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César A. Amores L. and H. Xavier Jara

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César A. Amores L. [a,b]

H. Xavier Jara [c]

[a] Universidad Central del Ecuador

[b] Instituto de Altos Estudios Nacionales

[c] ISER, University of Essex

Abstract

A series of social benefits targeting vulnerable groups, such as the elderly population, has been implemented in Ecuador over the last few decades. Elderly adults living in vulnerable conditions and not affiliated with social security are entitled to non-contributory pension assistance under the Human Development Transfer program. However, over one quarter of old-age beneficiaries still live in poverty and the recent fall in oil prices has put increasing pressure on government expenditures to deliver such schemes. This paper aims to assess the current needs of old-age adults based on expenditure data, and makes use of microsimulation techniques to evaluate the effect of covering those needs through an increase in pension assistance. Our results show that increasing pension assistance to match the level of the poverty line in Ecuador would reduce elderly poverty by 40% and would take 18% of old-age beneficiaries out of poverty. We analyze the effect of additional hypothetical reforms and discuss the importance of using microsimulation techniques, in particular to assess the effect of budget neutral reforms in a macroeconomic environment with low oil prices.

JEL: I32, I38, H24, D13

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Corresponding author:

H. Xavier Jara
hxjara@essex.ac.uk

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1. Introduction

The economic protection of old-age adults has been at the forefront of the policy agenda in Latin American countries over the last few decades. In particular, the traditional contributory pension systems, which provide pension benefits to formal workers, have been complemented with an expansion of non-contributory pensions for elderly adults and also for people with disabilities (Arza 2017). In Ecuador, the Constitution recognizes the priority treatment of elderly citizens (i.e. individuals aged 65 or older) in terms of social and economic inclusion and requires the State to provide public policies and programs to care for the elderly.

The Human Development Transfer (HDT), the main social assistance program in Ecuador, provides pension assistance for elderly adults in vulnerable conditions who are not entitled to contributory pensions. The budgetary costs of the scheme represent a non-negligible amount of State resources, with the benefit amount equal to USD 50 per month since 2013. However, over a quarter of old-age beneficiaries still live in poverty and the sustainability of the program might come under threat given the recent fall in oil prices.[1]

The aim of this paper is twofold. First, we discuss and assess the potential needs of the elderly poor based on expenditure data of individuals aged 65 or older. Throughout the paper refer to individuals aged 65 or older in receipt of HDT as the elderly poor. Second, we take advantage of newly developed tax-benefit microsimulation tools to assess the effect of reforming the HDT to cover the needs of the elderly poor. In particular, we make use of ECUAMOD, the tax-benefit microsimulation model for Ecuador, to analyze the effect of three hypothetical reforms on elderly poverty. The use of tax-benefit microsimulation is particularly useful to consider the overall effect of increasing the HDT amount, financed via an increase of employee social insurance contributions. These types of budget neutral reforms seem particularly relevant in the context of low oil prices affecting the Ecuadorian economy. As such, this paper contributes to the recent literature on economic protection of the elderly in Latin America (Albornoz 2013; Arza 2013, 2017; Bertranou et al. 2002).

Our results show that increasing the pension assistance amount to the levels of the absolute poverty line in 2014 (USD 81.40 per month) would reduce elderly poverty from 19.55% to 11.84%. The absolute poverty line is calculated based on the value of a basic basket of goods and seems therefore a relevant reference to proxy the needs of old-age adults. A more generous amount of USD 157.9, equivalent to average expenditure of old-age HDT beneficiaries, would decrease elderly poverty by an extra 3 percentage points (8.89%). Finally, a more sophisticated reform, where the USD 157.9 amount would decrease with the level of household net market income and a minimum provision of USD 81.40 per month, would result in an elderly poverty rate of 9.76%. Our results indicate that the budgetary costs of such reforms would represent between 0.19% and 0.6% of GDP in 2014. Under our budget neutral scenarios, the contribution rates would increase between 1.03 points and 3.22 points, depending on the hypothetical reform scenario. Our results provide some insights into potential ways of improving income protection for the elderly poor in Ecuador and are particularly relevant to discuss financing possibilities through tax or social insurance contributions reforms in a macroeconomic environment of low oil prices.

The remainder of this paper is structured as follows. Section 2 presents a brief overview of the evolution of the Ecuadorian population. Section 3 describes the main cash transfer targeting the elderly population in Ecuador, the Human Development Transfer. Section 4

[1] The Ecuadorian economy is heavily depend oil. Oil exports represented around 50% of exports in 2014.

presents the data and the tax-benefit microsimulation model for Ecuador. Section 5 presents the results. Finally, section 6 concludes.

2. An overview of the evolution of the Ecuadorian population

According to census data, Ecuador has experienced significant population changes. Table 1 shows that the Ecuadorian population has more than quadrupled between 1950 and 2010, from 3,202,757 to 14,483,499 inhabitants. Inter-census growth rates have decreased from 2.96% in the period 1950-1974 to 1.95% in the period 2001-2010, due to the low birth rate and moderate mortality rate (see Figure 1). The gender composition has remained stable, with females representing around 50% of the population between 1950 and 2010. Table 1 further highlights the remarkable process of "urbanization" experienced in Ecuador between 1950 and 2010, driven by the migratory process from the countryside to the city. The rural population represented 71.5% in 1950 and only 37.2% in 2010.

Table 1: Evolution of the Ecuadorian population by geographic area and gender

Census year	Females		Males		Total	% Rural population	Growth rate (%)
	Cases	%	Cases	%			
1950	1,607,94	50.2	1,594,803	49.8	3,202,757	71.5	2.96
1974	3,263,297	50.0	3,258,413	50.0	6,521,710	58.6	2.31
2001	6,138,255	50.5	6,018,353	49.5	12,156,608	38.9	1.95
2010	7,305,816	50.4	7,177,683	49.6	14,483,499	37.2	

Source: Author's calculations based on INEC census data from 1950, 1974, 2001, 2010.

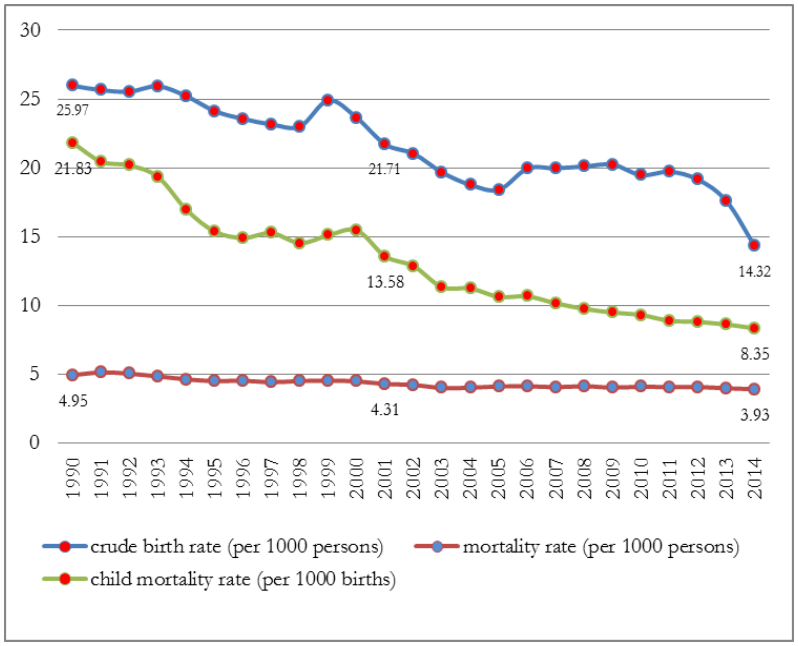
Until 2000, the growth of the Ecuadorian population was governed by two fundamental factors, births and deaths. Since 2000, net migration has also played an important role. In particular, after the deep economic crisis of the late 1990s, a great wave of migration of Ecuadorians to Europe took place (particularly to Spain and Italy) in addition to the traditional migratory process of Ecuadorian people from the Austro region to the United States. It is estimated that about one million Ecuadorians migrated as a result of the economic crisis (FLACSO-UNFPA, 2008).

Figure 1 presents the evolution of the crude birth rate, mortality and child mortality rates in Ecuador over the period of 1990 to 2014. All three indicators show a decreasing trend over time. The crude birth rate has evolved from 25.97 births per thousand inhabitants in 1990 to 14.32 in 2014. The child mortality rate has dropped considerably from 21.83 per thousand live births in 1990 to 8.35 in 2014. The gross mortality rate has also decreased over the period 1990-2014 but to a lesser extent, from 4.95 per thousand inhabitants in 1990 to 3.93 in 2014.

The demographic structure of the Ecuadorian population in 1990, 2001 and 2010 is presented in Figure 2. In each of these years, Ecuador is characterized by an expansive population pyramid, meaning that the base (i.e. younger age groups) is broad and the top (i.e. older age groups) is narrow. The changes in the population pyramids between 1990 and 2010 depict a decline in the proportion of the younger age groups (i.e. narrowing of the base), and a slight increase in the adult population (i.e. broadening of the middle). This reflects the process of demographic transition in which Ecuador is immersed. The population below 15 years old represented 38.8% of the population in 1990, 33.2% in 2001 and 31.3% in 2010. Working age individuals represented 56.9% of the population in 1990,

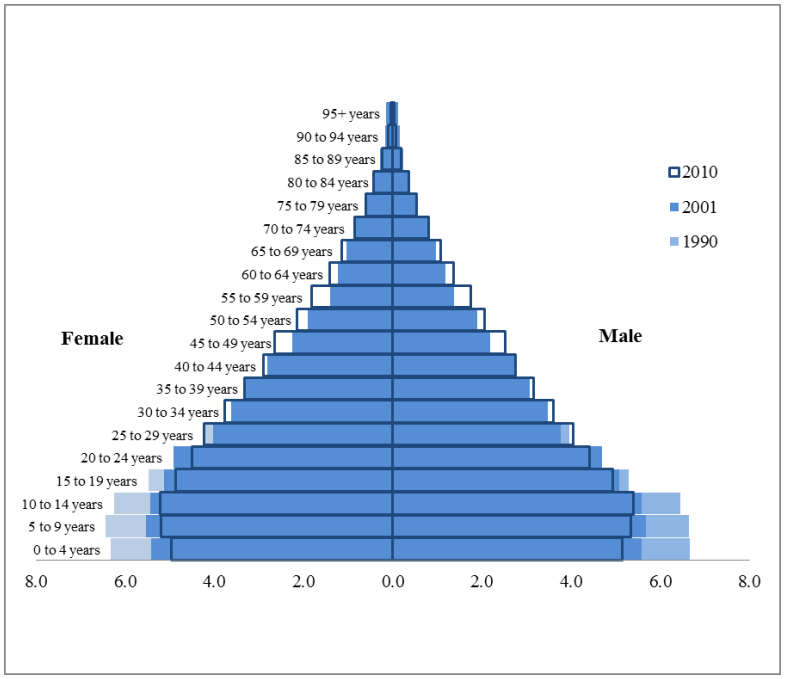
60.1% in 2001 and 62.2% in 2010. Finally, the proportion of old-age individuals (65+) increased from 4.3% to around 6.7% in 2001, but then remained relatively stable up to 2010.

Figure 1: Crude birth rate, mortality and infant mortality rates 1990-2014



Source: Authors' elaboration based on administrative records from INEC (2014)

Figure 2: Ecuadorian population pyramids, 1990, 2001 and 2010



Source: Author's calculations based on INEC census data from 1990, 2001 and 2010.

The dependency ratios relating to the population in 2001 and 2010 based on census data, and in 2014 based on projections, are shown in Table 2. The dependency ratio, defined as the ratio between the number of dependent people (i.e. individuals below 15 years old and over 65 years old) and the number of working age individuals (i.e. aged 15-65), decreased from 66.5 in 2001 to 60.7 in 2010. The young dependency ratio and the old dependency ratio also dropped over this period, from 55.3 to 50.2 and from 11.1 to 10.4, respectively.

Table 2: Evolution of the Ecuadorian population by age group and dependency ratios

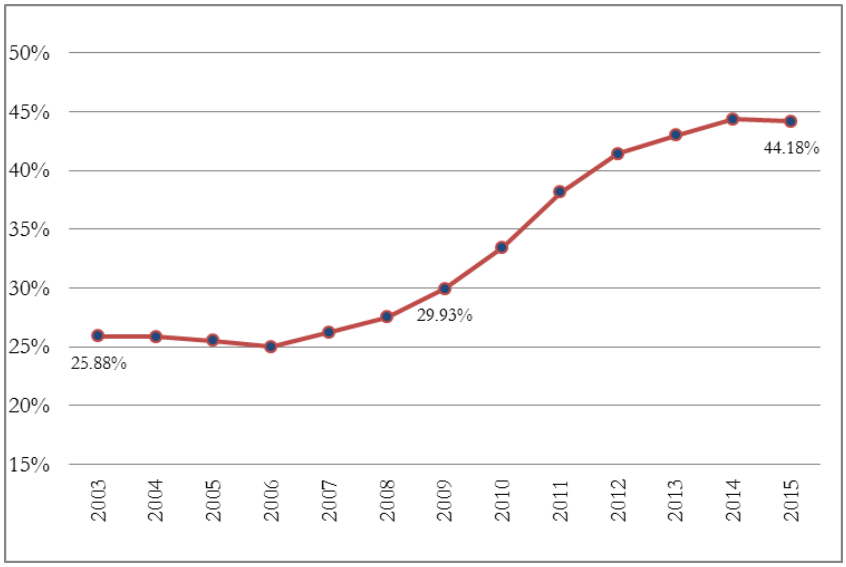
	2001	**2010**	**2014**
Population below 15 years old (younger dependents)	4,040,020	4,528,425	4,982,359
Population aged 15–64 years old (independents)	7,302,964	9,014,169	9,967,520
Population over 65 years old (older dependents)	813,624	940,905	1,077,587
Total population	12,156,608	14,483,499	16,027,466
Dependency ratio (x 100)	66.5	60.7	60.8
Young dependency ratio (x 100)	55.3	50.2	50.0
Old dependency ratio (x 100)	11.1	10.4	10.8
Old to child ratio -aging- (x 100)	20.1	20.8	21.6

Source: Authors' elaboration based on census data from 2001, 2010. Population projections by ages, 2014- INEC

This brief overview of the evolution of the Ecuadorian population indicates a process of moderate demographic transition characterized by low fertility rates and low mortality. The demographic structure, characterized by a large and growing working age population, a decreasing young cohort and a small old-age group, is known as a "demographic window of opportunity". The concept reflects the fact that there is an opportunity of increasing per capita output with relatively low costs from the dependent population (young and old-age groups).

However, the Ecuadorian economy (as many developing economies) is still characterized by a large share of informal work. Figure 3 shows that despite the important increase in affiliation to social security over the last decade, still only 44% of the working age population is affiliated. As such, a large share of the population would not have access to contributory public pensions in old-age. The implementation of policies aimed at formalizing workers would therefore need to go hand-in-hand with reforms to non-contributory pensions to protect old-age individuals not covered by social security.

Figure 3: Percentage of the working-age population affiliated with contributory social security



Notes: Affiliation to social security includes affiliation to the Ecuadorian Institute of Social Security (IESS), the Institute of Social Security of the Armed Forces (ISSFA) and the Institute of Social Security of the National Police (ISPOL)
Source: Authors' elaboration based on SENPLADES_Sistema Nacional de Información

3. The Human Development Transfer *(bono de desarrollo humano)*

The Human Development Transfer (HDT) is a conditional cash transfer, which aims to improve human capital and avoid the persistency of poverty by means of monetary transfers to poor families. The HDT was first introduced in 2003 by combining two program: the Solidarity Transfer (*bono solidario*) and the Education Grant (*Beca Escolar*). The Solidarity Transfer aimed at providing a monetary transfer to poor households in compensation to the elimination of gas and electricity subsidies. The Education Grant consisted of a monetary transfer to poor families conditional on children's school attendance.

The HDT is designed as a proxy means-tested benefit, which targets three population subgroups: (i) families with children younger than 18 years old; (ii) elderly adults above 65 years old who are not entitled to any pensions; and (iii) individuals with disabilities. The proxy means test is based on the composite index of socioeconomic classification of the Social Registry. The index is based on a series of variables containing information on household composition and characteristics, characteristics of the head of the household, housing, living conditions, access to services, assets, and territory (Fabara 2009).

In order to be eligible for HDT, families of children aged 18 years or below need to belong to the poorest population according to the composite index. Two types of conditionality apply for mothers with children receiving HDT. First, it is required that children aged 6–18 years old in the household enroll in school and attend at least 90 per cent of school days in a month. Second, it is required that children below 6 years old in the household attend health centres at least twice per year for medical check-ups. Eligible elderly adults and disabled persons (with 40 per cent or higher degree of disability) are those living in vulnerability conditions (as based on the composite index of the Social Registry) and cannot be affiliated with any type of social security institutions

Table 3 presents the amounts of the HDT during the period of 2003-14. In 2003, the amount of HDT was USD 15 for poor families with children; and USD 11.5 for elderly citizens aged 65 or older, and people with disabilities. In 2007, the amount was fixed at USD 30 for all three target groups. The amount was increased in two other occasions; to USD 35 in 2009 and to USD 50 in 2013.

Table 3: Human Development Transfer, amounts 2003-2016 in US dollars

	2003-2006	2007-2008	2009-2012	2013-2016
Families with children	15	30	35	50
Elderly (age >=65)	11.5	30	35	50
Disabled	11.5	30	35	50

Source: Presidencia de la República (2003, 2007, 2009, 2013)

The number of beneficiaries and total expenditure on the Human Development Transfer is presented in Table 4, for selected years. The number of beneficiaries increased from 1,066,467 in 2004 to 1,896,244 in 2012. In 2013 a process of retargeting started, which resulted in a drop in beneficiaries, and in 2014 the number of beneficiaries equaled 1,119,858 following a decrease in the threshold for the eligibility of families with children. The budgetary cost of the HDT increased substantially in 2007, 2009 and 2013 when the benefit amount increased, and a slight drop is observed in 2014 after the change in the eligibility threshold.

Table 4: Human Development Transfer, beneficiaries and total expenditure

	2004	2007	2011	2012	2013	2014
Number of beneficiaries	1,066,467	1,269,742	1,854,054	1,896,244	1,717,491	1,119,858
Total expenditure (in millions USD)	170	379	706	732	1,035	865

Source: Ministerio de Inclusión Económica y Social/Sistema de Indicadores Sociales del Ecuador (2016)

4. Data and methodology

Our analysis makes use of different sources of micro-data, together with microsimulation techniques to evaluate the effect of covering the needs of the elderly poor in Ecuador. We proceed in two steps. First, we estimate the average needs of individuals aged 65 or older based on recent household expenditure data. Then, ECUAMOD, the tax-benefit microsimulation model for Ecuador, is used to simulate reforms to the HDT in order to cover the estimated needs of the elderly poor. The remainder of the section describes the data and the model used for the simulations.

4.1. Data

Our results are based on two different representative household surveys from Ecuador: the 2014 Survey of Living Conditions (*Encuesta de Condiciones de Vida*) and the National Survey

of Income and Expenditures of Urban and Rural Households (*Encuesta Nacional de Ingresos y Gastos de Hogares Urbanos y Rurales*, ENIGHUR) 2011-2012.

The 2014 Survey of Living Conditions is a nationally representative cross-sectional household survey. The data was collected between November 2013 and October 2014 and contains information about 28,970 households and 109,694 individuals. The previous round of the survey was lifted in 2006. The 2014 Survey of Living Conditions contains extensive information on: personal and household characteristics, economic activities, education, practices and use of time, health, fertility and maternal health, income, expenditures, household equipment, migration, perceptions of living standards, psychosocial wellbeing, social capital and citizen insecurity. The 2014 Survey of Living Conditions is the most recent dataset containing information on household expenditures, which we use to estimate the needs of the elderly in Ecuador.

ENIGHUR 2011-2012 is a nationally representative cross-sectional survey on income and expenditures of households in Ecuador. The survey is conducted approximately every eight years. The survey contains very detailed information on labour and non-labour income, taxes and social insurance contributions, public pensions, cash transfers, private transfers, expenditures, as well as personal and household characteristics. ENIGHUR 2011-2012 is used as the underlying dataset for the simulations in our analysis, which contains information for 39,617 households and 153,341 individuals.

4.2. Tax-benefit simulations

Our study makes use of ECUAMOD, the tax-benefit microsimulation model for Ecuador.[2] ECUAMOD combines detailed country-specific coded policy rules with micro-data from ENIGHUR 2011-2012 in order to simulate direct taxes and social insurance contributions, as well as cash transfers for the household population of Ecuador. ECUAMOD is a static model 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. Simulation results for ECUAMOD have been validated both at the micro and macro level (see Jara et al. 2017).

Our analysis takes 2014 policies (as on June 30th) in Ecuador as the starting point. Market incomes and non-simulated tax-benefit variables in ENIGHUR 2011-2012 are adjusted to 2014 levels using source-specific updating factors (see Jara et al. 2017). ECUAMOD is used to simulate the main tax and benefit components of household disposable income in Ecuador, where household disposable income is defined as the sum of market income plus social cash transfers minus income tax and social insurance contributions. More precisely, in this study ECUAMOD is used to simulate hypothetical reforms to the Human Development Transfer to improve income protection of old-age (65+) beneficiaries of the benefit, based on information from their estimated needs obtained from the 2014 Survey of Living Conditions. Our analysis further exploits the functionalities of ECUAMOD to simulate budget neutral reforms, where the increase in HDT amounts is financed through an increase of employee social insurance contributions.

[2] ECUAMOD has been developed as part of UNU-WIDER's project on 'SOUTHMOD—simulating tax and benefit policies for development' in which tax–benefit microsimulation models have being built for selected developing countries.[2] ECUAMOD and other country models from the SOUTHMOD project are openly accessible, and run on the EUROMOD software, which enables users to analyse the effect of tax-benefit policies on the income distribution in a comparable manner. For more information about SOUTHMOD see: https://www.wider.unu.edu/project/southmod-simulating-tax-and-benefit-policies-development. For more information about EUROMOD see Sutherland and Figari (2013).

5. Empirical results

This section presents the results of our assessment of the needs of the old-age population in Ecuador and the effect of covering the needs of the elderly poor through an increase in the HDT amount. We first assess the needs of individuals aged 65 or older based on information on monthly expenditures from the 2014 Survey of Living Conditions. Then, ECUAMOD is used to simulate the effect of different policy reforms, where the amount of the HDT is adjusted to cover the needs of the elderly poor.

5.1. Assessing the needs of old-age individuals

Table 5 starts with some basic information from the 2014 Survey of Living Conditions about the number of individuals aged 65 and older. Information from the 2006 Survey of Living Conditions is also provided in order to show the variation over time. In particular, the Table differentiates between all old-age adults and those receiving the HDT, and within these two groups, those living alone. This distinction is made because these groups might have different expenditure patterns, as we will see in Table 6.

Over the period from 2006 to 2014, the number of old-age individuals (65+) increased by a considerable 45.1% from 834,730 to 1,211,451, reflecting the demographic transition stage in which the country is immersed. Over the same period, the number of old-age individuals living alone grew by 69.6%. The number of elderly people receiving HDT from 123,441 in 2006 to 582,998 in 2014, thus more than quadrupling, due to government policies that promoted the universal access to welfare pensions for the elderly. In practice, universal access was not achieved due to financial constraints and only less than half of the old-age population was granted the benefit. The number of elderly people living alone and receiving the HDT increased by around 278%.

Table 5: Old-age population in 2006 and 2014

	2006	2014
Number of old-age adults	834,730	1,211,451
Number of old-age adults living alone	110,036	186,580
Number of old-age adults receiving the HDT	123,441	582,998
Number of old-age adults living alone receiving the HDT	24,487	92,560

Source: Authors' calculations based on the 2006 and 2014 Surveys of Living Conditions.

Assessing the needs of old-age individuals is far from being an easy task. The approach taken in this paper is to proxy individual needs with information from expenditures. One way to define the needs of the old-age population could be to consider the minimum level of expenditures needed to purchase a basket of basic goods and services (absolute threshold). Another way to define the needs of the elderly could be to consider the average monthly expenditures of this specific population subgroup (relative threshold).

The definition of a minimum level of expenditures needed to purchase a basket of basic goods and services is consistent with the approach used to define the national poverty line in Ecuador (Hentschel and Lanjouw 1995, INEC 2007, INEC 2015). The extreme poverty line in Ecuador is defined as the minimum value of a food consumption basket to satisfy the nutritional needs for a healthy life. The poverty line is then obtained by using the inverse of the Engel coefficient (which measures the relationship between expenditure in food consumption and expenditure in total consumption) to scale the extreme poverty line (INEC 2015). Table 6 presents the poverty and extreme poverty lines in Ecuador, which equal USD 81.04 per month and USD 45.67 per month, respectively, in 2014.

Table 6 also provides information about average expenditures of the old-age population. In particular, average per capita expenditures of old age-adults and old-age HDT beneficiaries are shown. Our measure of expenditure exclude expenditures in education as the aim is to assess the needs of the elderly, and expenditure in durables in order to consider a measure of current expenditures. An important point to consider refers to the use of per capita expenditure as a measure of individual needs. The problem with this approach is that it assumes that all members of the household split consumption equally, regardless of preferences or income sources (Lise and Seitz 2011). In the context of Ecuador, adjusting expenditures by the number of household members could considerably affect our proxy for old-age needs, as large multi-generation households are still common in the country. However, as pointed by the literature, the problem arises because no measures of individual-level consumption are available for households with more than one member (Lise and Seitz 2011). It is for this reason, that Table 6 also provides information on average expenditures of old-age individuals and old-age HDT beneficiaries living alone. Our results show that average expenditures of old-age individuals living alone are much larger than per capita expenditure of all old-age adults. Using per capita expenditure as a measure of individual expenditure might therefore affect our assessment of individual needs due to the effect of household size. The same is true for old-age HDT beneficiaries. Old-age individuals living alone spend on average USD 253.73 per month, whereas old-age beneficiaries living alone have an average expenditure of USD 157.9 per month.

Table 6: Average expenditure and poverty lines in 2006 and 2014

	2006	2014
Expenditure (in USD per month)		
Average per capita expenditure of old-age adults	131.85	185.7
Average expenditure of old-age adults living alone	175.51	253.73
Average per capita expenditure of old-age adults receiving the HDT	66.37	118.1
Average expenditure of old-age adults living alone receiving the HDT	74.89	157.9
Poverty lines (in USD per month)		
Extreme poverty line	31.92	47.56
Poverty line	56.64	84.32

Notes: Expenditures in education and durable goods are excluded from average expenditures.
Source: Authors' calculations based on the 2006 and 2014 Surveys of Living Conditions.

The amount of the HDT for the elderly increased from USD 11.5 in 2006 up to USD 50 in 2014 (see Table 3). Despite the important increase in HDT amounts, Table 6 shows that the pension assistance falls short compared to the estimated average monthly expenditures of old-age adults and old-age HDT beneficiaries. If the average expenditures are considered as a proxy for the level of needs of the elderly, then an increase in the HDT amount would seem necessary to cover these needs.

A question remains whether the average monthly expenditures of all individuals aged 65 or older should be considered as the appropriate proxy for the needs of the elderly poor, or whether the average monthly expenditures of old-age HDT beneficiaries should be used to define the amount of pension assistance. Our results show that average per capita expenditures of old-age adults living alone (USD 253.73 per month) are 60% higher than average per capita expenditures of old-age HDT beneficiaries (USD 157.9 per month). In our simulations, we opted for average expenditures of old-age HDT beneficiaries living alone as a proxy of the needs of the old-age population, in addition to taking the absolute poverty line as a measure of basic needs. Before turning to the simulation results, the

following section provides some information on the sources of income of old-age adults in Ecuador.

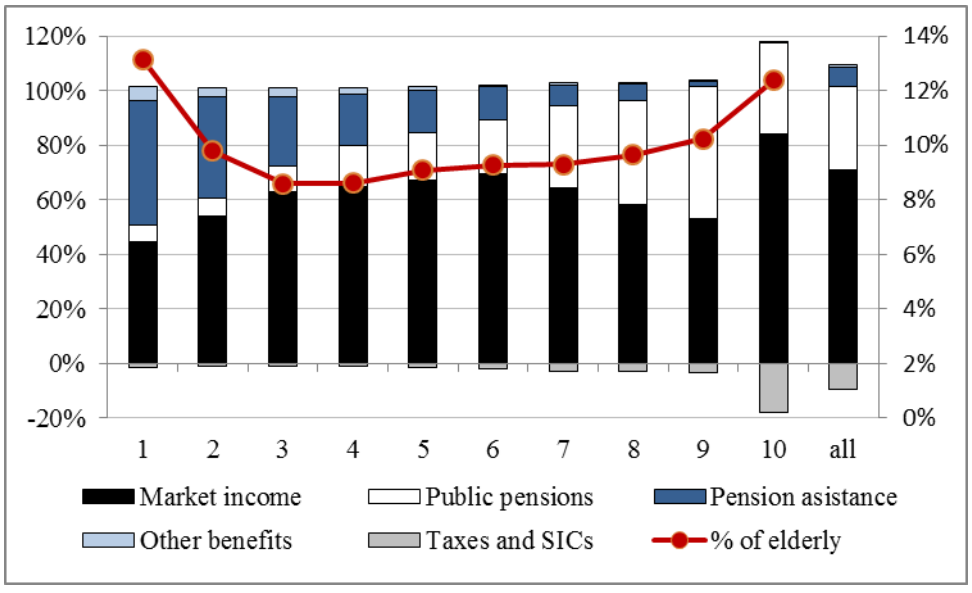
5.2. Income composition of old-age adults

One way to measure the financial situation of old-age adults is to look at their position across the income distribution (Figari et al. 2013). Figure 3 shows the proportion of old-age adults in each decile of per capita household disposable income (red line). The results depict a U-shape pattern, with 13% of the elderly found in the bottom income decile, a relatively stable share of 8.5% to 9.3% of elderly in the middle of the income distribution and up to 12% of old-age adults in the top decile.

The composition of incomes of old-age adults is of particular interest for our analysis, in order to have an indication of the relative importance of market income, public pensions and pension assistance from the HDT as a source of income for this population subgroup. Figure 3 shows the average size of the different sources of income of the elderly as a proportion of average disposable income by per capita household disposable income decile. Taxes and social insurance contributions are shown as negative values as they represent deductions from disposable income.

Market incomes contribute significantly to disposable income of the elderly. They represent 45% of disposable income for the first decile group and up to 84% for the top decile. Contributory public pensions represent 30% or disposable income on average for the elderly population. However, they present a regressive pattern with the relative importance of public pensions increasing along the income distribution, which is consistent with previous findings for Ecuador (see Jara and Varela 2017). Contributory public pensions represent only 6% of disposable income of old-age adults in the bottom income decile, whereas they amount to over 30% for deciles 8, 9 and 10.

Figure 4: Income components as a share of elderly disposable income by household disposable income decile group (2014)



Source: Authors' elaboration based on ECUAMOD version v1.0

Our results show the important role played by pension assistance from the HDT in providing a source of income to the elderly poor. HDT for the elderly represents 45.8% of disposable income of old-age adults in the first income decile, 37% and 26% in the second and third deciles, respectively. Other benefits, such as disability carer benefits and housing

grants, represent only a minor share of disposable income of the elderly. Finally, the role of taxes and SICs is noticeable only for the top income decile group, where they represent 17.8% of disposable income of the elderly.

5.3. Evaluation of policy reform scenarios

ECUAMOD is used to evaluate the effect of increasing the value of HDT in 2014 to cover the estimated needs of old-age adults. Three hypothetical reforms are analyzed. In a first simulation (reform A), we increase the value of the transfer to USD 81.04 per month, which corresponds to the level of the poverty line in 2014. In a second simulation (reform B), we consider a more generous amount of USD 157.9, which is equivalent to the average monthly expenditure of old-age individuals living alone and receiving the HDT in the 2014 Survey of Living Conditions. In a third simulation (reform B), we consider a more sophisticated scheme, where the benefit amount if set to USD 157.9 but the amount decreases by every dollar of household market income net of taxes and SICs, with a minimum payment of USD 81.04. The last reform aims to take into account of the fact that some old-age adults might dispose of other sources of income (whether their own or from other household members) to cover their needs.

The hypothetical reforms should, however, take into consideration the economic environment the country has experienced since 2014. Oil exports, which play a major role in government revenue, have been recently affected by low oil prices. Reforms involving increased amounts of cash transfers would therefore prove difficult to finance under such macroeconomic conditions. For this reason, our analysis considers, for each reform, a scenario where the increase in HDT amounts would be financed by an increase of employee social insurance contributions, under the condition of budget neutrality. The following subsections describe the budgetary cost of our hypothetical reforms, the distribution of gains and losses, and the resulting effects on poverty and inequality.

Budgetary cost. The budgetary cost of each of our hypothetical reforms is presented in Table 7. Under reform A, the increase of HDT from USD 50 to USD 81.04 would result in an increase of government expenditures of USD 192.70 million, which is equivalent to 0.19% of GDP in 2014. If the increase of HDT was to be financed through an increase in employee social insurance contributions, the contribution rate of employees would increase by 1.03 percentage points.[3] Under reform B, the increase of HDT from USD 50 to USD 157.9 would result in an increase in government expenditures of USD 605.83 million, equivalent to 0.60% of GDP in 2014. Financing reform B through employee SICs would result in an increase of the contribution rate of employees by 3.22 percentage points. Finally, the budgetary cost of reform C lies in middle ground between reform A and B, as the maximum benefit amount is reduced for individuals living in households with high net market income. Under reform C, government expenditures would increase by USD 463.42 million (0.46% of GDP) which could be financed by an increase of 2.47 percentage points in the rates of employee SICs.

[3] In 2014 the total contribution rate of employees was either 9.45% of 11.45% depending on the sector of work.

Table 7: Budgetary cost of policy reforms (2014)

	Reform A	Reform B	Reform C
Additional cost (in million USD)	192.70	605.83	463.42
Additional cost (in % of GDP)	0.19	0.60	0.46
Increase in employee SICs	1.03	3.22	2.47

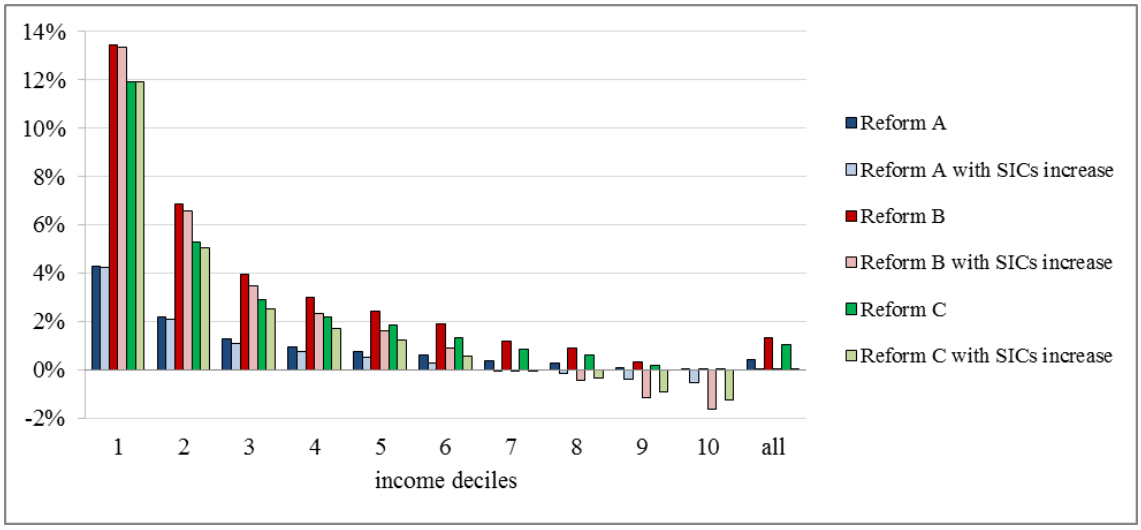
Source: Authors' elaboration based on ECUAMOD version v1.0

Effect of policy reforms on the income distribution. We now assess the effects of our hypothetical reforms over the whole population. Figure 5 presents the gains and losses in terms of household disposable income for the different disposable income deciles. Positive effects (upward pointing bars) reflect gains from the hypothetical reforms, while negative effects (downward pointing bars) are due to the increase in employee social insurance contributions required to achieve revenue neutrality.

Figure 5 shows that an increase in the HDT amount for the elderly is a progressive reform in the sense that individuals in the lowest part of the income distribution gain more from such reforms, and the gains decrease, the higher the disposable income. Our results show that reform A would result in an increase of disposable income of around 4.3% for the first decile and around 2.2% for the second decile. Under the more generous increase in reform B, the first decile would gain around 13.4% more in terms of disposable income, and an increase of 6.9% and 4% is observed for the second and third decile groups, respectively. The more sophisticated reform C, which would take into account household net market income would still increase household disposable income substantially for the first and second decile groups (11.9% and 5.3%, respectively).

The effect of financing the increase in HDT amounts through employee social insurance contributions becomes evident at the top of the income distribution, starting at the 8th decile group. Under all reforms, financing the increase in HDT through employee SICs results in a loss of less than 2% of household disposable income for the higher income decile groups. The top decile group would experience a loss of 0.5%, 1.6% and 1.3% of household disposable income respectively under reforms A, B and C.

Figure 5: Percentage change in household disposable income by income decile group: all reforms

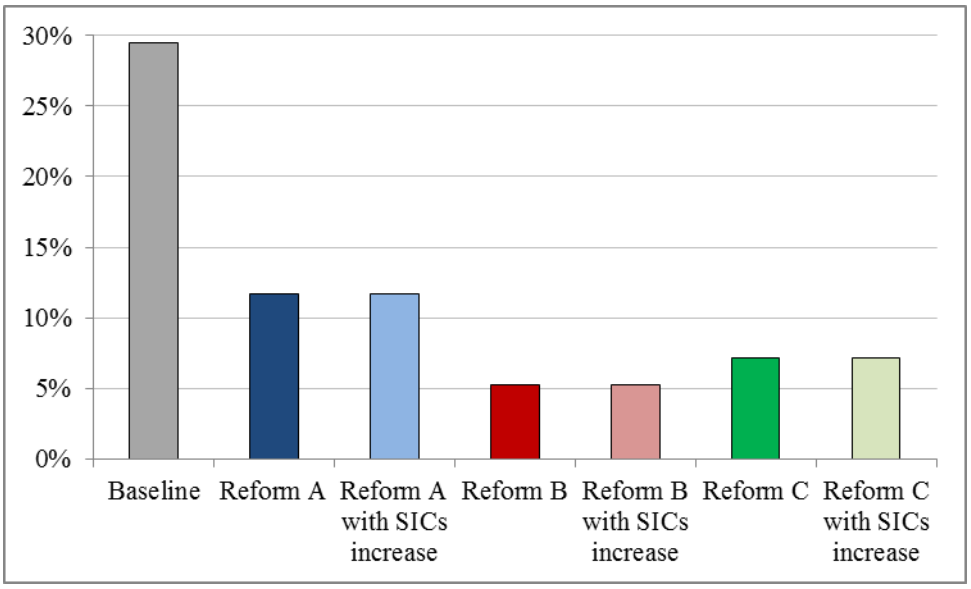


Source: Authors' elaboration based on ECUAMOD version v1.0

Effect of policy reforms on poverty and inequality. We now summarise the effects of our reforms on income poverty and inequality. We start by looking at the share of old-age HDT beneficiaries who were at risk of poverty in 2014 and the effect of the different reform scenarios. The results are computed based on household disposable income equivalised by the number of individuals in the household, using the absolute national poverty line, equal to USD 81.04 in 2014.

Figure 6 shows that around 29% of old-age HDT beneficiaries were in a situation of income poverty in 2014. All three scenarios would reduce the risk of poverty of old-age HDT beneficiaries. The share of beneficiaries under the poverty line would decrease to 11.7% under reform A, 5.3% under reform B, and 7.2% under reform C. Financing such reforms through an increase of employee SICs would have no effect on the risk of poverty of old-age HDT beneficiaries.

Figure 6: Share of old-age HDT beneficiaries at risk of poverty by reform scenario



Source: Authors' elaboration based on ECUAMOD version v1.0

We now turn to poverty and inequality results at the population level. Table 8 presents absolute poverty measures for the whole population and for the elderly (65 years or more) using national poverty and extreme poverty lines, equal to 81.04 USD and 45.67 USD per month in 2014, respectively. To measure the effect on inequality, the Gini coefficient is used.

Table 8 shows that poverty rates of old-age adults are higher than poverty rates of the overall population in the baseline scenario of 2014 policies. Extreme poverty rates are on the other hand of similar magnitude. Turning to our simulation, our results show that poverty would decrease by 0.77 percentage points under reform A, 1.39 points under reform B, and 1.22 points under reform C. Extreme poverty would decrease by 0.26 points, 0.39 points and 0.37 points, respectively. In terms of elderly poverty, all three reforms would have a substantial effect. Under reform A, elderly poverty would decrease by 7.7 percentage points. The decrease would amount to 10.66 points under the more generous payment in reform B, whereas taking into account household net market incomes under

reform C, would result in drop of elderly poverty of 9.79 points. Finally, inequality, as measured by the Gini coefficient, would also fall, by 0.29 points, 0.72 points and 0.62 points under reforms A, B and C, respectively.

Table 8: Poverty and inequality by policy reform scenario (%)

	Baseline	Reforms					
		without increase in SICs			with increase in SICs		
		A	B	C	A	B	C
Poverty	15.97	15.20	14.58	14.75	15.23	14.69	14.83
Extreme poverty	4.20	3.94	3.81	3.83	3.94	3.83	3.84
Elderly poverty	19.55	11.84	8.89	9.76	11.84	8.90	9.75
Elderly extreme poverty	4.28	3.23	2.84	2.88	3.23	2.84	2.88
Gini coefficient	46.02	45.74	45.30	45.40	45.67	45.09	45.23

Source: Authors' elaboration based on ECUAMOD version v1.0

Financing the reforms to the HDT through an increase in employee SICs has a very similar effect in poverty and elderly poverty, as shown in columns 5 to 7 from Table 8. Inequality, on the other hand, would decrease further under such scenarios, due to the fact that the top income decile groups are contributing to the increase in employee SICs.

6. Conclusion

The Ecuadorian population is experiencing a process of moderate demographic transition. Although working-age individuals represents a large proportion of the population, labor market informality remains high, meaning that a large number of workers will not have access to contributory pensions in their old-age. The Human Development Transfer has played an important role providing pension assistance for old-age individuals not affiliated to social security. However, the benefit amounts might not necessarily cover the basic needs of old-age beneficiaries.

The present paper makes use of different sources of micro-data together with tax-benefit microsimulation techniques to evaluate the effect of reforming pension assistance in Ecuador to cover the needs of the elderly poor. The paper contributes to the recent literature on the economic protection of elderly citizens in Latin America and proves particularly relevant in a period where reforms to the Human Development Transfer are increasingly being debated.

Our results show that increasing the amount of pension assistance to the level of the absolute poverty line in 2014 would reduce elderly poverty by 40% and would take 18% of old-age HDT beneficiaries out of poverty. The value of the absolute poverty line seems a good proxy for the needs of the old-age population as it is based on the value of a basic basket of goods. A more generous pension assistance, equivalent to average expenditures of old-age HDT beneficiaries (USD 157.9 per month), would decrease elderly poverty by 55% and would take 24% of old-age HDT beneficiaries out of poverty. Our analysis also presents the effect of a more sophisticated reform, where the USD 157.9 per month amount of the benefit would decrease with the level of net market income of the household with a minimum provision of USD 81.40 per month. Our results highlight the

costs of the hypothetical reforms. The budgetary costs of the reforms would represent less than 0.7% of GDP in 2014, and in the case that they would be financed by an increase of employee SICs, the contribution rates would increase between 1.03 and 3.22 points depending on the generosity of the benefit.

From a policy perspective, our paper highlights the advantages offered by tax-benefit microsimulation models to improve income protection of vulnerable groups in developing countries. The analysis and discussion of financing social benefits through taxes and/or social insurance contributions is particularly relevant for economies which depend on primary resource with volatile prices, such as oil. The recent expansion of social benefits in Latin America has played an important role in the reduction of inequality in the region and, therefore, the sustainability of such programs should be at the center of the policy agenda.

Future research could consider several extensions to this study. For instance, a more in depth analysis about the needs of old-age individuals could be considered to estimate individual-level consumption following the work on intra-household allocation models. Moreover, our paper considers only the direct effects of increasing the amount of pension assistance for the elderly poor. Potential behavioural effects could be considered. In particular, old-age individuals and other household members involved in economic activities might adjust their labour supply as a result of the hypothetical reforms.

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