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Fostering social mobility. The case of the *Bono de Desarrollo Humano* in Ecuador

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ABSTRACT

Social protection programmes are now expanded due to their efficacy in reducing poverty and vulnerability. However, the literature is scarce regarding long-term effects. Using administrative panel data, this study analyses social mobility in Ecuador and evaluates the effect of the social transfer programme *Bono de Desarrollo Humano* (BDH). Results show that social policies should focus on household composition, the accumulation of human capital, and the accumulation of durable goods. Complementary policies must address gender and ethnic equity, as well as reproductive health. Finally, we find that the BDH does foster social mobility, especially if the transfer is complemented with economic inclusion programmes.

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1. Introduction

Social protection programmes are implemented in many low- and middle-income countries due to their efficacy in reducing poverty, vulnerability, and inequality. Over the last decade, evidence on the positive effects of investments in social protection has accumulated.¹ Social transfers have proved to positively impact human capital development, labour supply, and assets accumulation. They strengthen social networks and stimulate local markets. However, the literature is scarce regarding long-term effects of social transfers, such as the effects on social mobility of the poor, and the reduction of chronic poverty.² It is relevant to analyse how sustainable the effects of social transfers are. Moreover, social mobility as a notion of *origin independence* is desirable because it is a necessary condition to guarantee that a person has the freedom to achieve whatever she wants to achieve in the future.

The accumulation of human and physical capital and the reduction of fertility rates (leading to smaller households) might be key for a sustainable exit from chronic poverty and reduce the likelihood that the future generation is poor (Jalan and Ravallion 2000). The command over human, financial and physical capital increases the resilience of households to withstand shocks. If households invest part of the social transfer in the accumulation of human and physical capital, this could eventually change their welfare trajectory and reduce the likelihood that they become poor in the event of a shock. McCulloch and Baulch (2000) have shown that interventions that enable households to smooth income over time significantly reduce transitory poverty.

The main question this paper aims to answer is whether and to what extent social transfers foster social mobility of poor households. Social mobility is generally understood as a long-term process by which households change their position in the welfare distribution (Baulch and Hoddinott 2000). In

this paper, we contribute by looking at social mobility not as a change in the income distribution (often called economic mobility), or education level and occupational status (often called social mobility) as is generally done in the literature (see for example Baulch and Hoddinott (2000), Woolard and Klasen (2005), Azevedo and Bouillon (2009), Crawford et al. (2011), Sandberg (2012), Rodríguez-Oreggia and Freije (2012), Jäntti and Jenkins (2015), Lambert, Ravallion, and van de Walle (2014), Cano (2015)), but by considering a composite index. Furthermore, by looking at intra-generational upward mobility we first analyse the extent to which households change their position in the welfare distribution over time, and the determinants that explain such movements. Subsequently, we look at the role social transfers played in this process. The latter is relevant in order to evaluate the effect of social transfers beyond their transitory consumption smoothing and poverty reduction effect; something that is scarcely done in the literature. The analysis will consider trajectories at the household level both in absolute and relative terms. In absolute mobility we analyse the effect on welfare growth, while in relative mobility we focus on the probability of a positive rank change.

Additionally, we contribute with empirical evidence by evaluating the Ecuadorian *Bono de Desarrollo Humano* (BDH) using administrative panel data from the Ecuadorian *Registro Social* (RS). The data contains information on beneficiary and non-beneficiary households at three points in time (2002–2003, 2008–2009 and 2013–2014) allowing the creation of a panel and the evaluation of the effect of the BDH over a decade. The panel follows 413,043 households over the three periods. The welfare indicator is the RS index, which is a proxy means test to predict household consumption estimated by principal components, providing a value between 0 and 100 for each household. It is used in Ecuador to target the BDH and other social programmes.

We assess social mobility in three ways. First we consider the poverty transition matrix. Secondly, we identify the determinants of social mobility both in absolute (welfare growth) and relative (changes in rank) terms. Finally, we estimate the effect of the BDH on absolute mobility. Moreover, we calculate the effect of the transfer amount among beneficiaries and the effect of an alternative programme called *Crédito de Desarrollo Humano* (CDH) which pays a yearly amount aimed at promoting productive investments, instead of a monthly transfer for consumption.

The rest of the paper is organised as follows. Section two discusses the theoretical framework to analyse the effect of social transfers on social mobility. Section three introduces the data and methodology. Results are presented in section four, and section five concludes.

2. Social transfers and social mobility: theory and evidence

Social mobility is a long-term process by which households change their relative position in the welfare distribution (Baulch and Hoddinott 2000). Jäntti and Jenkins (2015) distinguish four different concepts of social mobility. First, mobility as *positional change* looks at variations in population rank. If the change in position does not affect the concentration of people in a particular slot, it concerns *exchange mobility*; otherwise it reflects *structural mobility*. In the first case mobility of one person depends on other people's situation, and the transition matrix accounts for the probability to move from one position to another. It is essentially a concept of relative mobility. Second, absolute mobility as *individual growth* focuses on individual changes over time, and mobility is defined as the distance between the initial and final situation. Third, mobility as *reduction of longer-term inequality* is characterised in terms of the extent to which longer-term welfare (i.e. average welfare) inequality is lower than in the case of period-specific income distributions. Finally, *mobility as risk* gives a behavioural interpretation to the longer-term welfare average (i.e. expected future welfare). The reduction in inequality is interpreted as a measure of risk. In this perspective the long-term average is a permanent component, while the period specific deviation (i.e. transitory component) represents unexpected idiosyncratic shocks. Higher dispersion of the transitory component across individuals denotes higher risk.

In addition, social mobility can be considered within- or between-generations. The first concentrates on changes between two points of time over the life cycle of a person (i.e. intra-generational mobility), while the latter studies changes between generations of parents and children (i.e. inter-generational mobility) (Jäntti and Jenkins 2015). In this paper, we analyse intra-generational mobility at the household level, in Ecuador, following the aforementioned concepts of relative and absolute social mobility.

Social mobility is desirable because it reflects greater equality of opportunities. It means that where a person ends up is not (or is less) conditioned on where she started from (Jäntti and Jenkins 2015). This concept of *origin independence* indicates the degree to which future well-being is independent of present well-being (Gottschalk and Spolaore 2002). We relate this concept with the human development approach in the sense that origin independence is a necessary condition to guarantee that a person can achieve whatever she wants in the future (i.e. freedom of choice), without being pre-conditioned by her current situation.³

2.1. Social mobility and poverty dynamics: the role of social transfers

Azevedo and Bouillon (2009) relate social mobility with the idea of guaranteeing equal economic opportunities for all. Hence, the lack of mobility is associated with the generation of inequality, poverty and social exclusion. In this sense, upward social mobility indicates a process of escaping chronic poverty. Using the concept of social mobility allows the analysis of the temporal dimension, and the reasons why some households do (not) increase their well-being over time. It is important to distinguish between transitory and chronic poverty. From an anti-poverty policy perspective, transitory poverty demands strategies to smooth household consumption, but chronic poverty needs welfare growth interventions (McCulloch and Baulch 2000). Given that chronic or permanent poverty is associated with low endowments and returns, intra-generational social mobility is determined by: a) the level of asset accumulation, b) the returns of those assets, and c) the cumulative impact of shocks (Baulch and Hoddinott 2000).

Chronic poverty is often the result of persistent poverty traps and intrinsic characteristics that condition the equilibrium level of well-being (Carter and Barrett 2006), such as the decision to invest in low return activities or underinvest in human capital. From a microeconomic perspective poverty traps are related with a positive relation between wealth and marginal returns, which can be the result of at least three circumstances: i) increasing returns to scale, ii) entry costs to high return activities, and iii) risk aversion (Carter and Barrett 2006). Market failures and individual behavioural responses under extreme scarcity may lead to poverty traps (Ghatak 2015), as do expectations of the future related to underinvestment by the poor (Banerjee et al. 2015).⁴

Next to the positive effects of social transfers on income poverty and inequality, and on social outcomes such as attainments in education and health, they also affect economic performance at different levels. At the micro level, social transfers help households to alleviate credit constraints by fostering savings, investments and access to credit. They allow households to smooth consumption, which may reduce transitory poverty, and to secure and accumulate assets by promoting access to economic opportunities. Moreover, social transfers help to cover transaction and transportation costs, enhancing labour supply and fostering local economy effects (see Barrientos (2012), Alderman and Yemtsov (2012), Tirivayi, Knowles, and Davis (2013), and Mideros, Gassmann, and Mohnen (2016)).

Relating the aforementioned potential economic returns of social transfers with the determinants of intra-generational mobility, it can be seen that social transfers help poor households to invest in both human and physical capital (i.e. assets accumulation). Moreover, social transfers help households to confront negative economic shocks that otherwise may force them into asset destitution (Baulch and Hoddinott 2000). In this case social transfers, if permanent and reliable, allow poor households to smooth their consumption, solve liquidity constraints and protect them against economic shocks. Given that intergenerational mobility is driven by two mechanisms, endowments

inheritance and the propensity of parents to invest in the human capital of the children (Rodríguez-Oreggia and Freije 2012),⁵ social transfers promote mobility between generations by helping poor households to accumulate more assets and to afford higher human capital investments, thereby breaking the intergenerational transmission of poverty. In this sense, we argue that social transfers should not be seen only from a protection perspective, but also as an instrument for economic inclusion and upward social mobility.

2.2. Empirical evidence

Literature about the effects of social transfers on social mobility in developing countries is scarce, in part due to the lack of long-term panel data. A study for Latin America found that intergenerational social mobility is lower in this region than in developed countries (Azevedo and Bouillon 2009). Intergenerational income correlation for Chile, Brazil and Peru are around 0.52 and 0.60 in comparison with United Kingdom (0.50), United States (0.47), France (0.41), Canada (0.19) and Nordic Countries (0.19). The authors explain these results with lack of access to basic services and markets, labour market discrimination, low education level, and credit constrains. Interestingly, they found that relative mobility is lower at the top of the income distribution which means that it is more likely that a poor becomes non-poor, than a rich becomes non-rich. The main factors influencing social mobility are family background, market failures, access to basic services and markets, labour segmentation and discrimination, access to safety nets, and inheritances. In addition, the authors found low intra-generational social mobility which they explain by the presence of poverty traps produced by lack of human and physical capital (Azevedo and Bouillon 2009). In the case of Ecuador, Cano (2015) found that income mobility is low for top incomes, which may reflect structural inequalities, while education is a main driver of upward intra-generational mobility.

In the case of social transfers, it is important to note that they may be necessary but not sufficient for social mobility. In the words of Sandberg, 'the possible impact on chronic poverty and exclusion rests on its ability to enable more than a temporary exit from poverty' (2012, 1355). Complementary policies regarding housing, coverage and quality of health and education services, social exclusion and discrimination, gender equity,⁶ and economic inclusion are necessary to foster social mobility. For example, social transfers may help to solve qualification deficits by promoting human capital accumulation and liquidity constrains for own business investments, but they usually do not have a direct link with the labour market neither with the expected returns of such assets. In this sense, complementary policies providing professional training, self-employment support, labour intermediation, employment creation and fostering the local economy are necessary to guarantee social mobility (Sandberg 2012).

A qualitative social mobility analysis of the Uruguayan conditional cash transfer (CCT) *Asignación Familiar* (AFAM) does not find significant effects on residential segregation, education segmentation and labour market segmentation, which are necessary to break the intergenerational transmission of poverty and social exclusion (Sandberg 2012). Sandberg concludes that 'major socio-economic reforms and interventions are needed to correct structural inequalities, asymmetric processes and supply-side deficiencies, particularly in urban planning and development, the secondary education system, and the labour market' (2012, 1356) and that with higher transfer amounts and complementary active labour market policies AFAM could help in such direction (2012).

In the case of Mexico, Rodríguez-Oreggia and Freije (2012) found little evidence of positive effects of the cash transfer programme *Oportunidades* on employment, wages and intergenerational occupational mobility among a cohort of beneficiaries aged 14–24 in 2007. They do not find any significant effect on the probability of being employed while a positive effect on wages is found only for males exposed to the programme for at least six years. The authors argue that the positive effects of the programme operate only via the increase in education level. For the same programme, Villa

and Niño-Zarazúa (2014) analyse poverty dynamics in the context of programme graduation (and hence, poverty) and found that successful graduation is only achieved for 28.9% and 26.7% of beneficiary households in urban and rural areas, respectively.

However, Banerjee et al. (2015) evaluate multifaceted programmes in six countries, which include productive asset grants, training, life skills coaching, and access to health information and savings accounts on top of temporary cash or food transfer. They found positive effects after one and three years of the intervention on consumption, household assets, food security and income. They argue that this kind of programme provides a 'big push' to unlock poverty traps. An important aspect related with this kind of programmes is that they go beyond the traditional objective of consumption smoothing and human capital accumulation by delivering synergies with productive activities. As such, they achieve a more sustainable reduction of poverty, as recommended by Handa and Davis (2006).

3. Data and methods

Contrary to poverty status at one point in time which can be observed using cross-sectional data, the analysis of social mobility and poverty transition requires longitudinal data in order to examine welfare trajectories over time (Baulch and Hoddinott 2000). In this paper, we use administrative data from the Ecuadorian *Registro Social* (RS). The data was collected by the Coordinator Ministry of Social Development (MCDS) and includes beneficiary and non-beneficiary households at three points in time: 2002–2003, 2008–2009 and 2013–2014. Henceforth, we use the second year to refer to each period (e.g. 2003 for 2002–2003).

The RS is used to estimate a composite indicator (RS index) using principal components and provides a value between 0 and 100 for each household. The index has been updated each period whereby variables and weights changed. Hence, the indices are not directly comparable. Weights for each variable were estimated using household surveys as a proxy of consumption. They have been provided by the MCDS in order to directly estimate the indices. The RS index is the instrument used to target the Ecuadorian *Bono de Desarrollo Humano* (BDH) and other social programmes in Ecuador.

The BDH is a cash transfer with soft conditionality (i.e. monitoring is weak) of children attending school and health controls. It provides a flat transfer. In 2003, each beneficiary household received USD 15 per month irrespective of household size. The amount was increased in 2007, 2009, and 2013 to USD 30, USD 35, and USD 50, respectively.⁷ The official RS index threshold to receive the BDH was defined for the lowest 40% in 2003 and as a proxy of the consumption poverty line at 50.6 points in 2009 and 36.5 points in 2014, respectively. An additional eligibility condition requires the presence of school age children under 18 years old in the household.

The variables used to calculate the RS index are changed each time the RS information is collected.⁸ It means that the RS indexes are not comparable. The RS 2003 index uses different variables and weights than the RS 2009 index, and the RS 2014 index. For instance, the RS 2003 index is estimated using 27 variables, from which only 23 variables are available in 2009 and 25 variables in 2014. Therefore, the RS 2003 is imputed for the periods 2009 and 2014 in order to have a comparable welfare indicator. This is done by firstly estimating a partial index ($RS2003_{2009,j}^{23}$ and $RS2003_{2014,j}^{25}$) using the available variables at each period. Secondly, the RS 2003 index is imputed for each household (j) using the equations below. Coefficients are estimated using a univariate linear regression model with a constant and assuming an independent and identically distributed (i.i.d.) error term with mean zero.

$$\widehat{RS2003}_{2009,j}^{27} = 7.976611 + (1.149994 * RS2003_{2009,j}^{23})$$

$$\widehat{RS2003}_{2014,j}^{27} = 2.104049 + (1.078523 * RS2003_{2014,j}^{25})$$

Similarly, we impute the RS 2009 index for the period 2014. It includes 30 variables, but only 28 variables are available in 2014. As in the previous case the RS index is subsequently imputed using the following equation:

$$RS_{2009}^{30}_{2014,j} = -2.711827 + \left(1.102745 * RS_{2009}^{28}_{2014,j} \right)$$

The data allow us to build a panel to evaluate social mobility and the effect of the BDH over a decade. It is important to note that given the design of the RS as an instrument to evaluate poverty and vulnerability, households at the upper tail of the welfare distribution are not included. Hence, our analysis concentrates on low-welfare households. The panel follows 413,043 households over the three periods, of which 35% are female headed.⁹ Average household median schooling increased from 4.8 to 5.4 years between 2003 and 2014, while household size decreased from 4.0 to 3.4. The average RS 2003 index increased from 43.9 in 2003 to 48.4 in 2009 and 53.3 in 2014 (Table 1).

As mentioned above, we use the RS index as welfare indicator for the empirical analysis of social mobility. Table 2 shows general social mobility indicators.¹⁰ Between 2003 and 2009, 72.7% of households experience positive absolute mobility (i.e. welfare growth on the RS index). This percentage is higher in the period between 2009 and 2014 with between 77.4% and 82.6% of households experiencing positive absolute mobility. Over the complete period 2003–2014 this percentage is 87.9%. However, in the case of relative upward mobility (i.e. moving to a higher percentile on the welfare distribution) mobility was slightly higher between 2003 and 2009 (48.7% of households) than between 2009 and 2014 (between 46.5% and 48.6% of households). Both measures are complementary in the sense that absolute mobility shows that most of the households have improved their welfare level, while relative mobility indicates *origin independence* but also risk and in some cases vulnerability. It is possible to have positive relative mobility with negative absolute mobility, when those higher up the welfare distribution become worse off. The desirable scenario is having both positive absolute and relative mobility, as it indicates that everybody is better off, but that the final position on the welfare distribution is not conditioned to the initial condition.

The Shorrocks mobility index compares the Gini of the total welfare indicator (adding up both periods) with the weighted average of the Gini in each period (Woolard and Klasen 2005).¹¹ A value of zero means no mobility, while one indicates perfect mobility. This index measures relative mobility, and in the case of the RS index in Ecuador shows a value of 0.11 comparing 2003 with 2014. This value is close to that found for income and expenditure in South Africa, which is also similar to that of Spain in the 1990s (0.1), but higher than the value in industrialised countries (0.05) as reported by Woolard and Klasen (2005). The index is slightly higher in the period 2003–2009 than in 2009–2014. However, as upward absolute mobility is lower in the period 2003–2009, higher relative mobility can be seen as an indication of more risk and vulnerability compared to 2009–2014. In the absence of positive absolute mobility, relative mobility is driven by individuals getting worse off.

Finally, the Fields and Ok's per capita mobility index measures absolute mobility as the average distance between the final and the initial welfare value. While the total index adds up both positive and negative mobility in absolute terms, the positive index only includes upward mobility.¹² Positive mobility is higher in the period 2009–2014 (between 4.9 and 8.2 RS index points) compared to 2003–2009 (4.4 RS index points). Overall, the different indicators provide evidence of social mobility in Ecuador; relative mobility is slightly higher between 2003 and 2009, while absolute mobility is higher between 2009 and 2014. It means that in general there is more upward mobility (being better off) in the period 2009–2014, than in 2003–2009, but at the same time the risk and vulnerability of getting worse off were higher.

In the next section we assess social mobility in three different ways. First we consider the poverty transition matrix over the periods 2003, 2009 and 2014, which allows us to identify structural mobility. Poverty lines are the previously indicated RS index thresholds to target the BDH and other social programmes in Ecuador. Secondly, we identify the determinants of social mobility both in absolute (welfare growth) and relative (changes in rank) terms. In both cases we follow the model proposed by Woolard and

Table 1. Descriptive statistics

Variable	Observations	Mean	Standard deviation	Min.	Max.
<i>RS index</i>					
RS 2003 in 2003	413,043	43.93	9.00	11.54	88.49
RS 2003 in 2009	413,043	48.36	8.58	14.24	85.09
RS 2003 in 2014	413,043	53.30	9.00	11.70	88.21
RS 2009 in 2009	413,043	28.64	12.83	0.00	87.19
RS 2009 in 2014	413,043	36.80	13.88	0.00	91.84
<i>Segmentation variables</i>					
Head of household is female (Yes=1 / No=0)	413,043	0.35	0.00	0.00	1.00
Indigenous (Yes=1 / No=0)	413,043	0.15	0.00	0.00	1.00
Afroecuadorian (Yes=1 / No=0)	413,043	0.04	0.00	0.00	1.00
Montubio (Yes=1 / No=0)	413,043	0.11	0.00	0.00	1.00
Mestizo (including white and others) (Yes=1 / No=0)	413,043	0.71	0.00	0.00	1.00
Rural area (Yes=1 / No=0)	413,043	0.47	0.00	0.00	1.00
<i>Human capital variables</i>					
Household size in 2003	413,043	3.97	2.00	1.00	18.00
Household size in 2009	413,043	3.77	1.97	1.00	16.00
Household size in 2014	413,043	3.43	1.87	1.00	18.00
Household dependency ratio in 2003	413,043	0.48	0.26	0.00	1.00
Household dependency ratio in 2009	413,043	0.49	0.29	0.00	1.00
Household dependency ratio in 2014	413,043	0.46	0.33	0.00	1.00
Household median schooling in 2003 (years)	413,043	4.80	2.91	0.00	23.00
Household median schooling in 2009 (years)	413,043	4.89	2.95	0.00	23.00
Household median schooling in 2014 (years)	413,043	5.40	3.22	0.00	23.00
<i>Physical capital variables</i>					
Household number of durables in 2003	413,043	1.15	0.98	0.00	5.00
Household number of durables in 2009	413,043	1.80	1.20	0.00	5.00
Household number of durables in 2014	413,043	2.32	1.19	0.00	5.00
<i>Labour variables</i>					
Share of working age with income in 2003	413,043	0.69	0.33	0.00	1.00
Share of working age with income in 2009	413,043	0.59	0.35	0.00	1.00
Share of working age with income in 2014	413,043	0.43	0.38	0.00	1.00
<i>Change variables</i>					
Change in household size between 2003 and 2009	413,043	-0.21	1.62	-13.00	10.00
Change in household size between 2003 and 2014	413,043	-0.54	2.00	-14.00	11.00
Change in household size between 2009 and 2014	413,043	-0.33	1.24	-11.00	11.00
Change in household dependency ratio between 2003 and 2009	413,043	-0.15	1.44	-10.00	10.00
Change in household dependency ratio between 2003 and 2014	413,043	-0.46	1.83	-11.00	10.00
Change in household dependency ratio between 2009 and 2014	413,043	-0.31	1.10	-9.00	8.00
Change in median schooling between 2003 and 2009	413,043	0.09	2.66	-20.00	18.00
Change in median schooling between 2003 and 2014	413,043	0.60	2.88	-17.00	18.00
Change in median schooling between 2009 and 2014	413,043	0.51	2.35	-21.00	17.00
Change in durables between 2003 and 2009	413,043	0.65	1.11	-5.00	5.00
Change in durables between 2003 and 2014	413,043	1.17	1.18	-5.00	5.00
Change in durables between 2009 and 2014	413,043	0.52	1.10	-5.00	5.00
Change in share of working age with income between 2003 and 2009	413,043	-0.10	0.39	-1.00	1.00

(Continued)

Table 1. (Continued).

Variable	Observations	Mean	Standard deviation	Min.	Max.
Change in share of working age with income between 2003 and 2014	413,043	-0.26	0.46	-1.00	1.00
Change in share of working age with income between 2009 and 2014	413,043	-0.16	0.44	-1.00	1.00

Note: Household dependency ratio is defined as the number of persons below 15 years old and above 64 years old, over total household size. The share of working age with income is the ratio between the number of persons 15-64 years old who receive an income and the total number of working age members.

Source: Own estimations based on *Registro Social* 2002-2003, 2008-2009 and 2013-2014.

Table 2. Social mobility indicators

Period	Positive mobility*		Shorrock's mobility index	Fields and Ok's per capital mobility index	
	Absolute	Relative		Total	Positive
2003-2009 ⁺	72.73%	48.73%	0.10	6.97	4.44
2003-2014 ⁺	87.85%	48.59%	0.11	10.38	9.37
2009-2014 ⁺	77.42%	47.28%	0.08	6.72	4.94
2009-2014 ⁺⁺	82.60%	46.47%	0.06	9.84	8.16

⁺RS 2003 index, ⁺⁺RS 2009 index

*Percentage of household with increased welfare indicator. Immobility is zero in the case of absolute mobility, while it accounts to between 2.6% and 3.3% in the case of relative mobility; the complement is negative mobility.

Source: Own estimations based on *Registro Social* 2002-2003, 2008-2009 and 2013-2014.

Klasen (2005) to analyse the determinants of welfare change. The underlying assumption is that household welfare (W_j) is a function of physical (K_j) and human (H_j) assets, and labour (L_j) and segmentation (S_j) conditions. The dependent variable is the change in household welfare between periods:

$$\Delta \log W_j = f(S_j, H_j, K_j, L_j)$$

We use a linear regression model to estimate the determinants of absolute mobility which has the following specification:

$$\ln W_{j,t} = \psi \log W_{j,t-1} + \alpha S_{j,t-1} + \beta H_{j,t-1} + \gamma K_{j,t-1} + \delta L_{j,t-1} + \theta C_{j,t} + \varepsilon_j$$

Where $W_{j,t}$ is the RS index for household j at period t . $\psi, \alpha, \beta, \gamma, \delta$ and θ are vectors of coefficients. C_j reflects changes in assets (H and K) and labour (L) conditions between periods $t - 1$ and t . ε is a measure of unobservable characteristics assumed to be i.d.d. with mean zero. With respect to the determinants of relative mobility we estimate the following logit model on the probability of a positive movement among percentiles:

$$Pr = \frac{1}{1 + e^{-(\rho \log W_{j,t-1} + \sigma S_{j,t-1} + \tau H_{j,t-1} + \varphi K_{j,t-1} + \omega L_{j,t-1} + \phi C_{j,t} + \pi_j)}}$$

where $\rho, \sigma, \tau, \varphi, \omega$ and ϕ are vectors of coefficients, and π is a measure of unobservable characteristics assumed to be i.d.d. with mean zero. The variables included in the models are discussed in the next section.

Finally, we estimate the effect of the BDH on absolute mobility by exploiting a difference-in-difference (DD) setting. The DD compares treatment (T) and comparison (C) groups in terms of outcomes. The average programme impact is defined as $E(Y_1^T - Y_0^T | T_1 = 1) - E(Y_1^C - Y_0^C | T_1 = 0)$; where $t = 1$ indicates time after programme implementation and $t = 0$ before, $T_1 = 1$ denotes

treated and $T_1 = 0$ non-treated. The main assumption is that unobserved heterogeneity ($\sigma_{j,t}$) is time invariant and uncorrelated with the treatment over time, which is likely to be the case once we include the available control variables for physical and human assets, labour characteristics, and segmentation conditions. Under a regression framework the DD model is specified as:

$$\log W_{j,t} = \lambda + \mu T_{j,1}t + \xi T_{j,1} + \eta t + \sigma_{j,t}$$

where the interaction term between treatment and time (μ) is the DD effect, while η estimates the effects of time and ξ the effect of being targeted (Khandker, Koolwal, and Samad 2010).

4. Social mobility in Ecuador (2003 – 2014)

Using the model and specifications presented in the previous section, we follow Woolard and Klasen (2005) and evaluate three ‘poverty traps’ as determinants of social mobility: i) household composition, ii) low education, and iii) lack of physical capital and income generation opportunities.

In order to analyse poverty transitions, we use the RS 2003 index with the poverty threshold of 50.65 points. In 2003, 77.9% of households in the panel has a RS index below the poverty threshold; this percentage decreases to 60.4% in 2009 and to 37.7% in 2014. Table 3 shows that the probability to exit poverty between 2003 and 2009 is 29.3% (see Panel A), and 44.8% between 2009 and 2014 (see Panel B). On the other hand, the probability to become poor decreases from 24.2% in 2003–2009 to 10.9% in 2009–2014. Hence, social mobility in terms of poverty transition is positive in Ecuador.

Panel C in Table 3 shows that 31.9% of households have been poor over the whole period; 23.2% were poor in 2003 and 2009, but left poverty in 2014; 19.2% were poor in 2003, but non-poor in 2009 and 2014; while 16.1% have never been poor. These figures are consistent with the idea that poverty reduction has been sustained in Ecuador over the last decade.

Table 3. Poverty transition matrix

Panel A					
2003-2009			2009		
			Non-poor	Poor	
2003	Non-poor		75.81%	24.19%	
	Poor		29.29%	70.71%	
Panel B					
2009-2014			2014		
			Non-poor	Poor	
2009	Non-poor		89.08%	10.92%	
	Poor		44.79%	55.21%	
Panel C					
2003-2009-2014				2014	
				Non-poor	Poor
2003	Non-poor	2009	Non-poor	16.10%	0.67%
			Poor	3.86%	1.49%
	Poor		Non-poor	19.16%	3.65%
			Poor	23.21%	31.87%

Source: Own estimations based on *Registro Social* 2002-2003, 2008-2009 and 2013-2014.

These results can be related to changes in drivers of social mobility. Table 1 shows that household size and dependency ratio have decreased between 2003 and 2014, while at the same time median schooling and ownership of durables increased. Moreover, changes as those in household median schooling and dependency ratio are higher between 2009 and 2014 (0.5 years/-0.3 points) than between 2003 and 2009 (0.1 years/-0.2 points). This may explain why positive social mobility, in terms of poverty reduction, is higher in 2009–2014 than in 2003–2009.

4.1. Determinants of social mobility

By exploring the determinants of social mobility, it is possible to analyse ‘poverty traps’ (i.e. structural conditions which limit capabilities and opportunities of the poor), which must be addressed in order to promote positive mobility of the poor and vulnerable. In the case of Ecuador, a middle income country¹³ with high inequality,¹⁴ the elimination of poverty traps is necessary in order to achieve inclusive development by promoting economic growth together with poverty reduction and inequality decline.

The selection of explanatory variables (Table 1) follows the literature on social mobility in the sense that ‘education, changes in employment and the demographic composition of the households play a large role in explaining existing mobility’ (Woolard and Klasen 2005, 869). *Initial conditions* include dummy variables accounting for segmentation characteristics (gender of the household head, ethnic group and area of residence), human capital variables (household size, dependency ratio and median schooling¹⁵), physical capital variables (number of durable goods,¹⁶ including television, refrigerator, kitchen, telephone and car) and labour variables (ratio between the number of persons 15–64 years old who receive an income and the total number of working age members). In addition, *change variables* are calculated by subtracting initial from final values for human capital, physical capital and labour variables.¹⁷

Absolute mobility is analysed by an RS index change regression including the aforementioned control variables. The left side of Table 4 shows the results for the three periods of analysis. All variables have a significant effect on the RS index change. The initial RS index has a positive coefficient, indicating that the higher the initial welfare indicator, the more likely the household is to experience absolute mobility (elasticity between 0.2 and 0.4). It means that there exists increasing returns to scale; in other words, the poorer a household is, the less likely it experiences welfare growth. All else being equal, female-headed households, indigenous and Montubio households, and rural households have lower absolute mobility than male-headed households, mestizos-and-whites, and urban households, respectively. This indicates persisting inequalities against women, ethnic minorities (especially against indigenous and *montubio*¹⁸ populations) and rural areas. Separate estimations for urban and rural areas show that the determinants of social mobility are similar, but that durables have a higher effect in rural areas. In addition, an alternative specification without the initial RS index provides similar results.¹⁹

Regarding initial human capital conditions, Table 4 shows that an increase in the household size by one person reduces RS index growth by between 2.2% and 3.9%. Similarly, a higher dependency ratio is related with a lower RS index growth (except in the period 2003–2009). These results show that large initial household size and higher dependency ratios should be considered as a demographic poverty trap in the sense that these conditions reduce absolute social mobility. In the case of schooling, an initial additional year of education (at the median) increases RS index growth by between 0.6% and 1.7%. It means that low initial education also constrains social mobility. Initial physical capital measured by the ownership of durable goods has a positive effect on social mobility of between 7.5% and 11.4% for each additional durable good. The more physical capital a household possesses, the more it can grow (i.e. increasing returns to scale). In the case of initial income generating conditions we found a positive effect on RS index growth (except in the period 2009–2014 using the RS 2009). This hints at a third poverty trap related with low access to work and physical capital. Finally, looking at change variables, the highest effect is measured for durables (between 7.7% and 14.6%). Other positive effects are related with increments in household median schooling and working age persons with income generation activities. On the other hand, absolute social mobility is reduced if household size or the dependency ratio increases.

Table 4. Determinants of social mobility in Ecuador (2003-2009-2014)

Variable	Absolute mobility				Relative mobility			
	RS index change regression (OLS) - log RS index				Probability of a positive rank change (percentile) - average marginal effect			
	2003-2009+	2003-2014+	2009-2014+	2009-2014++	2003-2009+	2003-2014+	2009-2014+	2009-2014++
Log RS index (initial)	0.245 (0.002)	0.196 (0.001)	0.329 (0.002)	0.422 (0.002)	-1.422 (0.006)	-1.492 (0.006)	-1.671 (0.007)	-0.474 (0.002)
Household Head is female (Yes=1 / No=0)	-0.002 (0.000)	-0.008 (0.000)	-0.013 (0.000)	-0.004 (0.001)	-0.004 (0.001)	-0.020 (0.001)	-0.037 (0.001)	-0.008 (0.002)
Indigenous (Yes=1 / No=0)	-0.060 (0.001)	-0.041 (0.001)	-0.027 (0.001)	-0.034 (0.002)	-0.127 (0.002)	-0.083 (0.002)	-0.081 (0.002)	-0.030 (0.003)
Afroecuadorian (Yes=1 / No=0)	0.000 (0.001)	0.003 (0.001)	0.002 (0.001)	0.007 (0.002)	0.003 (0.003)	0.008 (0.003)	0.009 (0.003)	0.007 (0.004)
Montubio (Yes=1 / No=0)	-0.011 (0.000)	-0.014 (0.000)	-0.012 (0.000)	-0.061 (0.001)	-0.029 (0.002)	-0.030 (0.002)	-0.030 (0.002)	-0.068 (0.002)
Rural area (Yes=1 / No=0)	-0.007 (0.000)	-0.017 (0.000)	-0.023 (0.000)	-0.047 (0.001)	-0.015 (0.001)	-0.036 (0.001)	-0.062 (0.001)	-0.049 (0.001)
Head of household age	0.001 (0.000)	0.003 (0.000)	0.003 (0.000)	0.000 (0.000)	0.001 (0.000)	0.006 (0.000)	0.008 (0.000)	-0.001 (0.000)
Household size (initial)	-0.022 (0.000)	-0.024 (0.000)	-0.025 (0.000)	-0.039 (0.000)	-0.049 (0.000)	-0.056 (0.001)	-0.069 (0.001)	-0.039 (0.001)
Household dependency ratio (initial)	0.013 (0.001)	-0.054 (0.001)	-0.052 (0.001)	-0.046 (0.002)	0.049 (0.003)	-0.138 (0.003)	-0.171 (0.003)	-0.072 (0.003)
Household median schooling (initial)	0.010 (0.000)	0.009 (0.000)	0.006 (0.000)	0.017 (0.000)	0.025 (0.000)	0.021 (0.000)	0.014 (0.000)	0.020 (0.000)
Household number of durables (initial)	0.075 (0.000)	0.072 (0.000)	0.058 (0.000)	0.114 (0.001)	0.162 (0.001)	0.165 (0.001)	0.154 (0.001)	0.129 (0.001)
Share of working age with income (initial)	0.029 (0.001)	0.028 (0.001)	0.017 (0.001)	-0.004 (0.002)	0.074 (0.003)	0.070 (0.002)	0.040 (0.003)	-0.010 (0.003)
Change in household size	-0.027 (0.000)	-0.028 (0.000)	-0.028 (0.000)	-0.033 (0.001)	-0.066 (0.001)	-0.072 (0.001)	-0.079 (0.001)	-0.037 (0.001)
Change in household dependency ratio	-0.007 (0.000)	-0.012 (0.000)	-0.012 (0.000)	-0.037 (0.001)	-0.023 (0.001)	-0.029 (0.001)	-0.042 (0.001)	-0.052 (0.001)

(Continued)



Table 4. (Continued).

Variable	Absolute mobility		Relative mobility	
0.018	0.006	0.006	0.014	0.016
Change in median schooling	0.006	0.006	0.014	0.016
(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Change in durables	0.081	0.077	0.216	0.231
(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Change in share of working age with income	0.031	0.037	0.086	0.110
(0.000)	(0.000)	(0.001)	(0.002)	(0.002)
Number of observations	413,043	413,043	413,043	413,043

Note: Heteroskedasticity consistent standard errors are between brackets. All estimations include a constant, and dummy variables at the province level (not reported). Variance inflation factor (VIF) is lower than 5 for all variables in any model, showing that collinearity is not a problem. Adjusted R2 is higher than 0.71 in all the OLS models.

+PS index 2003, ++PS index 2009; *** Significance at 1%, ** significance at 5%, * significance at 10%.

Source: Own estimations based on *Registro Social* 2002-2003, 2008-2009 and 2013-2014.

Similar results are found in the case of *relative social mobility*. The right side of Table 4 shows average marginal effects for a logit model on the probability of a positive movement among percentiles. A female-headed household has a probability to move up between 0.4 and 3.7 percentage points lower than a male-headed household, all else being equal. As in the previous case, being indigenous or *montubio*, and living in a rural area are related with a lower probability of social mobility. In the case of initial conditions, higher household size and dependency ratios reduce the probability of relative social mobility, while education, ownership of durables and income generating activities have positive effects. The key change variables to promote relative social mobility are access to durables (physical capital) and income generating activities, which increases the probability of social mobility by 19.5–23.1 and 2.0–11.0 percentage points, respectively. On the other hand, a positive change in household size reduces the probability of relative social mobility by between 3.7 and 7.9 percentage points.

4.2. The effect of the *Bono de Desarrollo Humano* (BDH) on social mobility

The Ecuadorian cash transfer programme *Bono de Desarrollo Humano* (BDH) is targeted at poor households with children below 18 years old. Eligibility thresholds using the RS 2003 and RS 2009 indices are 50.65 and 36.50 points, respectively. By using this targeting rule and exploiting a difference-in-difference (DD) model we first estimate the intention to treat effect (ITT) in two periods: 2003–2009 and 2009–2014. Given that there are no administrative data to identify actual recipients of the BDH before 2009, we calculate the effect on those supposed to receive it. Secondly, additional administrative records available for the second period (2009–2014), which indicate actual BDH recipients, allow estimating average treatment effects (ATE). Finally, we calculate the effect of the per-capita value of the BDH, and the effect of an alternative design of the cash transfer programme called *Crédito de Desarrollo Humano* (CDH), among those receiving the BDH. The difference between the BDH and the CDH is that the latter pays a yearly amount aimed at promoting productive investments, while the BDH is a monthly transfer that guarantees a minimum level of consumption. The CDH can be requested only by household which are active recipients of the BDH.

Table 5 shows the results on absolute mobility. The DD coefficient for the ITT effect of the BDH shows a positive and significant effect. Being eligible for the BDH increases the RS index with 11.1% and 14.8% in 2003–2009 and 2009–2014, respectively. As in the previous models household size and dependency ratios are negatively related with the RS index. The same effect (14.8%) is found for the period 2009–2014 using an expanded data set with a panel of 1,258,462 households.²⁰ The effect of actually receiving the BDH results in an increase of the RS index with 12.0% to 13.6%, which is slightly lower than the estimated ITT for the same period. It means that the BDH does affect household welfare, not only temporarily, but also in the longer term, thereby fostering social mobility.

Estimations using households which received the BDH between 2009 and 2014 show that a 10% higher transfer amount (USD 3 per month) is related with a 0.79%–0.86% higher RS index. Finally, those households which received the CDH have a 4.0%–4.2% higher RS index than those households receiving the BDH only. These results indicate that social transfers should not only be seen as an instrument to protect consumption, but also as a tool to foster social mobility. Moreover, the size of the transfer matters in this context, and social transfers which have an explicit productive objective have an even stronger effect on absolute mobility, which is consistent with international evidence (see for example Banerjee et al. (2015)).

5. Final remarks

Social protection programs are now implemented in many low- and middle-income countries, due to their efficacy in reducing poverty, vulnerability and inequality. Over the last decade evidence on the positive effects of investments in social protection has accumulated. However, the literature is scarce regarding long-term effects of social transfers, such as the effects on social mobility and chronic



Table 5. The effect of the BDH on absolute social mobility (2003-2009-2014)

Variable	2003-2009 ⁺	2009-2014 ⁺	2009-2014 ⁺	2009-2014 ⁺	2009-2014 ⁺⁺	2009-2014 ⁺⁺	2009-2014 ⁺⁺	2009-2014 ⁺⁺	
					(p)	(p)	(p)	(p)	
T=BDH - IIT (Yes=1 / No=0)	-0.122 (0.000)	-0.288 (0.001)	-0.212 (0.001)	-0.132 (0.001)	-0.009 (0.001)	-0.304 (0.001)	-0.272 (0.001)	-0.140 (0.001)	-0.011 (0.001)
T=BDH - recipient (Yes=1 / No=0)									
T=BDH - log USD									
T=CDH - recipient (Yes=1 / No=0)									
t=period (Final=1 / Initial=0)	-0.054 (0.000)	0.079 (0.001)	0.034 (0.001)	-0.435 (0.010)	0.125 (0.001)	0.074 (0.000)	0.035 (0.001)	-0.470 (0.006)	0.133 (0.001)
DD - Interaction (T * t)	0.111 (0.000)	0.148 (0.001)	0.120 (0.001)	0.079 (0.001)	0.040 (0.002)	0.148 (0.001)	0.136 (0.001)	0.086 (0.001)	0.042 (0.001)
Head of household is female (Yes=1 / No=0)	-0.003 (0.000)	0.029 (0.001)	0.027 (0.001)	0.023 (0.001)	0.025 (0.001)	0.051 (0.000)	0.041 (0.000)	0.046 (0.001)	0.048 (0.001)
Indigenous (Yes=1 / No=0)	-0.062 (0.001)	-0.136 (0.001)	-0.134 (0.002)	-0.128 (0.002)	-0.126 (0.002)	-0.134 (0.001)	-0.134 (0.001)	-0.127 (0.001)	-0.125 (0.001)
Afroecuadorian (Yes=1 / No=0)	0.002 (0.001)	0.002 (0.002)	0.001 (0.002)	0.001 (0.002)	0.001 (0.002)	0.006 (0.001)	0.006 (0.001)	0.009 (0.001)	0.009 (0.001)
Montubio (Yes=1 / No=0)	-0.014 (0.000)	-0.134 (0.001)	-0.140 (0.001)	-0.139 (0.001)	-0.147 (0.001)	-0.134 (0.001)	-0.134 (0.001)	-0.136 (0.001)	-0.143 (0.001)
Rural area (Yes=1 / No=0)	-0.043 (0.000)	-0.089 (0.001)	-0.091 (0.001)	-0.086 (0.001)	-0.092 (0.001)	-0.103 (0.000)	-0.105 (0.000)	-0.100 (0.001)	-0.106 (0.001)
Head of household age	0.002 (0.000)	-0.001 (0.000)	0.002 (0.000)	0.002 (0.000)	0.003 (0.000)	-0.001 (0.000)	0.002 (0.000)	0.003 (0.000)	0.003 (0.000)
Household size	-0.035 (0.000)	-0.056 (0.000)	-0.072 (0.000)	-0.074 (0.000)	-0.077 (0.000)	-0.050 (0.000)	-0.065 (0.000)	-0.071 (0.000)	-0.073 (0.000)
Household dependents share	-0.033 (0.000)	-0.019 (0.001)	-0.018 (0.001)	-0.022 (0.001)	-0.025 (0.001)	-0.007 (0.001)	-0.003 (0.001)	-0.011 (0.001)	-0.014 (0.001)
Household median schooling	0.011 (0.000)	0.031 (0.000)	0.030 (0.000)	0.031 (0.000)	0.033 (0.000)	0.033 (0.000)	0.031 (0.000)	0.033 (0.000)	0.036 (0.000)

(Continued)

Table 5. (Continued).

Variable	2003-2009 ⁺	2009-2014 ⁺	2009-2014 ⁺	2009-2014 ⁺	2009-2014 ⁺	2009-2014 ⁺⁺	2009-2014 ⁺⁺	2009-2014 ⁺⁺	2009-2014 ⁺⁺
						(p)	(p)	(p)	(p)
Household number of durables	0.092 (0.000)	0.184 (0.000)	0.189 (0.000)	0.192 (0.000)	0.198 (0.000)	0.172 (0.000)	0.173 (0.000)	0.183 (0.000)	0.189 (0.000)
Share of working age with income	0.022 (0.000)	0.005 (0.001)	-0.003 (0.001)	-0.007 (0.001)	-0.006 (0.001)	0.019 (0.001)	0.010 (0.001)	0.011 (0.001)	0.012 (0.001)
Number of observations	826,086	825,957	825,957	673,764	673,764	2,516,925	2,516,925	1,877,660	1,877,660
Adjusted R2	0.7504	0.6492	0.6326	0.5851	0.5764	0.6583	0.6476	0.5699	0.5601

Note: Heteroskedasticity consistent standard errors are between brackets. All estimations include a constant, and dummy variables at the province level (not reported).
⁺RS index 2003, ⁺⁺RS index 2009, *** Significance at 1%, ** Significance at 5%, * Significance at 10%; (p) panel including 1,258,462 households which can be followed between 2009 and 2014.

Source: Own estimations based on *Registro Social* 2002-2003, 2008-2009 and 2013-2014.

poverty. This study contributes to literature on social mobility and cash transfers by analysing the determinants of upward mobility in Ecuador using a multivariate index (RS index), and evaluating the effect of the social transfer programme called *Bono de Desarrollo Humano* (BDH).

Female-headed households, indigenous, Montubio, and rural households have lower absolute mobility compared to male-headed households, mestizos-and-whites and urban households, respectively. This shows that inequalities persist against women, ethnic minorities and rural areas. Results also show that large initial household size and higher dependency ratios should be considered as a demographic poverty trap in the sense that these conditions reduce absolute social mobility. Similarly, low initial education and the lack of physical capital and income generation opportunities constrain social mobility. In the case of change variables, higher effects were found for physical capital. Other positive effects are related with increments in household median schooling and working age persons with income generation activities. On the other hand, social mobility is reduced if household size or the dependency ratio increases.

Evaluating the BDH using a difference-in-difference setting, we found a positive intent-to-treat effect on absolute social mobility in the periods 2003–2009 and 2009–2014. The average treatment effect is the same for those who actually received the BDH in the period 2009–2014. Additional estimations showed that the amount of the transfer is important, which may be related with the possibility to cover demographic and physical capital poverty traps. Finally, we found evidence suggesting that social transfers aimed not only at guaranteeing a minimum level of consumption but also at promoting productive investments have a higher effect on multivariate social mobility.

These results indicate that in order to enable social mobility, anti-poverty policies should be geared towards improving access to physical capital and income generating activities (i.e. labour) and the accumulation of human capital, thereby promoting reproductive health, fostering gender equity and reducing welfare and opportunity gaps between ethnic groups and among urban and rural areas. In order to solve poverty traps, social protection instruments should consider household composition and economic vulnerabilities, and be complemented with policies that strengthen the determinants of upward social mobility. Moreover, social transfers should not only be assessed by their impact on household consumption smoothing, but also as an instrument that can foster social mobility, due to their potential to solve different poverty traps.

Notes

1. For surveys of empirical evidence see Handa and Davis (2006), Barrientos and Scott (2008), Barrientos and Niño-Zarazúa (2010), Arnold, Conway, and Greenslade (2011), IEG (2011), Barrientos (2012), UNICEF (2012), Alderman and Yemtsov (2012), Mideros, Gassmann, and Mohnen (2012), Tirivayi, Knowles, and Davis (2013), World Bank (2015), Bastagli et al. (2016).
2. For a discussion on chronic poverty see for example Jalan and Ravallion (2000), Hulme, Moore, and Shepherd (2001) and Hulme and Shepherd (2003). For a link between upward social mobility and overcoming chronic poverty see for example Carter and Barrett (2006).
3. The human development paradigm provides a people's centred focus of development, based on the capability approach (Robeyns 2005). In this perspective development is about expanding capabilities, choices and *agency* of all people (Funkada-Parr 2003).
4. For a recent discussion of poverty traps and the role of the aid transfers at the macro level see Meysonnat, Muysken, and Van Zoon (2015).
5. For seminal literature on the role of human capital and intergenerational mobility see Becker and Tomes (1986, 1994). For the importance of early child conditions on social mobility see Heckman and Mosso (2014).
6. In most developing countries large labour market gender inequalities exist against women, reducing the returns of their labour participation. In addition, authors like Molyneux (2009) argue that conditional cash transfers may entrap women in patriarchal gender roles.
7. Own estimations based on official data show that on average the BDH reflects at USD 15 7% (12%) of the income (extreme) poverty line; at USD 30-35 12% (22%), and at USD 50 15% (27%).
8. The variables used to calculate the RS index are presented in [Annexe 1](#).
9. According to the population census of 2010, Ecuador has 3.8 million households with a total population of 14.5 million inhabitants.

10. For a discussion on social mobility indexes see Cowell and Schluter (1998) and Jäntti and Jenkins (2015).
11. It is important to note that the mobility index is equal to one minus the rigidity index used by Woolard and Klasen (2005). The formula for the Shorrocks' mobility index is then $1 - \left\{ G_{(x+y)} / \left[(\mu_x G_x + \mu_y G_y) / (\mu_x + \mu_y) \right] \right\}$, where x and y are periods, μ_t the mean welfare value at period t , and G_t the Gini index for period t .
12. Total mobility is measured as $\frac{1}{n} \sum_{j=1}^n |x_j - y_j|$ while positive mobility is calculated by $\frac{1}{n} \sum_{j=1}^n (x_j - y_j)$.
13. Current GNI per-capita, by the Atlas method, was USD 6,010 in 2015 (World Bank 2016).
14. Gini coefficient was 45.4 in 2014 (World Bank 2016).
15. We use median schooling as a proxy of a household's productivity level.
16. Durables are included as proxy of physical capital. However, as they are also part of the RS index we test for collinearity using variance inflation factors.
17. While the inclusion of other variables can be debated, we are constrained by those variables available in the RS.
18. *Montubios* are peasant populations along the coast.
19. Not presented here, but available upon request from the authors.
20. We use the enlarged panel for comparative purposes. On top of the 413,043 households from the original panel, it includes another 845,419 households (in RS 2009 and RS 2014, but not in RS 2003).

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Disclosure statement

No potential conflict of interest was reported by the author(s).

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Annexe 1: Variables included in RS index 2003 and 2009

Variables RS 2003	Replica		Variables RS 2009	Replica 2014
	2009 (23 variables)	2014 (25 variables)		
Area of residence: urban/rural	Yes	Yes	Area of residence: urban/rural	Yes
Floor materials	Yes	Yes	Floor materials	Yes
Electricity	Yes	Yes	Shower	Yes
Shower	Yes	Yes	Toilet facility	Yes
Toilet facility	Yes	Yes	Garbage disposal	Yes
Cooking fuel	Yes	Yes	Treatment to drinking water	Yes
Land ownership	Yes	Yes	Wall materials	Yes
Overcrowding	Yes	Yes	Access to drinking water	Yes
Number of children below 6 years old	Yes	Yes	Roof materials	Yes
Working age persons without income	Yes	Yes	Quality of dwelling	Yes
Language	Yes	Yes	Road to housing	Yes
Household's head education level	Yes	Yes	Access to internet	Yes
Spouse education level	Yes	Yes	Location of water and toilet facilities	Yes
Social security coverage	Yes	Yes	Household's size	Yes
Access to credit	Yes	Yes	Overcrowding	Yes
Ownership of kitchen	Yes	Yes	Household's head education level	Yes
Ownership of television	Yes	Yes	Ownership of mobile phone	Yes
Ownership of refrigerator	Yes	Yes	Ownership of television	Yes
Ownership of telephone	Yes	Yes	Ownership of refrigerator	Yes
Ownership of car	Yes	Yes	Ownership of telephone	Yes
Ownership of radio		Yes	Ownership of car	Yes
Ownership of video recorder			Ownership of washing machine	Yes
Number of children not attending to school	Yes	Yes	Ownership of computer	Yes
Children assisting to public education	Yes	Yes	Ownership of oven	Yes
Number of life-born children who died			Ownership of blender	Yes
Last life-born children alive		Yes	Ownership of iron	Yes
Number of persons with disabilities	Yes	Yes	Scholarships, pensions or rental income	
			Children assisting to public education	Yes
			Number of children below 14 years old	Yes
			Poverty index at the parish level	

Source: Own elaboration based on *Registro Social* 2002–2003, 2008–2009 and 2012–2013.