UNITED NATIONS
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DRAFT

WIDER Development Conference

Public economics for development

5-6 July 2017 | Maputo, Mozambique

This is a draft version of a conference paper submitted for presentation at UNU-WIDER's conference, held in Maputo on 5-6 July 2017. This is not a formal publication of UNU-WIDER and may reflect work-in-progress.

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Poverty and vulnerability to poverty in Ecuador: a microsimulation approach

Mauricio Cuesta Zapata
Instituto de Altos Estudios Nacionales, Quito, Ecuador
m.cuesta@iaen.edu.ec

Holguer Xavier Jara Tamayo
Institute for Social and Economic Research, University of Essex, Colchester, UK
hxjara@essex.ac.uk

June, 2017

ABSTRACT

The aim of this paper is to study household poverty and vulnerability to poverty in Ecuador over the period 2011-2016. The analysis makes use of ECUAMOD, the tax-benefit microsimulation model for Ecuador, based on household representative microdata from the National Survey of Income and Expenditures of Urban and Rural Households (ENIGHUR) 2011/12. Our strategy consists in using microsimulation techniques to construct a series of repeated cross-sections for each year from 2011 to 2016 to focus on the role of the tax-benefit system on poverty and vulnerability to poverty. Our results show that over the period 2011-2016 relative poverty has remained relatively stable between 22.9% and 23.6%. Over the same period, vulnerability to poverty has been around 35%. Around 20% of the poor population and 25% of the no poor are found in a situation of vulnerability. We show that the country tax policy and the rate of social insurance liabilities as well as cash benefit transfers have maintained a non-decreasing relative poverty rate and a decreasing vulnerability during the period of analysis.

JEL: D30, H53, I38
Keywords: Poverty, Vulnerability, Microsimulation

1. Introduction

The present study estimates household poverty and vulnerability to poverty in Ecuador, using household income information available in the National Survey of Income and Expenditures of Urban and rural Households (ENIGHUR)[1] 2011/12 which allows for representative results at the national level. (INEC, 2012). The analysis makes use of ECUAMOD, the tax-benefit microsimulation model for Ecuador, which is based on the EUROMOD platform.[2] Microsimulation has been increasingly used as a tool for establishing the *ex-ante* distributional impact of policy reforms and broader economic developments.[3]

Vulnerability to poverty would ideally be estimated using long and rich panel data. However, such data is not available in the case of Ecuador. Therefore, we use cross-sectional data together with microsimulation techniques with the aim of focusing on the role of tax-benefit systems on vulnerability to poverty. The use of tax-benefit microsimulation allows us to estimate the income distribution for years 2011-2016, and to compute household poverty, vulnerability to poverty, as well as the policy cost of alleviating vulnerability through the Human Development Bonus (HDB).[4] More precisely, our strategy consists in using microsimulation techniques to construct a series of repeated cross-sections for each year from 2011 to 2016, based on representative household data from ENIGHUR 2011/2012. Poverty is then directly calculated for each constructed cross-section, while vulnerability to poverty is derived calculating an income

[1] Encuesta Nacional de Ingresos y Gastos de Hogares Urbanos y Rurales, ENIGHUR.

[2] The ECUAMOD model is part of the SOUTHMOD project developed by the World Institute for Development and Economic Research of the University of the United Nations (UNU-WIDER) and the EUROMOD team at the Institute of Economic and Social Research (ISER) of the University of Essex and the South African Social Policy Research Institute (SASPRI), in which microsimulation models have been assembled for Ecuador, Ethiopia, Ghana, Mozambique, Namibia, South Africa, Tanzania, Vietnam and Zambia. For more information about ECUAMOD see Jara et al. (2017). For more information about EUROMOD see Sutherland and Figari (2013).

[3] See for example, Ajwad, 2013; Brewer *et al*, 2011; Brewer, Brown and Joice, 2013; Brandolini, D'Amuri and Faiella, 2013; Habib *et al*, 2010; Keane *et al*, 2014.

[4] Human Development Bonus (HDB) is a proxy means-tested benefit based on a composite welfare eligibility index. The benefit amount was USD 35 per month in 2011 and increased to USD 50 in 2015. Two types of conditionality apply for families with children receiving the HDB. First, children under 6 in the household require to attend health centers at least twice per year for medical check-ups. Second, children aged 6 to 15 in the household enroll in school and attend at least 90 per cent of the school days in a month. The conditionality of the program also extends to prenatal health controls, sexual and reproductive health consultations, eradication of child labor and mendacity, maintenance of the dwellings, and an annual update of changes in the socioeconomic situation of the household. (Jara *et al*, 2017).

function using the feasible generalized least squares method (FGLS) following Chaudhuri, Jalan and Suryahadi (2002).

Essential for the design and evaluation of policy reforms is to estimate the cost and distributional effects of tax and benefit policy changes. This microsimulation model is based on household micro-data and is designed to supply tools for those purposes. This model allows to hold constant all other variables (*ceteris paribus*) so that we can focus on the policy aspects of interest.

This paper illustrates the way in which microsimulation can help us to develop policies to reduce poverty and vulnerability to poverty. This particular simulation makes reference to policies intended to reduce the uncertainty of the flow of future income and the loss of welfare among households facing limited sources of income.

The remainder of the paper is structured as follows. Section 2 discusses the concepts of poverty and vulnerability. Section 3 describes the procedure to estimate vulnerability to poverty using cross-sectional data and feasible generalized least squares (FGLS). Section 4 presents ECUAMOD and the data, and the typical respondent to the survey. Section 5 presents the simulated results of poverty and its evolution over the last six years, as well as profiles of household vulnerability. Finally, section 6 concludes.

2. Poverty and vulnerability

Being poor is generally assessed in terms of deprivation of some of life's basic needs, such as food, shelter, clothing, education, health care and social security among other dimensions of wellbeing. There is disagreement about how to measure these indicators and various considerations about what it means to be poor. The predominance of income-based measures of poverty implies that poverty is a unidimensional construct, when, in fact, it is multidimensional (Desai & Shah, 1988).

However, there is a question that applies to all empirical studies of poverty: whether the level of cash income is an adequate guide to the level of material well-being. This paper, following Sutherland (2001), explores changes in income: one important component of the wider picture, thus, in what follows, for poverty, we refer to as "income poverty".

In order to determine whether a person is poor, her household disposable income needs to be compared to an income threshold known as the poverty line. The literature has extensively discussed whether an absolute or relative threshold should be used to analyze poverty. An absolute threshold could be, for instance, defined in terms of the cost of a

basket of goods to satisfy the minimum required biological needs of an individual. On the other hand, a relative threshold could be considered based on the median disposable income of each country. The main measure of monetary poverty, considered here, is a relative one, known as the "at-risk-of-poverty" rate defined as those living in households with equivalised household disposable income below 60% of the national median equivalised household income (Bradshaw and Mayhew, 2011, 6).

It has been recognized that in a dynamic global environment, poor people flow in and out of the poverty count of the poverty measure estimates as a result of adverse economic, social and or political shocks affecting them, and such movements can be observed when looking at poverty in absolute or relative terms. This finding suggests the need for an *ex-ante* view of poverty -vulnerability- and a thorough enquiry about the social protection/social risk management instruments for dealing with it (Holzman, 2001, 3).

Vulnerability is an *ex-ante* measure of the person's well-being, which reveals future expectations and risks of their realization: loss of production, price increase, illness, unemployment (Filgueira and Peri, 2004), thus suggesting the risk of becoming poor in the future or staying in poverty. For the measurement of this future condition, it is required several years of annual household income or consumption (longitudinal measurement) to be able to measure their volatility (variance) and to establish its fluctuation around the poverty line (Suryahadi and Sumarto, 2003; Jalan and Ravallion, 2000). However, in most developing countries, longitudinal data is not available. To replace this lack of information, previous studies (see for instance Chaudhuri, Jalan and Suryahadi, 2002) have estimated the expected income and variance of the household disposable incomes using cross-sectional data to determine vulnerability as the probability of becoming poor using feasible generalized least squares (FGLS). Vulnerability, then is defined in terms of exposure to adverse shocks to welfare, rather than in terms of exposure to poverty.[5] This means that a household's vulnerability is measured as a probability, hence households have greater or lesser degrees of vulnerability. (Suryahadi and Sumarto, 2003). Therefore, a social protection strategy is to identify those who are exposed to effects of shocks and risks to determine their vulnerability to poverty. The following section describes in detail the method used to estimate vulnerability to poverty based on cross-sectional data.

[5] See for instance: Cunningham and Maloney, 2000 and Glewwe and Hall, 1998.

3. Methodology

In order to assess the household characteristics related to vulnerability and given the lack of longitudinal data, this study focuses on vulnerability to poverty defined in terms of a single measure: current disposable income available for consumption expenditure.

Vulnerability, within the framework of poverty determination, is therefore considered the *ex-ante* risk that a household will, if currently non-poor, fall below the poverty line, or if currently poor, will remain in poverty. This section presents the methodology to estimate vulnerability to poverty using cross-sectional data and draws extensively on the work of Chaudhuri, Jalan and Suryahadi (2002).

The key to estimating a household's vulnerability to poverty is to obtain an estimate of the household's variance of consumption expenditures (Suryahadi and Sumarto, 2003). A reliable estimate of consumption expenditure variance can be obtained from panel data collected over a sufficiently long period.

$$v_{h,t} = \Pr\left(c_{h,t+1} \le z\right), \qquad (1)$$

where,

$v_{h,t}$ is vulnerability of a household *h* in the period *t*,

$c_{h,t+1}$ is the household per-capita consumption in the period *t+1*, and

z is a predetermined poverty line.

A household's consumption in any period depends on its wealth, its current income, its expectations and uncertainty of future income and its ability to smooth consumption in the face of various income shocks, among other things. This household attitude depends on the observable and non-observable household characteristics, the macroeconomic and socio-political features of the aggregate environment in which the household finds itself (Deaton, 1992; Browning and Lusardi, 1995), which suggests the following expression for consumption:

$$c_{h,t} = c\left(x_h, \beta_t, \alpha_h, e_{h,t}\right), \qquad (2)$$

where,

x_h is a vector of observable household characteristics

β_t describes the state of the economy

α_h time invariant household level effect, and

$e_{h,t}$ idiosyncratic factors (shocks)

Substituting equation (2) in equation (1), we have

$$v_{h,t} = \Pr\left(c(\underbrace{x_h, \beta_{t+1}, \alpha_h, e_{h,t+1}}_{future\ consumption}) \le z \mid \underbrace{c(x_h, \beta_t, \alpha_h, e_{h,t})}_{current\ consumption} \right), \qquad (3)$$

so that, vulnerability to poverty is the probability that a household future consumption be less than a predetermined poverty line given the state of its current consumption.

This definition would include among the vulnerable, households who are currently poor and have a high probability of remaining poor even if they do not experience any large adverse welfare shocks. On the other hand, it would exclude those households among the non-poor who face a high probability of a large adverse shock but are currently well-off enough so that even were they to experience the shock, they would still remain non-poor.

To estimate a household's vulnerability to poverty we need to estimate both its expected consumption and the variance of its consumption since

$$v_{h,t} = \Pr(become\ \ poor) = f\left[E(c_{h,t+1}), V(c_{h,t+1})\right] \qquad (4)$$

Ideally, this would be done using longitudinal data (where the same households are tracked over a number of periods) of sufficient length. With such data, one could directly estimate the inter-temporal variance of consumption at the household-level without the need for auxiliary assumptions.[6]

However, most of the available standard data sources in developing countries are based on a 'single visit' (cross-sectional) household surveys. (Jalan and Ravallion, 2000). These cross-sectional surveys provide the raw data to develop a method for estimating household consumption expenditure variance from cross-section data. This requires relatively strong assumptions about the stochastic process generating consumption.

Then, following the method for estimating vulnerability to poverty using cross-sectional data proposed by Chaudhuri, Jalan and Suryahadi (CJS, 2002), we begin by assuming that the stochastic process generating the consumption of a household (*h*) is given by:

$$\ln c_h = x_h \beta + e_h, \qquad (5)$$

where

c_h is the per-capita consumption expenditure,

x_h is a vector of observable household characteristics,

β is a vector of parameters, and

e_h is a mean-zero disturbance term that captures idiosyncratic factors (shocks) that contribute to different per capita consumption levels for households that are otherwise observationally equivalent.

[6] See, for example, Skoufias and Quisumbing, 2003.

Implicit in equation (5) is the assumption that the idiosyncratic shocks to consumption are identically and independently distributed over time for each household. This implies that we are ruling out unobservable sources of persistence (arising for example, from serially correlated shocks or unobserved household-specific effects) over time in the consumption level of an individual household.

Another assumption is that the structure of the economy (captured by the vector β) is relatively stable over time (fixed β), ruling out the possibility of aggregate shocks (i.e., unanticipated structural changes in the economy). That is, the uncertainty about future consumption stems solely from the uncertainty about the idiosyncratic shock, e_h, that the household will experience in the future.

Both these assumptions are forced upon us because we are attempting to estimate vulnerability from a single cross-section. Without longitudinal data we cannot identify the parameters driving persistence in individual consumption levels. And without a long enough time-series of repeated cross-sections, we cannot identify the stochastic process generating β.

We do however allow the variance of e_h (and hence of $\ln c_h$) to depend upon observable household characteristics in some parametric way. The estimates we report are generated assuming the following extremely simple functional form:

$$\sigma_{e,h}^2 = x_h\theta \qquad (6)$$

We estimate β of equation (5) and θ of equation (6) using a three-step feasible generalized least squares (FGLS) procedure suggested by Amemiya (1977). Details of the estimation procedure are available in Chaudhuri (2000).

Using the estimates $\hat{\beta}$ and $\hat{\theta}$ that we obtain we are able to directly estimate expected log consumption:

$$\hat{E}\left[\ln c_h \mid x_h\right] = x_h\hat{\beta}, \qquad (7)$$

and the variance of log consumption:

$$\hat{V}\left[\ln c_h \mid x_h\right] = \hat{\sigma}_{e,h}^2 = x_h\hat{\theta} \qquad (8)$$

for each household.

By assuming that consumption is proxied by disposable income and is log-normally distributed, we are then able to use these estimates to form an estimate of the probability that a household with the characteristics x_h will be poor, i.e. to estimate the household's

vulnerability level. Letting Φ (·) denote the cumulative density of the standard normal, this estimated probability will be given by:

$$\hat{v}_h = \Pr(\ln c_h < \ln z \mid x_h) = \Phi\left(\frac{\ln z - x_h\hat{\beta}}{\sqrt{x_h\hat{\theta}}}\right) \quad (9)$$

While vulnerability is a risk and comes in degrees (between zero and one), being vulnerable is a state (either zero or one). We take the threshold probability level that defines a vulnerable household to be 0,5. (Suryahadi and Sumarto, 2003).

4. ECUAMOD and the data

Our analysis makes use of ECUAMOD, the tax-benefit microsimulation model for Ecuador, based on household representative microdata from the National Survey of Income and Expenditures of Urban and rural Households, ENIGHUR 2011/12, which contains detailed income and expenditure data as well as information on characteristics of households and individuals. ECUAMOD input data, based on ENIGHUR 2011/2012, contains information for 39,617 households and 153,341 individuals.[7]

ECUAMOD combines detailed country policy rules with cross-sectional microdata from ENIGHUR to simulate personal income tax and social insurance contribution liabilities, as well as cash benefit transfers from the Human Development Bonus and Joaquín Gallegos Lara Bonus.[8] The main advantage of using ECUAMOD is its capacity to estimate the effects of changes in taxes and benefits on income distribution and to simulation potential policy reforms taking into account the complex interactions between tax-benefit policies and the heterogeneity of the population.

Our strategy to estimate poverty and vulnerability to poverty consists in constructing a series of repeated cross-sections for years 2011 to 2016 using ECUAMOD based on ENIGHUR 2011/2012. Tax-benefit policies are taken as on June 30th of each year. Market incomes and other non-simulated income components are adjusted from 2011 levels to the levels of subsequent years using source-specific updating factors based on available administrative statistics.[9] At this stage, labour market and demographic characteristics of the population are assumed to remain unchanged (as in 2011). This is a plausible

[7] Domestic workers and their children, living at the employer's house were dropped from the original dataset because information about their own household is not available in the data. In total 103 observations were dropped.

[8] ECUAMOD simulations have been validated against official statistics. See Jara et al. (2017) for more information.

[9] See Jara et al. (2017) for more information.

assumption for short-term analysis in a stable macro-economic climate. (Navicke, Rastrigina and Sutherland, 2013; Leventi et al, 2014, p4). This was particularly the case of Ecuador during most of the period of analysis in this paper. Unemployment rates were stable, between 3.8% to 4.2% during 2011-2014. Only in the last two years, we observed an increase in unemployment, with unemployment rates at 4.8% and 5.2%, in 2015 and 2016, respectively. (INEC, 2017).

Household disposable income (HDI) is defined as market income plus private transfers and social benefits minus taxes and social insurance contributions, aggregated at the household level. Non-cash benefits are not included. HDI is equivalised using the modified Organization for Economic Co-operation and Development (OECD) equivalence scale.[10] Income poverty is then calculated in relative terms for years 2011-2016. Individuals are considered at risk of poverty if they live in households with equivalised household disposable income below 60% of the national median equivalised household income.

Table 1 presents some demographics for the typical male and female household head (hhh) in ENIGHUR. Around 24% of household heads in female and 76% males. Females are the most disadvantaged individuals in the society: 29% of the hhh have not finished primary vs 20% of male hhh, 59% of the hhh are single (separated or widowed) compared to only 34% of male hhh. Females have also less access to social security 68% vs 57% of males.

Table 1. The typical household head.

		Female	Male
Age	median age (years)	50	45
Education	not completed primary	29%	20%
	primary	23%	29%
ethnicity	Mestizo	79%	79%
	Indigenous	6%	7%
Marital status	Separated	32%	
	Widowed	27%	
	Married		57%
	Single		34%
Social security	No social security	68%	57%
	Social security general	24%	32%
Industry	Agriculture	13%	24%
	Wholesales	18%	14%

[10] The OECD-modified equivalence scale assigns a value of 1 to the household head, a value of 0,5 to each additional adult member aged 14 or more and a value of 0,3 to each child aged below 14.

Occupations	Services	26%	
	Elementary occupations	18%	17%
	crafts and trade		17%
Economic status	self employed	39%	36%
	employee	31%	53%

Regarding the industry to which the hhh belongs, female and male are engaged in agriculture and commerce. Males are mostly farmers (24%). Women are also farmers (13%) and work in wholesales (18%). Female occupation is mostly in services (support workers) 26%. Males, on the other hand, work mostly in elementary occupations and crafts and trade (artisans). With regard to the position they occupy in the work activity, it can be seen that women (39%) and men (36%), are self-employed, only 31% of the female hhh are employee while more than half of males (53%) are employees.

5. Results

Equation (5) in section 3 specifies the relationship of the household disposable income (where lnC_h has been proxied by log of household disposable income) as function of the hhh characteristics (x_h). The main results of the regression are:

1. age, years of education and experience show the expected positive sign which increases de income of the household head. Their square value, however, do not show the expected negative sign although their absolute value is negligibly, aspects which are according to the human capital theory[11].
2. industry, occupation, job status, ethnicity, education level except primary school, marital status except being single o separated are not significant, having children younger than 14 years do not contribute to explain the variability of disposable income, that is, they show significance values greater than 0,05.
3. The main variables that contribute to the variability of disposable income are: age (years), education (years), professional experience (years), gender (male-female), area (urban-rural), disability, burocracy, house ownership.
4. The independent variables explain 49% of the variability of the disposable income (R^2 =0,489). The estimated coefficients are presented in Annex 1.

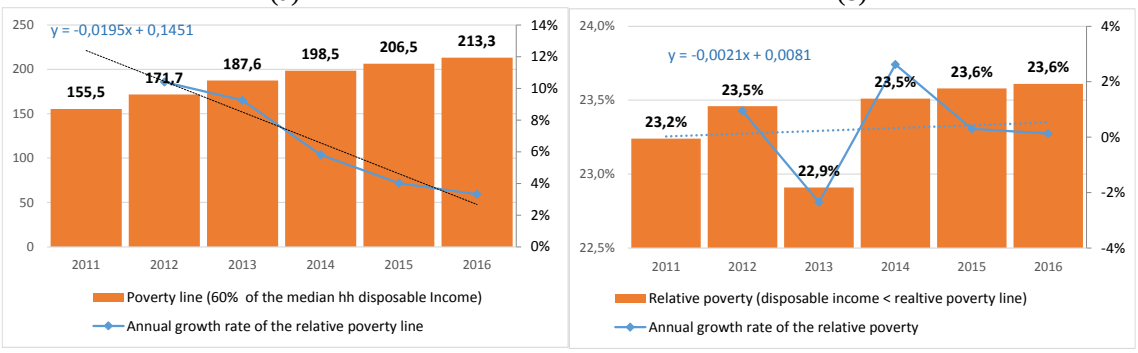
5.1. Poverty and vulnerability to poverty

[11] See for example Becker (1962, 1964), Mincer (1957, 1958, 1962), Schultz (1960, 1961).

The poverty line (60% of the household median disposable income) has increased steadily during the period of analysis (Graph 1a), however the household relative poverty calculated from the microsimulation using ECUAMOD (Jara *et al*, 2017) for the period of 2011-2016 stays relatively at the same level, between 23.2% and 23.6% (Graph 1b). This fact is explained by the growth rate of both variables, the relative poverty line grows annually at an average decreasing rate of 1,95%, while the rate of growth of the household poverty has kept steady at an average of 23,4%.

Graph 1. Growth rates for the relative poverty line (a) and relative poverty (b).

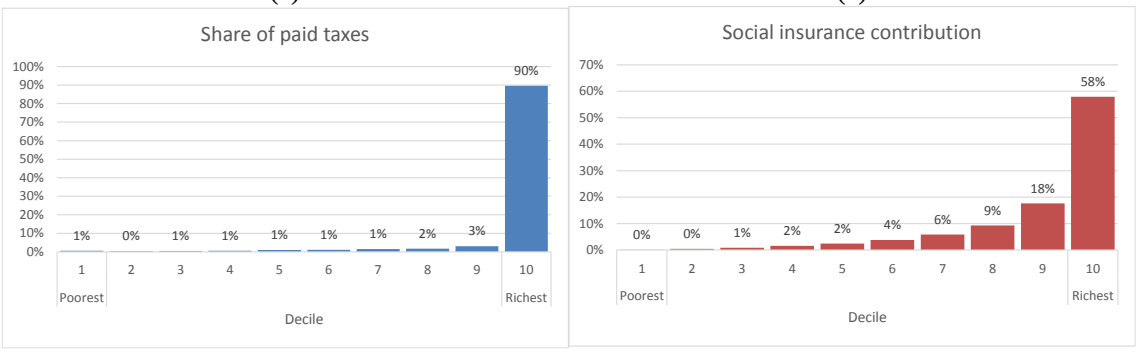
(a) (b)



These differences in the growth rates reflect the redistributive effect of the tax policy implemented during these years: taxes are paid, almost entirely (90%) by the 10% richest hh (Graph 2a), also, 58% of the social insurance contributions are covered by the hh in the richest decile of income (Graph 2b).

Graph 2. Share of paid taxes (a) and social insurance contributions (b) paid by each decile group.

(a) (b)



Poor hh paid only 1,5% of the tax revenue and 0,63% of the social insurance contributions. Furthermore, the growth rate of the poverty line mirrors the level and growth rate of the unified basic salary (Table 2).

Table 2. Comparison of the minimum wage and the median of the household disposable income

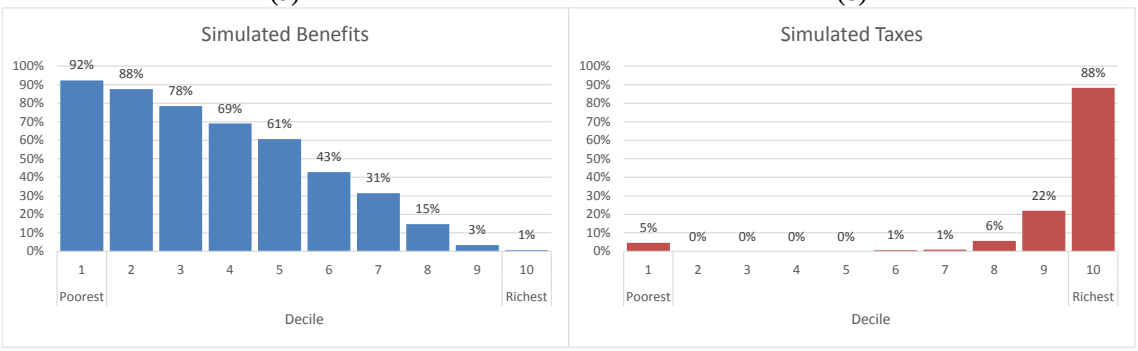
	2011	2012	2013	2014	2015	2016

Unified Basic Salary (US$/month)	264	292	318	340	354	366
Median of disposable income (US$/month)	259.2	286,1	312,6	330,8	344.1	355.5
Relative poverty line (US$/month)	155.5	171.7	187.6	198.5	206.5	213.3
Growth rate of the monthly minimum wage		10,6%	8,9%	6,9%	4,1%	3,4%
Growth rate of the relative poverty line		10,4%	9,3%	5,8%	4,7%	3,3%

In the same vein, benefits are mostly distributed among the poor hh. The receipt of benefits are heavily concentrated in the low half of the population, deciles 1 to 5 (Graph 3a); similarly, in the opposite direction, taxes are paid mostly by the richest hh, deciles 8 to 10. (Graph 3b).

Graph 3. Simulated benefits received (a) and taxes paid (b). Percentage of hh in each decile group.

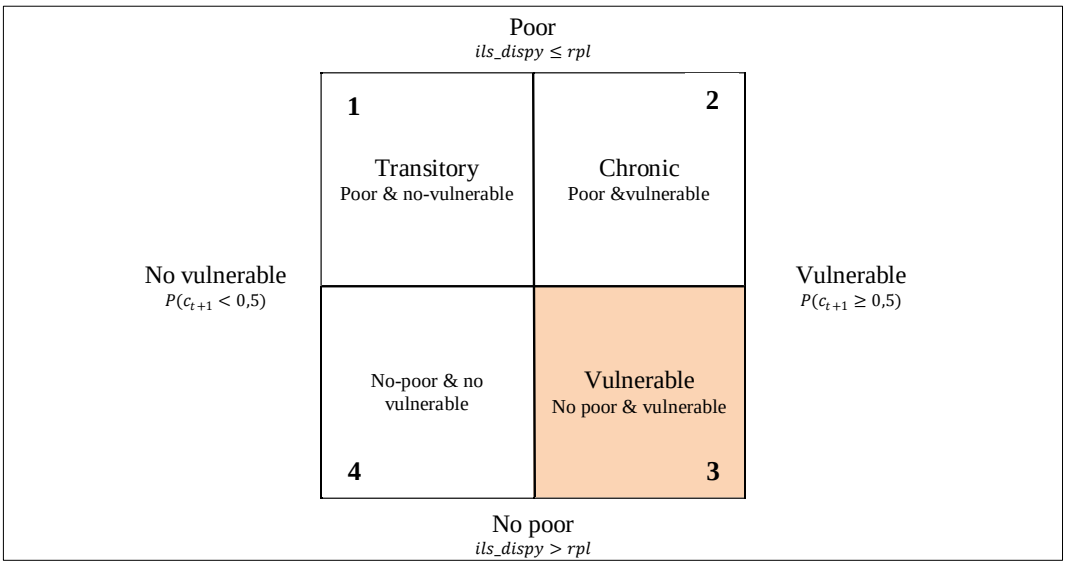
(a) (b)



Using these figures and exploiting the FGLS methodology as described in the model (section 3), combining the household condition of poverty and vulnerability, they can be grouped into four groups of intervention by the public policy:

1. Poor-no-vulnerable is the transitory poor, who enters and exits from poverty due to idiosyncratic shocks
2. Poor-vulnerable is the chronic poor.
3. No-poor-vulnerable is the vulnerable, properly speaking, who is prone to see his welfare altered given any idiosyncratic or external shock,
4. No-poor-no-vulnerable, is the one that faces shocks without affecting their well-being. (Graph 4).

Graph 4. Classification of households according to the poverty-vulnerability relationship.



ils_dispy disposable income
rpl relative poverty line (60% of the median household disposable income)

Households who are in the quadrant 1 and 2 are the transitory poor and chronic poor whether they are no-vulnerable or vulnerable, respectively. They are the population assisted through anti-poverty policies; the ones in the quadrant 4 are the well suited hh not affected by any idiosyncratic shock: no-poor-no-vulnerable. The quadrant three represent the no-poor but vulnerable to idiosyncratic shocks and they are the population of interest.

Who is the vulnerable?

Table 3 presents the distribution of disposable income (**ils_dispy**) of the hh groupings along with the poverty-vulnerability association:

Table 3. Descriptive statistics of the hh disposable income (**ils_dispy**)

	N	Mean	Standard deviation	Minimum	Maximum
poor-no-vulnerable	15%	93,2	38,7	0	155,5
poor-vulnerable	20%	89,9	37,4	0	155,3
no-poor-vulnerable	25%	340,6	240,8	155,61	2.296
no-poor-no-vulnerable	40%	512,2	844,4	155,55	31.544

Vulnerable is the hh whose earnings (mean disposable income) are lower than the relative poverty line (60% of the median disposable income): $155,5 and face a probability greater than 50% that their future income be lower than the relative poverty line. Based on this present-future income association, we can identify the typical vulnerable hh and put them apart.

If we compare the vulnerable hh (no-poor-vulnerable) with the poor household (poor-vulnerable and poor-no-vulnerable), one important trait that defines them as poor or no-poor is the disposable income: the poor hh mean disposable income is $91,5 per month, while the no-poor-vulnerable hh has an income almost three times that of the poor, $340.6 per month. However, the dispersion (standard deviation) of the vulnerable earnings is more than six times the dispersion of the poor hh, which make them, at any moment, to have a 30,5% probability of vulnerability higher than the poor hh.

Table 4 presents the mode of some demographics and features that characterize these two groups of hh. Thus, we could describe the vulnerable hh as a mestizo male, 61 years old, married, living in a family of four members with no children younger than six and at least one member older than 65 years, located in the province of Manabi in the coastal region, with a minimum level of education, almost an illiterate person with less than one year of education (mean of 0,79 years) that works in Agriculture as employee with no social security affiliation.

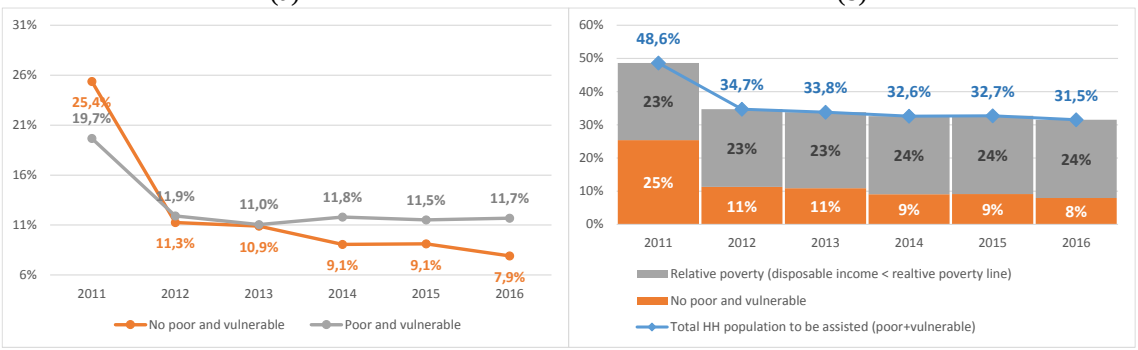
Table 4. Demography and characteristic features of the poor and no-poor-vulnerable hh

		Poor	No-poor-vulnerable
Who	Age (mean years)	51,6	64,2
	Sex	male	male
	Marital status	married	married
	Household size	4	4
	Children younger than 6	0	0
	Adult older than 65	1	1
	Ethnicity	Mestizo	Mestizo
	Years of education (mean)	0,92	0,79
Where	Province	Manabi	Manabi
	Region	coastal	coastal
	Area	Rural	Urban
Work	industry	Agriculture	Agriculture
	Job status	Farmer	Employee
	Experience (mean years)	15,7	11
	Social security affiliation	None	None
Income	Disposable income	$99,9	$340,6
	Standard deviation	(37,4)	(240,8)
	Relative poverty line (rpl)	$213,3	$213,3

The evolution of the estimated vulnerability is presented in Graph 5. The effect of vulnerability in poor and non-poor households, follows the same pattern of change: growth with decreasing rates, along the years, however poor households face a higher risk of being affected by idiosyncratic shocks, thus they are more vulnerable than the no-poor hh. (Graph 5a).

Graph 5. Growth rates for the poor- and no-poor vulnerable hh (a) total hh population to be assisted (b).

(a) (b)



The average poverty rate for the 2011-2016 period is 23% and the average vulnerability is 12%, then the mean percentage of population to be assisted would be 35%, more than one third of the total population (Graph 5b). Thus, if we combine poverty and vulnerability rates, the antipoverty policy design should contemplate the inclusion of the vulnerable-no-poor hh, which means that the population to be included would be not just the percentage of poor, but the vulnerable, also, that is to say that every four out of ten persons are poor or potential poor.

6. Conclusions

We showed that the country tax policy and the rate of social insurance liabilities as well as cash benefit transfers has maintained a non-decreasing relative poverty rate and a decreasing vulnerability. Relative poverty keeps an average of 24% during the period of analysis; at the same time, vulnerability to poverty levels show an average of 11%. These vulnerable hh are those whose income is just above the poverty line and they are considered no-poor, although they do not experience a significant difference in their standard of living (Qizilbash, 2003). This group of "just above" (the vulnerable) hh shows a high propensity to fall into poverty and they should be included in an effective public policy of fighting poverty.

As a consequence, the fight against poverty should consist of the poor and the vulnerable, then any strategy should include 35,5% of the hh population. This means that more than one third of the population (four of every 10 persons) is poor or vulnerable to poverty.

The vulnerable hh shares many of the disadvantages of the poor hh, together they stand in the same condition: almost illiterate, engaged in the same labor activities (agriculture), although one is a farmer and the other an employee, both face the same condition of labor vulnerability: no social security affiliation.

Considering other variables than income is plausible and useful to identify groups of people and areas of intervention for policy design. However, this identification of the poor has economic policy implications since the areas of intervention are different than the traditional strategy of approaching poverty: poverty alleviation with payments to the poor, subsidies, price intervention, food baskets, among others, centered on specific groups: poor, extreme poor, vulnerable, identified as shortage of income

This assessment centered on one specific component of well-being presents poverty and the poor as responsible of her/his place in society. Making an analogy, if there is one, two, ten individuals with any disease, that is an individual problem, but if there are 100, 150 individuals suffering some malady and not to say thousands or millions, that is an epidemic and that is a society problem. Since vulnerability implies shocks other than income and there are thousands of them, should poverty be approached as an individual phenomenon or as a social problem?

This fact suggests to include a higher population in any program to assist the poor, also, any poverty alleviation scheme has to include more dimensions than income alone.

This approach of fighting poverty including aspects of well-being such as vulnerability leads us to the same final conclusion that, although income gives us a good approximation to identify the poor, it is necessary to consider the broader dimensions of well-being.

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Annex 1

Table A1. Parameter estimates of the hh disposable income.

		β	Standard error	t	Significance
	(Constante)	4,161	,405	10,273	,000
Age	age	,031	,004	7,996	,000
	age2	,000	,000	-7,667	,000
Education	eduy	,044	,008	5,505	,000
	eduy2	,001	,001	1,330	,183
Experience	exper	,014	,002	8,042	,000
	exper2	,000	,000	-7,795	,000
Gender	hombr	,045	,022	2,007	,045
	rural	-,311	,022	-14,452	,000
Disability	disab	,732	,292	2,505	,012
	serpub	,158	,080	1,977	,048
Children	men6_sum	-,019	,014	-1,405	,160
	ma6me14_sum	-,003	,011	-,260	,795
	may65_sum	,017	,019	,900	,368
Education	prim	,064	,031	2,087	,037
	sec3	,061	,052	1,177	,239
	sec6	,010	,073	,141	,888
	posec	-,100	,148	-,677	,499
	tercia	-,015	,121	-,125	,901
Province	azuay	-,745	,082	-9,045	,000
	boliv	-,857	,088	-9,705	,000
	cañar	-,795	,088	-9,079	,000
	carch	-,933	,089	-10,452	,000
	cotop	-,824	,087	-9,454	,000
	chimb	-,923	,086	-10,724	,000
	eloro	-,703	,084	-8,320	,000
	esmer	-,837	,086	-9,766	,000
	guaya	-,720	,082	-8,772	,000
	inbab	-,871	,087	-9,978	,000
	loja	-,885	,082	-10,747	,000
	lrios	-,690	,087	-7,901	,000
	manab	-,774	,082	-9,436	,000
	moron	-,824	,094	-8,732	,000
	napo	-,836	,100	-8,394	,000
	pasta	-,644	,095	-6,767	,000
	pichi	-,676	,083	-8,184	,000
	tungu	-,728	,082	-8,824	,000
	zamor	-,776	,095	-8,206	,000
	sucum	-,805	,100	-8,038	,000
	orell	-,772	,110	-7,018	,000
	sdom	-,773	,089	-8,669	,000
	selen	-,948	,094	-10,068	,000
Marital	single	-,127	,027	-4,752	,000
status	marrie	,009	,027	,348	,728
	separ	-,071	,031	-2,321	,020
	divorc	-,027	,043	-,623	,533
Social	iessge	,460	,024	19,060	,000
security	iessvo	,304	,059	5,168	,000
affiliacion	iessca	,046	,029	1,592	,111
	iessmi	,600	,066	9,151	,000
	segmsp	-,093	,082	-1,131	,258
Industry	agricul	,133	,255	,521	,602
	manuf	,110	,256	,429	,668

	constr	,230	,258	,890	,373
	comer	,156	,254	,612	,541
	turism	,189	,257	,737	,461
	transp	,322	,258	1,246	,213
	finanz	,039	,317	,124	,901
	inmob	,076	,259	,293	,770
	admpub	-,017	,260	-,064	,949
	educa	-,022	,266	-,083	,934
	salud	,012	,270	,046	,963
	otros	,099	,257	,386	,700
Occupation	direct	,641	,255	2,513	,012
	profes	,074	,245	,302	,763
	tecnic	-,079	,250	-,315	,753
	oficini	,044	,251	,177	,859
	vended	-,134	,242	-,554	,579
	agricu	-,305	,245	-1,244	,213
	artesa	-,148	,244	-,606	,544
	operad	-,052	,245	-,211	,833
	nocalif	-,252	,242	-1,041	,298
Job status	patro	-,189	,149	-1,268	,205
	asala	-,113	,150	-,753	,452
	pensio	,079	,156	,504	,614
	desemp	-,169	,172	-,982	,326
	estudi	,298	,273	1,095	,274
	inacti	-,111	,157	-,710	,478
	discap	-1,102	,328	-3,365	,001
	otra	-,199	,151	-1,313	,189
Ethnicity	indig	,197	,342	,575	,565
	afro	,473	,347	1,361	,173
	negr	,412	,345	1,192	,233
	mulat	,243	,345	,703	,482
	mont	,440	,342	1,287	,198
	mest	,449	,341	1,319	,187
	blanc	,477	,342	1,393	,164
House	credit	,259	,071	3,646	,000
ownership	propia	,220	,024	9,085	,000
	arrien	,220	,038	5,744	,000
Dependent variable: **ils_dispy** (disposable income) R^2: 0,489					