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WIDER Working Paper 2019/1

Income redistribution in Latin America

A microsimulation approach

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Abstract: We analyse the effect of taxes and benefits on income distribution of six Latin American countries: Argentina, Bolivia, Colombia, Ecuador, Uruguay, and Venezuela. Our analysis makes use of tax-benefit microsimulation models based on harmonized household representative survey data and developed within the structure of EUROMOD. The analysis focuses on the relative importance of tax-benefit instruments across countries and on the effect of taxes and benefits on poverty and inequality. The selected countries represent a wide range of cases in terms of the redistributive role of the tax-benefit system with Uruguay providing a large degree of redistribution, whereas the Bolivian system has a very modest role. We further exploit the advantages of our models and perform a simulation exercise whereby the most progressive income tax system of our set of countries is applied to the rest and assess its effect on inequality and revenue. Our paper represents the first study making use of microsimulation techniques to assess the redistributive role of tax-benefit systems in the region in a comparable manner, and highlights the advantages offered by microsimulation models to evaluate the effect of policy reforms aiming to improve social protection in the region.

Keywords: taxes, benefits, microsimulation, Latin America

JEL classification: I32, I38, H24, D13

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1 Introduction

Latin America is one of the most unequal regions in the world and the fiscal system shows modest results in reducing income inequality. According to Lustig (2017), tax benefit systems in Latin America decrease the Gini coefficient by 2.7 points, on average, when market income is compared to disposable income for the year 2011; while it does by around 20.9 points on average in European countries.¹ This modest redistributive role in Latin America can be explained, among others, by: a) the modest size of tax systems, despite their growth in recent decades (raising, on average from 13.2 per cent of GDP in 1990 to 21 per cent of GDP in 2014) (Gómez Sabaini et al 2017); b) the composition of the tax systems, with a high participation of indirect taxes (51.7 per cent in 2014 in Latin America and the Caribbean (LAC) countries, in contrast to 32.9 per cent in OECD countries) (ibid: 47.) and, even, a weak design of the most progressive taxes. Around 2010, personal income tax in LAC countries represented only 29 per cent of total income tax revenue, compared to 74 per cent in OECD countries (ibid: 70-71); and c) social spending has also increased, mainly because of conditional cash transfers to the population with the lowest income, but remains lower than in the OECD countries. Designing reforms to improve the redistributive impact of the tax and social protection systems requires evaluating the fiscal policy of each country, as well as learning from the comparative analysis between systems of different countries.

Tax-benefit microsimulation models are useful tools to assess the impact of fiscal policies on distributive justice, poverty, and public revenue. Moreover, harmonized simulations enable a comparative analysis that could help improve public policies. Microsimulation models have been developed only for a few countries in Latin America and only as independent models for analysis at the national level (López Calva and Urzúa 2011) or to study specific components of the fiscal policy. More recently, a group of countries (Ecuador, Colombia, Argentina, Bolivia, Mexico, Uruguay, Paraguay, and Venezuela) have developed tax benefit models following the EUROMOD modelling conventions (EUROMOD 2017; Sutherland and Figari 2013) with the aim of enabling cross-country comparative analysis.

The aim of this work is to analyse the effect of direct taxes and benefits on the income distribution of six Latin American countries: Argentina, Bolivia, Colombia, Ecuador, Uruguay, and Venezuela. Our paper represents the first study making use of microsimulation techniques to assess the redistributive role of tax-benefit systems in the region in a comparable manner, and highlights the advantages offered by microsimulation models to evaluate the effect of policy reforms aiming to improve social protection in the region.

Our results show a wide variation in the effect of tax-benefits systems on income inequality and poverty across the six Latin American countries based on microsimulation data. Colombia and Bolivia present the highest levels of income inequality, whereas inequality is the lowest in Uruguay. The Foster–Greer–Thorbecke indices show a high disparity in terms of the population living in poverty, with lower levels of headcount ratio, poverty gap and severity in Argentina or Venezuela, and higher levels in Colombia. These results are to a large extent influenced by the distortion between national and purchasing power parity (ppp) dollar poverty lines in Venezuela and Argentina. Third, the most redistributive tax-benefit system is that of Uruguay, where inequality decreased by 9 percentage points (pp) when measured by the difference between Gini from market

¹ Information for European countries is based on EUROMOD statistics on Distribution and Decomposition of Disposable Income, accessed at <http://www.euromod.ac.uk/using-euromod/statistics> using EUROMOD version no. H1.0+.

income relative to disposable income's Gini, and leads to a remarkable poverty reduction by -12 percentage points. In contrast, the least redistributive impact is found in Colombia and Bolivia, where the tax-benefit system reduces inequality but by less than 2.4 percentage points, and the impact on poverty reduction goes in a range from a -2.1 pp in Bolivia to a slightly higher -4 pp in Venezuela.

Finally, our study exploits the advantages of a harmonized multi-country microsimulation model to simulate a counterfactual reform whereby the personal income tax from Uruguay's (the most redistributive country) replaces national personal income tax systems in all other countries. Applying the Uruguayan personal income tax to other countries increases the redistributive effect of the tax-benefit system, although to a modest degree in most cases. This policy swap is particularly important in Venezuela, where Uruguay's tax-benefit structure would reduce inequality by 1.14 percentage points. Argentina, Colombia and Bolivia would also experience a decrease in income inequality but by a lower 0.15, 0.14, and 0.53 percentage points respectively. In Ecuador, this swap would have no major effect. Additionally, as a result of this policy swap we would observe large increases in tax revenue for all countries.

This paper is structured as follows. Section 2 presents a literature review of the distributive incidence of tax benefit systems in the Latin American countries considered in this paper. It also summarizes the scarce comparative studies in the region. Section 3 provides information about the data and the newly developed tax-benefit microsimulation models in the six Latin American countries included in this study. Section 4 describes the relative size of different tax-benefit components across the income distribution in each fiscal system and their effect on income poverty and inequality. Section 5 presents and discusses the results of a policy swap exercise, where we select the most progressive income tax among the countries studied and apply it to all the other ones, to assess its impact on poverty and inequality. Section 6 concludes.

2 Literature review

In this section we present a literature review of studies on the distributive incidence of fiscal policy in each of the countries included in the analysis and, additionally, of the comparative studies among LAC countries. Few comparative studies have been found, probably due to the lack of a common methodology to assess the redistributive effect of tax-benefit instruments across countries.

In Argentina, several studies have estimated the effect of taxes on income distribution. In the late 1990s Gómez Sabaini et al. (2002) found a regressive effect due to indirect taxes. Gómez Sabaini and Rossignolo (2009) examined the impact of tax structure in 2006 and Gómez Sabaini et al. (2013) in 2008, and both found a regressive effect, despite of a higher participation of export taxes, income, and payroll taxes. With respect to the effect of public expenditures and the impact of specific programs, several studies found a reduction on inequality (Gasparini (1999), Rossignolo (2017), SPE (2002), SPER (1999)) and on poverty (Maurizio (2009), Marchionni et al. (2008)). The net effect of direct and indirect taxes and public expenditures (direct transfers, indirect subsidies, and value of expenditure in health and education) on income distribution has been estimated by Gasparini (1999), SPE (2002), Gaggero and Rossignolo (2011), Gómez Sabaini et al. (2013), Rossignolo (2017), Lustig (2017), among others. Although the studies introduced different methodologies, all of them found that the fiscal policy reduces inequality, mainly explained by the effect of direct taxes and direct transfers.

For Colombia, there are few studies on the effect of the fiscal system on income redistribution. However, most of them emphasize the minor role of the government in reducing income

inequality, the prevalence of narrow tax income bases and revenues, and an increasing importance of conditional cash transfers alleviating poverty. For instance, Goñi et al. (2011) found a negligible effect on inequality with Gini coefficients from market and disposable income in 2003 at 0.54 and 0.53 respectively, on the other hand Gonzalez (1996) and Joumard and Londoño (2013) highlight the weak progressivity of the income tax system and the high share of income paid in taxes by low-income households, especially due to VAT and property taxes.

In the case of Bolivia, Lustig (2017) with data from 2009 points out that Bolivia's tax system and cash transfers programs do not significantly reduce inequality and poverty. According to the author, this is due to the effect of indirect taxes that nullifies the positive effect of cash transfers, and due to problems with the programs' target strategy. However, several studies using different methodologies suggest that these programs have, in fact, a positive impact on inequality and poverty reduction (see Ugarte et al. (2016), Arancibia and Macas (2016), Escobar et al (2013), Hernani (2013) and Yañez (2012)). These different arguments between Lustig and the rest of researchers are just a starting point to understand the underlying complexity of the Bolivian economy.

For Ecuador, studies by CEPAL-IEF (2014) and Lustig (2017) show that the redistributive role of the tax-benefit system is non-negligible and close to the regional average. Cash transfers and in-kind benefits in public health and education play the largest role, whereas the effect of direct taxes is minor. Recent studies using microsimulation techniques show, however, that income tax is more redistributive than previously acknowledged and the overall redistributive role of the tax-benefit system is therefore larger (Jara and Varela, 2018; Bargain et al. 2017).

In Uruguay OPP (2016) find that the tax-benefit system reduces the Gini coefficient from 0.46 to 0.38. While taxes have a slightly concentrating effect, public social expenditure considered as a whole (monetary and in-kind transfers) is progressive and reduces inequality significantly. Bucheli et. al. (2012) state that Uruguay achieves a nontrivial reduction in inequality and poverty when all taxes and transfers are combined, direct taxes are progressive and indirect taxes are regressive, whereas social spending on direct transfers, contributory pensions, education and health is quite progressive in absolute terms. On the other hand, Roca (2010) found that the redistributive effect of personal income tax is higher than the concentration effect of VAT and, therefore, the distribution of income after taxes improves slightly. As for public social spending, all items have a really significant impact on the reduction of inequality. The overall impact of the system shows that the poorest 60 per cent of the population "wins" (increases its share of income) with fiscal policy and the 20 per cent of the highest income "loses".

In the case of Venezuela, there is a limited number of studies that evaluate the redistributive role of the tax-benefit system due to availability of household data. Seijas et. al (2003) estimate the redistributive impact of the tax-transfer system for the late 1990s. They found that both taxes and public expenditure were progressive. For the early 2000s Garcia and Salvato (2006) also show that tax system (both VAT and personal income tax) has a relative progressive structure. Estimating the effect of the transfer system proved challenging compared to that of the tax system. For this reason, Garcia and Salvato (2006) only calculate the distributional impact of subsidies for domestic fuel consumption which was shown to be progressive. The most recent contribution was provided in the Commitment to Equity project where Molina (2016) estimates the global impact of taxes and transfers (Lustig, 2017). This research confirms the progressivity of the tax-transfer system in Venezuela as a whole, although only a small redistributive effect is observed, when measured with the Gini index.

In Latin America there are only few comparative studies of the distributive incidence of fiscal policy, and the use of tax-benefit microsimulation models is scarce. First, the Commitment to

Equity (CEQ) Institute has estimated the distributive incidence of fiscal policy in sixteen countries in Latin America around 2010, using a common imputation methodology. Lustig (2017) found that tax-benefit systems reduce extreme poverty in twelve out of the sixteen countries and that systems from Argentina, Brazil, Costa Rica, and Uruguay are the most redistributive. Ecuador and Venezuela appear in the middle of the ranking, whereas Colombia and Bolivia are among the countries with the least redistributive tax-benefit systems. The redistributive effect is mostly explained by direct taxes and cash transfers. Second, CEPAL IEF (2014) analyse the redistributive effect of fiscal systems of 17 Latin American countries around 2011, including income taxes, social security contributions and cash and in-kind benefits. The effectiveness of fiscal policy in reducing income inequality is higher in Argentina, Brazil, and Uruguay. More recently, Bargain et al (2017) use tax benefit microsimulation models to analyse the impact of tax benefit systems in Ecuador and Colombia. Their results show that the Ecuadorian system is more redistributive than the Colombian system. Moreover, they estimated that if the Ecuadorian system was applied to the Colombian population, the Gini coefficient would be reduced by 1.7 points in Colombia.

The development of a regional microsimulation model for Latin America through a common harmonized language, will represent an important tool for assessing the redistributive effect of tax-benefit system in LAC countries.

3 Data and methodology

Our analysis makes use of newly developed tax-benefit models for Latin American countries based on representative household survey data which are part of LATINMOD, COLMOD and ECUAMOD projects, developed in the EUROMOD framework. In order to ensure comparability, the datasets have been harmonized and the simulations have been implemented in a common tax-benefit modelling language. More precisely, the models follow the EUROMOD modelling conventions (EUROMOD 2017) and have been implemented within the structure of the EUROMOD software (Sutherland and Figari 2013).

3.1 Data

The analysis makes use of household survey data containing detailed information on household and personal characteristics, employment, earnings, income from capital and property, private transfers, cash transfers, pensions, and expenditures.

The underlying microdata used in ECUAMOD comes from the National Survey of Income and Expenditures of Urban and Rural Households (ENIGHUR) 2011-2012. ENIGHUR contains information for 39,617 households and 153,444 individuals. Adjustments to the data and variables, for the construction of ECUAMOD's input data are described in detail in Jara *et al* (2017).

Data from Colombia is based on the Quality of Life National Survey for 2014 (Encuesta Nacional de Calidad de Vida, ENCV). The data contains information for 20,141 households and 67,332 individuals. Adjustments to the data and variables, for the construction of COLMOD's input data are described in detail in Rodriguez (2017).

LATINMOD-Argentina is based on data from the National Household Survey on Incomes and Expenditures (ENGHo) conducted by the National Bureau of Statistics in Argentina (INDEC) from March 2012 to February 2013. The data contains and is a representative sample of 87 per cent of the population. LATINMOD-Bolivia is based on the national Household Survey 2015 (Encuesta de Hogares 2015) which contains microdata for 10,171 households and 37,364

individuals. LATINMOD-Uruguay is based on the Uruguayan household survey (Encuesta Continua de Hogares, ECH), released by the national statistics office (INE). The data used is based in the ECH of the year 2014 which took place from January to December and contained microdata for 48,583 households and 131,857 individuals. LATINMOD-Venezuela simulations are based on the IV National Survey of Households Budgets (*IV Encuesta Nacional de Presupuestos Familiares ENPF*) of the year 2009. The data contains information of 37,142 households and 158,924 individuals. In total, 84 individuals (0.05 per cent of the sample) were dropped from the original sample, leaving us with a sample of 158,840 individuals. Also, no adjustments to the weights were made as a result of dropping individual observations. One important shortcoming is that the ENPF does not release information about the household head and the relation of each member with the household head. Therefore, we have no way of knowing the family kinship.

3.2 Tax-benefit simulations

ECUAMOD², the tax-benefit model for Ecuador, simulates direct and indirect taxes, social insurance contributions, as well as the main cash transfers (i.e. Human Development Transfer and Joaquín Gallegos Lara transfer) for the household population of Ecuador.

COLMOD, the tax-benefit microsimulation model for Colombia, simulates direct and indirect taxes, social insurance contributions and the main cash transfers in Colombia (*Familias en acción* and *Colombia Mayor*).

The models for Argentina, Bolivia, Uruguay, and Venezuela have been developed as part of the LATINMOD. LATINMOD is a regional tax-benefit microsimulation model for six Latin American countries that is being developed in the EUROMOD platform and within a harmonized database which provides cross-country comparability. LATINMOD simulates direct taxes (personal income tax, and social security contributions), indirect taxes (VAT), and the main social cash transfers in each country.³

All models are static in the sense that tax-benefit simulations abstract from behavioural reactions of individuals and no adjustments are made for changes in the population composition over time.

The remainder of this section briefly describes the policy instruments simulated in LATINMOD for the year 2015 for the countries under study, as well as the underlying assumptions used in the simulations of each policy instrument.

Personal income tax

In general, the personal income tax policy of the Latin American countries studied here are similar (Appendix- Table A1): a) it is assessed at the individual level; b) the basis of the personal income tax is constituted mainly by labour income: salaries, income from independent work, pensions (in some countries), and to a lesser extent by income from capital. In Argentina and Uruguay, old age pension income is also taxed with a similar structure than labour income tax; c) exemptions or special treatments include: financial placements, interest on public securities, investment fund benefits, capital gains on real estate and shares. In all countries different deductions can be made from taxable income. In Argentina, only deductions from dependants (e.g. spouse, children or parents) apply. In Ecuador, Colombia, and Venezuela, deductions from personal expenditures

² For more information about SOUTHMOD see: <https://www.wider.unu.edu/project/southmod-simulating-tax-and-benefit-policies-development>.

³ For more information about LATINMOD see a recent book by Oliva (2018).

such as education, health, and housing expenditures apply, and in the case of Ecuador also deductions from personal expenditures in food and clothing.

The progressivity of the income tax schedule differs across countries. The tax schedule is relatively similar in Argentina, Colombia, Ecuador, Uruguay, and Venezuela, with different tax bands and a highest tax rate between 33 and 35 per cent. Bolivia on the other hand has a proportional income tax with a rate of 13 per cent for employees and 15,5 per cent for the self-employed.

The tax system of Bolivia does not include a personal income tax policy as such. To assess this gap, Bolivia created the Supplementary Regime for Added Value RC-IVA (*Régimen Complementario al Valor Agregado* in Spanish) with the purpose of regulating the personal income of employees at the same time it serves to control the payment of VAT. Additionally, self-employed income tax in Bolivia has been assessed through a Corporate Profits Tax and a Transactions Tax, both applied considering that self-employed as a one-person-business.

All the models simulate income tax under the assumption of full compliance (zero evasion) with the exception of Uruguay, where personal income tax is simulated only for individuals affiliated with social security.

Social insurance contributions for employees and self-employed

All employees are liable to pay SICs based on their gross employment income in the countries under study (Appendix - Table 2). In Argentina and Uruguay, SIC includes retirement, survivor, disability and health insurances. The total contribution rate for employees ranges from 6 per cent in Venezuela to 17,9 per cent in Uruguay, according to the sector of work or the employment income.

Regarding the self-employed contributions, they are voluntary in Ecuador, Bolivia, and Venezuela. In Argentina and Uruguay, the policy design is more complex than in the other countries, since they contemplate sub-systems depending on the activity, the size of the firm and the gross income.

All the models include some adjustments for labour informality for the purpose of SICs simulations. Models for Bolivia, Colombia, Ecuador, Uruguay, and Venezuela simulate social insurance contributions only for those individuals, who report affiliation to the social security system in the survey. The model for Argentina simulates social contributions for those employees who report affiliation to social security in the survey. In the system for self-employed, the model assumes that the recipients of universal allowance per child (AUH in Spanish), contribute to the *monotributo social* sub-system and, in the rest of the cases, it applies the fiscal rule without considering the possibility of non-registration in the tax administration. This is a limitation, since it has been observed that the incidence of informality in this regime is close to 60 per cent (Bertranou & Casanova 2013).

Public Pensions

Public pensions of the countries under analysis include contributory and non-contributory pensions. Contributory pensions cannot be simulated due to lack of information about contribution history in the data. Non-contributory old-age pension programs have been simulated in all countries. Although some countries include other types of pensions (such as those for mother of more than seven children, disability pensions, survivor pensions, veteran pension, unemployment insurance, and family assignments), they were not simulated in this work or they were simulated as part of the Social Assistance benefits.

Social Assistance benefits

Social assistance benefit policies in these six countries include unconditional and conditional transfer programs, mainly related to school attendance and medical checks, especially for children and adolescents in each household, vulnerable elderly, disabled for work, and pregnant women. However, for each country the programs have been adapted to their own political and institutional contexts (Appendix- Table 3).

4 Tax-benefit systems and income redistribution in Latin America

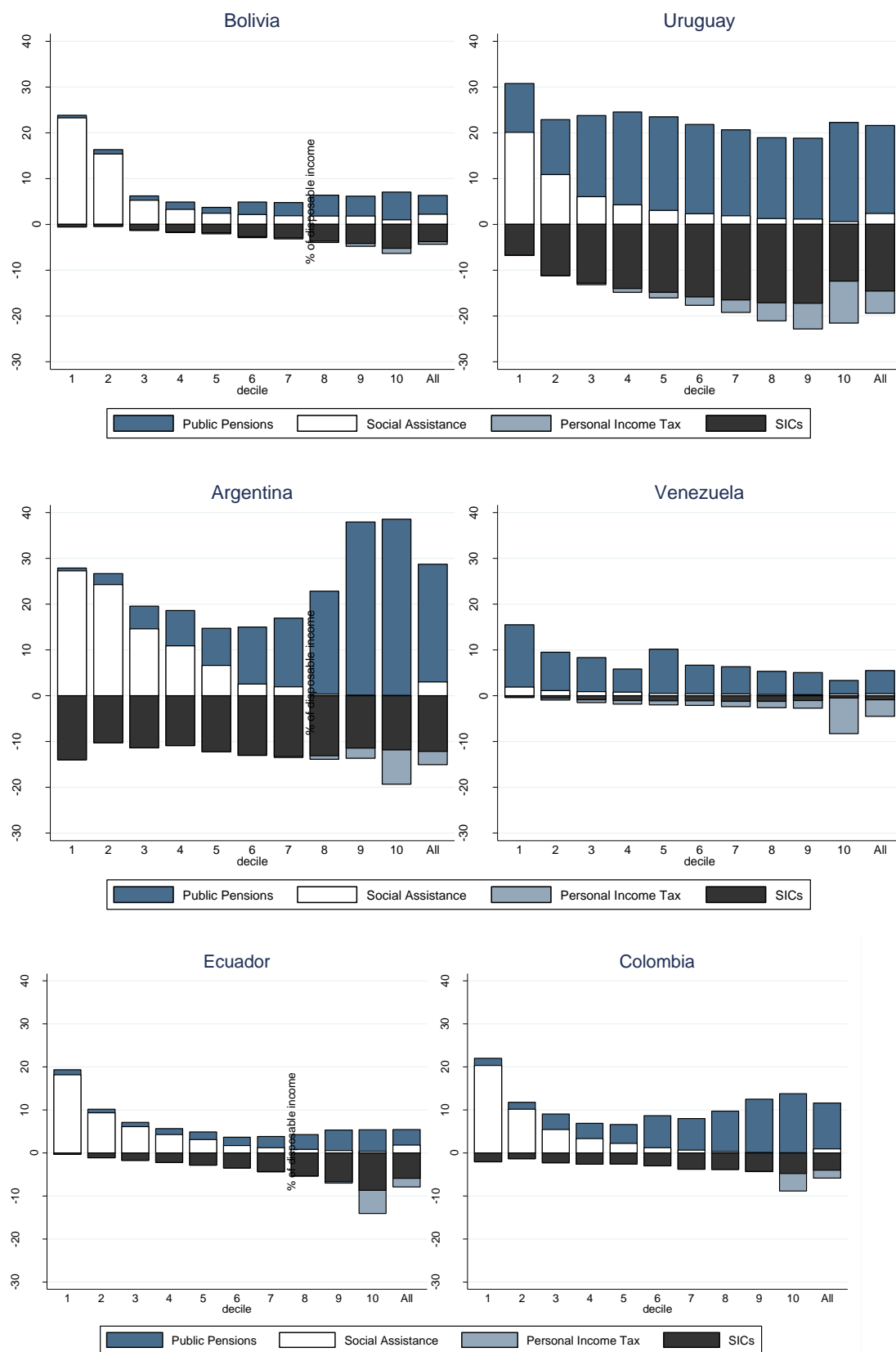
In this section we present a detailed comparison of tax-benefits systems across six Latin American countries based on microsimulation data.⁴ First, we provide a comparison of the variation of the relative size of the tax-benefit components across the income distribution of each country. Then, we present a summary of inequality and poverty indicators calculated from the simulated data. Finally, we provide a detailed picture of the effect of different tax-benefit components on income inequality and poverty.

4.1 Relative size of tax-benefit instruments

Figure 1 shows the relative size of four tax-benefit components in Ecuador, Colombia, Argentina, Venezuela, Uruguay, and Bolivia where the average size of each income component is measured as a percentage of average household disposable income by household disposable income decile, and on average for the whole population. Personal income tax and social insurance contributions are shown as negative values as they represent deductions from disposable income.

⁴ Validation of simulated outcomes (benefits and taxes) is a crucial part of microsimulation modelling and are show in table A4, A5, A6 and A7 for Bolivia, Argentina, Uruguay and Venezuela in the Appendix.

Figure 1: Tax - benefits components as a share of household disposable income



Source: Authors' calculations based on LATINMOD version v0.11, ECUAMOD version 1.4 and COLMOD version 1.1.

Our results show that in Uruguay and Argentina the size of the redistributive system (roughly measured by the total length of the bars for the whole population) is greater than the other four countries. Venezuela's public pensions succeed in targeting groups with low incomes, representing on average 13 per cent of the household disposable income for individuals at the bottom decile of the income distribution. Venezuela's outcomes are due to the non-contributory pension system that started to be implemented since 2006. At the other extreme, Colombia and Argentina fail in targeting low income households through public pensions which represent on average 1 per cent and 2 per cent of household disposable income, respectively. In both countries public pensions benefit individuals in the top decile of the income distribution where they represent on average a 14 per cent of household disposable income.

Figure 1 also shows that, regarding social assistance, Argentina succeeds in allocating benefits to individuals in the bottom decile where these transfers represent on average 28 per cent of the household disposable income. Bolivia and Colombia come second. In both countries, social assistance benefits represent on average 23 per cent of the household disposable income for individuals at the bottom decile. On the other hand, the country that allocates the least amount of benefits across all levels of income is Venezuela, where benefits represent on average 0.6 per cent of the household disposable income. This result is not totally comparable because it is a picture of 2009 transfers when social programs were not fully developed ("*Misiones sociales*"). Also, the latter might be related with the way Venezuela assesses social assistance not necessarily through monetary transfers.

The countries with the most redistributive income tax policy appear to be Uruguay and Venezuela, with personal income tax playing an important role on the top two deciles of income distribution, representing 8 per cent and 7 per cent of the household disposable income respectively; unlike the Bolivian case whose regressive income tax policy represent just 1 per cent of the disposable income of the top decile of income distribution.

In terms of social security, these represent a large percentage of disposable income in Argentinian and Uruguayan households, compared to the other countries, for example, in the bottom decile of income in Argentina, 12 per cent of their disposable income goes to SICs, while the top decile in this country allocates 10 per cent of its income to SICs. Ecuador has a more progressive dispersion for the contributions to the SICs, as can be seen in figure 1, individuals at the top decile pay 8 per cent of their disposable income to SICs and individuals at the bottom decile get to pay up to 2 per cent of their disposable income to SICs.

4.2 The effect of tax-benefit systems on poverty and inequality

This section introduces the effect of each tax-benefit instrument on income poverty and inequality. Before continuing, it is worth analysing the broad incidence of each tax-benefit system through the gap between each country's original income and the disposable income.

Table 1 presents the results of our comparison of inequality and poverty indicators across our six countries. Poverty and inequality indicators are based on household disposable income per capita, where disposable income is defined as market income plus cash transfers net of social insurance contributions and income tax. In terms of income distribution, Table 1 shows that the highest levels of inequality are observed in Colombia and Bolivia with a Gini coefficient of 56.8 and 48.3 respectively. On the other hand, Uruguay presents the lowest level of inequality, with a Gini of 41.72. When focusing in the upper and lower percentiles of income distributions (P90/P10), the table shows that in Uruguay, incomes higher than 90 per cent of the population are 7.3 times greater than incomes higher than only 10 per cent of the population. Venezuela has the second lowest ratio (6.98) while the most unequal or higher ratio is reached in Bolivia and Colombia, where top incomes are 16.2 and 13.3 times the bottom ones, respectively.

Table 1: Absolute poverty rates and income inequality in 2015

	ECUAMOD	COLMOD	LATINMOD			
	Ecuador	Colombia	Argentina	Bolivia	Uruguay	Venezuela
<i>Inequality</i>						
Gini Index	46.17	56.14	45.63	48.58	41.72	46.69
Atkinson index (0.5)	17.82	26.52	16.46	19.56	14.11	19.17
Atkinson index (1)	30.80	44.57	31.35	37.93	25.84	31.76
Atkinson index (2)	50.66	73.98	62.31	75.89	50.07	60.07
p90/p10	7.49	13.31	9.92	16.22	6.80	6.98
p90/p50	2.98	3.60	3.02	2.91	2.60	2.75
p50/p10	2.52	3.70	3.29	5.57	2.62	2.53
<i>Poverty*</i>						
Headcount index (FGT0)	24.89	41.78	22.98	34.55	5.5	38.62
Poverty Gap index (FGT1)	8.07	19.24	9.36	17.99	1.78	14.01
Poverty Severity index (FGT2)	3.8	12.03	5.59	12.67	1.85	7.22

Note: * Based on per capita household disposable income. Poverty line of 5.5 PPP dollars per day.

Source: Author's calculations based on LATINMOD version v0.11, ECUAMOD version 1.4 and COLMOD version 1.1.

From a 'normative' perspective, table 1 also provides the Atkinson index, a welfare-based measure of inequality representing the percentage of total income that a society should forego in order to have a more equal income distribution among its citizens. We show results for three weighting parameters that measure the 'inequality aversion' ($\epsilon = 0.5, 1, \text{ and } 2$). Calculating the Atkinson index for different values of " ϵ " allows us to change the importance attached to variations at different points in the income distribution, larger values of " ϵ " being more sensitive to variations at the lower end of the distribution. Hence, if we consider a high aversion to inequality ($\epsilon = 2$), we are focusing our attention towards what is happening to lower incomes of our distributions.

Accordingly, Table 1 using $\varepsilon = 2$, the highest Atkinson index is reached in Bolivia, where the loss of welfare because of inequality is 75 per cent of what the welfare level would be if the overall income had been equally distributed. Welfare losses in Colombia are around 73 per cent while Ecuador and Uruguay have the lowest percentage of welfare loss because of inequality in its income distribution (50 per cent of what the welfare level would be if the overall income had been equally distributed).

The second section of Table 1 compares statistics on poverty across countries according to the international poverty line of 5.5 PPP dollars per day. According to Table 1 results, the Foster–Greer–Thorbecke indices point out a high disparity in terms of population living below poverty lines. While in Uruguay 5.5 per cent of individuals are poor, this percentage rises up to 41.8 per cent in Colombia and 38.6 per cent in Venezuela. Argentina has the second lower percentage of poor individuals (22.98 per cent of its population). These disparities are also present in terms of the depth of poverty. The poverty gap shows that poverty is more severe in Colombia and Bolivia (19.2 and 18 per cent respectively) relative to Uruguay for instance, where poverty is less severe given a poverty gap far below those levels: 1.8 per cent. Inequality among the poor is also much higher in Colombia and Bolivia relative to Ecuador, Venezuela, and Argentina. While the poverty severity indexes in the formers are around 12 per cent, inequality among the poor in these last three countries are between 1.9 per cent and 7 per cent. In table A8, in the Appendix, we compare how sensitive the head count ratio is to the choice of poverty lines (national line vs 5.5 PPP dollars per day) and show that in some countries the level of poverty has significant changes depending on the line we choose. This is particularly the case of Argentina and Venezuela, which have experienced important inflation over the last years and for which uprating monetary variables in the survey to 2015 levels might prove problematic. Therefore, results for Venezuela and Argentina should be considered with care.⁵

Having analysed inequality and poverty indicators across countries, we now focus our interest towards the effect each tax-benefit instrument has on poverty and inequality. This is the key to understanding the role of taxes and benefits in reducing poverty and inequality as well as improving the design of new policy instruments. Tables 2 and 3 compare the effects of different tax-benefit components on income inequality and poverty. We focus on income inequality as measured by the Gini coefficient and calculate poverty rates based on the national poverty lines. In order to assess the effect of social benefits, we deduct them from disposable income and recalculate income inequality and poverty. In the same way, we assess the effect of taxes and SICs by adding back each component separately to disposable income and recalculate poverty and inequality. Finally, we also show poverty and inequality estimates for market incomes.

⁵ We provide the poverty lines estimates for our set of countries in Table A9 in Appendix

Table 2: GINI Index

	ECUAMOD	COLMOD	LATINMOD			
	Ecuador	Colombia	Argentina	Bolivia	Uruguay	Venezuela
<i>Disposable Income (DPI)</i>	46.2	56.1	45.6	48.6	41.7	46.7
DPI minus Social Benefits	47.6	57.1	48.5	49.5	43.4	46.9
DPI plus Taxes	47.3	56.9	47.0	48.8	43.3	47.9
DPI plus Social Insurance Contributions	47.5	56.6	45.8	49.3	42.1	46.6
<i>Market income</i>	50.1	58.7	53.8	51.0	51.1	50.8
Market income plus Benefits	48.7	57.8	50.7	49.9	49.5	50.6
Market income minus Taxes	49.1	58.0	53.6	50.9	50.1	49.6
Market income minus Social Insurance Contributions	48.9	58.3	54.9	50.4	51.0	50.9

Source: Author's calculations based on LATINMOD version v0.11, ECUAMOD version 1.4 and COLMOD version 1.1.

The redistributive effect of pensions, social benefits, taxes, SICs as a whole, is defined by the difference between the Gini coefficient from disposable income and the Gini from market income. Table 2 shows that the tax-benefit system that achieves the highest income inequality reduction is that of Uruguay. Indeed, Uruguay's system leads inequality reduction by more than 9 percentage points (pp), followed by Argentina (-8.2 percentage points). On the other side of the spectrum, tax-benefit systems in Colombia and Bolivia decrease inequality by 2.5 and 2.4 pp respectively.

A detailed analysis of table 2 points out that in all countries except Venezuela, the income component that reduces inequality the most is social benefits, accounting for a reduction of around 1.4 percentage points on average. The effect is obtained by calculating the difference between the disposable income's Gini coefficient and the Gini coefficient from disposable income minus social benefits. In the case of Venezuela, the income component that reduces inequality the most is direct taxes, accounting for a reduction of 2 points. Here we calculate the difference between the Gini coefficient from disposable income and the Gini coefficient from disposable income plus taxes. Finally, a cross-country analysis of the effect of SICs in inequality reduction shows that it is in Ecuador where this effect is higher relative to the other countries. While SICs reduce income inequality by around 0.4 percentage points in Colombia, Bolivia and Uruguay and to a lesser extent (0.1 percentage points) in Argentina their incidence in Ecuador is far higher, accounting for an inequality reduction of 1.3 percentage points. In this case, the Gini from disposable income is compared to the Gini from disposable income plus SICs.

Table 3 presents the effect of tax-benefit systems on poverty measured by the headcount ratio (with the 4 PPP dollars per day line). As before, when we compare absolute poverty for disposable income and absolute poverty for market income, it is the Uruguayan tax-benefit system that achieves the best outcomes allowing for a poverty reduction of 13 percentage points. Argentina also achieves an important poverty reduction of 11.7 pp, followed by Venezuela (-5.7 pp), Ecuador

(−3.4 pp), Colombia (−3.1 pp), and Bolivia (−2.2 pp). The income component analysis shows that for all cases, the income component that reduces poverty the most is social benefits. Social benefits reduce poverty by 4.5 percentage points in Argentina followed by Uruguay (−3.4 pp). In Colombia and Bolivia social benefits account for a one-percentage point poverty reduction while this effect in Venezuela is marginal. The effects of taxes and SICs are, on the other hand, very modest as in most of the countries, and they tend to increase poverty.

Table 3: Poverty Head Count (Poverty line of 5.5 PPP dollars per day)

	ECUAMOD	COLMOD	LATINMOD			
	Ecuador	Colombia	Argentina	Bolivia	Uruguay	Venezuela
<i>Absolute poverty headcount</i>						
<i>Disposable Income (DPI)</i>	24.9	41.8	23.0	34.6	5.5	38.6
DPI minus Social Assistance Benefits	27.6	42.9	27.4	35.6	8.9	39.2
DPI plus Taxes	24.8	41.5	23.0	34.5	5.5	38.6
DPI plus Social Insurance Contributions	24.3	40.7	19.8	34.2	4.9	38.1
<i>Market income</i>	28.3	44.9	34.7	36.7	18.8	44.4
Market income minus Benefits	25.7	43.9	30.2	35.7	15.6	43.8
Market income plus Taxes	28.4	45.2	34.9	36.7	18.9	44.5
Market income plus Social Insurance Contributions	29.0	46.1	38.8	37.3	20.3	44.9

Source: Author's calculations based on LATINMOD version v0.11, ECUAMOD version 1.4 and COLMOD version 1.1.

5 Reforming tax-benefit systems in Latin America: a policy swap exercise

The previous section highlighted the extent to which the redistributive effect of tax-benefit systems differs across Latin American countries. In this section, we take advantage of the common language and conventions in the EUROMOD framework to perform a policy swap exercise between our countries. Previous comparative studies have applied the swap of one or more components of the tax-benefit system between countries, for instance, Atkinson et al. (1988) exchanged child and family benefits between France and the UK and Bargain et al. (2017) exchanged the complete tax-benefit system between Ecuador and Colombia⁶ to quantify comparatively the contribution of policy instruments and other effects such as market income distribution.

In our case, given that we observe Uruguay to be the country with the most redistributive tax system (i.e. the tax system that reduces income inequality the most, see Table 2), we compute counterfactual scenarios in which the Uruguayan personal income tax replaces the national personal income tax policies of other countries. Our focus on personal income tax is motivated

⁶They use ECUAMOD and COLMOD respectively.

by two main reasons. First, although taxes on goods and services represent the largest share of tax revenue, the importance of taxes from incomes and profits has grown over time. On average, in the LAC region the share of revenues from taxes from incomes and profits has grown from 22.3 per cent to 27.2 per cent of total tax revenues between 1990 and 2015 (OECD/ECLAC/CIAT/IDB 2017). Out of our selected countries, Venezuela is the only one that has experienced a decline in the share of revenue from taxes from incomes and profits.⁷ Second, reforms to personal income tax are potentially interesting for countries in the region because they could allow to achieve a reduction in income inequality and at the same time increase government revenues during a period where oil prices are low. For this reason, results presented below focus on the effect of the policy swap exercise on income inequality and income tax revenue.

As explained before, income tax in Uruguay applies to employees, professional self-employed, and pensioners. Although only formal workers are liable to income tax in the baseline simulations for Uruguay, in the policy swap for the other five Latin-American countries we assume that income tax applies to all workers because this is our default simulation assumption in other countries. Given the lack of data on occupations for Argentina we assumed that no self-employed in this country is liable to income tax whereas for the other four countries income tax applies to professional self-employed workers.

There is only one parameter of interest to adjust income brackets for each country to those in Uruguay namely the Benefits and Contributions Units, (Base de Prestaciones y Contribuciones, BPC). The value of each unit is updated each year by the Uruguayan government to adjust income brackets for inflation. In 2015 a BPC unit was equivalent to 3,052 Uruguayan pesos. For each country we compute the value of BPC multiplying 3,052 times the ratio of the average labour earnings in each country relative to those in Uruguay with the results of Table 4.

Table 4: Adjustment parameter

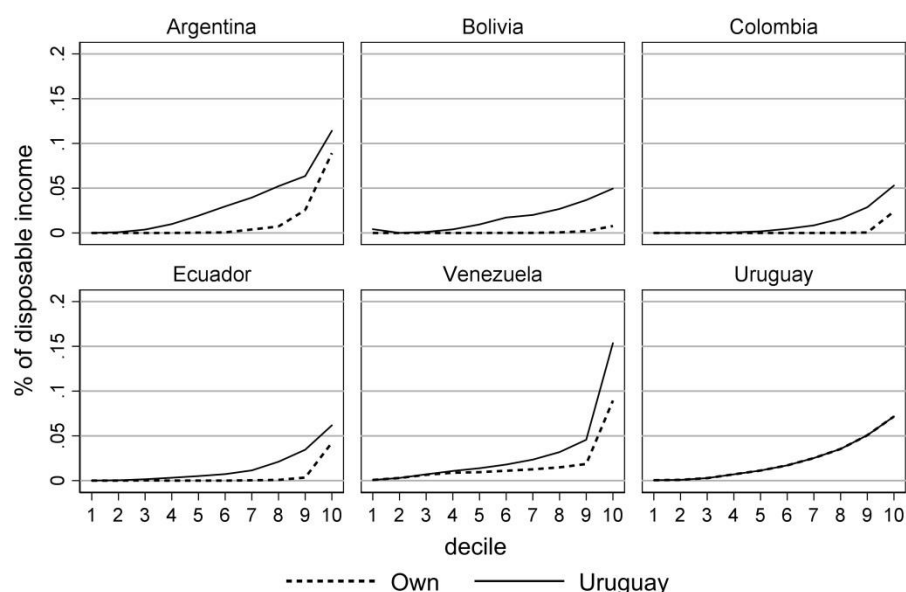
	Ecuador	Colombia	Argentina	Bolivia	Uruguay	Venezuela
Currency	Dollar	Peso	Peso	Boliviano	Peso	Bolivar Fuerte
BPC	49.87	90,801.33	452.85	274.69	3,052	2,145.19

Source: Authors' calculations

Figure 2 presents the main finding of the policy swap exercise. It shows that for any decile of disposable income, the tax burden increases with the tax system of Uruguay. However, there are noticeable differences between countries. If we focus on the last decile we observe the highest increase for Venezuela: a 5.9 pp increase in the tax burden, followed by Bolivia with 4.1 pp, but results are less notorious for Ecuador 1.9 pp and Argentina 2.4 pp. Other deciles display important increases, with tax payers starting to contribute more than 1 per cent of disposable income from the fifth decile upwards on average instead of the 8th or 9th with the original systems.

⁷ This is due to the fact that Venezuela database is from 2009 and we uprate to 2015 with a serious inflation process.

Figure 2: Tax share of household disposable income in the policy swap
(Deciles of baseline disposable income)



Source: Authors' calculations based on LATINMOD versionv0.11, ECUAMOD version 1.4 and COLMOD version 1.1.

Changes in inequality and tax revenue resulting from the policy swap experiment are presented in Table 5. For all countries we observe a minor reduction in disposable income inequality relative to the baseline. In line with the mentioned tax burden change for the top income, the highest reduction is found for Venezuela (1.064 pp) and Bolivia (0.53 pp) and the lowest for Ecuador (0.06 pp) and Colombia (0.14 pp). It is important to note that although income inequality is only marginally affected by the implementation of the Uruguayan income tax in other countries, tax revenue increases dramatically for Bolivia (4 times higher) and Argentina (100 percent higher) and more modestly for Ecuador (48 per cent higher). The reason for this contrasting result is that the policy swap is affecting only a small fraction of the population in all countries (i.e. high earners), therefore, the effect on the Gini is small. On the other hand, despite affecting only a small fraction of the population, the implementation of the Uruguayan income tax translates into higher tax liabilities of those effectively paying income tax.

Table 5: Changes in inequality and tax revenue in the policy swap
(Relative to baseline)

	Ecuador	Colombia	Argentina	Bolivia	Venezuela
Gini Change (pp)	-0.060	-0.141	-0.153	-0.530	-1.064
Tax Revenue Change (percent)	48.5	76.8	90.9	422.9	117.38

Source: Authors' calculations based on LATINMOD versionv0.11, ECUAMOD version 1.4 and COLMOD version 1.1.

Several factors explain the varying effects of the policy swap across countries. First, and most important, the level of the non-taxable income threshold varies across countries. In Uruguay personal income tax applies to incomes above the non-taxable income threshold, which in 2015 was equivalent to 2.1 times the annualized minimum wage. For the next most redistributive country, Argentina, this income threshold, was equivalent to 2.34 times the annualized minimum wage for employees, and 0.81 times the annualized minimum wage for self-employed. These

thresholds are lower than in the other Latin American countries analysed. In Ecuador and Colombia, a common non-taxable income threshold applies to employees and the self-employed, which was equivalent to 2.54 and 4.17 times the annualized minimum wage in 2015 respectively. In Bolivia, employees are subject to income tax on incomes above a non-taxable income threshold equivalent to 4.58 times the annualized minimum wage. For the self-employed, there is no threshold in Bolivia. Venezuela is the only country where the minimum exempted income threshold is lower than in Argentina and is equivalent to 1.78 times the annualized minimum wage.

Second, in all countries different deductions can be made from taxable income. In Uruguay and Argentina, only deductions from dependants (e.g. spouse, children or parents) apply. In Ecuador, Colombia, and Venezuela, deductions from personal expenditures such as education, health, and housing expenditures apply, and in the case of Ecuador also deductions from personal expenditures in food and clothing.

Third, the progressivity of the income tax schedule differs across countries. The tax schedule is relatively similar in Uruguay, Argentina, Colombia, Ecuador, and Venezuela, with different tax bands and a highest tax rate between 30 and 35 per cent. Bolivia on the other hand has a proportional income tax with a rate of 13 per cent for employees and 15,5 per cent for the self-employed.

In summary, the proposed policy swap would have differentiated effects: on the one hand Ecuador would see a minor reduction in inequality and tax revenue but on the other, Venezuela would observe both high increases in the tax burden for top earners and reductions on inequality. Lastly, Bolivia, the country originally with the less burdensome income tax system, would observe the highest increase in tax collections.

6 Conclusions

The present study made use of microsimulation techniques to analyse the effect of tax-benefit systems on poverty and inequality for six Latin American countries: Argentina, Bolivia, Colombia, Ecuador, Uruguay, and Venezuela. Moreover, the advantage offered by harmonized multi-country microsimulation models were exploited to perform a policy swap exercise aiming to analyse the effects on poverty and inequality of applying to the rest of our countries the most progressive personal income tax system, which turned to be that of Uruguay.

The challenge of simulating and comparing policies between six LAC countries at the same time allowed us to provide a number of interesting findings. First, and in terms of distribution, our model showed the highest levels of income inequality in Colombia and Bolivia with a Gini coefficient of 56.14 and 48.5 respectively. On the other hand, Uruguay had the lowest inequality (41.72). This scenario was consistent with a p90/p10 ratio of 13.3 and 16.2 in Colombia and Bolivia and a lower 6.9 in the case of Venezuela. From a 'normative' perspective and focusing in the lower end of each country's income distribution, the Atkinson index showed higher indices for Bolivia and Colombia (75.9 and 73.9 respectively) and lower figures for Uruguay (50.1) and Ecuador (50.6).

Second, differences across countries are more evident when analysing poverty. The Foster–Greer–Thorbecke indices show a high disparity in terms of population living below national poverty lines. While in Uruguay the headcount ratio reaches 5.5 per cent, in Colombia this percentages rises up to 41.7 per cent. Again, these figures are consistent with similar disparities in terms of poverty gap and severity indexes: lower levels in Uruguay (1.3) and higher levels in Colombia (19.2).

Third, the most redistributive tax-benefit system is observed in Uruguay, where inequality decreased by 9.4 percentage points (pp) when measured by the difference between Gini from market income relative to disposable income's Gini. The second most redistributive system was that of Argentina with an inequality reduction of 8.2 pp, followed by Ecuador (-3.9 pp). Finally, the least redistributive effect is observed in Colombia and Bolivia, where the tax-benefit system reduces inequality but by less than 2.4 percentage points. In the same line, the Uruguayan tax-benefit system also leads to a remarkable poverty reduction by -12.7 percentage points. The remaining tax-benefit systems also reduce poverty in a range that goes from a -2.1 pp in Bolivia to a higher -11.7 pp in Argentina

Finally, exporting the Uruguayan personal income tax system to the other countries allows us to come across an interesting result. In all of our remaining countries, swapping the Uruguayan personal income tax increases the redistributive effect of their tax-benefit systems. This policy swap is particularly important in Venezuela, where the Uruguayan income tax would reduce inequality, measured by the Gini coefficient from disposable income, by an additional 1.14 percentage points. Bolivia and Argentina would also experience a reduction in inequality but by a lower 0.53 and 0.15 percentage points respectively. In Ecuador, this swap would have no major impact. Finally, tax revenue would increase in all countries, but particularly so in Bolivia (4 times higher), Venezuela (117 per cent higher) and Argentina (100 per cent higher).

As observed all over our analysis, tax-benefit microsimulation models represent an outstanding tool for assessing the redistributive effect of tax-benefit systems. In this sense, modelling the tax-benefit system and understanding its potentiality in reducing income inequality and poverty is a first step to be considered when implementing public policies in developing countries. We expect that future improvements in our regional microsimulation model, through a common harmonized language, will represent an important opportunity for policy developments and collaborations within the region as well as a huge challenge aiming to strengthen Latin America's so much needed social protection. In addition, the harmonized microsimulation model in the near future will include Mexico and Paraguay.

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Appendix

Table A1: Main characteristics of the personal income tax in Latin America

	Ecuador	Colombia	Argentina	Bolivia	Uruguay	Venezuela
	Tax unit is the individual	Tax unit is the individual	Tax unit is the individual	<i>Bolivia does not have a PERSONAL INCOME TAX policy, but it has approached this issue by establishing differentiated taxes based on income for employees (RC-IVA) and self-employees (IUE and IT) For employees:</i>	Tax unit is the individual	Tax unit is the couple or individual.
	Taxable income is gross labour income plus extra pay plus utilities participation plus SICs	Taxable income is labour income, extra pay, pension income and income from assets	The taxable income includes land rent, capital gains and labour income	<ul style="list-style-type: none"> • Tax unit is the individual • Taxable income is gross labour income plus extra pay minus SICs 	Taxable income is gross labour income plus extra pay	Taxable income is labour income and capital income.
	Exemptions include income from pensions, 13th and 14th months, reserve funds, and deductions for old age and disability	Exemptions include income from company ownership, taxed as business tax; depending on the system up to 25% of labour income	Exemptions include interest from fixed term deposits and savings accounts; national bonus; dismissal compensations; royalties; donations; inheritances and legacies; awards of games of luck; benefits based on activities related to preservation of the environment.	<ul style="list-style-type: none"> • Exemptions include holiday bonuses and maternity bonuses. • Deductions include all billed expenditures. • Tax base is taxable income minus exemptions, minus deductions • Tax schedule is calculated as it follows: (Tax base - 2 national minimum wage) * 13% - (2 national minimum wage * 13%) 	Exemptions include a 30% of labour income from self employed	Main exemptions:(i) those taxpayers with a tax base less than 1.000 tax units or a gross income less than 1500 tax units. (ii) Income from interest received from bank account savings. (iii) Pensions.
	Deductions include SICs and deductions from personal expenditures in food, clothing, education, health, and housing	Deductions include expenditure in education, health and mortgage payments	Deductions include family charges (children, partner and parents not earning incomes); general deductions (expenditures in health, housing rental, among others); special deductions for labour income.	<ul style="list-style-type: none"> • Tax unit is the individual (considered as one-person-business) • Taxable income is gross labour income minus estimated business-related expenditures and SICs. • It is considered that self-employee's expenditures are 50% of their gross labour income. • Tax base is taxable income 	Deductions base include social insurance contributions, health contributions and a fixed amount for children charges. Deductions tax schedule is formed of six tax bands between 10% and 30%. Tax base is taxable income minus exemptions	Deductions include expenditure in education, health and mortgage payments. Residents may opt for a unique deduction of 774 tax units instead of the above deductions. Tax base is taxable income minus exemptions, minus deductions
Personal Income Tax	Tax base is taxable income minus exemptions, minus deductions	Tax base is taxable income minus exemptions, minus deductions	Tax base is taxable income minus SIC, non-taxable minimum, exemptions and deductions.	<ul style="list-style-type: none"> • Tax schedule is calculated as it follows: (Tax base - 50% of gross labour income) * 25% • Transactions tax • Tax unit is the individual (considered as a one-person-business) 	Final tax is tax base through tax schedule, plus auxiliary IRPF, minus deductions base through deductions tax schedule	

				<ul style="list-style-type: none"> • Taxable income is Income from property rental • Tax base is taxable income • Tax schedule is calculated as it follows: 3% of Tax base Total Self-employee Tax sums 15,5% of his/her income. 	<p>Tax schedule is formed of seven tax bands between 0% and 30%</p> <p>13th months and holiday bonuses rate are the maximum rate reached by each person (auxiliary IRPF)</p>	<p>Tax schedule is formed of different bands rates between 6% and 34%. Resident individual receives an additional annual personal rebate of 10 tax units and a family rebate of 10 tax units for each member that fulfill the legal age.</p>
	Tax schedule is formed of nine tax bands and rates between 0% and 35%	Tax schedule is formed of different bands contingent on the system applied, rates are between 0% and 33%	Tax schedule is formed of seven tax bands between 9% and 35%			

Note. In Uruguay pension income is taxed by IASS, with a similar structure than IRPF, and capital gains is taxed by IRPF Category 1, with two rates: 7% and 12% depending on the income category.

Source: Authors' compilation.

Table A2: Main characteristics of social insurance contributions for employee and self-employed in Latin America

Countries	Employee Social Insurance Contributions	Self-employed Social Insurance Contributions
Ecuador	<p>All employees are liable to pay SICs</p> <p>Contribution base is gross employment income</p> <p>Total contribution rate is either 9.45% or 11.45% depending on the category of the worker</p> <p>Min. contribution: 9.45% or 11.45% of the minimum wage (340 USD in 2014) for full-time, or of a fraction of the minimum wage based on days of work for part-time.</p>	<p>Self-employed workers can contribute to SICs on a voluntary basis</p> <p>Contribution base is declared gross self-employment income</p> <p>Total contribution rate is 20.50%</p> <p>Min. contribution: 20.50% of the minimum wage (340 USD in 2014)</p>
Colombia	<p>All employees are liable to pay SICs</p> <p>Contribution base is gross employment income</p> <p>Total contribution rate is between 8% and 10% depending on employment income</p> <p>Min. contribution: 8% of a minimum wage. Max. contribution: 12% of 25 minimum wages</p>	<p>All self-employed are liable to pay SICs</p> <p>Contribution base is 40% of gross self-employment income</p> <p>Total contribution rate is between 28.5% and 30.5% depending on income</p> <p>Min. contribution: 28.5% of a minimum wage. Max. contribution: 30.5% of 25 minimum wages</p>
Argentina	<p>All employees are liable to pay SICs</p> <p>Contribution base is gross employment income</p> <p>Total contribution rate is 17%, with minimum and maximum retribution limits</p> <p>The contribution includes previsional and health insurance</p>	<p>All self-employed are liable to pay SICs</p> <p>Two systems: "autónomos" (5 categories depending on the activity and the gross income) and "monotributistas" for small taxpayers.</p> <p>Both systems: total contribution is a fixed amount depending on the category of the worker</p> <p>The contribution includes previsional and health insurance</p>
Bolivia	<p>All employees are liable to pay SICs</p> <p>Contribution base is gross employment income</p> <p>Total contribution rate is between 12,71% and up (depending on employment income).</p> <p>Min. Contribution: 12,71% when gross employment income is below 13.000 Bs. Max. Contribution: 1% of National Solidarity Contribution when employment income is above 13.000 Bs; 5% of National Solidarity Contribution when employment income is above 25.000 Bs; 10% of National Solidarity Contribution when employment income is above 35.000 Bs.</p>	<p>Self-employed workers can contribute to SICs on a voluntary basis</p> <p>Contribution base is declared gross self-employment income</p> <p>Total contribution rate is between 14, 42% and up (depending on employment income).</p> <p>Min. Contribution: 14,42% when gross employment income is below 13.000 Bs. Max. Contribution: 1% of National Solidarity Contribution when self-employment income is above 13.000 Bs; 5% of National Solidarity Contribution when self-employment income is above 25.000 Bs; 10% of National Solidarity Contribution when self-employment income is above 35.000 Bs.</p>
Uruguay	<p>All employees are liable to pay SICs</p> <p>Contribution base is gross employment income</p>	<p>All self-employed are liable to pay SICs</p> <p>There are 6 systems depending on the activity and the firm size</p>

	<p>Total contribution rate is between 13% and 17,9% depending on the category of the worker and the retirement fund. In the general case is 15%.</p> <p>From an upper limit, the contribution is voluntary</p> <p><u>Health insurance contributions</u> rate is between 3% and 8% depending on the category of the worker, the retirement fund, and family composition (children, partner)</p>	<p>Total contribution is a fixed amount depending on the category of the worker and the retirement fund</p> <p><u>Health insurance contributions</u> rate is between 3% and 13% depending on the category of the worker, the retirement fund, and family composition (children, partner). Employers with more than 5 employees and "monotributo sociedad de hecho" are not included, and "monotributo unipersonal" contribution is voluntary</p>
Venezuela	<p>All employees are liable to pay SICs</p> <p>Contribution base is gross employment income</p> <p>Total contribution rate is 6% for general workers. Armed Force rate is 13.5%</p> <p>Max. contribution: the contribution base is up to a ceiling of five minimum wages</p>	<p>Is not compulsory for self employed workers</p>

Source: Authors' compilation.

Table A3.a: Main characteristics of the Social Assistance benefits in Latin America

	Ecuador	Colombia	Argentina	Bolivia	Uruguay	Venezuela
	<i>Bono de Desarrollo Humano</i>	<i>Familias en acción</i>	<i>Asignación Universal por Hijo</i>	<i>Bono Juancito Pinto</i>	a) <i>Asignaciones Familiares – Plan de Equidad</i> b) <i>Asignaciones Familiares – Ley 15.084</i>	<i>Misión Madres del Barrio, Misión Niño Jesús, Misión Hijos de Venezuela y la Fundación Nacional El Niño Simón. All has been integrated in 2014 in the "Gran Misión Hogares de la Patria".</i>
	Proxy means-tested benefit based on the composite index of the Social Registry	Proxy means-tested benefit based on a composite welfare index (SISBEN)	Cash transfer for children with parents working in the informal sector or unemployed	Non means-tested benefit for children from 1st to 12th grade that record an 80% of scholar attendance in public schools.	a) Proxy means-tested benefit based on a composite welfare index (ICC) b) Contributory benefit for pensionary and workers registered in public security system	Non-means tested benefit
	Eligible are: (i) poor families with children below 18 years; (ii) vulnerable elderly not affiliated with social security, not receiving pensions; and (iii) vulnerable persons with 40% or higher degree of disability, not affiliated with social security.	Eligible are: families with children below 18	Eligible are: parents with dependent children under the age of 18 who are informal workers with an income lower than the minimum salary of the formal sector, unemployed without unemployment benefits, or domestic service workers.	Eligible are: children and teenagers from 1st to 12th grade below 21 years old who enrolled in public schools.	a) Eligible are: children under 18 years in vulnerable households (ICC + upper income limit) b) Eligible are: children under 18 years in households with income below certain amount	Women that does not have paid work and that live in a family with an income less than the minimum basket /minimum wage
Social Assistance Benefits	Amount: 50 USD per month	Amount: (i) health component: 33-38 USD per month per family; (ii) education component: 11-24 USD per month per child for up to 3 children	Amount: 17 Usd per child (up to 5 childs)	Amount: 200 Bs. per year	a) Amount: 45 USD per child, with an equivalence scale of 0.6 + 20 USD if the child is assisting to secondary school, also with the same equivalence scale applying b) Amount: 22 USD or 11 USD per child, depending on	Amount "Mision Madres del Barrio": 60-80% of minimum wage. Amount "Misión Hijos de Venezuela": 430 Bs. of each son and 600 Bs. for each son with disability. Up to 3 amounts.

					the household income	
	Conditionality for children: school enrolment and attendance, and medical check-ups	· Conditionality for children: school enrolment and attendance, and medical check-ups	Conditionality for children: school enrolment and attendance, and medical check-ups	Conditionality: 80% of school attendance in public, alternative or special schools.	a) and b) Conditionality for children: attend the education system and health controls	

Source: Authors' compilation.

Table A3.b: Main characteristics of the Social Assistance benefits in Latin America

	Ecuador	Colombia	Bolivia	Uruguay	Venezuela
	<i>Bono Joaquín Gallegos Lara</i>	<i>Colombia mayor</i>	<i>Bono Juana Azurduy</i>	<i>Tarjeta Uruguay Social</i>	<i>Misiones educativas: Robinson (I y II), Ribas y Sucre</i>
	Benefit for persons caring for individuals with severe disability and/or illness	Proxy means-tested benefit based on a composite welfare index (SIBEN)	Non means-tested benefit for women between 13 and 50 years that are pregnant and children below 2 years old.	Proxy means-tested benefit based on a composite welfare index (ICC)	Scholarship for primary, secondary — high school— and undergraduate education.
	Amount 240 USD per month	Eligible are: elderly older aged 54 years (female) and 58 years (male) or more; no pension income	Eligible are: pregnant women between 13 and 50 years. Children below 2 years.	Eligible are: extreme vulnerable households (ICC)	Eligible are: (i) poor families; (ii) The individual must be enrolled in one of the education institutions of the government
Social Assistance Benefits		Amount: Between USD 21 and USD 59 per month depending on city/town	Amount: For pregnant women: 320 Bs For each pregnancy period. For children below 2 years: 1.500 Bs	Amount: between 30 USD and 160 USD depending on the number of children under 18 years and the ICC	Amount: 100 USD per month
			Conditionality: For pregnant women: 4 pre natal controls (50 Bs each) Birth at public health institutions. For children below 2 years: Bi-monthly postnatal health checks (125 Bs each)	Conditionality for children: non	Conditionality: school enrollment and attendance
			<i>Renta Dignidad</i>		<i>Gran Misión En Amor Mayor Venezuela</i>
			Non means-tested benefit for elderly people above 60 years.		Noncontributory pension
			Eligible are: elderly people above 60 years old.		Eligible are: (i) old age persons that did not contribute to the social insurance during their Laboral life (ii) Income less than minimum wage
			Amount: For elderly people who did not contribute to social security: 2.400 Bs For elderly people who contribute to social security: 1.800 Bs		Amount: Minimum wage

Source: Authors' compilation.

Table A4: Bolivian tax-benefits instruments for 2015.

Policy	Tax Revenue / Transfers Expenditure				Number of taxpayers/beneficiaries	
	Microsimulation		External data		Microsimulation	External data
	Millions Bs	% GDP	Millions Bs	% GDP		
Personal Income Tax	899.25	0.394%	914.59	0.401%	172,781	184,260
Personal Income Tax for EMPLOYEES	475.89	0.209%	491.22	0.215%	96,989	108,468
Personal Income Tax for SELF-EMPLOYED	423.37	0.186%	423.37	0.186%	75,792	75,792*
Social Insurance Contributions	5,986.49	2.625%	5,519.97	2.421%	881,378	831,555
Employees SICs	4,810.86	2.110%	4,794.35	2.102%	760,870	755,874*
Self-Employed SICs	1,175.64	0.516%	725.62	0.318%	120,508	75,681*
Pensions (Old Age)	5,568.52	2.442%	5,133.90	2.251%	178,939	158,618
Social Benefits	3,205.57	1.406%	3,434.61	1.506%	3,995,406	3,369,875
Juancito Pinto Bonus	466.22	0.204%	446.00	0.196%	2,330,618	2,228,900
Juana Azurduy Bonus (MOTHER)	25.29	0.011%	39.23	0.017%	164,137	90,435
Juana Azurduy Bonus (CHILD)	359.72	0.158%	111.38	0.049%	479,630	95,599
Social Benefit for the Elderly (Renta Dignidad)	2,354.34	1.032%	2,838.00	1.245%	1,021,021	954,941

Note: Self-employed income tax and SICs information is not available, the number reported comes from 2015 Household Survey.

Source: LATINMOD versionv0.11. Unidad de Análisis de Políticas Sociales y Económicas (UDAPE).

Table 5: AArgentinian tax-benefits instruments for 2012 and 2015

Policy	2012						2015					
	Tax Revenue / Transfers Expenditure				Number of taxpayers/beneficiaries		Tax Revenue / Transfers Expenditure				Number of taxpayers/beneficiaries	
	Microsimulation		External data		Microsimulation	External data	Microsimulation		External data		Microsimulation	External data
	Millions \$	% GDP	Millions \$	% GDP			Millions \$	% GDP	Millions \$	% GDP		
Personal Income Tax	22,392	0.85%	9,942	0.38%	1,606,138	859,858	31,152	0.52%	21,629	0.36%	1,377,441	782,212
Social Insurance Contributions	95,608	3.62%	89,178	3.38%	10,923,785	8,176,987	118,152	1.98%	208,029	3.49%	10,923,785	8,378,996
Employee	88,020	3.34%	81,728	3.10%	7,550,348	6,309,135	102,900	1.73%	188,972	3.17%	7,550,348	6,262,869
Self-Employed	7,588	0.29%	7,450	0.28%	3,373,437	1,876,851	15,252	0.26%	19,057	0.32%	3,373,437	2,076,185
Cash transfer in social assistance programs (<i>Asignación Universal por hijo</i>) (1)	8,369	0.32%	11,075	0.42%	1,537,374	1,854,993	31,728	0.53%	35,534	0.60%	1,831,018	1,978,596

Note: (1) The statistic corresponds to the number of holders, not to beneficiaries.

Source: LATINMOD versionv0.11. CIETES-UNRN.

Table A6: Uruguayan tax-benefits instruments for 2014 and 2015

Policy	2014						2015					
	Tax Revenue / Transfers Expenditure				Number of taxpayers/beneficiaries		Tax Revenue / Transfers Expenditure				Number of taxpayers/beneficiaries	
	Microsimulation		External data		Microsimulation	External data	Microsimulation		External data		Microsimulation	External data
	Millions \$	% GDP	Millions \$	% GDP			Millions \$	% GDP	Millions \$	% GDP		
Personal Income Tax	21,357	1.6%	27,130	2.0%	494,146	484,998	29,250.6	2.0%	30,666	2.1%	558,527	432,462
Social Insurance Contributions	62,540	4.7%	79,668*	6.0%	1,278,465	1,477,130*	75,121	5.2%	84,336*	5.8%	1,278,465	1,454,331*
Employees SICs	57,046	4.3%	n/a	-	1,082,578	1,281,884*	68,955	4.7%	n/a	-	1,082,578	1,257,945*
Self-Employed SICs	5,494	0.4%	n/a	-	195,887	195,246*	6,166	0.4%	n/a	-	195,887	196,386*
Social Insurance Contributions (health)	20,838	1.6%	23,407	1.8%	1,082,276	1,164,344	24,527	1.7%	25,965	1.8%	1,086,523	1,148,645
Employees SICs (health)	17,470	1.3%	n/a	-	933,426	n/a	20,863	1.4%	n/a	-	937,673	n/a
Self-Employed SICs (health)	3,368	0.3%	n/a	-	148,850	n/a	3,664	0.3%	n/a	-	148,850	n/a
Social Benefits												
Asignación Familiar (Plan Equidad)	3,826	0.3%	4,241	0.3%	360,934	362,829	4,144	0.3%	4,646	0.3%	360,934	367,754
Asignación Familiar (Ley 15.084)	451	0.03%	664	0.05%	119,732	119,132	493	0.03%	712	0.05%	119,732	115,153
Tarjeta Uruguay Social	1,403	0.1%	1,448	0.1%	53,851**	62,213**	1,540	0.1%	1,780	0.1%	53,851**	66,396**

Notes: (*) Only includes SICs from Banco de Previsión Social (private funds not included)

(**) The beneficiaries are households instead of individuals

Source: LATINMOD versionv0.11. Dirección General Impositiva, Banco de Previsión Social, Ministerio de Desarrollo Social, Junta Nacional de Salud.

Table A7: Venezuelan tax-benefits instruments for 2009 and 2015.

Policy	2009						2015					
	Tax revenue / transfers				number of tax payers/beneficiaries		Tax revenue / transfers				number of tax payers/beneficiaries	
	Simulation		official statistics or other studies		Simulation	official statistics or other studies	Simulation		official statistics or other studies		Simulation	official statistics or other studies
	millions Bs.	% GDP	millions Bs.	% GDP			millions Bs.	% GDP	millions Bs.	% GDP		
Personal Income Tax (1)	6,333.9	0.90%	4,688	0.7%	45,901	n/a	121,164	1%	59,625	0.7%	45,901	n/a
Social Insurance Contributions SIC (2)	9,575.5	1.35%	6,740	0.95%/1.3%	2,259,488	n/a	109,206	1%	38,200	0.95%/1.3%	2,259,488	n/a
Pensions (3)	25,779.6	3.64%	22,280	3.2%	1,610,643	1,618,881	168,669	2%	-	3.2%	1,610,643	3090281
Cash transfer in social assistance programs (Misión Madres del Barrio and others) (4)	1,479.7	0.21%	n/a	n/a	150,943	n/a	9,683	0%	n/a	n/a	150,943	n/a
Scholarship for primary, secondary —high school— and undergraduate education ("Misión Ribas, Robinson y Sucre") (5)	954.5	0.13%	n/a	n/a	189,101	175,246	6,246	0%	n/a	n/a	189,101	175246
Non-contributory pension: "Gran Misión en Amor Mayor Venezuela " (since 2012) (6)	n/a	n/a	n/a	n/a	n/a	n/a	10,698	0%				

Notes: (1) The official tax collection is an estimation of the authors based on the tax record of personal income tax from the Tax Office of Venezuela—SENIAT—. (2) The first official estimation comes from OECD statistics and the second one from Community to Equity CEQ Standard Indicators Web version 2.0. (3) The amount of tax collection comes from CEQ Standard Indicators Web version 2.0 and the number of beneficiary are form Venezuela's Government. (4) The main programs that give cash transfer are: "Madres del Barrio" (2006) and "Hijos e Hijas de Venezuela" (2011). Now they are part of the integrated Mission "Gran Misión Hogares de la Patria". (5) The official statistic of beneficiaries just covers the program "Misión Ribas". (6) The official statistic of beneficiaries cannot be compared with survey statistics because this is from 2009 and the noncontributory pension started in 2012.

Source: LATINMOD version beta.

Table A8. Poverty Head Count 5.5. USD – (PPP 2011) and national poverty lines comparison

	ECUAMOD		COLMOD		LATINMOD							
	Ecuador		Colombia		Argentina		Bolivia		Uruguay		Venezuela	
<i>Poverty line</i>	PPP	National	PPP	National	PPP	National	PPP	National	PPP	National	PPP	National
<i>Disposable Income (DPI)</i>	24.9	15.6	41.8	41.1	23.0	64.7	34.6	40.6	5.5	28.1	38.6	60.06
DPI minus Social Assistance Benefits	27.6	18.7	42.9	42.1	27.4	65.5	35.6	41.6	8.9	30.6	39.2	60.42
DPI plus Taxes	24.8	15.5	41.5	40.9	23.0	64.6	34.5	40.5	5.5	27.9	38.6	59.92
DPI plus Social Insurance Contributions	24.3	15.3	40.7	40.0	19.8	59.9	34.2	39.8	4.9	23.4	38.1	59.53
<i>Market income</i>	28.3	19.5	44.9	44.3	34.7	71.2	36.7	42.4	18.8	37.7	44.4	64.57
Market income minus Benefits	25.7	16.4	43.9	43.3	30.2	71.0	35.7	41.4	15.6	35.7	43.8	64.26
Market income plus Taxes	28.4	19.6	45.2	44.6	34.9	71.3	36.7	42.5	18.9	37.9	44.5	64.72
Market income plus Social Insurance Contributions	29.0	19.9	46.1	45.4	38.8	76.4	37.3	43.3	20.3	43.2	44.9	65.12

Source: Author's calculations based on LATINMOD versionv0.11, ECUAMOD version 1.4 and COLMOD version 1.1.