the *Commitment to Equity Assessment* (CEQ) project (Lustig and Higgins, 2012).[5] In addition, we complete the analyse using well-known poverty, inequality, and incidence approaches. A micro-simulated methodology has been developed to assess taxation and public expenditure systems and their impacts on poverty and inequality. This methodology has been applied to many countries in Latin America and in the MENA region, including Tunisia (Jouini et al., 2018), Egypt (Lara Ibarra et al., 2019), Jordan (Inchauste and Lustig, 2017), and Morocco (Abdelkhalek and Ejjanoui (2018); Ehrhart et al.

[5]Information avalaible online : https://commitmentoequity.org

(2020)).[6] In terms of analysis, it covers direct and indirect taxes as well as various subsidies and access to some public services (e.g. education and health).

Figure 1 shows the identification of each of the income measures needed to analyze the contribution of taxation in Morocco, based on the method developed by Lustig and Higgins (2012) and adapted by Abdelkhalek and Ejjanoui (2018).

The fact that the approach is standardized also makes it possible to compare countries in terms of performance at different levels. It should be remembered that one concept that makes it possible to evaluate the distributive impact of a fiscal policy (taxes or transfers) is progressivity, which can be approached using concentration curves and indices, the best known of which is that of Kakwani (1977).[7] The concentration coefficients are calculated according to the same principle as the Gini coefficient. They reflect the gap between the triangle of perfect equality and the areas under the concentration curve. Unlike the Gini index, this coefficient will be negative for a transfer.

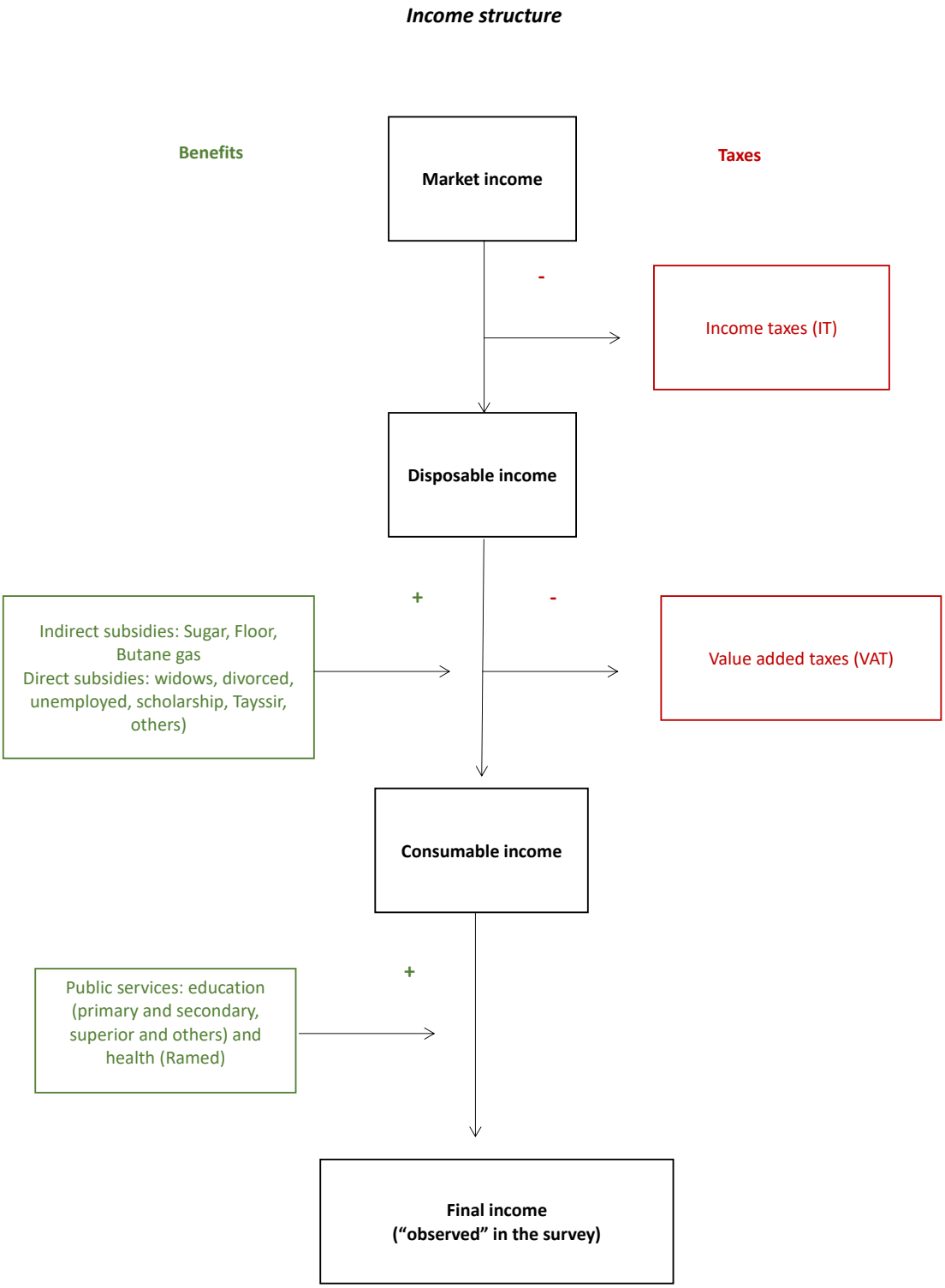
In this literature, the terms 'progressive' and 'regressive' are used in different ways for taxes and transfers. The progressive or regressive nature of a transfer or tax can first be measured in absolute terms. This involves comparing the values of that transfer or tax across quantiles of the population. This concept can also be approached in relative terms. In this case, the transfers or taxes are compared as a percentage of income (before taxes or transfers) for each quantile of the population. In tax-benefit analysis, both approaches are considered. Each provides complementary information on the concentration of taxes and subsidies and their distributive nature. In general, a transfer is progressive (regressive) if the proportion received relative to income decreases (increases) with the level of income. A transfer is progressive in relative terms, if its concentration curve lies anywhere between the first bisector and the Lorenz curve of income, since the proportion of the transfer in relation to income decreases as the level of income increases. The concentration curve of a regressive transfer is everywhere below that of the Lorenz income curve.

A transfer will be progressive in absolute terms if its concentration curve is everywhere above

[6] An associated explanatory manual (A Methodological Handbook) has been prepared and shared with countries. It presents the methodological steps for conducting a CEQ-type fiscal impact analysis.

[7] A concentration curve is very similar to a Lorenz curve. The difference is that on the vertical axis the proportions or shares of taxes or transfers analyzed, paid or received by each quantile of the population studied are plotted. As a result, the concentration curve for a transfer that would target more of the poor population may lie above the first bisector, unlike a Lorenz curve.

Figure 1: *Income Concepts and Components*



Source: Adapted from Lustig and Higgins (2012) and Abdelkhalek and Ejjanoui (2018).

the first bisector, in which case its concentration coefficient will be negative.[8] Finally, when the concentration curve of a transfer crosses the first bisector, but remains above the Lorenz curve of income everywhere, the transfer will be progressive in relative terms without ambiguity. An ambiguity exists, however, when the criterion of absolute progressiveness is used. A tax is progressive (regressive) in relative terms if it leads to a less (more) unequal distribution of income. Thus the Lorenz curve of a progressive (regressive) tax is always below (above) the one for income. It follows then that the Gini coefficient associated with the Lorenz curve of a progressive (regressive) tax is necessarily larger (smaller) than that of income. If two concentration curves intersect, there will be ambiguity in terms of the progressiveness/regressiveness of the tax. Further analysis is then necessary to conclude. A tax or transfer will be neutral in relative terms if its distribution in the population coincides perfectly with that of income. Its concentration coefficient will then be equal to the Gini index of income.[9]

To strengthen our analysis, we consider in this article the concepts of progressiveness in both absolute and relative terms. In the Section 3.3, we apply the Lustig and Higgins (2012) method and measure the contribution of each of the components to the variation in income using the Shapley decomposition.

3.1 Shapley Decomposition: Theoretical Framework

Since the 1990s, an abundant literature has been produced on the decomposition of economic phenomena, such as poverty and inequality, into component parts. However, as pointed out by Sastre and Trannoy (2002) and Shorrocks et al. (2013) among others, many of these methods have limitations from both conceptual and empirical perspectives. In this context and based on the cooperative models of game theory, several authors have developed a decomposition method based on the Shapley value (Shapley, 1953).[10] The principle of this method consists in measuring the marginal effect of the successive elimination of each component taken one by one. Since the order in which each component is eliminated is multiple and can influence the result (*pathdependence* principle), the method consists of computing the average of all possible combinations of eliminations. This average is then interpreted as the contribution of each component to the

[8] A negative concentration coefficient does not, however, imply that the transfer will be progressive in absolute terms.

[9] For more details on these concepts, see for example Duclos and Araar (2006), Chapters 7 and 8, and Khandker and Haughton (2009).

[10] For a brief literature review, see for example Sastre and Trannoy (2002) and Shorrocks et al. (2013).

indicator of interest. While Sastre and Trannoy (2002) and Chantreuil and Trannoy (2011) developed an approach based on Shapley's value to solve the problem of the inconsistency of the decomposition of inequality into different income components, Shorrocks et al. (2013) proposed a generalization of this method.

Based on the formalization chosen by Azevedo et al. (2012b), Shorrocks et al. (2013) and Baye (2006), we consider a well-being indicator such as for example, income, Y^h for the individual h ($h = 1, \ldots, H$). This indicator is a function of N components c_k^h (with k, an element of the set $\mathrm{K} = \{1, \ldots, N\}$) such as $Y^h = f\left(c_1^h, c_2^h, \ldots, c_N^h\right)$ with $f(.)$ a function not necessarily linear. Let us define I, an index of interest as a function of Y^h such that $I(Y^1, Y^2, \ldots, Y^H) = I\left(f\left(c_1^1, c_2^1, \ldots, c_N^1\right), f\left(c_1^2, c_2^2, \ldots, c_N^2\right), \ldots, f\left(c_1^H, c_2^H, \ldots, c_N^H\right)\right)$.

Let us note S all subsets of K such that $\mathrm{S} \subseteq \mathrm{K}$ and $I(\mathrm{S})$ a characteristic function with argument S. Let $I(\mathrm{S})$ be the value that the interest index takes on when the components c_k, $k \notin \mathrm{S}$ remain unchanged between two states of nature (t) which can be two periods or a scenario ($t = 1$) and a reference situation ($t = 0$).[11] By convention, if no component is considered, I will be null, i.e. $I(\varnothing) = 0$.

Let ϕ_k be the marginal contribution of each of the N components c_k to the total variation of the interest index I between $t = 0$ and $t = 1$. Shapley's method calculates the c_k contribution as the weighted average of the marginal contributions of the k components, $I(\mathrm{S} \cup \{k\}) - I(\mathrm{S})$, for any subset S ($\mathrm{S} \subseteq \mathrm{K} - \{k\}$) with *Cardinal* $|\mathrm{S}| = s$. This marginal contribution, ϕ_k, therefore represents the change in I associated with the addition of the k^{th} component.

Given the *pathdependence* problem mentioned earlier, it is important to consider the order σ in which the component k is added to the components already considered in S such that $\sigma = (\sigma_1, \sigma_2, \ldots, \sigma_{k-1}, \sigma_k, \sigma_{k+1} \ldots, \sigma_N)$. It follows that the value $I(\mathrm{S})$ is obtained by considering the s first components of σ contained in S. The contribution of the components included in S is measured by the probability that the s first components of σ belong to S. This probability is obtained by considering a number of favorable cases (numerator) over a number of possible cases (denominator). The numerator is the result of the product of the number of permutations of the s first components of S ($s!$) by the number of permutations of the other components not belonging to S and different from the k^{th}, $(N - s - 1)!$. In other words, the number of arrangements in which the s first components belong to S is given by $s!(N - s - 1)!$. The denominator is none other than the total number of permutations or $N!$.

[11] To simplify the notation, we will note c_k the vector of the k^{th} component relative to the H individuals.

It follows that the Shapley value of the component k, ϕ_k:

$$\phi_k = \sum_{s=0}^{N-1} \sum_{\substack{\mathrm{S}\subseteq K-\{k\} \\ |\mathrm{S}|=s}} \frac{s!(N-s-1)!}{N!}[I(\mathrm{S}\cup\{k\}) - I(\mathrm{S})]. \tag{1}$$

In this article, we decompose the variable of interest, i.e. final (or observed) income, into market income and all other components (taxes and subsidies). Next, we identify the marginal contributions of each component, using Shapley's method, to the transition of poverty and inequality measures between *Market income* and *Observed income* prevailing in 2019.

3.2 Data

In this article, we use household survey data from the fifth wave of the 2019 *Enquête Panel de Ménages* (EPM) from the *Observatoire National du Développement Humain* (ONDH). Since 2017, the ONDH survey has ensured regional representativeness (the 12 regions of the country in addition to national and by areas of residence).[12] In 2019, the initial base used has 16,879 households representing 71,798 individuals. After extrapolating, we are dealing with a population of more than 35.5 million Moroccans.[13]

The questionnaire for the first survey has 17 components and provides information on the main dimensions of human development including education, health and access to basic services, income, consumption expenditures, detailed food expenditures, detailed non-food expenditures of each household, as well as all transfers paid and/or received by the household. It also provides all relevant information on household members (socio-demographic characteristics, literacy, education, employment, unemployment and economic activity, etc.).[14] The extensive information contained in this survey allowed us to conduct the analysis proposed in this article according to the methodology chosen.[15]

[12]For the first three waves, national representativeness and by areas of residence (urban and rural) were ensured with a sample size of approximately 8,000 households. For the last two waves (2017 and 2019), the sample size was more than doubled to almost 17,000 households.

[13]In some of the treatments conducted in this work, the sample sizes appear slightly different. This is because we did not impute any missing data in the different files.

[14]The ONDH 2019 Household Panel Survey questionnaire is available online : http://www.ondh.ma/fr/data/questionnaire-de-lenquete-panel-de-menages-2019.

[15]We thank ONDH for giving us access to the required modules to carry out our work.

3.3 Implementation

To carry out our analysis, we construct all the variables of interest. First, the different income components, particularly those subject to income tax (IT), are identified for each household member. The survey identifies 24 sources of income that are not taxed uniformly. These include income from agricultural and non-agricultural activities, transfers, pensions, etc. The IT at the individual level is first deduced and then aggregated at the household level.

Furthermore, based on the official nomenclature of products and on the goods in the ONDH survey (around 1,300 products), we deduct the value added tax (VAT) paid by households based on 2019 rates. Similar work is done for subsidies for subsidized products. As mentioned above, we have taken into account the fact that two products subsidized in 2012 and considered in Abdelkhalek and Ejjanoui (2018) were no longer subsidized in 2019 (gasoline and diesel).

With regard to education-related subsidies, we differentiated between primary and secondary levels, higher education and, finally, other subsidies indirectly linked to education. For these latter subsidies, inspired by Ehrhart et al. (2020), we retained the Tayssir program, school canteens and school transport, internships and the *Un million de cartables* program. These are the only programs documented in the survey used. To take into account the two *education* subsidies (primary-secondary and higher education), we divided the Ministry of Education budget for each cycle by the number of pupils or students in each cycle, and allocated this amount to households with children enrolled in school.

On the same principle, for health-related subsidies, we considered the annual budget of the RAMED program in relation to the number of members in the same year, and allocated this amount to the households in the survey that declared they had a RAMED card.[16]. The *per capita* income variables (observed and recommended in the CEQ approach) are calculated.

Once the treatments have been completed, we obtain, in addition to *Observed income*, three other types of income: *Consumable income*, *Disposable income* and *Market income*. Finally, the decomposition is based on eight components (taxes and subsidies).

[16]Volet 5 of the EPM 2019 contains information on medical consultations, particularly in the public sector. However, we did not have access to this part of the survey.

4 Results and Discussion

4.1 Inequality and Poverty

In terms of inequality, taxes and subsidies are progressive as expected, whatever the index chosen (Table 3). Income taxes have a greater redistributive impact in urban areas, while subsidies have a greater effect in rural areas. For example, subsidies for public services (health and education) reduce the Gini index (Resp. Theil) by 27.76% (Resp. 36.37%) in rural areas, versus only 11.65% (Resp. 11.88%) in urban areas (variation between *Observed income* and *Consumable income* in the Figure 1). We also note that the effects of VAT and indirect subsidies (change from *Disposable income* to *Consumable income*) are weaker than those associated with public services. We can already clearly see the important redistributive role of education and health subsidies.

Table 3: Gini and Theil inequality indices

	Areas	**Gini**	**Theil**
Market Income	Morocco	0.470	0.434
	Urban	0.449	0.397
	Rural	0.401	0.290
Disposable Income	Morocco	0.438	0.369
	Urban	0.418	0.338
	Rural	0.380	0.253
Consumable Income	Morocco	0.435	0.365
	Urban	0.416	0.336
	Rural	0.376	0.249
Observed Income	Morocco	0.378	0.284
	Urban	0.367	0.296
	Rural	0.272	0.159
Expenditure	Morocco	0.359	0.252
	Urban	0.343	0.234
	Rural	0.280	0.135

Source: Authors from EPM 2019.

With regard to poverty, we again observe a reduction in poverty at national level, as well as in urban and rural areas (Table 4). This reduction is mainly observed between *Consumable income* and *Observed income*. For example, subsidies for health and education reduce the incidence of poverty by over 60% in rural areas (−61.46%) and by 40.51% in urban areas. In terms of taxes, VAT unsurprisingly leads to an increase in poverty (change between *Disposable income*

and *Consumable income*). However, Table 5 shows that the poorest pay less VAT, since it is directly linked to quantities consumed, which are lower for the poor. Income taxes also increase poverty, but only in rural areas. This increase remains low, which can be explained by the fact that rural households paying income tax are not poor households. Here again, Table 5 confirms that over 50% of the poorest rural households do not pay income tax.

For urban households, we see a slight drop in the incidence of poverty following the introduction of income tax. This surprising result is explained by the fact that the poverty line used is a relative one. Figure 7 in the Appendix illustrates this result. At a constant poverty line, IT reduces incomes, implying an increase in the incidence of poverty ((a) to (b)). However, the shift in the income distribution leads to a reduction in the mean and median, and therefore in the relative poverty line considered. Thus, in the case of urban households, the fall in the relative poverty line is greater than the rise in the incidence of poverty associated with the income tax introduction ((b) to (c)).

Table 4: FGT poverty indices

	Areas	FGT_0	FGT_1	FGT_2
Market Income	Morocco	0.226	0.075	0.037
	Urban	0.231	0.072	0.033
	Rural	0.217	0.080	0.043
Disposable Income	Morocco	0.218	0.071	0.035
	Urban	0.218	0.066	0.030
	Rural	0.218	0.080	0.043
Consumable Income	Morocco	0.220	0.070	0.034
	Urban	0.221	0.066	0.029
	Rural	0.219	0.078	0.041
Observed Income	Morocco	0.114	0.020	0.005
	Urban	0.132	0.024	0.007
	Rural	0.084	0.014	0.003
Expenditure	Morocco	0.110	0.019	0.005
	Urban	0.123	0.022	0.006
	Rural	0.087	0.013	0.003

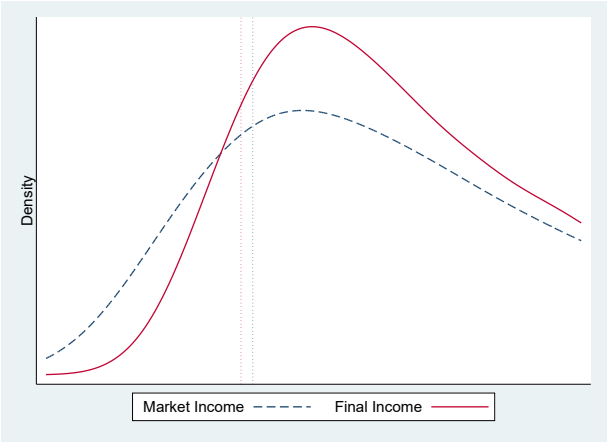
Source: Authors from EPM 2019.

In distributional terms, we see that densities after the imposition of taxes and subsidies have shifted to the right, with a clearly greater effect for rural areas (Figures 2- a and 2- b).

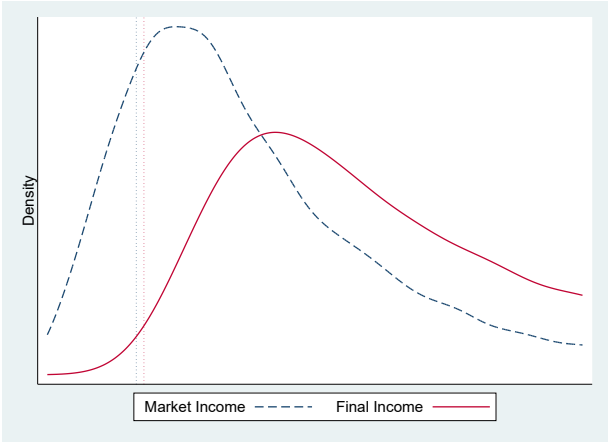
The stochastic dominance analysis between the *Market income* distribution and that obtained after application of taxation and payment of subsidies (*Observed income*) shows the absence of stochastic dominance of order 1, both at national level and for urban and rural areas (Figures 3 - a, - b, and - c). This means, however, that for plausibly low poverty lines, the tax system as a

Figure 2: ***Density function curves***

a - Urban



b - Rural



Source: Authors from EPM 2019.

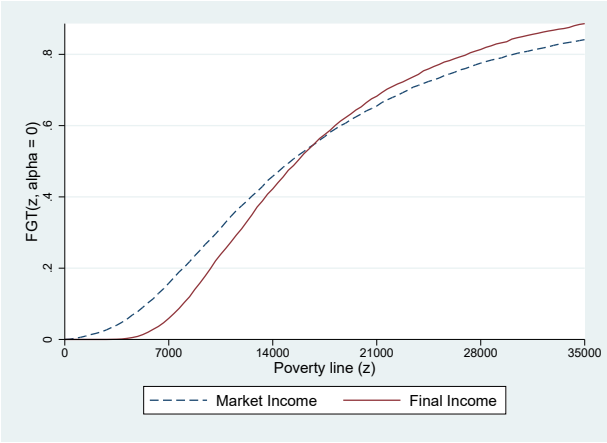
whole reduces poverty. This is confirmed by the analysis of second-order stochastic dominance. Indeed, the final distribution dominates the initial distribution (*Market income*) for high threshold values (Figures 8). This corroborates the results obtained with the punctual approach.

Finally, to reinforce our results, we conduct an incidence analysis of the Moroccan tax system, assessing its pro-poor character using the concept of incidence curves introduced by Ravallion and Chen (2003). These curves show, for both areas, that the system is clearly pro-poor in the sense of Ravallion and Chen (2003), since everyone wins (growth rates are all positive). We also conclude that this system is pro-poor in relative terms in the sense of de Kakwani et al. (2000) with clearly decreasing incidence curves. Indeed, Figure 4-a shows that in urban areas, the poorest half of the population saw their incomes rise by more than the average for the population as a whole, with growth rates of over 25% for the poorest quintile. In rural areas, slightly more than the poorest 40% earned more than the average increase, again with growth rates in excess of 25% for the poorest quintile (Figure 4-b).

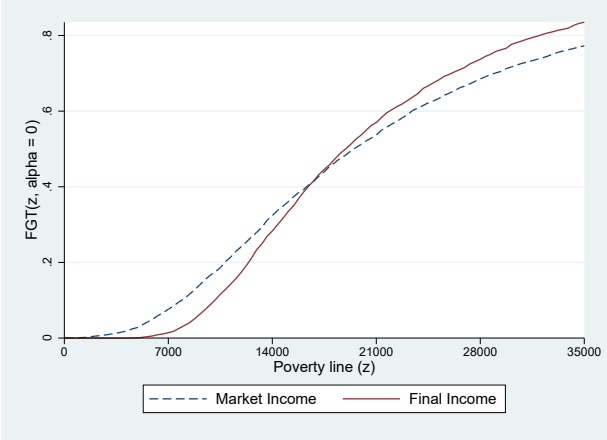
So, with this selective analysis of poverty and inequality completed by a distributive analysis, we confirm the progressive role of taxation and budgetary measures in force in Morocco. In the next section, we determine the contribution of each considered tax and subsidy to poverty and inequality measures between the *Market income* and the *Observed income*.

Figure 3: ***Stochastic dominance test - Order 1***

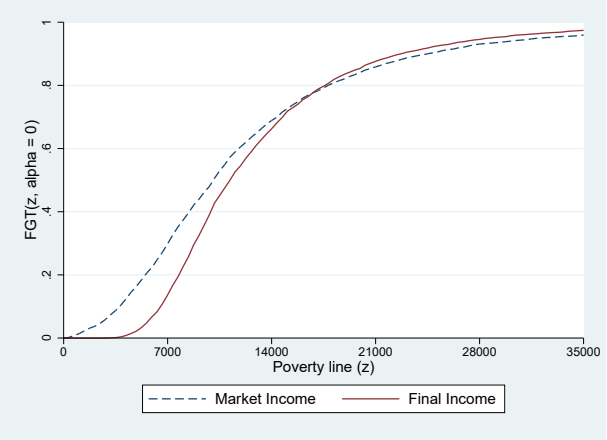
a - Morocco



b - Urban



c - Rural



Source: Authors from EPM 2019.

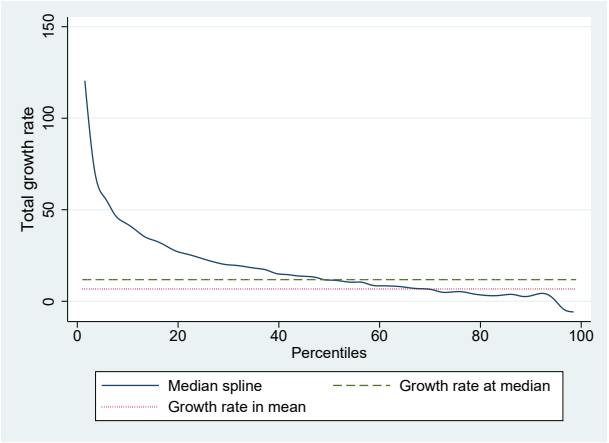
4.2 Contribution of Moroccan Fiscal Components

Table 5 summarizes statistics on the distribution of *Market income* and *Observed income*, as well as for each of the two taxes (IT and VAT) and the six subsidies considered. As mentioned above, over a quarter of Moroccans pay no income tax. In rural areas, more than 50% of the population is exempt. Table 6 allows us to confirm that this tax (IT) is indeed progressive, since as the level of *Observed income* increases, so does the share of that income paid in IT. We also see that the share paid by the first quintile of the *Observed income* distribution of total income taxes is 1.43%, while the wealthiest 20% pay more than 60% of government revenues from this tax.

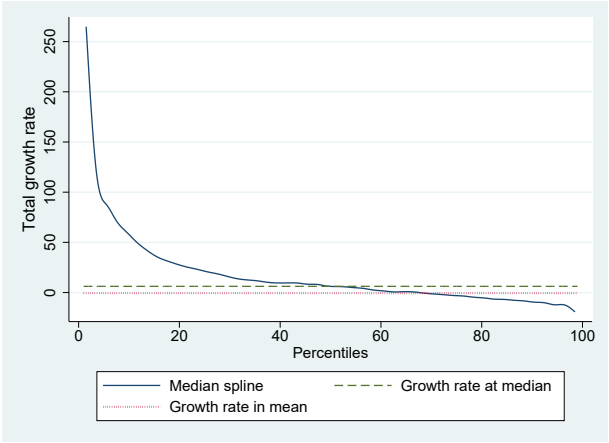
The results for value-added tax (VAT) are different. All Moroccans pay such taxes (Table 5).

Figure 4: ***Incidence curves on income***

a - Urban



b - Rural



Source: Authors from EPM 2019.

As expected, people living in urban areas pay more VAT than those in rural areas. Moreover, the latter benefit less from compensation on subsidized products than urban households. Table 6 also shows that VAT accounts for between 5% and 6% of final household income, whatever the quintile and areas. In contrast, the poorest 20% of Moroccans pay 8.06% of the total value of VAT paid in Morocco. In urban areas, the top quintile of individuals pay only 2.97% of the VAT collected in the cities. By contrast, the poorest 20% of rural households pay one-fifth (20.79%) of the VAT paid by all rural households, as do the other quintiles.

In terms of school subsidies, we note that those associated with primary and secondary education do not affect individuals in the same way as those corresponding to higher education. On average, people living in rural areas receive *per capita* more school subsidies for primary education than those living in urban areas (1746.91 MAD versus 1572.32 MAD) (Table 7). We observe the opposite for higher education subsidies, with an average of 392.42 MAD for urban households compared to 154.32 MAD in rural areas. Other education-related subsidies also target rural areas more than urban ones. This arises from the government's efforts to combat school drop-out rates in rural primary schools, and initiatives such as the Tayssir program. In terms of progressivity, subsidies for primary and secondary education represent a larger share for the first quintile of the *Observed income* distribution (28.02%) for Morocco. This share decreases to just 1.63% for the richest individuals (quintile 5). In rural areas, the poorest receive 44.27% of the total subsidy paid by the government, while in urban areas, quintiles 2 and 3 receive almost 50% of the subsidy paid in the cities (Tables 9 and 10). On the other hand, the share of subsidies

Table 5: Statistics for Morocco and by areas

	Total	Mean	p10*	p25*	p50*	p75*	p90*
MOROCCO							
Market Income	1.502e+9	21043.95	5287.82	8709.09	14368.51	24584.85	40607.07
Observed Income	1.402e+9	19646.4	7700	10205.83	14899.44	22663.79	34366.4
Income Taxes	1.853e+8	2596.43	0	0	393.94	2261.91	6882.42
VAT	79598648	1115.59	372.89	534.5	817.12	1332.45	2084.59
Other Subventions	7365942	103.24	0	0	0	0	0
Comp. Prod. Sub.	22373254	313.57	132.35	183.82	265.6	386.46	548.42
Educ. Sup. Sub.	20350981	285.22	0	0	0	0	1447.85
PrimSec Educ. Sub.	1.088e+8	1524.24	0	0	1388.65	2777.29	4165.94
Other Educ. Sub.	3537888.6	49.58	0	0	0	21.14	63.43
Health Subsidies	2756140.3	38.63	0	0	0	90.28	108.34
URBAN							
Market Income	5.930e+11	28570.43	7858.88	12141.75	19497.67	32838.47	53596.46
Observed Income	5.260e+11	25336.43	10140	13307.09	18925.57	28632.3	43779.98
Income Taxes	8.734e+10	4209.34	0	0	916.67	4671.43	10152.38
VAT	3.022e+10	1456.75	502.98	701.86	1049.14	1687.23	2739.24
Other Subventions	2.129e+9	102.63	0	0	0	0	0
Comp Prod. Sub.	6.647e+9	320.39	145.59	202.49	275.45	390.11	537.22
Educ. Sup. Sub.	8.142e+9	392.42	0	0	0	0	1930.47
PrimSec Educ. Sub.	3.262e+10	1572.32	0	0	1388.65	2777.29	4165.94
Other Educ. Sub.	2.842e+8	13.7	0	0	0	0	37
Health Subsidies	6.358e+8	30.64	0	0	0	72.23	108.34
RURAL							
Market Income	1.560e+11	12955.19	3755.33	6332.68	10057.34	15826.26	24500.86
Observed Income	1.640e+11	13564.38	6502.32	8307.92	11183.79	16000	22716.66
Income Taxes	1.231e+10	1021.24	0	0	0	760	2854.88
VAT	9.347e+9	775.33	310.47	419.35	605.26	947.38	1442.05
Other Subventions	9.837e+8	81.6	0	0	0	0	200
Comp Prod. Sub.	3.425e+9	284.07	111.18	165.44	238.43	352.18	508.03
Educ. Sup. Sub.	1.860e+9	154.32	0	0	0	0	0
PrimSec Educ. Sub.	2.106e+10	1746.91	0	0	1666.37	2777.29	4165.94
Other Educ. Sub.	1.091e+9	90.49	0	0	0	45.31	146.64
Health Subsidies	5.831e+8	48.36	0	0	43.34	108.34	108.34

Source: Authors from EPM 2019.
* Values of the percentile. The zeros are therefore effectively zero values and indicate, for example, that only urban households above the 90^{th} percentile receive *Other subventions*. Several subsidies considered are very low on a *per capita* basis. However, we have maintained them in our decomposition to highlight this weakness.

for higher education is more or less the same for all quintiles across the country (between 1.07% and 1.85%). When we distinguish between areas of residence, it appears that in urban areas, the first three quintiles receive slightly more than the richest individuals in terms of *Observed income*. In rural areas, only quintile 5 receives a smaller share than the least affluent 80% of the population. Finally, unlike the subsidy for primary and secondary education, we find that the subsidy for higher education is regressive across Morocco and in urban areas, since the higher

Table 6: Distribution of Income taxes and VAT by quintile

		Income Taxes			VAT		
	Observed Income	Total	% of total Income taxes	% of Observed Income	Total	% of total VAT	% of Observed Income
MOROCCO							
Quintile 1	123600407	3103996	1.43%	2.51%	6934928	8.06%	5.61%
Quintile 2	174523037	8824618	4.07%	5.06%	9915278	11.52%	5.68%
Quintile 3	219903177	17845735	8.23%	8.12%	12819252	14.89%	5.83%
Quintile 4	307737131	36244487	16.72%	11.78%	18336413	21.30%	5.96%
Quintile 5	595188688	130817319	60.36%	21.98%	33623332	39.06%	5.65%
Total	1499095708	216743095	100.00%	14.46%	86072456	100.00%	5.74%
URBAN							
Quintile 1	30754707	1019522	0.62%	3.32%	1685709	2.97%	5.48%
Quintile 2	80689127	4570495	2.79%	5.66%	4530104	7.99%	5.61%
Quintile 3	130670534	11444309	6.99%	8.76%	7539978	13.30%	5.77%
Quintile 4	216648891	27372212	16.71%	12.63%	12841228	22.66%	5.93%
Quintile 5	503708157	112881991	68.93%	22.41%	28757226	50.74%	5.71%
Total	985713689	163764523	100.00%	16.61%	56674738	100.00%	5.75%
RURAL							
Quintile 1	92314852	2003619	6.05%	2.17%	5230325	20.79%	5.67%
Quintile 2	93357786	4006011	12.09%	4.29%	5382848	21.40%	5.77%
Quintile 3	88987970	6058563	18.28%	6.81%	5294794	21.05%	5.95%
Quintile 4	90666046	7912767	23.88%	8.73%	5503229	21.88%	6.07%
Quintile 5	83760060	14772587	44.58%	17.64%	4226215	16.80%	5.05%
Total	440109913	33135001	100.00%	7.53%	25156425	100.00%	5.72%

Source: Authors from EPM 2019.

the *Observed income*, the higher the share of the subsidy received. In rural areas, the subsidy appears to be neither regressive nor progressive.

Furthermore, the health subsidy remains marginal, averaging 38.63 MAD *per capita* in Morocco, only slightly higher in rural areas (48.36 MAD) and lower in urban areas (30.64 MAD) (Table 5). In addition, we see that the share of this subsidy is very low for all quintiles, and virtually nil for quintile 5 (Table 7). Identical results were obtained for urban and rural areas. In terms of progressiveness, the results show that this subsidy is progressive, since once again it is the poorest who benefit most, with 34.56% of the subsidy going to the poorest 20% of the population, while only 6.6% goes to the richest quintile. This result can also be observed in rural areas, where 43.92% of the health subsidy is redistributed to quintile 1 (Table 10). In urban areas, however, this subsidy appears to be regressive, with the exception of quintile 5, which receives only 10.38% of the subsidy (Table 9). All these results corroborate with the idea that the wealthiest would probably make greater use of the private healthcare system in Morocco.

Table 7: Distribution of subsidies by quintile for Morocco

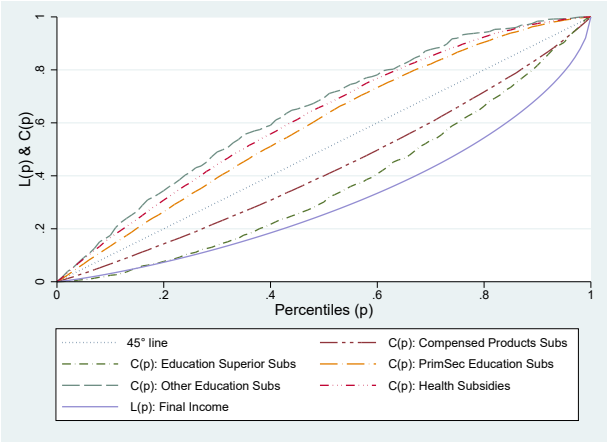
Morocco	Observed Income	Compensed Products Subs.			Health Subs.		
		Total	% of total comp. Prod. Subs.	% of Observed Income	Total	% of total health Subs.	% of Observed Income
Quintile 1	123600407	3516102	16.05%	2.84%	916288	34.56%	0.74%
Quintile 2	174523037	3773112	17.22%	2.16%	693886	26.17%	0.40%
Quintile 3	219903177	4070055	18.58%	1.85%	545351	20.57%	0.25%
Quintile 4	307737131	4725821	21.57%	1.54%	405824	15.31%	0.13%
Quintile 5	595188688	5393978	24.62%	0.91%	175171	6.61%	0.03%
Total	1499095708	21907715	100.00%	1.46%	2651103	100.00%	0;18%
	Observed Income	**Education Superior Subsidies**			**PrimSec Education Subsidies**		
		Total	% of total Sup. educ. Subs.	% of Observed Income	Total	% of total PrimSec. educ. Subs.	% of Observed Income
Quintile 1	123600407	1878606	8.63%	1.52%	34637042	29.66%	28.02%
Quintile 2	174523037	3196686	14.69%	1.83%	30146688	25.82%	17.27%
Quintile 3	219903177	4060145	18.66%	1.85%	25472508	21.82%	11.58%
Quintile 4	307737131	5468023	25.13%	1.78%	19574943	16.76%	6.36%
Quintile 5	595188688	6362314	29.24%	1.07%	9703719	8.31%	1.63%
Total	1499095708	21755990	100.00%	1.45%	116764634	100.00%	7.79%
	Observed Income	**Other Education Subsidies**					
		Total	% of total Other. educ. Subs.	% of Observed Income			
Quintile 1	123600407	1153220	38.56%	0.93%			
Quintile 2	174523037	772424	25.83%	0.44%			
Quintile 3	219903177	559638	18.71%	0.25%			
Quintile 4	307737131	469522	15.70%	0.15%			
Quintile 5	595188688	152462	5.10%	0.03%			
Total	1499095708	2990972	100.00%	0.20%			

Source: Authors from EPM 2019.

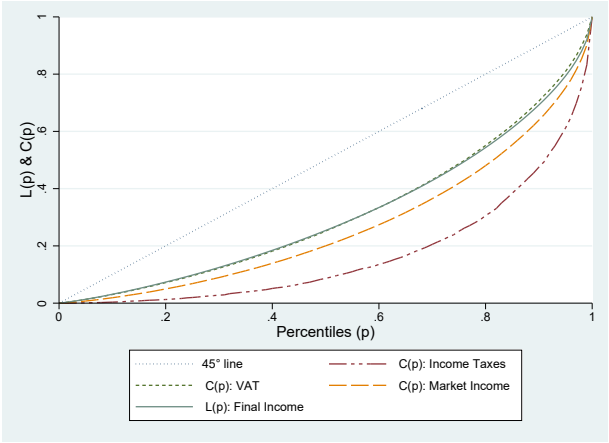
Lorenz and concentration curves for all considered components confirm the previous analysis. Subsidies tend to reduce inequalities, while IT and VAT increase them (Figures 5 a- and b-). Thus, subsidies for higher education and subsidized goods appear regressive, unlike subsidies for health or primary and secondary education (Table 8). Similar results are obtained for urban and rural areas (Figures 10 and 9).

Figure 5: ***Lorenz and concentration curves: Morocco***

a - Subsidies



b - Taxes



Source: Authors from EPM 2019.

Finally, we measured the contribution of each tax and subsidy when moving from *Market income* to *Observed income*, applying the Shapley decomposition method introduced earlier.[17] Overall, this method enables us to corroborate the results obtained previously. Taxes increase poverty, while subsidies as a whole reduce its incidence in Morocco. In terms of taxes, VAT increases both poverty (23%) and inequality (3.3%). So, as several authors have noted[18], this indirect tax is regressive in Morocco. As a result, any reform of the tax system should be undertaken with caution, so the situation of Moroccans is not worsened. As Alavuotunki et al. (2019) pointed out, the alternative is to have a progressive income tax. This is also the case in Morocco. We obtain a positive contribution to the variation in poverty (+16.1% for FGT_0) and a negative contribution to inequality (−38.9% for the Gini index).

Regarding subsidies, our analysis shows that those for primary and secondary education contribute to both poverty reduction (−97.7%) and inequality reduction (−47.8%) in Morocco.

[17] In the article, we only present results for the incidence of poverty (FGT_0) and for the Gini index. Decompositions of the other indices are available from the authors on request.

[18] See for example Ruiz and Trannoy (2008), Abdelkhalek and Boccanfuso (2022) and Thomas (2020) for a more exhaustive review.

We confirm the finding previously made concerning higher education subsidies, namely that although they help reduce the incidence of poverty, their contribution to inequality remains marginal (−0.4%). This result can be observed in all areas, although the contribution is greater in rural than in urban areas. This leads us to conclude that the government's efforts on programs targeting primary and secondary education, as well as other programs (such as Tayssir), should be maintained or even reinforced by other programs, given their greater impact on well-being.

Table 8: Concentration index by subsidy and areas

	Subsidies	Concentration index	Standard Deviation	Lower Bound	Upper Bound
Morocco	Other Subventions	0.200	0.024	0.152	0;248
	Compensed Products Subsidies	0.142	0.002	0.139	0.145
	Education Superior Subsidies	0.265	0.008	0.250	0.281
	PrimSec Education Subsidies	-0.174	0.003	-0.179	-0.168
	Other Education Subsidies	-0.281	0.011	-0.303	-0.259
	Health Subsidies	-0.234	0.003	-0.240	-0.228
Urban	Other Subventions	0.242	0.032	0.179	0.304
	Compensed Products Subsidies	0.147	0.002	0.143	0.151
	Education Superior Subsidies	0.178	0.009	0.159	0.196
	PrimSec Education Subsidies	-0.224	0.004	-0.231	-0.216
	Other Education Subsidies	-0.211	0.025	-0.261	-0.162
	Health Subsidies	-0.288	0.005	-0.297	-0.279
Rural	Other Subventions	0.107	0.017	0.074	0.140
	Compensed Products Subsidies	0.129	0.003	0.124	0.135
	Education Superior Subsidies	0.239	0.015	0.210	0.268
	PrimSec Education Subsidies	-0.107	0.004	-0.114	-0.100
	Other Education Subsidies	-0.015	0.013	-0.041	0.011
	Health Subsidies	-0.092	0.004	-0.100	-0.084

Source: Authors from EPM 2019.

Subsidies on flour, sugar, and gas also contribute to reducing poverty in Morocco (−13.8%). However, we note that the contribution to reducing inequality is only −3.9%. Furthermore, our results show that individuals living in urban areas benefit more from these subsidies in terms of their contribution to poverty reduction than those living in rural areas. This result shows that compensation does help poor households, but also benefits clearly the less poor. The abolition of the compensation fund, as currently being discussed by the government, needs to be assessed in terms of its impact on poverty and inequality, taking into account not only the changes in behaviour that this would imply, but also the impact on the prices of other goods and therefore on expenditure.

Finally, although the health subsidy is progressive, its effects are relatively weak. The contribution to poverty reduction is equal to 5.9%, while that to inequality reduction is only 1.0% in Morocco. We also note that this subsidy contributes very little to reducing poverty and inequality in rural areas.

5 Conclusion

In this article, we proposed a detailed diagnosis of the tax and subsidy system in Morocco for 2019. This allows to identify and specify whether subsidies and the main taxes are progressive or regressive. Using Shapley's decomposition method, we also measure the contribution of each component of the Moroccan fiscal system to the passage from counterfactual *Market income* to *Observed income*, the income of individuals without taxes or subsidies.

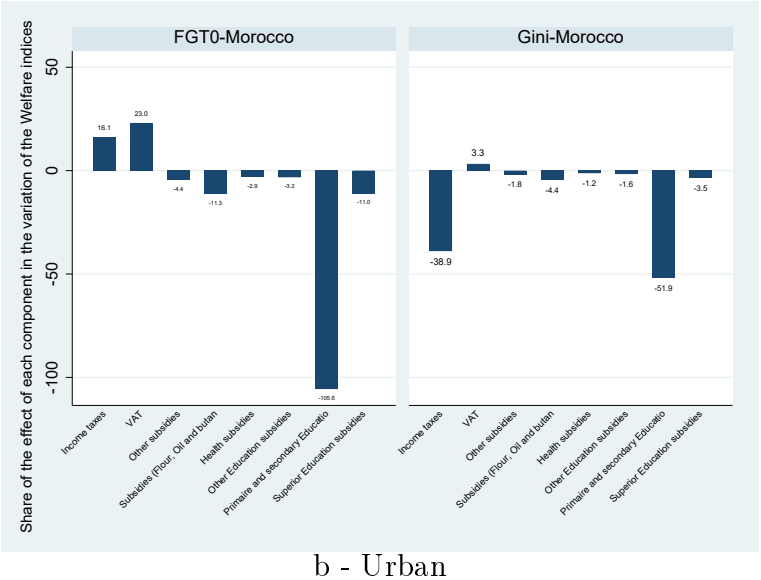
We show that Morocco's tax/subsidy system is unambiguously pro-poor overall. Between a *Market income* and the *Observed income*, poverty decreases at the national level as well as in both rural and urban areas, as does inequality. However, there is a need to consolidate the system, since the taxes and subsidies considered are not all progressive, and should require revision or more ambitious reform. Indeed, income taxes appear to be progressive whereas the value added tax is clearly regressive, increasing poverty and inequality. In the current debate surrounding the abolition of the *Caisse de compensation* in Morocco, our results also confirm that the subsidies for three goods (flour, sugar, and butane gas) are indeed, regressive. We therefore feel it is important to deepen our work by carrying out an impact analysis to support the government in its decision to abolish the *Caisse de compensation*, looking at both the direct effects and the induced effects on poverty and inequality. This analysis should also propose compensatory measures for poor and vulnerable individuals who would be affected by its suppression.

A contrario, the implicit subsidies relating to education (primary and secondary) are clearly pro-poor. The analysis obtained from the Shapley decomposition method shows that the subsidies dedicated to primary and secondary education contribute strongly to the reduction of poverty and inequality, while the subsidy for higher education does not, benefiting the wealthiest quintiles.

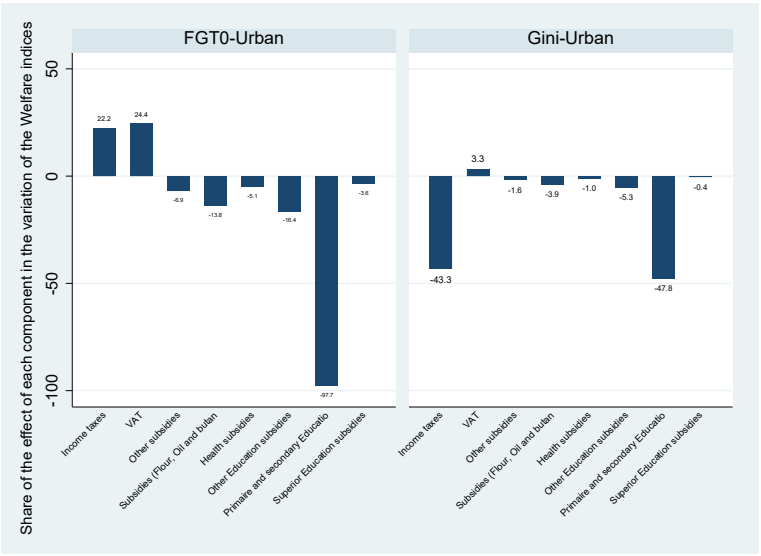
This article sets out the diagnosis required to continue work on social protection and tax reform in Morocco. Impact analyses should help decision-makers involved in the reforms with a view to making the Moroccan tax and subsidy system progressive in its completeness.

Figure 6: ***Shapley decomposition of welfare indices***

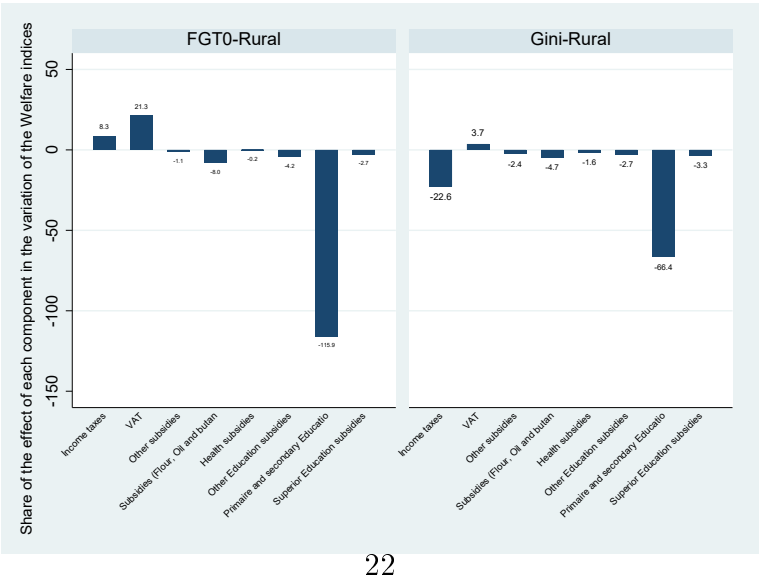
a - Morocco



b - Urban



c - Rural



Source: Authors from EPM 2019.

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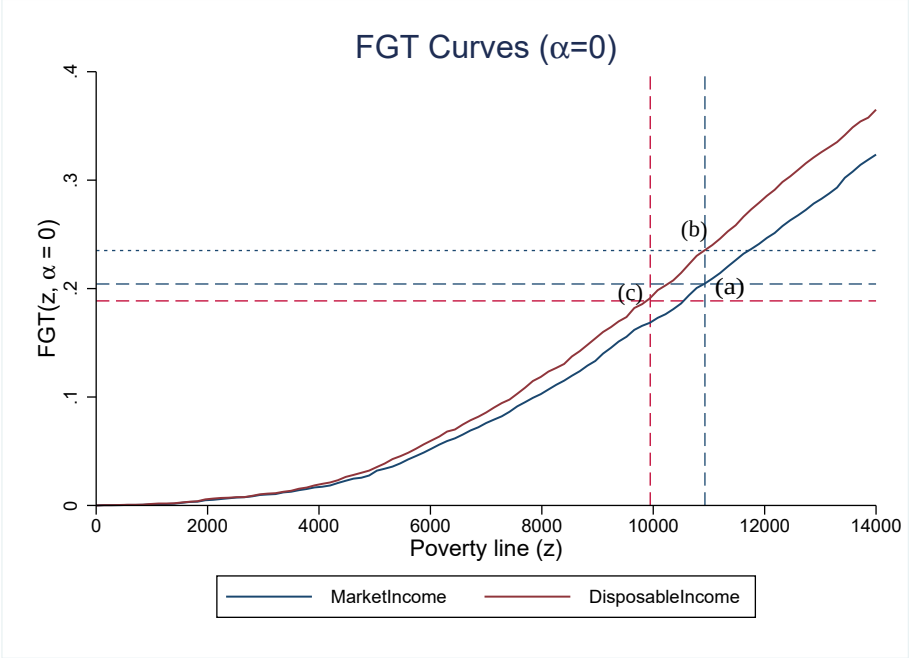
6 Appendices

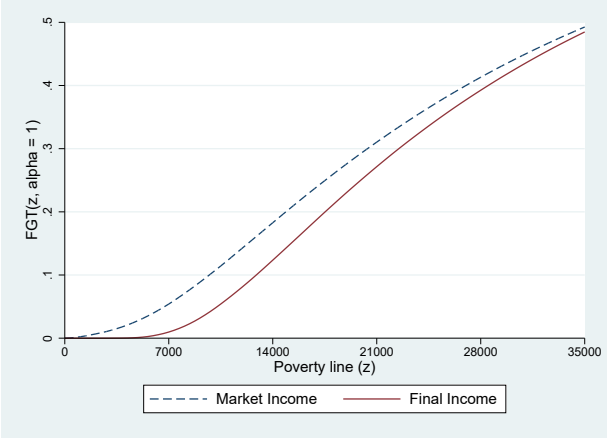
Figure 7: ***Impact of income taxes on incomes - Urban poverty***



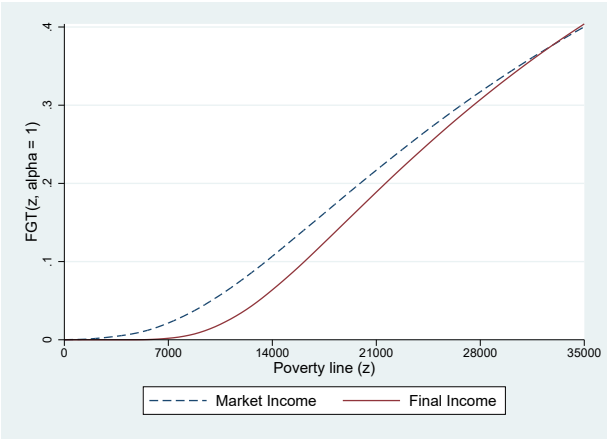
Source: Authors from EPM 2019.

Figure 8: ***Stochastic dominance test - Order 2***

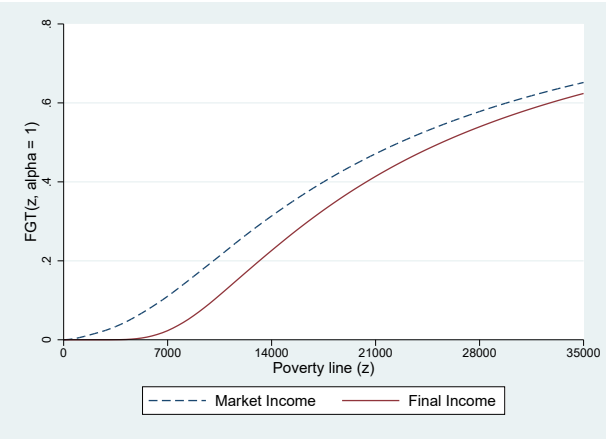
a - Morocco



b - Urban



c - Rural



Source: Authors from EPM 2019.

Table 9: Distribution of subsidies by quintile for Urban areas

URBAN	Observed Income	Compensed Products Subs.			Health Subs.		
		Total	% of total comp. Prod. Subs.	% of Observed Income	Total	% of total health Subs.	% of Observed Income
Quintile 1	30754707	746689	5.99%	2.43%	224212	18.81%	0.73%
Quintile 2	80689127	1641810	13.17%	2.03%	314151	26.35%	0.39%
Quintile 3	130670534	2322719	18.63%	1.78%	294366	24.69%	0.23%
Quintile 4	216648891	3228329	25.90%	1.49%	256983	21.56%	0.12%
Quintile 5	503708157	4410982	35.39%	0.88%	123718	10.38%	0.02%
Total	985713689	12464643	100.00%	1.26%	1192163	100.00%	0.12%
	Observed Income	**Education Superior Subsidies**			**PrimSec Education Subsidies**		
		Total	% of total Sup. educ. Subs.	% of Observed Income	Total	% of total PrimSec. educ. Subs.	% of Observed Income
Quintile 1	30754707	688049	4.51%	2.24%	9228048	15.09%	30.01%
Quintile 2	80689127	1800233	11.79%	2.23%	15070959	24.64%	18.68%
Quintile 3	130670534	2821337	18.48%	2.16%	15516925	25.37%	11.87%
Quintile 4	216648891	4188833	27.44%	1.93%	14290454	23.36%	6.60%
Quintile 5	503708157	5601918	36.69%	1.11%	7898165	12.91%	1.57%
Total	985713689	15267053	100.00%	1.55%	61171085	100.00%	6.21%
	Observed Income	**Other Education Subsidies**					
		Total	% of total Other. educ. Subs.	% of Observed Income			
Quintile 1	30754707	99430.2	18.66%	0.32%			
Quintile 2	80689127	105979	19.89%	0.13%			
Quintile 3	130670534	121607	22.82%	0.09%			
Quintile 4	216648891	143091	26.85%	0.07%			
Quintile 5	503708157	71480.6	13.41%	0.01%			
Total	985713689	532856	100.00%	0.05%			

Source: Authors from EPM 2019.

Table 10: Distribution of subsidies by quintile for Rural areas

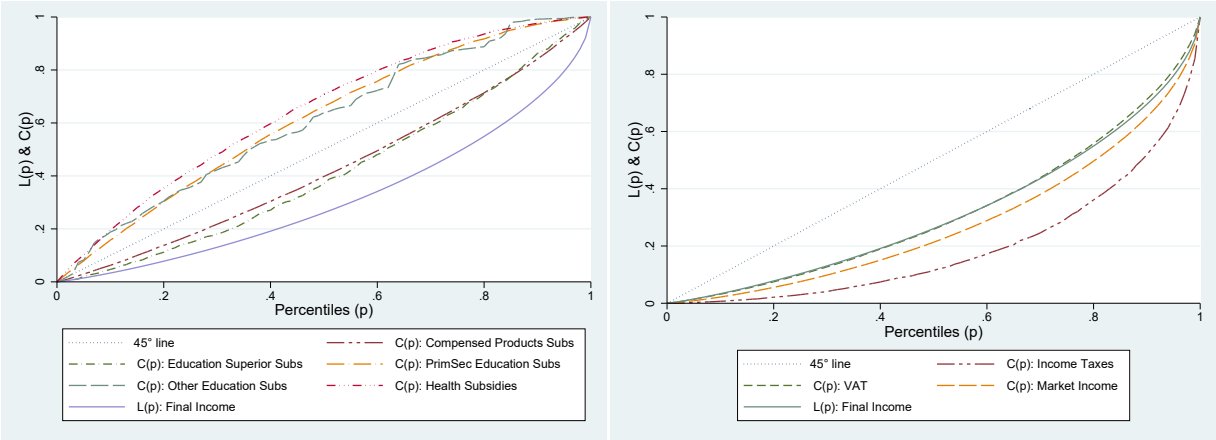
URBAN	Observed Income	Compensed Products Subs.			Health Subs.		
		Total	% of total comp. Prod. Subs.	% of Observed Income	Total	% of total health Subs.	% of Observed Income
Quintile 1	92314852	2789334	30.26%	3.02%	689174	43.92%	0.75%
Quintile 2	93357786	2167895	23.52%	2.32%	380885	24.27%	0.41%
Quintile 3	88987970	1779638	19.31%	2.00%	261795	16.68%	0.29%
Quintile 4	90666046	1539383	16.70%	1.70%	162364	10.35%	0.18%
Quintile 5	83760060	1016954	11.03%	1.21%	65740.5	4.19%	0.08%
Total	440109913	9217050	100.00%	2.09%	1569246	100.00%	0.36%
	Observed Income	**Education Superior Subsidies**			**PrimSec Education Subsidies**		
		Total	% of total Sup. educ. Subs.	% of Observed Income	Total	% of total PrimSec. educ. Subs.	% of Observed Income
Quintile 1	92314852	1122222	22.41%	1.22%	25093720	44.27%	27.18%
Quintile 2	93357786	1240535	24.78%	1.33%	14476037	25.54%	15.51%
Quintile 3	88987970	1077131	21.51%	1.21%	9780860	17.26%	10.99%
Quintile 4	90666046	1105351	22.08%	1.22%	5007831	8.84%	5.52%
Quintile 5	83760060	531038	10.61%	0.63%	1891727	3.34%	2.26%
Total	440109913	5006924	100.00%	1.14%	56680243	100.00%	12.88%
	Observed Income	**Other Education Subsidies**					
		Total	% of total Other. educ. Subs.	% of Observed Income			
Quintile 1	92314852	1100064	37.47%	1.19%			
Quintile 2	93357786	779046	26.53%	0.83%			
Quintile 3	88987970	518517	17.66%	0.58%			
Quintile 4	90666046	417681	14.23%	0.46%			
Quintile 5	83760060	117854	4.01%	0.14%			
Total	440109913	2936112	100.00%	0.67%			

Source: Authors from EPM 2019.

Figure 9: ***Lorenz and concentration curves: Urban areas***

a - Subsidies

b - Taxes

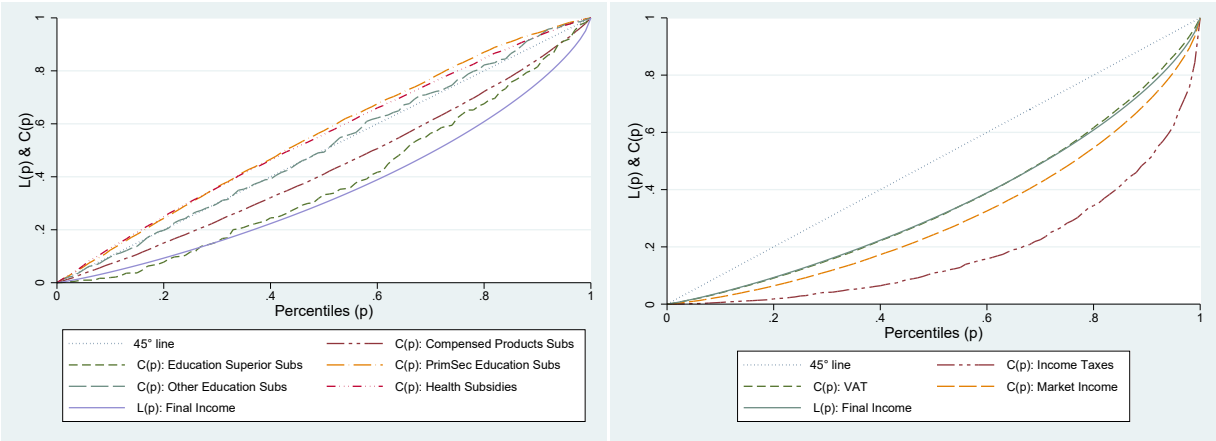


Source: Authors from EPM 2019.

Figure 10: ***Lorenz and concentration curves: Rural areas***

a - Subsidies

b - Taxes



Source: Authors from EPM 2019.