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Income Mobility in Ecuador
New evidence from individual income tax returns*

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Abstract

This paper presents new evidence on the study of income mobility in Ecuador over the period 2004-2011. We utilize longitudinal data of individual income tax returns to measure income mobility both at the top and at the middle of the income distribution, and we find three main empirical results. First, income mobility in Ecuador is low for top incomes; the probability of remaining in the top 1% after one year is nearly 66%, and it remains stable by the end of the period. Second, there is a high degree of income mobility over the 2004-2011 period. Individuals are more likely to experience upward mobility than downward mobility, especially those in the middle-income deciles. Third, regression results suggest that the initial position in the income distribution is highly related to the probability of upward or downward mobility. Moreover, having a high school degree is associated with upward income movements. To our knowledge, this is the first time that research has utilized data from individual income tax returns to measure income mobility in Ecuador.

JEL Classification: D31; H24; N36; O54
Keywords: Income Inequality, Income Mobility, Top Incomes, Middle class, Latin America

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1 Introduction

While many studies have recently documented the decline in income inequality in most Latin American countries since the 2000s, (Cornia, 2010; Gasparini et al., 2009; Lustig, 2009), less attention has be paid to the study of income mobility in this region.

This paper investigates intragenerational income mobility in Ecuador with a focus on the top and middle of the distribution. First, we study whether the evolution of top income shares has been accompanied by an increase or a decrease in mobility for high-income groups. Second, we analyze whether a surging Ecuadorian middle-class has arisen. Our study is based on the individual income tax returns database from 2004 to 2011.

There are two main motivations for this study. The first is based on the growing interest in the study of top shares of income using income tax data and national accounts. Since the seminal work of Piketty (2001) and Piketty and Saez (2003) on the long-run distribution of top incomes in France and in the United States, the evolution of top income concentration in different countries has received much attention both in research and in politics. Several researchers have used tax return statistics to study the historical evolution of top income shares in more than 25 countries. All of these series are available online at the Paris School of Economics at http://g-mond.parisschoolofeconomics.eu/topincomes/. The World Top Income database includes estimations for developed countries and for some developing countries, such as China (Piketty and Qian, 2009), India (Banerjee and Piketty, 2005), Indonesia (Leigh, 2007), Argentina (Alvaredo, 2010), Colombia (Alvaredo and Londoño, 2013) and, more recently, Uruguay (Burdín et al., 2014).

In a recent working paper (Cano, 2014), we follow the top income literature, and by employing individual income tax returns data, we computed series on top shares of income for Ecuador from 2004 to 2010. Our first results suggest that the top 1% of income earners received in 2010 almost 20% of total income, similar to findings to other Latin American countries for which estimates are available. Although income concentration remains extremely high at the top of the distribution, our top income series has decreased since 2009[1]. However, we have not explicitly analyzed income mobility, and understanding how income evolves over time is a key factor in the study of income inequality.

The second motivation is based on the study of intragenerational mobility, especially on the study of Latin American's growing middle class. A recent economic report from the World Bank (Ferreira et al., 2013) documented the expansion of the middle class in this region by approximately 50% over the last decade. The change in the size and the composition of this social class must imply a reduction of income inequality in some way. It is an important issue because we know that, on the long run, the decrease of middle incomes is a source of stagnation and economic crisis (Piketty, 2013).

[1]This pattern is consistent with recent empirical evidence based on household surveys suggesting a decline of income inequality in most Latin American countries since the 2000s.

In Ecuador, estimates of economic mobility for the middle class are scarce mainly because of a lack of appropriate data that looks at how the income of individuals changes over time.

This paper contributes to this discussion by measuring income mobility in Ecuador. We organize our analysis into three parts. In the first part, we explore income mobility between the richest 1%, 0.1% and 0.01%. For this, we construct Ecuadorian top income shares using individual income tax data to compute top income series, and household surveys to compute aggregate income. Afterwards we compute the probability of remaining in the top income groups after one, two or three years. Then, utilizing transition matrices we study movements into and out of the top income groups.

In the second part, we analyze income mobility between the middle-income deciles over the 2004-2011 period. To do this, we construct transition matrices, and we analyze movements and staying probabilities of the entire tax filers' population. Certainly there are limitations when utilizing tax database, especially for the bottom of the income distribution, but as we will see in section 3, the tax database provides an accurate measure of income for middle and high-income individuals, more so than most household survey data.

In the third part, we analyze the factors associated with income mobility over the 2008-2011 period. We estimate transition probabilities of upward or downward mobility while controlling for variables associated with mobility, such as the initial income position, age, gender, level of education, marital status and geographical region of origin.

To our knowledge, this is the first time that a research has employed income tax returns data to compute income mobility in Ecuador. The rest of the paper is organized as follows. Section 2 presents the literature review and develops hypotheses. Section 3 describes the data and the methodology. Section 4 presents the main findings of top incomes mobility. Section 5 presents the findings of income mobility and the results of our regression analysis. Section 6 offers conclusions. All tables concerning income mobility are presented in the Appendix.

2 Literature review and hypotheses

Mobility is a concept that has been largely analyzed in different branches of social sciences, such as economics or sociology. In this paper, we focus on the economics literature that stress the role of mobility in the study of income distribution.

Most studies on income inequality provide snapshots of the income distribution at one point of time (Fields and Ok, 1999). Unfortunately, static positions are unable to depict the dynamics of income over time, and therefore the opportunity of individuals to move up or down through the income distribution(Auten and Gee, 2009). With the aim of studying

income dynamics, a large body of the economics literature analyzes changes in economic status from one period of time to another or from one generation to another (Fields and Ok, 1999). An important review of conceptual and methodological issues is provided in Fields and Ok (1996); Fields (2000); Atkinson et al. (2001); Fields (2008); Burkhauser and Couch (2011); Jenkins and Van Kerm (2006); Fields (2010); Jantti and Jenkins (2013).

Because the term *mobility* connotes different ideas to different researchers (Fields, 2009), the literature on income mobility is vast and does not provide a harmonized framework of measurement. We will start this section by stressing the main mobility definitions, and then we will present the specific mobility measures that will be used in the remainder of this paper.

2.1 Main income mobility definitions

Although income mobility is certainly less clearly defined by the economic literature than income inequality, a prime definition that drives most mobility analysis concerns *the changes in economic status of individuals from one period of time to another*. Based on this definition, in this paper we make three principal mobility distinctions.

The first distinction concerns two mobility magnitudes. The first is **intragenerational mobility**, which analyzes income dynamics of the same unit of observation (individuals or households) over time. The second one is **intergenerational mobility** which focuses on income dynamics across generations (parents and children) in different periods of time. For instance, most studies on mobility between generations are associated with the notion of equality of opportunity[2].

The second distinction refers to ways to measure mobility. The existing literature propose more than 20 empirical mobility measures, which are mostly associated with different mobility definitions and with particular aspects of mobility that one seeks to capture (Fields, 2010; Ferreira et al., 2013). Following the seminal work of Fields (2000), we identified three fundamental *mobility measures* as follows: (i) mobility as time independent,(ii) mobility as movement, and (iii) mobility as an equalizer of long-term incomes.

(i) Mobility as time independent answers the question about dependence between present and past income: is the initial position less-or more determinantal to a future position? This approach can be seen as the correlation between the initial and the final income vectors over a period of time (Ferreira et al., 2013). For instance Cuesta et al. (2011) measure intragenerational income mobility as time independence as follows:

$$Y_{i,t} = \beta Y_{i,t-1} + \mu_{i,t}$$

[2]Inequality of opportunity involves, of course, different dimensions, and it can be measured in a number of different ways.

Where $Y_{i,t}$ is the income for the unite of measure i(individual or household) at the time t, $\mu_{i,t}$ is an error term, and the parameter β captures mobility due to permanent factors. β parameter takes the value 1 when there is not income convergence and therefore low income mobility, and takes the value 0 when there is entire mobility. This approach is also employed by the intergenerational literature. Intergenerational income mobility is usually estimated by a linear regression model in which the logarithm of the child's income is regressed on the logarithm of the parents' income (Solon, 2002). The regression coefficient β is therefore interpreted as the intergenerational income elasticity.

(ii)Mobility as movement is the second category of income measurement. Following the influential taxonomy of Fields (2000) and Ferreira et al. (2013), we identify four basic sub-concepts as follows:

Positional movement seeks to measure the movement of individuals across different positions (quintiles, deciles, percentiles or ranks) in the income distribution. **Share movement** seeks to quantify the movement (rise or fall) of individuals' income relative to the mean. Individuals can register upward or downward movement, although their income remains unchanged (Fields, 2008). **Non-directional income movement**, also called income flux, seeks to measure the amplitude of income fluctuations. **Directional income movement** seeks to quantify the extent of net upward or downward movement in individual incomes.

(iii) Mobility as equalizer of long-term incomes seeks to measure whether changes in income at one point of time influences income inequality over the long term.

The third distinction is based on the concept of *relative* and *absolute* mobility (Fields and Ok, 1999; Fields, 2008). Auten and Gee (2009) define relative mobility as the changes in individuals' income over time relative to the income of other individuals and absolute mobility as the changes of individuals' real income over time. Moreover, Brunetti and Fiaschi (2013) suggests that relative mobility depends not only on the relative variations of individuals but also on how social conditions have changed with respect to the average of the income distribution.

For the purpose of this paper, we will focus on income mobility defined as the changes in economic status from one period of time to another (*mobility as time independence and mobility as movement*) in an intragenerational dimension.

The next subsection reviews the literature on top incomes mobility and on middle-class mobility, and it presents the hypothesis to be tested.

2.2 Literature on top incomes mobility and hypothesis

Although research on top income mobility is scarce[3], there is increasing evidence from top incomes literature suggesting that the rise in income concentration has not been accompanied by an increase in income mobility at the very top. Moreover, staying probabilities in top income groups remain stable over time.

Starting on the intragenerational dimension, Auten and Gee (2009) analyzed income mobility in the United States at the top of the distribution utilizing a large set of data from income tax returns over the period 1987-2005. The authors found that nearly 40 percent of individuals in the top 1 percent in 1996 remained in the top 1 percent in 2005, whereas more than half of individuals in different income quintiles have moved to other ones over the same period. In a recent version of their work, Auten et al. (2013) analyzed the persistence rates of top incomes for the period 2000-2010. The authors found nearly the same trend. From 41% to 49% of high income earners who started in the top 1% at the beginning of the period were also there five years later.

Furthermore, Kopczuk (2010) using Social Security Administration longitudinal data since 1937, demonstrated that the increase in income concentration in the United States has not been accompanied by an increase in income mobility at the top of the distribution. The probability of remaining in the top 1 percent of the distribution after one, three or five years is nearly 60% and it has remained stable since 1978. On the intergenerational level, Chetty et al. (2014b) analyzed income mobility in the United States between 1996 and 2012. By employing information from federal income tax records, the authors calculated two different measures of intergenerational mobility based on relative and absolute mobility concepts. One the one hand, the results suggested that the intergenerational mobility in the U.S. has remained constant over the last 20 years. On the other hand, the study found that the probability of a child born in the bottom quintile reaching the top quintile as an adults was, on average 8%. For those born into the middle quintile, the probability of jumping into the top quintile was approximately 20%. However, the probabilities of being able to climb varied greatly by geographical area within the United States. Moreover, the probability of upward mobility is driven by various characteristics, such as ethnic origin, parents' income level, family characteristics, social networks dynamics and educational background. When analyzing the top 1%, the authors found no correlation between top income earners and intergenerational mobility. As Chetty et al. (2014a) noted, "the factors that erode the middle class hamper intergenerational mobility more than the factors that lead to income growth in the upper tail".

For Canada, Saez and Veall (2005) analyzed income mobility for high-income earners using a large panel of data based on tax returns over the period 1982-2000. The authors

[3]Research on top incomes mobility is scarce as panel data on high incomes is difficult to obtain (Jenderny, 2013). Studies dealing with this subject are mostly conducted in developed countries and uses panel data from income tax records.

found that mobility for high-incomes earners has not significantly increased since 1982 and suggest that the surge in top incomes in Canada is associated with an increase in long-term income concentration. On the intergenerational level, utilizing Canadian tax database, Corak and Heisz (1999) analyzed the degree of mobility among Canadian men. The results suggest that the extent of intergenerational earnings mobility is much greater at the lower-end of the income distribution than at the very top of the distribution. However, when analyzing income dynamics, the authors found less income mobility at the very top of the distribution.

For France, Landais (2009) found very similar results as obtained for Canada. The author calculated the probability of staying in the top 1% and in the top 0.1% groups of the income distribution over the period 1996 - 2006, and he found that income mobility is low and stable at the top of the distribution and it does not explain the recent surge in french top income shares.

For Sweden, Bjorklund et al. (2012) found that intergenerational transmission between fathers and sons remained strong at the very top of the income distribution. While Sweden has traditionally been considered as a country with a high level of intergenerational mobility, results suggest that above the top 0,1% transmission is high and likely drive by inherited wealth.

Trends on income mobility raise some questions about how much economic mobility there is in Ecuador. Are top income individuals more mobile than middle-income individuals? Given the declining trend in income concentration in most Latin American countries since the past years, would we expect to find more mobility through the income distribution? In other words, does the economic elite change with the reduction of income inequality? Based on the literature on top incomes, which shows no change in mobility with income concentration, we propose the following hypothesis:

Hypothesis H1: Income inequality's declining trend has not improved income mobility at the very top.

If *H1* were true, most top income individuals should stay in the top of the distribution by the final year and should be less mobile than individuals placed in middle-income quantiles. Consequently, the proportion of top income individuals who remain into the top should be greater than the proportion of top income individuals who drop to the bottom 95% or to the bottom 99%[4]. The proportion of individuals staying in the top of the distribution should be greater than the proportion of individuals staying in a specific middle-income quantile.

[4]We analyzed the 95% and the 99% thresholds to assess more in detail the spread of movements of the economic elite.

2.3 Income mobility in Latin America and hypotheses

In the introduction, we mentioned that for Latin American countries, empirical evidence on intragenerational or intergenerational income mobility using longitudinal data is scarce. Most research on income mobility is based on repeated cross-sectional surveys or on mean-based pseudo-panel techniques, with no particular emphasis on top incomes.

Among studies that shed some light on mobility patterns for Latin American countries, Navarro (2006) analyzed income mobility for Argentina; Calónico (2006) measured mobility for a set of 8 Latin American countries[5], Cuesta et al. (2011) for a set of 14 Latin American countries[6] and more recently Cruces et al. (2013) for Chile.

Two main trends arise from these studies. On the one hand, different mobility results are obtained for the same country mostly because of different income definitions, geographic area assumptions or time spans. For instance, Navarro (2006) found a higher degree of income mobility in Argentina for the period 1985-2004 than did Calónico (2006), who measured mobility over the period 1992-2004. On the other hand, outcomes varied depending on methodology used to measure mobility. Namely, Cruces et al. (2013) measured income mobility in Chile over the 1996-2006 period by employing real panel data and pseudo-panel data. The results suggested that pseudo-panel techniques underestimated the degree of income mobility or the percentage of individuals crossing a lower or an upper bound[7]. To overcome this methodological issue, Fields (2009) suggested that panel data is ideal for analyzing income mobility because income dynamics of the same unit of interest, i.e., individual or household can be observed and measured over time.

Unfortunately, few long-term panel are available in Latin American countries (Ferreira et al., 2013), and most evidence on income mobility is based on these methodologies. The recent economic report from the World Bank about economic mobility in Latin American countries (LAC), documented high levels of intragenerational mobility over the past 20 years. By employing a synthetic panel[8], Ferreira et al. (2013) found that almost 43% of Latin American individuals had experienced changes in their economic status over recent years. The results suggest that those individuals who are poor or near poverty benefitted the most from upward mobility. While almost 2% entered in a poverty status, 23% got out of poverty, and 18% entered the middle class. According to this report, intragenerational mobility in Ecuador follows the same pattern as other LAC. From 1995 to 2009, almost 53% of the population had experienced an upward income movement. Nearly 23% had moved into the middle class, and 30% got out of poverty.

Based on the latter literature, we propose the following hypotheses:

[5] Argentina, Brazil, Chile, Colombia, Costa Rica, Mexico, Uruguay and Venezuela

[6] Argentina,Brazil,Bolivia,Chile,Colombia,Costa Rica,Honduras,Mexico,Panama,Paraguay,Peru,El Salvador,Uruguay and Venezuela.

[7] When working with pseudo-panel techniques, different "cluster" definitions can affect the final result.

[8] Synthetic panels are constructed based on household surveys of 18 LAC.

Hypothesis H2: There has been a high degree of upward income mobility in Ecuador over the past years.

If *H2* were true, the proportion of individuals moving up in the income distribution would be greater than the proportion of individuals moving down or remaining stable.

Moreover, we could expect that this upward income mobility is mainly experienced by individuals in the lowest deciles of the distribution because they are bound to move down and because Ferreira et al. (2013) demostrated that individuals in the bottom of the distribution move up the most in Latin American countries, including in Ecuador. We can therefore test the following hypothesis:

Hypothesis H3: Upward mobility is mainly explained by the initial position in the income distribution.

If *H3* were true, the *explanatory power* (the R2) of a regression of economic mobility on the initial position would not be improved so much by adding control variables such as gender or education.

If we can expect that the initial position offered the strongest explanatory power to economic mobility, the literature explains that education is also an important factor for reducing income inequality (Piketty, 2013). We can therefore test the following hypothesis:

Hypothesis H4: The upward *economic effect* of education on income mobility should be more or as important as the initial position.

Consequently, we could expect that the centile upward effect of education is greater than the centile upward effect of the initial position.

3 Data and Methodology

The availability of data determines the possibility of analyzing income dynamics. We employed panel data[9] from individual income tax returns from 2004 to 2011[10] and information on individual characteristics such as age, gender, marital status, geographical region and level of education of some tax filers for the year 2008 from the Ecuadorian Civil Registry.

Income tax returns data are compiled every year by the Ecuadorian Internal Revenue Service (Spanish acronym SRI) and contain information on all individuals who have submitted their income tax returns. For every tax filer we have the following information: (i)

[9] As discussed above, research on income inequality requires data that follows changes in income of the same unit of interest i.e. individual or household, over different periods of time. For instance, Fields (2009) suggests that panel data is ideal to analyse mobility.

[10] Unfortunately, we cannot go back prior to 2004 because electronic tax records in Ecuador are only available since the early 2000s.

labor income: wages and salaries from formal employees and the self-employed; (ii) capital income: dividends, interest, other investment income; (iii) business income and other income items; and (iv) tax deductions and taxes paid[11]. Moreover, income in Ecuador is declared in US dollars and income taxes are assessed at the individual level, not at the family level [12]. Tax income data are obtained from three types of forms: form 107, form 102A and form 102. Tax form 107 reports salaries and wages from formal employment, tax form 102A reports wages, self-employment income, capital returns and other possible source of income; and tax form 102 presents income information from taxpayers required for keeping accounting books (e.g., individuals with commercial activities or professionals).

Using tax data certainly implies both advantages and disadvantages. One of the main advantages when focusing on the top of the distribution is that tax returns data overcomes the problem of sampling and self-report biases from household surveys[13] (Atkinson et al., 2011). While household surveys can only include a few high-income individuals, tax data include a much larger and more detailed sample of the highest income taxpayers. Conversely, tax evasion or tax avoidance can be a problem for studies employing income tax data. Still, Atkinson et al. (2011) suggested that even in presence of tax evasion or tax avoidance, tax returns provide a more accurate measure of income for middle and upper income individuals than most survey data.

To assess income mobility in Ecuador, we proceeded in three steps. First, to capture the heterogeneity of the top decile and to test *H1* we analyzed income mobility at the very top of the distribution[14]. For this, we followed Piketty (2001); Piketty and Saez (2003) and constructed annual series of top shares of income by relating the amounts of individual income tax returns (numerator of the top share) to a comparable control total for full population (denominator of the share). Control variables for total income and total population rely on the National Employment and Unemployment Survey (ENEMDU for Spanish acronym). This quarterly household survey is conducted by the Ecuadorian Statistical Office (INEC for Spanish acronym) and provides information on income sources: labor, capital and other type of income, and information on socio-economic characteristics of the population. Once top incomes series had been constructed, we estimated the probability of remaining in the top income groups over different periods of time. Then, by utilizing transition matrices, we looked at movements of individuals across top percentiles and over time.

Second, to test *H2*, we analyzed income mobility for all tax filers from 2004 to 2011. By utilizing transitions matrices, we computed the probability of staying in each income group

[11]The tax database is composed of 85 variables for each year. For 2011, we have 2.3 million observations.

[12]In countries like France, Ireland, Netherlands, Switzerland or the United States, the tax unit is a married couple or single individuals.

[13]For a sampling correction, surveys could exclude the very highest income individuals.

[14]The top incomes literature demostrated that the top decile is very heterogeneous in terms of income composition and in terms of income volatility. In most countries, movements of the top decile are driven by the top 1%.

by the end of the period. Tax filers are grouped by income deciles. Upward and downward movements are illustrated by transition matrices. While for top income shares, we have employed control variables for total income and total population, in this part, income deciles were constructed relative to the total tax filing population. This is mainly for one reason. When relating total number of tax filers to the potential number of tax units age 20 and over, we were able to capture, for instance, for 2011, 25% of the total population. Because of this methodological difference, we have to be cautious when interpreting results of the tax database. The top 5% constructed with the tax database while controlling for total income represented the last 22 centiles in 2008 or the last 19 centiles in 2011 of the tax database without control variables[15]. Interpreting the two last deciles of the tax database is nearly equivalent to interpreting the results of the top incomes analysis. The analysis of the middle class utilizing the tax database should focus on deciles below the 9th decile. Moreover, analyzing in absolute terms the 3rd decile of the tax database is equivalent to analyzing the 4th or 5th decile of the household surveys. Analyzing the 7th or 8th decile from the tax database is close to analyzing the 9th decile of the household surveys (cf. Appendix table 1). While there might be some limitations for the lowest income deciles, the tax returns data allowed us to measure changes in income of most middle and upper income individuals for a seven-year period.

Third, to test *H3* and *H4* we analyzed the factors associated with mobility in Ecuador. We estimated transition probabilities of upward or downward movement by utilizing a multinomial logit model and a generalized ordered logit model while controlling for some characteristics usually associated with mobility, such as the initial position in the income distribution, age, gender, marital status, education and geographic region.

Nevertheless, transition probabilities across deciles can hide a variety of situations. Crossing a decile is indeed possible thanks to a movement of 1 centile or with a movement of 19 centiles. To provide a more accurate picture of mobility, we will mobilize two other methods. First, we employed a multinomial logit model to assess upward and downward movements of at least 10 centiles from a given initial position. Second, we followed Auten and Gee (2009) and employed a logistic model to measure the change in the percentile position of an individual from 2008 to 2011. Tax filers were more than 1.9 million in 2008 and more than 2.3 million in 2011. We were able to analyze mobility while controlling for initial position of the 1,408,497 tax units present in both years. Other information on age, gender, level of education, geographical region of origin and marital status was obtained from the Ecuadorian Civil Registry for tax filers present in the tax database of 2008. Civil information was extracted in 2009, but tax information on 2008 was updated during 2009 and after. Consequently the databases do not match perfectly (we lost 36% of the 1.4 million observations). Moreover, civil information was available only for tax form 107 filers and tax form 102A filers (we lost 12% of the observations). We did regression

[15]The top 1% began in the 96th centile of the tax database in 2008 and began in the 97th centile in 2011.

analysis with all control variables on a final subsample of 737,891 observations.

Six types of explanatory variables were considered: the initial position in the income distribution, i.e., 10 deciles, age[16], gender (1 = men, 0 = women), marital status (1 = married, 0 = otherwise), level of education (1 = high school and more, 0 = less than high school)[17] and geographical region[18]. The region of birth is used as a proxy for the region of residence to take into account economic shocks across different regions. It is therefore important to assess the relevance of this proxy. According to the population census of 2010 (cf. Appendix table 2), two-thirds of the residents of the Center, Coast and North are from these regions. Three-quarters of residents of the South are from this region. More than 90% of the residents of Guayas and Pichincha are from these regions, which are, respectively, the economic and political centers of Ecuador. Despite migration flows, the region of birth appears to be an acceptable approximate of the region of residence. Moreover, Gray (2009) demostrated that poverty and environmental conditions are the main determinants of internal rural migration in Ecuador. The poorest rural Ecuadorians probably do not belong to the tax-filers database, and it can be assumed that this population will not bias the region of birth as a proxy of the region of residence. Finally, it is worth noting that international migration is mostly concentrated in the southern region and that it is highest among land-rich households, which probably will impact local development thanks to remittances (Gray, 2009; Requier-Desjardins, 2010).

4 Top incomes mobility

4.1 Constructing top income shares

In this section, we constructed top income shares for the period 2004-2011. As is commonly proposed by the top incomes literature (Atkinson and Piketty, 2007; Atkinson et al., 2011), we constructed first the top 1% (denoted as P99-100) series, and then we constructed the series for a number of finer fractiles: P99.5-100 (the top 0.5%), P99.9-100 (the top 0.1%), and P99.99-100 (the top 0.01%).

Every fractile was constructed relative to the total number of potential tax filers in the entire Ecuadorian population (adults age 20 and over). This number was computed

[16]Six age classes: -20 years, 20-29 years, 30-39 years, 40-49 years, 50-59 years and 60 years and more.

[17]It is worth noting that detailed level-of-education categories are available in the database. However, we separate the information into two principal categories, "less than high school" and "high school and above", because educational data are not automatically updated when, for instance, individuals obtain a University degree. On the contrary, there is a compulsory updating when individuals reach the age of majority, that is, 18 years old, when the high school degree has generally already been obtained.

[18]We construct six regional variables based on the geographical region of origin: 1) North includes the provinces of Carchi, Imbabura, Esmeraldas, Sucumbios. 2) Center includes the provinces of Bolivar, Cotopaxi, Chimborazo, Napo, Pastaza, Tungurahua, Orellana. 3)South includes the provinces of Azuay, Canar, Loja, Morona Santiago and Zamora Chinchipe. 4) Coast includes the provinces of El Oro, Los Rios, Manabi and Galapagos. 5) Pichincha includes Quito the capital city, and 6) Guayas includes Guayaquil the biggest city of the country.

using population data from the Ecuadorian household surveys (ENEMDU) from 2004 to 2011, and should not be interpreted as the actual number of tax filers. Table 3 presents thresholds and the average income level in each fractile, along with the number of tax units in each fractile, all for 2011. To belong to the top percentile (P99), which included 47 thousand individuals, the income needed was PPP US$ 64,236. The average income of the bottom half of the top percentile (P99 - 99.5) was nearly PPP US$ 175 thousand, and to belong to the top 0.001%, an individual needed almost PPP US$ 2.1 million.

The income definition used for top incomes and for income mobility includes all items reported on tax returns: salaries and wages, self-employment and small businesses, rents and capital income (interest and dividends), unincorporated business income and items reported as other income, including long term capital gains, inheritances, donations, and legal deductions incurred to obtain income [19]. Income was defined as being prior to personal personal income taxes and employee payroll taxes deductions.

We then estimated shares of income by dividing the income amounts accruing to each fractile (P99-100, P99.9-100, P99.99-100) by the total personal income reported by the Ecuadorian household surveys[20]. Figure 1 displays the income share of Ecuador's top 1% from 2004 to 2011, and figure 2 decomposes the top percentile into three groups: the top 1%-0.5 %, the top 0.5%-0.1% and the top 0.1%[21].

4.2 Top incomes persistence

Once top income series have been constructed, we analyze the probability of staying at the top of the distribution after one, two and three years later. Linking with our first hypothesis we expect to find more income mobility at the top of the distribution if the decline in top incomes shares reported since 2009 is permanent.

To test this hypothesis, we followed Saez and Veall (2005) and Landais (2009) and computed the probability of remaining in the top 1%, top 0.1% and top 0.01% after different periods of time. Figure 3 reports that the probability of remaining in the top 1% one year later was on average 65%, two years later was 56% and three years later was 49% . Two main trends arise from this figure. On the one hand, the results suggest that mobility at the top 1% was very modest. Over the last three years, the probability of staying in the top 1% was nearly 70%. On the other hand, the series demostrate a

[19] To make our income definition accurate we did not take into account "other personal deductions" related to personal living or family expenses because taxpayers would have tended to increase these personal deductions to reduce taxable income.

[20] The total income denominator, was constructed by taking into account all sources of income reported by household surveys: wages and salaries income, self-employment income, capital income, transfer income and secondary income, minus employees' deductions. Total income was weighted by the expansion factor provided by the INEC. Household surveys correspond to the month of December of each year.

[21] Although the level of income concentration remained high, almost 20% of total income was obtained by the top 1% of the population; figure 1 shows a declining trend for the very top groups since 2009. Because the main objective of this section is income mobility at the upper end, we do not describe in detail top income shares trends, composition of top incomes or the role of income taxation in Ecuador.

declining trend between 2006 and 2007. The probability of staying in the top 1% declined from approximately 70% to almost 45%. Nevertheless, since 2007, the series recovered the level seen before 2006, and it remained stable for the rest of the period.

Following the same methodology, figure 4 shows the probability of remaining in the top 0.1% and figure 5 shows the probability of remaining in the top 0.01% after same periods of time. For the top 0.1% the probability of staying one year later is on average 50% and for the top 0.01% is almost 32%. Both figures demostrate the same declining trend from 2006 to 2007, seen in figure 3, followed by a recovery for the rest of the period. While the series on the top 1% had the highest probability of staying in this position after one, two or three years, the series on the top 0.01% presented a lower staying probability. This trend could suggest that the top 0.01% income group is highly transient over time.

The results were quite similar to Canadian, French and Germany top income mobility findings. Saez and Veall (2005) demostrated that the probability of remaining in the top 0.1% group in Canada was approximately 60% after one year, and between 50% and 40% after two and three years later, respectively. Landais (2009) found that the probability of staying in the French top 0.1% was, on average, 67% after one year, 50% after two years and 40% after three years, and this trend remained stable over time. For Germany, Jenderny (2013) found that the probability of staying in the top 0.1% was 60% after one year and 50% after three years.

4.3 Transition between top fractiles

Given the level of persistence of top income groups described above, one important question is whether individuals from top income groups move among the economic elite or are more likely to drop to the bottom 95% after a period of time. We now examine in more detail movements of individuals across top fractiles using transition matrices[22]. The rows of our transition matrices correspond to the top percentiles at origin (i.e. first year of a given period) and the columns correspond to top percentiles at destination. Diagonal entries present the "stayer groups", in other words the persistence rate of top units over time. Thus, we are able to know how many individuals end up in the same top percentile at the end of a given period of time, and also movements into and out of the top income groups.

Fractile members of each matrix are not presented in the next richer fractile. For instance, individuals who are members of the annual top 1% are not present in annual top 0.1% or in annual top 0.01%. Table 4 refers to the base year 2004 and shows transitions to 2011. Further table 5 shows transitions for 2008 to 2011.

Diagonal entries of table 4 demostrate that the rate of persistence in the net income fractiles tends to decline with higher fractiles. While nearly 49 percent of the top 5% stayed in this group by 2011, only 11 percent of the top 0.05% and 10 percent of the net

[22]In this section, Markov transition matrices are computed using a counting method.

richest top 0.01% remained in the same group by 2011. The vast top income tax filers at the beginning of the 7-year period are absent from their respective top groups 7 years later.

Table 5 presents a different pattern. First, persistence rates are higher than those observed in table 4, suggesting that the highest income individuals were present more in this 3-year group than in the 7-year group. Second, persistence rates increased within the three net richest groups: top 0.1%, top 0.05% and top 0.01%. While 14% remained in the top 0.1%, almost 22% and 25% of the top 0.05% and top 0.01% remained in their respective groups by 2011. Persistence rates also increased between the top 1% and the top 0.5% percentiles: 30% remained in the top 1%, and nearly 37% stayed in top 0.5% by 2011.

Regarding income mobility dynamics between the economic elite, table 4 demostrates that nearly 82% of individuals placed in the top 1% (i.e., 82.3 = 100 - 17.7) in 2004 had moved to a different percentile by 2011. Almost 13% had moved to a higher top percentile, and approximately 70% had dropped to a lower top percentile, of which 50% went to the top 5% and only 20% dropped to the bottom 95%. The same trend is found for the top 0.1% in this period. While almost 7.5% move up to a higher top income percentile, nearly 83% fell to a lower top income percentile but only 24% dropped to the bottom 95% by 2011. In other words, only 24% had left the economic elite group by 2011.

Table 5 presents the top income mobility dynamics for the 2008 - 2011 period. Approximately 71% (i.e. 70.7 = 100 - 29.3) of individuals in the top 1% had moved by 2011. While 24.3% rose to a higher top percentile, 30% fell to the top 5%, and approximately 16% had dropped to the bottom 95%. The top 0.1% was also mobile across top percentiles in this period. Approximately 87% of individuals (i.e. 86.5 = 100 - 13.5) in the top 0.1% had moved to a different percentile. Of this percentage, 19% had moved to a higher top percentile by 2011, 47% fell between the top 5% and top 0.5%, and 20% had dropped to the bottom 95%. The bottom row describes the movement of the top 0.01%: 50% had fallen between the top 1% and the top 0.05%, and only 24% had dropped to the bottom 95% by 2011.

The results of tables 4 and 5 reveal an important degree of mobility in top incomes in both periods 2004-2011 and 2008-2011. Nevertheless, most of this movement happenned between the top 5% and top 0.01%. The percentage of individuals who had dropped to the bottom 95% by the final year, in both periods, was less than the percentage of individuals who had left their top income groups but remained among the economic elite.

From our Ecuadorian top income series findings, it appears that mobility does not explicate the decline of top income shares seen since 2009 (Figures 2 and 3). Put differently, if the decline in the top income shares were permanent, we should find, in theory, more mobility in the economic elite group since 2009. However, top income mobility dynamics suggest that the persistence rate is higher between top incomes and most of the movement

happens within the economic elite. These results clearly validate *H1*.

5 Factors associated with income mobility

This section presents first income mobility patterns for the entire distribution over the period 2004-2011. Then, we focus on the period 2008-2011, for which we have control variables to analyze the factors associated with income mobility.

Our previous evidence suggests that the probability of remaining in the top incomes groups is high and the proportion of individuals who drop to the bottom 95% is less than the proportion of individuals who remain among the economic elite by the end of the period. We now examine income mobility dynamics relative to the population of total tax filers. Linking with our second hypothesis, we expect to find an upward income mobility trend, especially at the bottom and at the middle of the distribution.

The results from table 6 demostrate an important degree of mobility of tax filers during the 2004-2011 period. On average, about 63% of tax filers placing in the 4th decile (i.e. 63.2 = 100 - 36.9) had moved into another decile. While 25% had dropped to a lower income income group, more than 38% had moved to a higher income decile. The same trend was observed for the 5th to 8th middle-income deciles. Nearly 30% of individuals placing in these deciles had experienced an upward movement, and on average 23% had dropped to a lower income group. Concerning the probability of remaining in any decile, diagonal entries show that approximately 40% of tax filers placing in the 5th to 8th deciles in a given year were still in those deciles the next year.

We now analyze the factors associated with income mobility for the 2008-2011 period using the longitudinal tax database described in section 3 and information on individual characteristics from the Ecuadorian Civil Registry. Markov transitions probabilities and regressions are implemented on 1.4 million observations, of which 737,891 observations have control variables information. We organize our analysis into three parts. In the first part, we calculated Markov transition probabilities from positions in the income distribution in 2008 to income positions in 2011 utilizing three different methods. The second part utilizes a multinomial logit model to estimate the odds of experiencing an upward or downward movement of at least 10 centiles. The third part utilizes a logistic model to measure changes in the centile position of tax filers by the end of the period.

5.1 Markov transition probabilities

To compute Markov transition probabilities from income positions in 2008 to income positions in 2011, we employed three different methods. The first method is a counting procedure. The second method predicts transition probabilities employing a multinomial logit model. Then, the third method predicts transition probabilities utilizing a generalized

ordered logit model. The latter two methods are controlled by the explanatory variables described in section 3.

We begin by counting the number of transitions of each unit of observation at the final year $t = 2011$ and at the initial year $t - 3 = 2008$, and then we estimate the probability of moving from one income decile to another. Let's denote η_{xj} the number of tax filers who were in decile x in year $t-3$ and now are in decile j in year t. Using the following formula we can estimate the probability p_{xj} of a tax filer being in decile j in year t, given that he was in state x in year $t - 3$:

$$p_{xj} = \frac{\eta_{xj}}{\sum_{j=1}^{10} \eta_{xj}}$$

The probability of transition from any given decile x is equal to the number of tax filers that started in decile x and ended in decile j as a proportion of all tax filers that started in decile x.

The second method uses a *multinomial logit model* to predict transitions probabilities in the income position from 2008 to 2011. The multinomial logit model in this part takes the form of:

$$Pr(y_i = j|X) = \begin{cases} \frac{1}{1+\sum_{m=2}^{10} exp(X_i\beta_m)}, & \text{if} \quad j = 1 \\ \\ \frac{exp(X_i\beta_j)}{1+\sum_{m=2}^{10} exp(X_i\beta_m)}, & \text{if} \quad j = 2, 3, \ldots, 10 \end{cases}$$

where X_i is the vector of explanatory variables for the ith observation and β_j is the vector of parameters to be estimated for each jth outcome. The dependent variable takes ten different outcomes: 1 if first decile, 2 if second decile, 3 if third decile, ... 10 if ten decile.

Because of natural ordering in the deciles positions, the third method uses a *generalized ordered logit model*[23] where predicted probabilities are calculated as:

$$Pr(y_i = j|X) = \begin{cases} \frac{exp(\alpha_1 - X_i\beta_1)}{1+exp(\alpha_1 - X_i\beta_1)}, & \text{for} \quad j = 1 \\ \\ \frac{exp(\alpha_j - X_i\beta_j)}{1+exp(\alpha_j - X_i\beta_j)} - \frac{exp(\alpha_{j-1} - X_i\beta_{j-1})}{1+exp(\alpha_{j-1} - X_i\beta_{j-1})}, & \text{for} \quad j = 2 \quad \text{to} \quad J-1 \\ \\ 1 - \frac{exp(\alpha_{J-1} - X_i\beta_{J-1})}{1+exp(\alpha_{J-1} - X_i\beta_{J-1})}, & \text{for} \quad j = J \end{cases}$$

where α are ordered estimated cutpoints and where j ranges from 1 to 10.

[23] A Brant-Wald test shows that the parallel regression assumption in an ordered logit model is violated. Consequently, we use a generalized ordered logit model which relaxes this assumption and allows estimations of different coefficients for different outcomes.

Table 7 presents Markov transition probabilities obtained with these three methods. Deciles were computed on the entire tax filing population, but transitions probabilities were computed for survivors in 2011[24]. Panel A presents transitions probabilities for the full population. The results are the same when employing the three methods described above. Panel B presents transitions probabilities for the sub-sample. Again, the results were the same when utilizing the three methods without control variables, and for the predicted probabilities from the multinomial logit model with control variables. Panel C presents predicted probabilities from the generalized ordered logit model when they were conditioned by control variables. Probabilities were only slightly modified compared to panel B.

The results from the panels suggest an important degree of mobility especially among middle-income deciles[25]. For instance, 87% (i.e. 87=100-13) of tax filers from the 2nd and the 3rd deciles had moved by 2011. Between 75% and 66% of tax filers respectively, placing in the 4th and the 8th deciles had moved by 2011. A much larger portion of tax filers rose to a higher income decile than dropped to a lower decile. Nearly 55% of individuals belonging to the 4th decile moved to a higher decile, and 20% had dropped to a lower decile. Patterns are similar for 5th to 8th deciles. Consistent with previous top income mobility analysis, diagonal entries demostrate that the level of persistence increases with higher deciles.

These results suggest that tax filers in the middle deciles (3th to 8th deciles of the tax database) are more likely to experience an upward movement (56% on average) than a downward movement (19% on average) or simply no movement (25% on average) by the final year of the period. Linking with our hypotheses, these results clearly validate *H1* and *H2*.

To obtain more detail about the main factors that influence transitions probabilities, figures 6 to 15 present probabilities from the multinomial logit model described above. The probabilities were predicted at the mean of regions and change as a function of decile origin, age, gender and education[26]. Changes in predicted probabilities suggest that having a high school degree highly influences the probability of rising in the income distribution. For instance, probabilities of advancing were higher for tax filers starting in the 6th decile and who had a high school degree. Conversely probabilities of falling in the lowest deciles were higher for those starting in the 6th decile and who did not have a high school degree. Moreover, tax filers starting in the first fifth deciles and who had a high school degree were more likely to move into the fifth or fourth last deciles. Regarding life-cycle, the probability of reaching the three first deciles decreases with age regardless of initial positions. The

[24]Table 8 in Appendix presents transitions probabilities from 2008 to 2011 computed relative to the panel population.

[25]Recall that the lowest deciles in the tax database probably capture middle-income deciles in household surveys (cf. table 1 in Appendix).

[26]For this purpose we create four cross variables of gender and education: EDUCMAN, EDUCWOMAN, NONEDUCMAN, NONEDUCWOMAN.

probability of reaching the 4th to 7th deciles increased with age (with a less clear pattern for the 5th decile) and the probability of reaching the three last deciles decreased with age (with a less clear pattern for the 9th and 10th deciles).

Of course, here we are faced with a methodological limitation. As noted by Auten and Gee (2009), some individuals might have crossed a decile by moving only a few income centiles while others could have moved several income centiles. Unfortunately, these movements cannot be seen in our transition matrices. To overcome this methodological issue, we employ two additional methods. The first one captures movements of at least 10 centiles. The second one measures the change in the percentile position of individuals following the method proposed by Auten and Gee (2009).

5.2 Strong movements predicted by a multinomial logit model

The multinomial logit model in this subsection takes the same form as the multinomial logit model described in section 5.1, where j has three categories: 1, if no movement or weak movement (between -10 and 10 centiles); 2, if strong upward movement; and 3, if strong downward movement, where "strong" means a movement greater than 10 centiles. Estimates give the probability of "strong upward mobility" or "strong downward mobility" relative to the base category of "weak or no movement"[27].

Table 9 presents multinomial logit regression results. Coefficients are reported as "relative risk ratios rrr", which indicate the relative risk associated with a one-unit change in the explanatory variable[28]. The 1st specification includes variables of the initial position in the income distribution for the entire population[29]. For those tax filers starting in the three first deciles, the relative risk of experiencing an upward movement rather than a weak movement is expected to increase by a factor between 2.1 and 3.1. On the contrary for individuals starting in the 4th decile and higher, the relative risk of moving up rather than experiencing a weak or no movement is expected to decrease by a factor between 0.9 and 0.09. The risk of falling rather than moving slightly decreased by a factor of between 0.16 and 0.38 for all initial positions. The 2nd specification includes regional variables[30] which do not qualitatively modify the results. The 3rd specification includes initial position and regional variables for the sub-sample, for which we have other control variables.

[27] The frequency of the dependent variable is the following: 39% for outcome 1 (35% of weak movement and 4% of no percentile movement), 43% for outcome 2, and 18% for outcome 3.

[28] Recall that a factor change greater (less) than 1 indicates a positive (negative) relationship between explanatory and dependent variables. Moreover, a positive and a negative effect have the same magnitude if they are the inverse of each other (e.g., 5 and 0.2).

[29] To analyze the effects of each initial position, we dropped the intercept. The results are qualitatively similar when the constant is added. Because the dependent variable catches an upward or a downward movement of at least 10 centiles, the coefficients of decile 1 cannot be estimated for a downward outcome, and the coefficients of decile 10 cannot be estimated for an upward outcome. The results for deciles 2 to 9 are qualitatively similar when we remove observations belonging to deciles 1 and 10.

[30] North is the omitted region.

The results are unchanged. The 4th specification includes variables of age[31]. When age is added, being in the 2nd or the 3rd deciles does not increase the odds of rising rather than not moving. In models 5 and 6, when all control variables are added the risk of moving down or moving up rather than moving slightly or not moving decreases regardless of initial positions. It is therefore worth analyzing which are the other determinants that increase the odds of moving up by more than 10 centiles.

Education is the most important determinant that influences upward movements. Having an educational degree increased the odds of moving up by a factor of 2.0. Moreover, being a woman with an educational degree rather than being a woman without an educational degree increased the odds of moving more than 10 centiles by a factor of 2.9. These results validate *H4*.

Factor changes of region, marital status or gender variables are quiet low[32]. Being in Guayas -the economic center- provided a higher relative risk of rising or falling than being in other regions (the respective rrr are 1.4 and 1.3 relative to the North region). Being in the South region resulted in the second highest odds of an upward movement relative to other regions. Nevertheless, differences between all regions are very small. Being less than 50 years old increased the relative risk of experiencing upward mobility rather than moving slightly, relative to individuals being 50 years old or more. Nevertheless, being less than 30 years old increased the odds of experiencing strong downward movements rather than a weak movement relative to individuals being 30 years old and more. Looking at other control variables, being a man increased the odds of moving up or moving down by a factor of 1.2. Being married slightly increased the odds of upward movements and slightly decreased the relative risk of experiencing downward movements rather than not moving.

5.3 Modeling centile effects

In this section, following Auten and Gee (2009), we measured the change in the centile position of individuals over the period 2008-2011. As noted by these authors, the simplest way to measure this change would be by computing the difference between two centiles position from the initial to the final period. For instance, an individual moving from the 60th percentile in 2008 to the 70th percentile in 2011 would have climbed 10 percentiles. However, if we proceed in this way, the dependent variable would present a consistency problem because the centile range is bounded by 0 to 100. To overcome this methodological issue, Baum (2008) suggests a logit transformation of the dependent variable y and the use of a linear regression to model this transformation as a linear function of a set of regressors:

$$y = \frac{1}{1 + exp(-X\beta)}$$

[31] 60 years and more is the omitted category.
[32] Wald tests show that differences described in this paragraph were always significant.

to obtain y^*

$$y^* = ln(\frac{y}{1-y}) = X\beta + \epsilon$$

This transformation allows us to model y^* while avoiding problems of estimating a bounded dependent variable. Following Auten and Gee (2009), the dependent variable in this part is defined as:

$$y = logit(dcent)$$

$$y = ln(\frac{dcent}{(1-dcent)})$$

$$dcent = \frac{\frac{1}{2}(endcentile - startcentile) + 50}{100}$$

where *dcent* is a transformation scaled in such a manner that individuals whose income remains the same at the end of the period, hold a dependent variable with a value of zero. For instance, individuals whose systematic effect is 0.06 would be predicted to increase their relative position in the income distribution by 3 percentiles, as shown in the following table:

Logit transformation of the centile effect

centile effect	99	...	3	2	1	**0**	-1	-2	-3	...	-99
dcent	0.995	...	0.515	0.510	0.505	**0.500**	0.495	0.490	0.485	...	-0.995
logit(dcent)	5.293	...	0.060	0.040	0.020	**0.000**	-0.020	-0.040	-0.060	...	-5.293

Table 10 presents the results. We remove the intercept from the regressions to observe the effect of each category in the initial position[33]. The first specification models changes in the centile position as a function of the initial position in the income distribution for all observations. Centile effects decrease from a positive to a negative value as the initial position increases. The second specification includes regional variables. The results are qualitatively similar in both models and centile effects remain stable. Starting in the 2nd and 3rd deciles is associated with an upward movement of 25 and 18 centiles by the end of the period. Being in the 4th to 7th deciles is associated with climbing in the income distribution approximately 9, 5, 3 and 2 centiles, respectively. Being in the 9th decile is associated with a downward movement of 5 centiles. The results are unchanged in the subsample for which we have all control variables (model 3), except for the 1st and the 10th deciles which respectively decreased from 45 to 35 centiles and increased from -13 to -7 centiles. When adding all control variables (models 5 and 6), there is a declining trend in centile effects for all initial positions. The centile effects decrease by approximately 10 points. Starting in 4th decile is now associated with downward mobility.

While the coefficients of the control variables are highly statistically significant, region of birth, age, being married, being a man or having a high school degree added very little to the explanatory power of the model, as shown by the evolution of the R2 (R-squared

[33]The results are qualitatively similar with the constant.

increases from 0.26 to 0.29). This result validates *H3*, which stresses the overriding role of initial position in the income distribution to explain mobility.

Most of the control variables are associated with low centile effects. Age variables are associated with an upward movement of 3 centiles for individuals being between 20 and 60 years old relative to those being 60 years old and more. Belonging to the South, Center and Guayas regions is associated with a rise of 1 or 2 centiles relative to the North region. Consistent with the previous multinomial logit model, the economic effect of region of birth is very low. Furthermore, being a man or being married does not seem to be economically significant because it is associated with rising by 1 centile.

However, having at least a high school degree is associated with an increase of approximately 9 centiles. In the sixth, specification we decomposed the education effect between men and women. The results demostrate that the constant effect of being a man is associated with an increase of 3 centiles. Being a man with an educational degree is associated with a rise of 8 centiles, while being a woman with an educational degree is associated with an 11 centile rise in the income distribution. A Wald test demostrated that this difference is significantly different from zero. The difference between the coefficient of the variable educwoman and the sum of the coefficients of variables man and educman is statistically not different from zero at a 1% significance level. Consequently education appears to reduce the small gender inequality in income mobility because both educated men and educated women are associated with moving up by 11 centiles relative to women without a high school degree. These results and those of the previous multinomial logit regression validate *H4*. We can conclude that the demand for skills is an explanation of the reduction of inequalities in a developing country such as Ecuador. This is consistent with recent trends in Latin American countries where the fall in income inequality is partly explained by a decrease in educational inequality among individuals (Cornia, 2010). It is also congruent with the argument of Piketty (2013) for developed countries in which the demand for skills does not explain the rise of inequality but may explain the decrease of inequality.

6 Conclusions

This paper examined income mobility in Ecuador using information reported on individual income tax returns. Three main empirical results were obtained. First, income mobility at the top of the distribution was low and it remained stable over the 2004-2011 period. The analysis found that top income individuals were more likely to move between the top 5% and the top 0.1% of the distribution. The proportion of individuals who dropped to the bottom 95% was less than the proportion of individuals who remained in the top 5% by the final year. Second, there was a significant degree of mobility in the middle of the income distribution. More than 50% of individuals moved to a higher decile group over the

2008-2011 period. Third, the results of regression analysis suggest that the initial position in the income distribution was closely associated with the probability of upward mobility or downward mobility. Moreover, having a high school degree was associated with rising in the income distribution by approximately 10 centiles between 2008 and 2011.

7 Appendix

Table 1: Comparison of tax data (TD) and household surveys (HS)

Deciles	2008				2011			
	mean income US$		in % of next decile		mean income US$		in % of next decile	
	HS	TD	HS	TD	HS	TD	HS	TD
1	337	184	53%	19%	400	321	53%	24%
2	640	958	53%	49%	753	1 337	52%	49%
3	1 206	1 973	69%	68%	1 450	2 726	65%	71%
4	1 750	2 894	77%	74%	2 215	3 864	78%	79%
5	2 279	3 889	84%	73%	2 855	4 866	83%	78%
6	2 714	5 310	82%	74%	3 428	6 229	85%	76%
7	3 315	7 216	77%	75%	4 011	8 239	81%	74%
8	4 327	9 600	72%	68%	4 938	11 104	72%	71%
9	6 037	14 148	41%	35%	6 903	15 748	46%	38%
10	14 770	40 862			15 110	41 371		

This table shows mean income by decile and proportion of mean income relative to the mean income of the next decile. Population aged 20 and over. Average income from household survey and from tax data is net of deductions.

Constructing top incomes shares requires the usage of individual income tax data and control variables for total income and total population. Nevertheless, for the analysis of the middle class, household surveys (HS) probably give an accurate picture of the income distribution because tax database (TD) captures only 25% of the adult population. Consequently, we have to be cautious when interpreting results of the TD without controls. For instance, the top 5% constructed with the TD while controlling for total income from HS represented the last 22 centiles in 2008 or the last 19 centiles in 2011 of the TD without control variables[34]. Interpreting the two last deciles of the TD is nearly equivalent to interpreting the results of the top incomes analysis. The analysis of the middle class using the TD should focus on deciles below the 9th decile.

Let us examine the 1st to 8th deciles in the TD. For the HS and TD, we scrutinize both the absolute value of the mean income by deciles and the proportion of mean income relative to the mean income of the next decile in order to assess whether the relative gap between each decile is the same across the two databases.

- First decile: the mean income of the 1st decile in the HS is more important than the mean income of the 1st decile in the TD. Moreover, in 2008 and 2011 the HS demostrated that the mean income of the 1st decile is 53% of the mean income of the 2nd decile, while it is between 19% and 24% for the TD. It would be difficult to interpret the evolution of the 1st decile in the TD which is clearly not representative of the 1st decile of household survey.

- Second decile: the mean income of the 2nd decile in the TD is greater than the mean

[34]The top 1% began in the 96th centile of the tax database in 2008, and began in the 97th centile in 2011.

income of the 2nd decile in the HS, but it is less than the mean income of the 3rd decile in the HS. Moreover, the mean income of the 2nd decile is approximately 50% of the mean income of the 3rd decile in both the household survey and tax database.

- Third decile: the mean income of the 3rd decile in TD is greater than the mean income of the 3rd and 4th decile in the HS. The mean income of the 3rd decile is between 65% and 71% of the mean income of the 4th decile in both the HS and TD.
- From the 4th to 7th deciles: every mean income of these deciles in the TD is greater than the mean income of the two next deciles in the HS. The mean income of one of these deciles is between 73% and 85% of the mean income of the next decile, with a minimum difference of one percentage point and a maximum difference of 11 percentage points between HS and TD, depending on the decile and on the year.
- Eighth decile: the mean income of the 8th decile in TD is greater than the mean income of the next decile in HS. The mean income of the 8th decile is between 68% and 72% of the mean income of the 9th decile in both the HS and TD.

While the analysis of the first decile in the TD should be ignored, the TD captures upper incomes in a better way. For the 2nd to the 8th decile, absolute revenue is less dispersed for the HS than for the TD. Nevertheless, relative gaps of mean absolute revenue between deciles are close in the two databases from the 2nd to the 8th decile. Mobility between the 4th and 7th (or 8th) decile in the TD probably represents mobility between the 6th and 9th decile in the HS. Moreover, analyzing in absolute terms the 3rd decile of the tax database is equivalent to analyzing the 4th or 5th decile of the HS. Further, analyzing the 7th or 8th decile from TD is closed to analyse the 9th decile in the HS. In this paper, we always refer to the deciles of the TD.

Table 2: Cross-table of region of birth and region of residence

	Region of residence							
Region of birth	**Center**	**Coast**	**Guayas**	**North**	**Pichincha**	**South**	**TOTAL**	**Match birth-residence**
Center	**942 145**	36 418	81 344	31 465	273 721	17 535	1 382 628	68%
Coast	35 149	**1 373 638**	397 255	68 486	164 390	28 644	2 067 562	66%
Guayas	15 269	72 983	**1 738 201**	12 134	40 061	20 188	1 898 836	92%
North	16 494	20 596	55 676	**513 918**	163 573	5 601	775 858	66%
Pichincha	28 135	17 295	22 017	28 960	**1 018 561**	10 287	1 125 255	91%
South	25 678	78 974	60 229	19 756	110 354	**828 272**	1 123 263	74%
TOTAL	1 062 870	1 599 904	2 354 722	674 719	1 770 660	910 527	8 373 402	

Censo de población y vivienda 2010, Instituto Nacional de Estadística y Censos-INEC, Ecuador Population aged 20 and more in 2010 (18 and more in 2008).
In this paper, the 24 administrative provinces are grouped into six regions:
Center = Bolívar, Chimborazo, Cotopaxi, Napo, Orellana, Pastaza, Tungurahua
Coast = El Oro, Galápagos, Los Ríos, Manabí
Guayas = Guayas, Península de Santa Elena
Norte = Carchi, Esmeraldas, Imbabura, Sucumbíos
Pichincha = Pichincha, Santo Domingo de los Tschilas
South = Azuay, Canar, Loja, Morona Santiago, Zamora Chinchipe

Table 3: Thresholds and average incomes in top groups within the top percentile, Ecuador 2011

Thresholds	Income threshold		Income groups	Number of tax units	Average income	
	US$	US$(PPP)			US$	US$(PPP)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
			Full Population	9 408 267	9 417	17 896
P90	7 141	13 572	Top 10-5%	470 413	28 648	54 446
P95	12 898	24 512	Top 5-1%	376 331	32 350	61 481
P99	33 800	64 236	Top 1-0.5%	47 041	91 712	174 298
P99.5	47 537	90 342	Top 0.5-0.1%	37 633	102 172	194 176
P99.9	98 236	186 695	Top 0.1-0.05%	4 704	299 473	569 145
P99.95	138 201	262 648	Top 0.05-0.01%	3 763	337 840	642 059
P99.99	313 641	596 071	Top 0.01%-Top 0.001%	847	773 507	1 470 039
P99.999	1 132 662	2 152 608	Top 0.001%	94	2 893 022	5 498 146

Note : In 2011 for Ecuador PPP US$ 1 = 0,52618
Note 2 : Computations are based on income tax returns statistics.

Table 4: Top Income Mobility in Ecuador (a,b)
Transitions between income fractiles 2004-2011
% of net fractile members

	Destination 2011							
Origin 2004	Bottom 95%	Top 5%	Top 1%	Top 0.5%	Top 0.1%	Top 0.05%	Top 0.01%	Total
Bottom 95%	77.4	17.4	2.4	2.2	0.3	0.3	0.1	100
Top 5%	44.3	48.9	4.1	2.4	0.2	0.1	0.0	100
Top 1%	19.8	50.0	17.7	10.9	0.9	0.6	0.1	100
Top 0.5%	19.4	29.3	21.5	25.1	2.8	1.7	0.3	100
Top 0.1%	23.9	18.9	10.2	30.3	9.3	6.4	1.1	100
Top 0.05%	24.0	17.2	9.9	23.6	10.6	11.2	3.6	100
Top 0.01%	35.0	17.1	7.4	12.5	5.8	12.1	10.1	100
Total	61.7	29.7	4.3	3.5	0.5	0.4	0.1	100

(a) Top shares are obtained from income tax returns statistics
(b) control population and control total income estimated from household surveys

Table 5: Top Income Mobility in Ecuador (a,b)
Transitions between income fractiles 2008-2011
% of net fractile members

	Destination 2011							
Origin 2008	Bottom 95%	Top 5%	Top 1%	Top 0.5%	Top 0.1%	Top 0.05%	Top 0.01%	Total
Bottom 95%	86.7	12.0	0.7	0.5	0.1	0.0	0.0	100
Top 5%	24.1	65.2	7.1	3.3	0.2	0.1	0.0	100
Top 1%	16.2	30.3	29.3	22.2	1.3	0.7	0.1	100
Top 0.5%	19.1	18.6	14.0	37.2	6.8	3.7	0.5	100
Top 0.1%	20.3	16.3	8.1	22.9	13.5	17.1	2.0	100
Top 0.05%	20.7	14.6	8.3	18.7	8.5	21.6	7.6	100
Top 0.01%	24.2	16.8	5.9	10.6	4.7	13.0	24.9	100
Total	71.0	23.2	2.9	2.3	0.3	0.2	0.1	100

(a) Top shares are obtained from income tax returns statistics
(b) control population and control total income estimated from household surveys

Table 6: Income Mobility in Ecuador (a)
Transitions between income deciles 2004 - 2011
% of net deciles members

	Destination 2011										
Origin 2004	Decile 1	Decile 2	Decile 3	Decile 4	Decile 5	Decile 6	Decile 7	Decile 8	Decile 9	Decile 10	Total
Decile 1	45.7	9.3	8.5	5.4	4.2	3.4	3.5	3.9	5.8	10.4	100
Decile 2	15.8	22.3	20.9	16.5	11.4	6.0	3.2	1.9	1.2	0.8	100
Decile 3	8.7	14.5	22.0	22.3	14.9	8.4	4.2	2.4	1.5	1.0	100
Decile 4	4.2	7.8	13.4	36.9	20.7	8.5	4.1	2.3	1.3	0.9	100
Decile 5	2.8	5.0	7.2	12.5	37.7	21.4	7.4	3.1	1.8	1.0	100
Decile 6	2.0	2.7	3.8	3.9	11.6	42.7	22.8	6.2	2.9	1.4	100
Decile 7	1.7	1.5	2.1	2.0	3.2	11.9	45.7	23.5	6.0	2.3	100
Decile 8	2.1	0.9	1.4	1.2	1.7	3.2	12.3	49.9	23.1	4.3	100
Decile 9	2.9	0.8	1.1	0.9	1.2	1.9	3.7	12.9	55.5	19.1	100
Decile 10	4.6	0.7	0.9	0.8	0.9	1.1	1.7	3.1	12.5	73.7	100
Total	8.3	6.0	7.6	9.9	10.7	11.1	11.3	11.4	11.7	11.9	100

a)This table shows income mobility in Ecuador from 2004 to 2011. Income mobility is relative to the total tax filing population.
Source : Author's calculations based on income tax returns statistics.

Table 7: Markov Transition Probabilities

Panel A: full population without control variables (probabilities obtained by counting transitions or predicted from multinomial logit model or from generalized ordered logit model)

Origin 2008		Destination 2011												
N	%	DEC	1	2	3	4	5	6	7	8	9	10	Total	Total 3
90 940	6,5%	**1**	***16,7***	**12,8**	**12,9**	11,4	10,6	9,1	7,0	5,5	5,5	8,6	100	42,4
110 400	7,8%	**2**	10,6	13,0	**14,8**	***15,9***	**15,7**	12,5	7,8	5,2	2,8	1,8	100	46,4
129 258	9,2%	**3**	6,8	8,8	12,8	**18,2**	***18,6***	**14,7**	9,6	5,1	3,3	1,9	100	51,6
142 433	10,1%	**4**	4,7	6,1	9,9	***24,7***	**20,5**	**14,9**	9,2	5,2	2,9	1,9	100	60,2
151 185	10,7%	**5**	3,5	4,3	6,1	10,2	**22,3**	***24,0***	**15,2**	7,9	4,0	2,4	100	61,5
156 316	11,1%	**6**	2,4	2,7	3,7	3,8	8,4	**26,9**	***27,8***	**14,5**	6,2	3,7	100	69,2
160 197	11,4%	**7**	1,7	1,6	2,2	1,9	2,9	7,6	**29,2**	***31,7***	**16,0**	5,1	100	76,9
162 898	11,6%	**8**	1,4	1,1	1,5	1,2	1,5	2,8	7,9	**34,1**	***38,6***	**9,7**	100	82,5
155 070	11,0%	**9**	1,8	1,2	1,5	1,3	1,5	2,2	4,1	**10,6**	***42,1***	**33,7**	100	86,4
149 800	10,6%	**10**	2,9	1,1	1,8	1,4	1,4	1,8	2,7	**4,3**	**11,7**	***71,0***	100	87,0
1 408 497	100,0%													

Panel B: sub-sample without control variables (probabilities obtained by counting transitions or predicted from multinomial logit model or from generalized ordered logit model) or with control variables (probabilities from multinomial logit model)

Origin 2008		Destination 2011												
N	%	DEC	1	2	3	4	5	6	7	8	9	10	Total	Total 3
28 996	3,9%	**1**	***15,1***	**15,0**	**14,4**	13,4	12,6	11,1	7,2	4,6	3,4	3,3	100	44,4
50 954	6,9%	**2**	10,3	12,4	**14,5**	**14,9**	***16,1***	13,6	8,7	5,1	2,9	1,4	100	45,4
61 086	8,3%	**3**	6,8	8,4	11,8	**16,7**	***19,2***	**15,6**	11,1	5,6	3,4	1,6	100	51,5
68 311	9,3%	**4**	4,8	6,0	9,0	***24,0***	**21,6**	**15,0**	9,9	5,3	2,9	1,6	100	60,5
85 100	11,5%	**5**	3,2	4,1	5,9	9,4	**23,1**	***24,6***	**15,9**	8,3	3,7	1,9	100	63,5
92 512	12,5%	**6**	2,0	2,5	3,3	3,3	7,7	**27,9**	***29,3***	**15,1**	5,8	3,1	100	72,3
95 860	13,0%	**7**	1,2	1,5	1,9	1,6	2,7	6,9	**30,2**	***36,3***	**13,7**	4,0	100	80,2
95 297	12,9%	**8**	0,9	1,0	1,1	0,9	1,2	2,4	7,6	***40,0***	**37,0**	**7,9**	100	84,9
86 509	11,7%	**9**	0,9	0,8	1,1	0,8	1,0	1,7	3,3	**9,5**	***48,3***	**32,6**	100	90,4
73 266	9,9%	**10**	1,0	0,6	1,0	0,8	0,9	1,3	1,9	**3,4**	**11,4**	***77,7***	100	92,6
737 891	100,0%													

Panel C: sub-sample with control variables (transition probabilities from generalized ordered logit model)

Origin 2008		Destination 2011												
N	%	DEC	1	2	3	4	5	6	7	8	9	10	Total	Total 3
28 996	3,9%	**1**	***14,8***	**14,8**	**14,3**	13,6	12,9	11,3	7,2	4,7	3,2	3,2	100	43,9
50 954	6,9%	**2**	10,3	12,4	**14,4**	**14,8**	***16,3***	13,7	8,7	5,1	2,8	1,4	100	45,5
61 086	8,3%	**3**	6,8	8,4	11,8	**16,4**	***19,2***	**15,7**	11,1	5,7	3,3	1,5	100	51,3
68 311	9,3%	**4**	4,8	6,0	9,1	***23,5***	**21,6**	**15,2**	10,0	5,4	2,8	1,6	100	60,3
85 100	11,5%	**5**	3,2	4,1	5,9	9,4	**22,8**	***24,7***	**16,1**	8,3	3,7	1,9	100	63,6
92 512	12,5%	**6**	1,9	2,4	3,2	3,6	7,8	**27,5**	***29,4***	**15,2**	5,9	3,1	100	72,1
95 860	13,0%	**7**	1,2	1,4	1,9	1,8	2,8	7,0	**29,8**	***36,3***	**13,9**	4,0	100	80,0
95 297	12,9%	**8**	0,8	0,9	1,1	1,0	1,3	2,5	7,7	***39,7***	**37,0**	**8,0**	100	84,7
86 509	11,7%	**9**	0,8	0,7	0,9	0,9	1,1	1,7	3,4	**9,5**	***48,0***	**32,8**	100	90,3
73 266	9,9%	**10**	0,9	0,5	0,9	0,8	0,9	1,3	2,0	**3,6**	**11,5**	***77,7***	100	92,8

This table reports mean values of transition probabilities from positions in the income distribution in 2008 to decile positions in 2011. Deciles are computed on the entire tax filing population but transitions probabilities are computed for survivors in 2011. In models with control variables, predicted probabilities are conditioned by previous position in income distribution, birth region, age, gender, marital status, and education. The most important probability by decile is in italic and in blue. The three most important probabilities are in bold. Their sum is in column "Total 3".

Table 8: Income Mobility in Ecuador, relative to the tax panel population
Transitions between income deciles 2008-2011
% of net deciles members

	Destination 2011										
Origin 2008	Decile 1	Decile 2	Decile 3	Decile 4	Decile 5	Decile 6	Decile 7	Decile 8	Decile 9	Decile 10	Total
Decile 1	30.4	19.3	13.5	9.9	6.8	5.1	4.1	3.1	3.3	4.4	100
Decile 2	21.2	21.5	19.2	14.2	9.4	5.9	3.5	2.2	1.7	1.2	100
Decile 3	13.4	25.3	22.2	15.1	9.2	5.9	3.7	2.3	1.7	1.2	100
Decile 4	10.0	13.9	24.2	20.8	12.7	8.2	4.4	2.7	1.9	1.3	100
Decile 5	6.8	6.9	10.9	22.8	21.8	14.3	7.7	4.0	2.9	1.8	100
Decile 6	4.6	4.0	3.8	9.3	25.9	25.4	14.0	6.5	4.0	2.6	100
Decile 7	3.1	2.5	2.0	2.9	7.0	21.2	31.7	20.2	6.3	3.1	100
Decile 8	2.9	2.0	1.4	1.9	3.1	7.6	22.0	32.6	21.1	5.4	100
Decile 9	3.3	2.1	1.3	1.6	2.3	4.1	7.0	19.8	39.5	19.0	100
Decile 10	4.3	2.5	1.4	1.5	1.8	2.4	3.1	5.5	17.5	60.1	100
Total	100	100	100	100	100	100	100	100	100	100	

(a)This table shows income mobility in Ecuador from 2008 to 2011. Income mobility is relative to the panel population.
Source : Author's calculations based on income tax returns statistics.

Table 9: Downward and upward movements of at least 10 centiles (Logit Multinomial)

	(1)		(2)		(3)		(4)		(5)		(6)	
	upward	downward	upward	downward	upward	downward	upward	downward	upward	downward	upward	downward
dec1	3.053*	na	2.758*	na	2.438*	na	1.144*	na	0.849*	na	0.635*	na
	(0.023)		(0.028)		(0.039)		(0.031)		(0.024)		(0.020)	
dec2	2.484*	0.155*	2.247*	0.145*	2.155*	0.133*	0.997	0.135*	0.742*	0.130*	0.555*	0.113*
	(0.017)	(0.002)	(0.021)	(0.003)	(0.029)	(0.004)	(0.026)	(0.004)	(0.020)	(0.004)	(0.016)	(0.004)
dec3	2.182*	0.362*	1.973*	0.338*	2.067*	0.345*	0.961	0.365*	0.710*	0.352*	0.532*	0.307*
	(0.014)	(0.004)	(0.018)	(0.005)	(0.027)	(0.007)	(0.025)	(0.010)	(0.019)	(0.010)	(0.015)	(0.010)
dec4	0.969*	0.332*	0.877*	0.311*	0.830*	0.298*	0.394*	0.329*	0.290*	0.319*	0.217*	0.279*
	(0.006)	(0.003)	(0.008)	(0.004)	(0.010)	(0.005)	(0.010)	(0.008)	(0.008)	(0.008)	(0.006)	(0.008)
dec5	0.862*	0.376*	0.778*	0.352*	0.717*	0.310*	0.342*	0.350*	0.237*	0.345*	0.176*	0.299*
	(0.005)	(0.003)	(0.007)	(0.004)	(0.008)	(0.005)	(0.009)	(0.009)	(0.006)	(0.009)	(0.005)	(0.009)
dec6	0.673*	0.287*	0.608*	0.270*	0.537*	0.221*	0.270*	0.263*	0.172*	0.264*	0.127*	0.228*
	(0.004)	(0.002)	(0.005)	(0.003)	(0.006)	(0.004)	(0.007)	(0.006)	(0.004)	(0.007)	(0.004)	(0.007)
dec7	0.556*	0.217*	0.505*	0.205*	0.409*	0.156*	0.207*	0.187*	0.125*	0.191*	0.092*	0.165*
	(0.003)	(0.002)	(0.004)	(0.002)	(0.005)	(0.003)	(0.005)	(0.005)	(0.003)	(0.005)	(0.003)	(0.005)
dec8	0.314*	0.176*	0.285*	0.167*	0.192*	0.116*	0.099*	0.144*	0.057*	0.150*	0.042*	0.129*
	(0.002)	(0.001)	(0.003)	(0.002)	(0.002)	(0.002)	(0.003)	(0.004)	(0.002)	(0.004)	(0.001)	(0.004)
dec9	0.093*	0.221*	0.084*	0.209*	0.059*	0.131*	0.033*	0.176*	0.019*	0.185*	0.014*	0.160*
	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)	(0.004)	(0.001)	(0.005)	(0.000)	(0.005)
dec10	na	0.250*	na	0.234*	na	0.130*	na	0.181*	na	0.191*	na	0.166*
		(0.002)		(0.003)		(0.002)		(0.004)		(0.005)		(0.005)
pichincha			1.074*	1.121*	1.215*	1.246*	1.185*	1.210*	1.117*	1.238*	1.118*	1.238*
			(0.009)	(0.012)	(0.013)	(0.018)	(0.013)	(0.018)	(0.012)	(0.018)	(0.012)	(0.018)
guayas			1.227*	1.130*	1.474*	1.301*	1.436*	1.255*	1.351*	1.275*	1.346*	1.273*
			(0.010)	(0.012)	(0.017)	(0.020)	(0.017)	(0.019)	(0.016)	(0.020)	(0.016)	(0.020)
coast			1.030*	1.087*	1.046*	1.112*	1.066*	1.133*	1.053*	1.133*	1.045*	1.128*
			(0.009)	(0.012)	(0.012)	(0.018)	(0.013)	(0.018)	(0.013)	(0.018)	(0.013)	(0.018)
center			1.119*	0.934*	1.107*	0.897*	1.130*	0.910*	1.077*	0.923*	1.073*	0.922*
			(0.010)	(0.011)	(0.013)	(0.015)	(0.014)	(0.015)	(0.013)	(0.015)	(0.013)	(0.015)
south			1.116*	0.979	1.241*	0.988	1.291*	1.012	1.241*	1.032	1.234*	1.030
			(0.011)	(0.012)	(0.016)	(0.017)	(0.017)	(0.018)	(0.016)	(0.018)	(0.016)	(0.018)
age19							1.602*	1.310*	1.303*	1.367*	1.348*	1.386*
							(0.047)	(0.047)	(0.039)	(0.050)	(0.040)	(0.051)
age20_29							2.555*	1.124*	2.007*	1.183*	2.061*	1.193*
							(0.058)	(0.022)	(0.046)	(0.024)	(0.048)	(0.024)

continued on next page

Table 9: (next)

	(1)		(2)		(3)		(4)		(5)		(6)	
	upward	downward	upward	downward	upward	downward	upward	downward	upward	downward	upward	downward
age30_39							2.173*	0.823*	1.770*	0.862*	1.812*	0.868*
							(0.049)	(0.016)	(0.041)	(0.017)	(0.042)	(0.017)
age40_49							1.608*	0.634*	1.338*	0.663*	1.364*	0.666*
							(0.037)	(0.013)	(0.031)	(0.014)	(0.032)	(0.014)
age50_59							1.073*	0.524*	0.965	0.540*	0.975	0.541*
							(0.027)	(0.012)	(0.024)	(0.012)	(0.024)	(0.012)
gender									1.199*	1.118*	1.667*	1.319*
									(0.008)	(0.009)	(0.027)	(0.027)
married									1.044*	0.964*		
									(0.007)	(0.008)		
education									2.015*	0.845*		
									(0.015)	(0.008)		
marriedman											1.090*	0.982
											(0.009)	(0.010)
marriedwoman											0.974	0.937*
											(0.010)	(0.013)
educman											1.809*	0.802*
											(0.015)	(0.009)
educwoman											2.874*	1.009
											(0.043)	(0.020)
Obs.	1408497		1408497		737891		737891		737891		737891	
Chi2 statistic	430313.03		430980.62		268284.33		271640.32		277792.66		278645.23	
Log pseudolikelihood	-1174173.92		-1173263.96		-587039.69		-581542.11		-575765.08		-575336.37	

Exponentiated coefficients
* p<0.01
na: coefficients non available because they cannot be estimated (no upward movement for dec10 and no downward movement for dec1)
Omitted categories are north, age60.

Table 10: Factors associated with income mobility in Ecuador, 2008-2011

	(1)		(2)		(3)		(4)		(5)		(6)	
	dcent	centile effect	dcent	centile effect	dcent	centile effect	dcent	centile effect	dcent	centile effect	dcent	centile effect
dec1	0.981*	45	0.969*	45	0.725*	35	0.657*	32	0.573*	28	0.534*	26
	(0.002)		(0.002)		(0.003)		(0.004)		(0.004)		(0.005)	
dec2	0.517*	25	0.507*	25	0.513*	25	0.441*	22	0.359*	18	0.320*	16
	(0.002)		(0.002)		(0.002)		(0.004)		(0.004)		(0.004)	
dec3	0.373*	18	0.363*	18	0.376*	19	0.297*	15	0.216*	11	0.177*	9
	(0.001)		(0.002)		(0.002)		(0.004)		(0.004)		(0.004)	
dec4	0.185*	9	0.174*	9	0.172*	9	0.089*	4	0.012*	1	-0.026*	-1
	(0.001)		(0.002)		(0.002)		(0.004)		(0.004)		(0.004)	
dec5	0.117*	6	0.105*	5	0.104*	5	0.018*	1	-0.073*	-4	-0.112*	-6
	(0.001)		(0.002)		(0.002)		(0.003)		(0.004)		(0.004)	
dec6	0.080*	4	0.066*	3	0.071*	4	-0.016*	-1	-0.126*	-6	-0.167*	-8
	(0.001)		(0.002)		(0.002)		(0.003)		(0.004)		(0.004)	
dec7	0.059*	3	0.045*	2	0.053*	3	-0.034*	-2	-0.160*	-8	-0.201*	-10
	(0.001)		(0.002)		(0.002)		(0.003)		(0.004)		(0.004)	
dec8	0.016*	1	0.000	0	0.013*	1	-0.075*	-4	-0.214*	-11	-0.254*	-13
	(0.001)		(0.002)		(0.002)		(0.003)		(0.004)		(0.004)	
dec9	-0.095*	-5	-0.110*	-5	-0.063*	-3	-0.150*	-7	-0.295*	-15	-0.335*	-17
	(0.001)		(0.002)		(0.002)		(0.003)		(0.004)		(0.004)	
dec10	-0.250*	-12	-0.265*	-13	-0.140*	-7	-0.224*	-11	-0.380*	-19	-0.419*	-21
	(0.001)		(0.002)		(0.002)		(0.003)		(0.004)		(0.004)	
pichincha			0.007*	0	0.016*	1	0.017*	1	0.004	0	0.004	0
			(0.002)		(0.002)		(0.002)		(0.002)		(0.002)	
guayas			0.016*	1	0.024*	1	0.025*	1	0.014*	1	0.013*	1
			(0.002)		(0.002)		(0.002)		(0.002)		(0.002)	
coast			-0.020*	-1	-0.015*	-1	-0.016*	-1	-0.016*	-1	-0.017*	-1
			(0.002)		(0.002)		(0.002)		(0.002)		(0.002)	
center			0.045*	2	0.032*	2	0.032*	2	0.022*	1	0.022*	1
			(0.002)		(0.002)		(0.002)		(0.002)		(0.002)	
south			0.039*	2	0.039*	2	0.041*	2	0.031*	2	0.030*	1
			(0.002)		(0.002)		(0.002)		(0.002)		(0.002)	
age19							-0.075*	-4	-0.108*	-5	-0.104*	-5
							(0.005)		(0.005)		(0.005)	
age20_29							0.084*	4	0.041*	2	0.044*	2

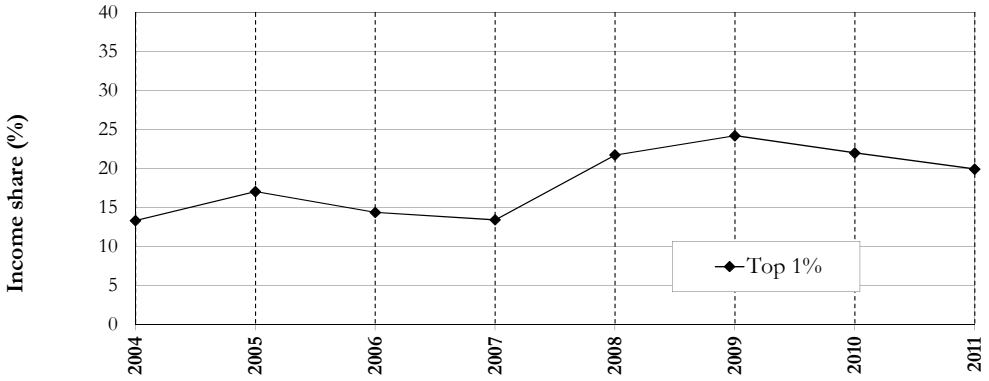
continued on next page

Table 10: (next)

	(1)		(2)		(3)		(4)		(5)		(6)	
	dcent	centile effect	dcent	centile effect	dcent	centile effect	dcent	centile effect	dcent	centile effect	dcent	centile effect
							(0.003)		(0.003)		(0.003)	
age30_39							0.097*	5	0.061*	3	0.063*	3
							(0.003)		(0.003)		(0.003)	
age40_49							0.092*	5	0.060*	3	0.061*	3
							(0.003)		(0.003)		(0.003)	
age50_59							0.086*	4	0.069*	3	0.069*	3
							(0.003)		(0.003)		(0.003)	
gender									0.022*	1	0.067*	3
									(0.001)		(0.003)	
married									0.018*	1		
									(0.001)			
education									0.171*	9		
									(0.001)			
marriedman											0.025*	1
											(0.001)	
marriedwoman											0.006*	0
											(0.002)	
educman											0.157*	8
											(0.001)	
educwoman											0.221*	11
											(0.003)	
Obs.	1408497		1408497		737891		737891		737891		737891	
F-statistic	54200.9		36331.2		17541.5		13373.3		12751.5		11764.0	
R2	0.278		0.279		0.263		0.266		0.284		0.285	
Root MSE	0.534		0.533		0.417		0.416		0.411		0.410	

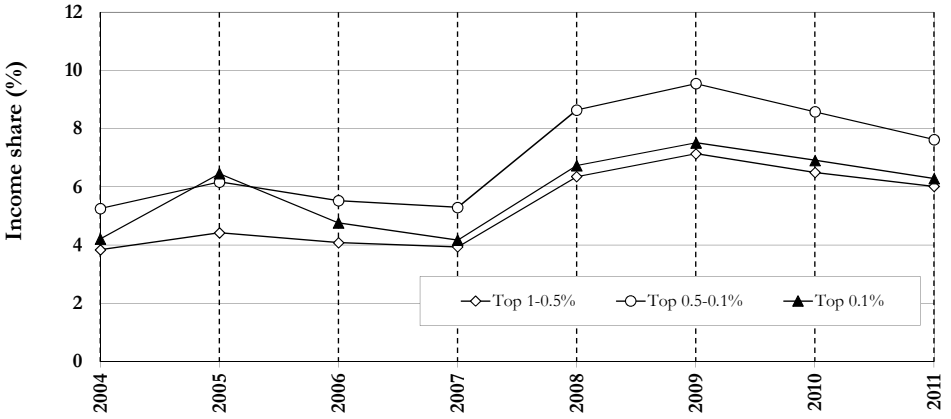
* p<0.01. Omitted categories are north, age60.

Fig 1. Income Share of the top 1 percent in Ecuador
2004 - 2011



Source: Author's calculation based on individual income tax returns.
Number of tax units is estimated. Total income is estimated from household surveys.
Top shares are obtained from income tax returns statistics.

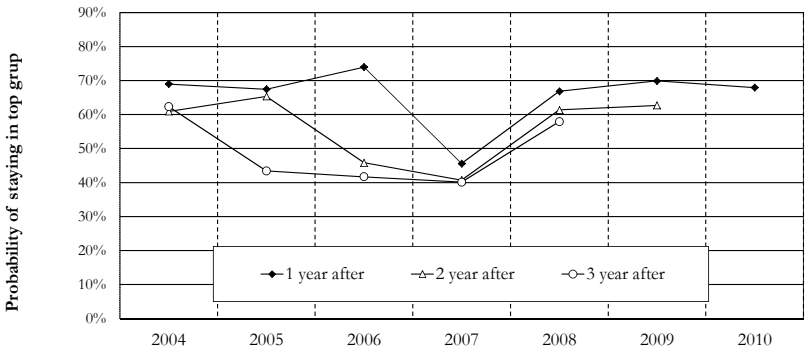
Fig 2. Top 1 - 0.5%, Top 0.5 - 0.1%, Top 0.1%
Ecuador, 2004 - 2011



Source: Author's calculation based on individual income tax returns.
Number of tax units is estimated. Total income is estimated from household surveys.
Top shares are obtained from income tax returns statistics.

Fig 3. Evolution of top income mobility in Ecuador (2004 - 2011)
Income mobility among the P99 - P100

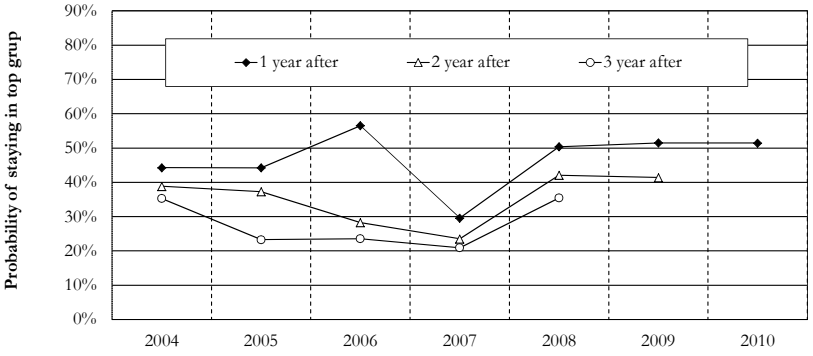
A. Probability of staying in the top 1% group



Source : Author's computations using individual income tax returns

Fig. 4 Evolution of top income mobility in Ecuador (2004 - 2011)
Income mobility among the P99.9 - P100

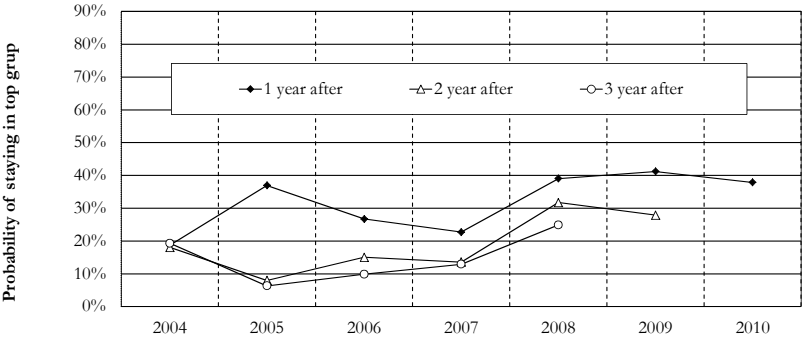
B. Probability of staying in the top 0.1% group



Source : Author's computations using individual income tax returns

Fig 5. Evolution of top income mobility in Ecuador (2004 - 2011)
Income mobility among the P99.99 - P100

C. Probability of staying in the top 0.01% group



Source : Author's computations using individual income tax returns

Figure 6

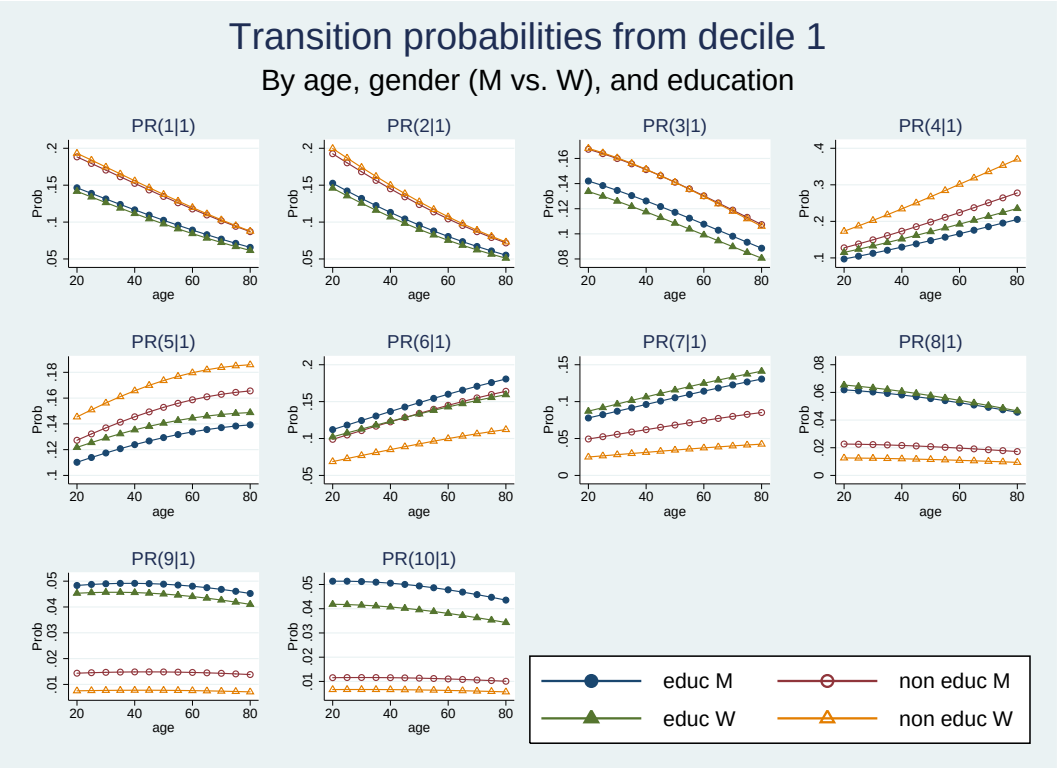


Figure 7

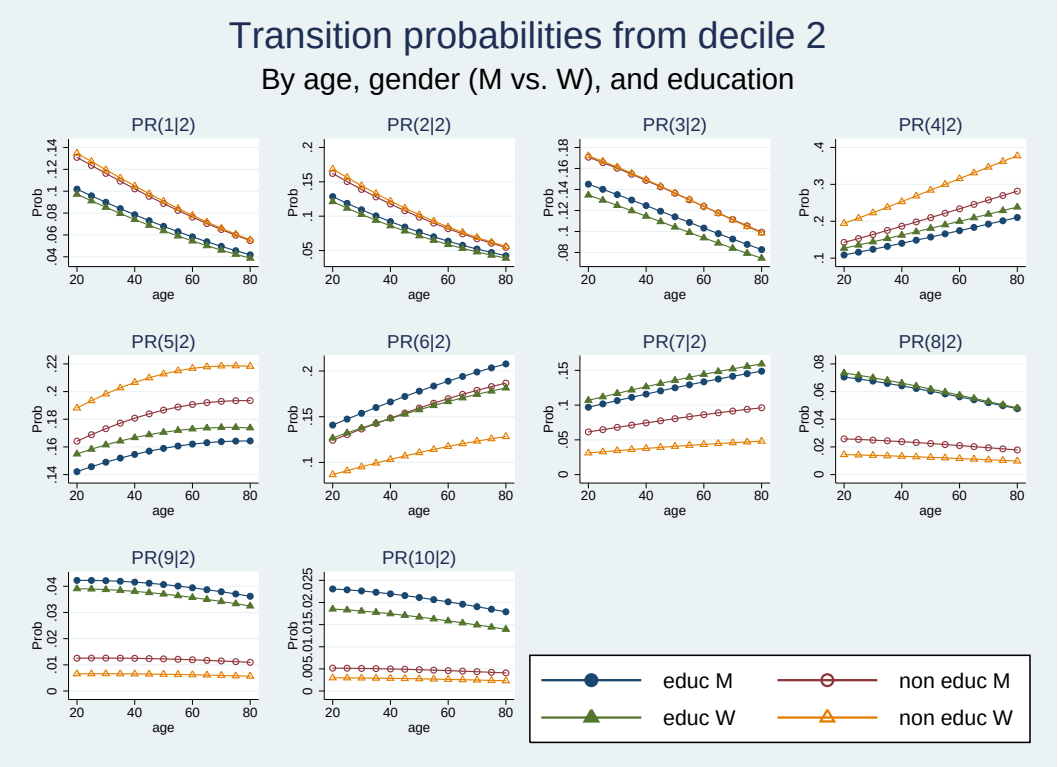


Figure 8

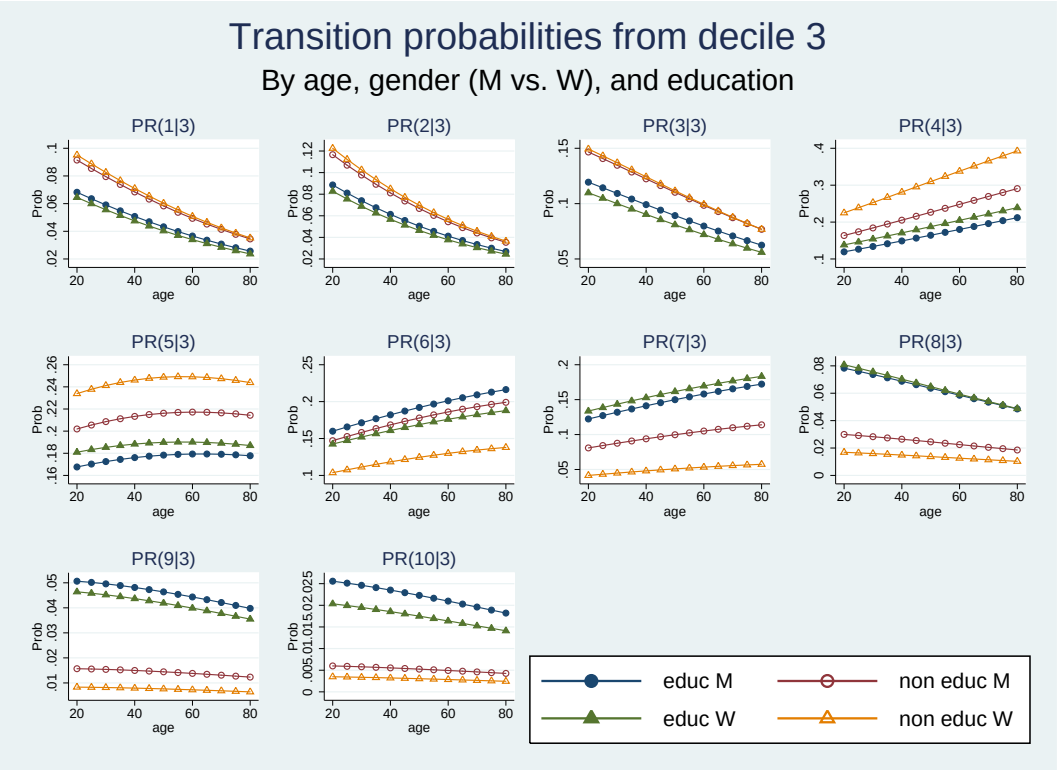


Figure 9

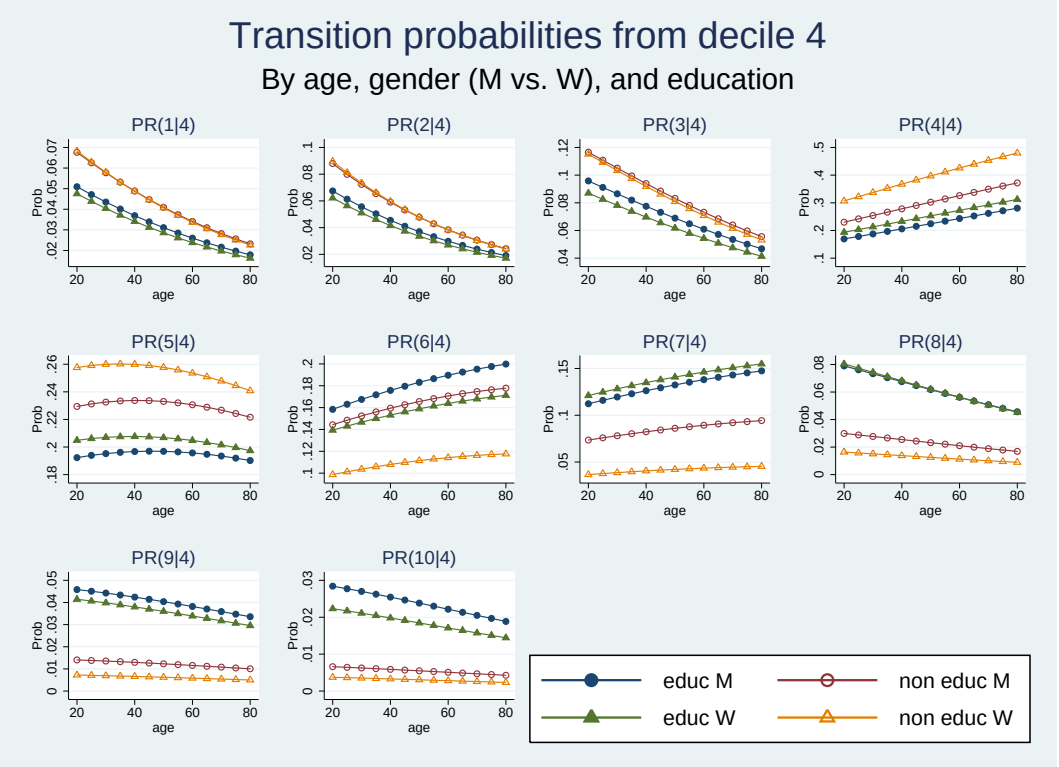


Figure 10

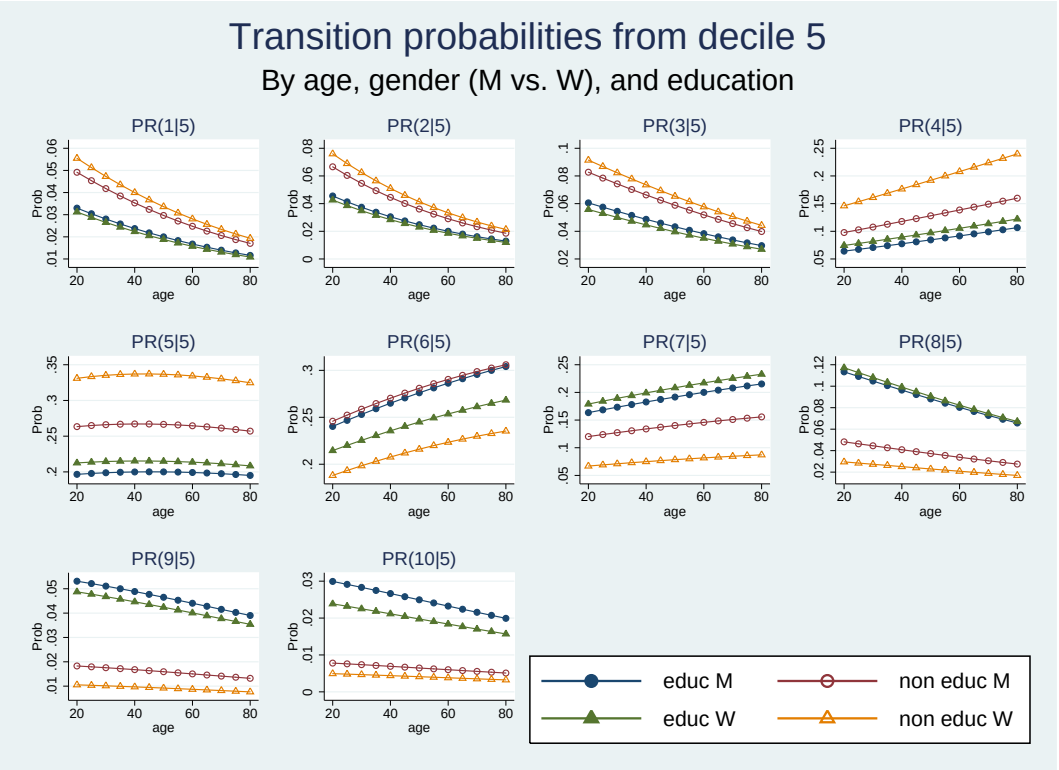


Figure 11

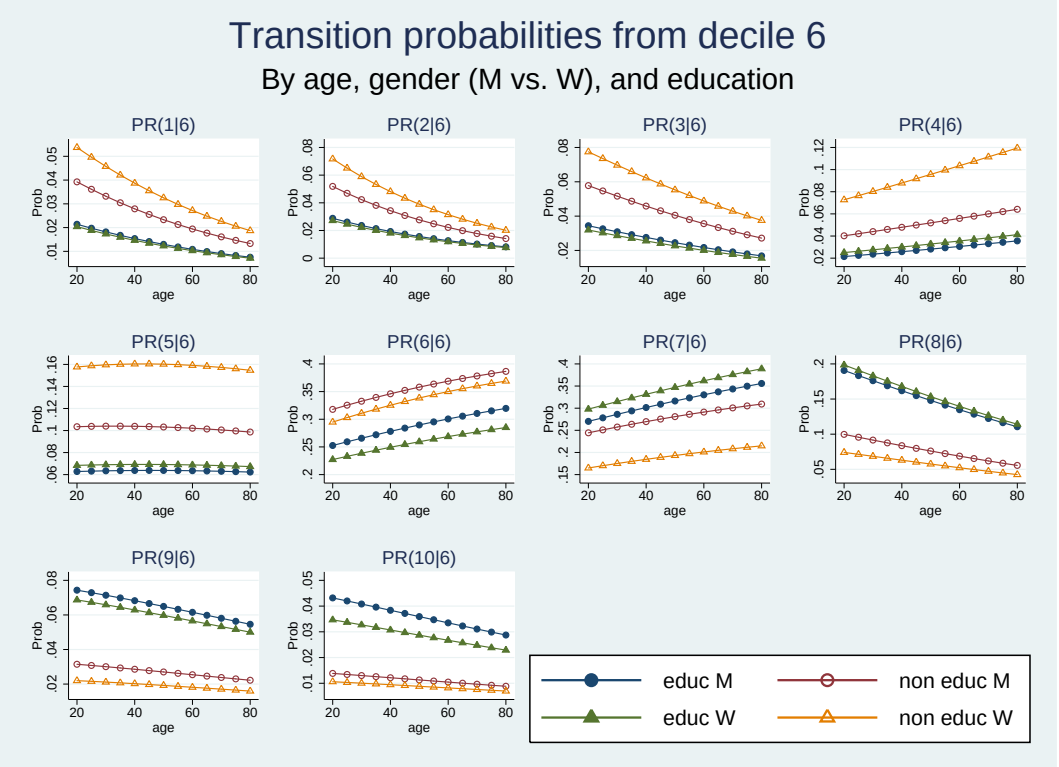


Figure 12

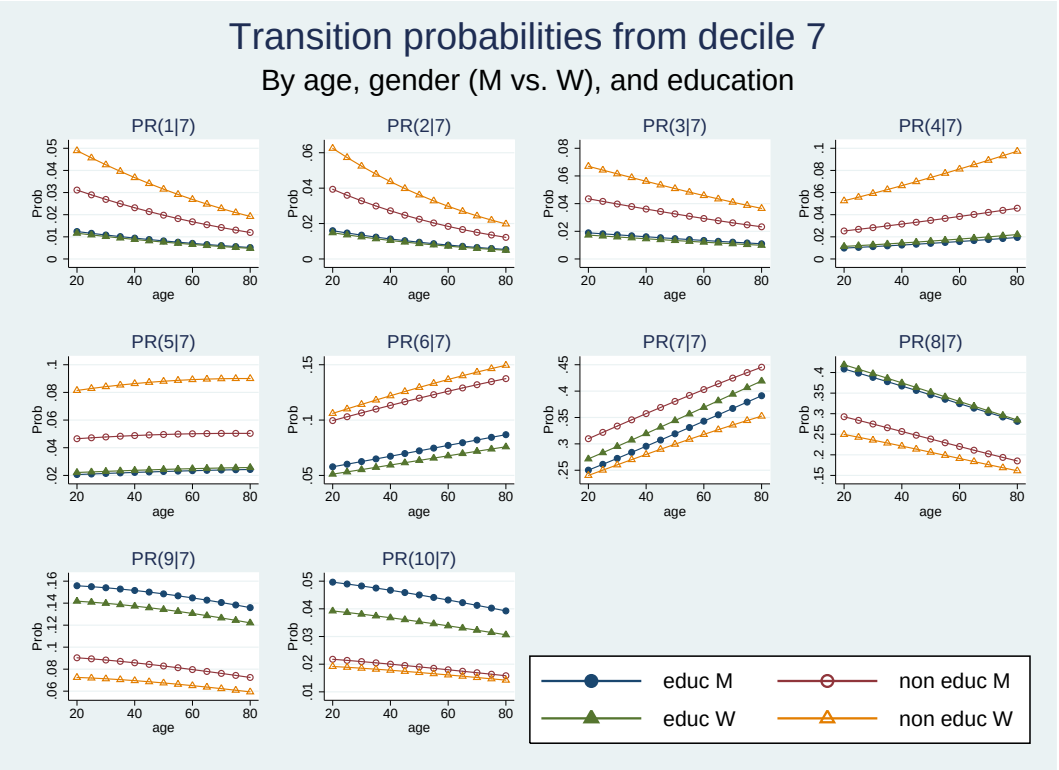


Figure 13

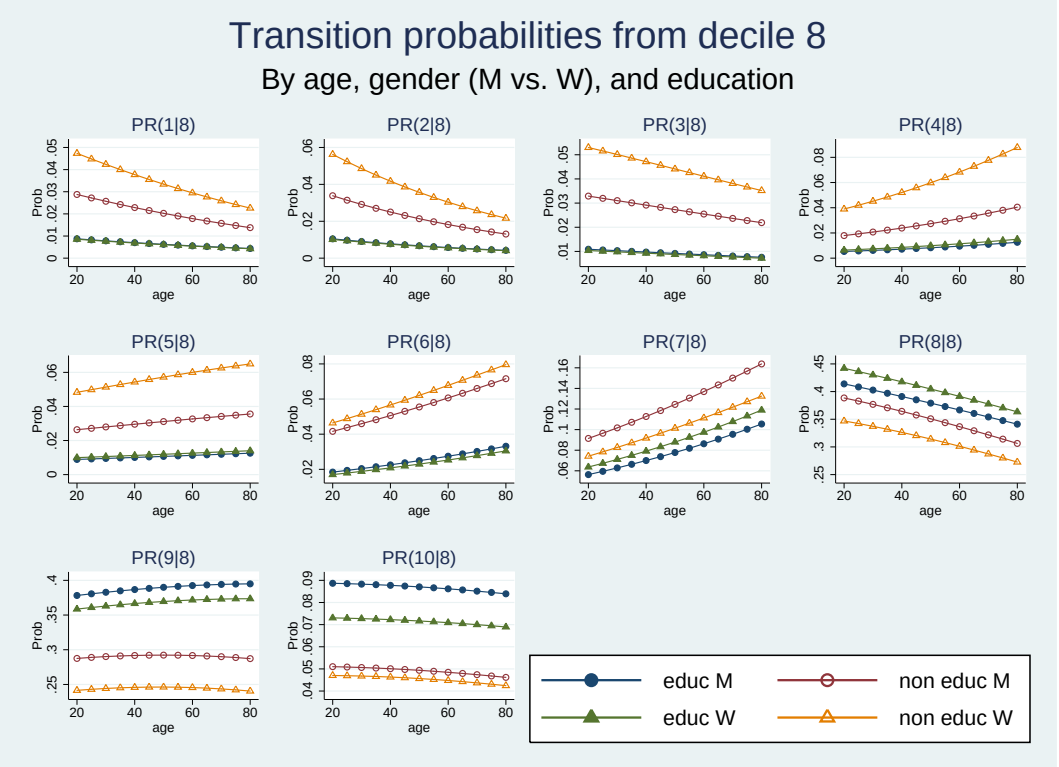


Figure 14

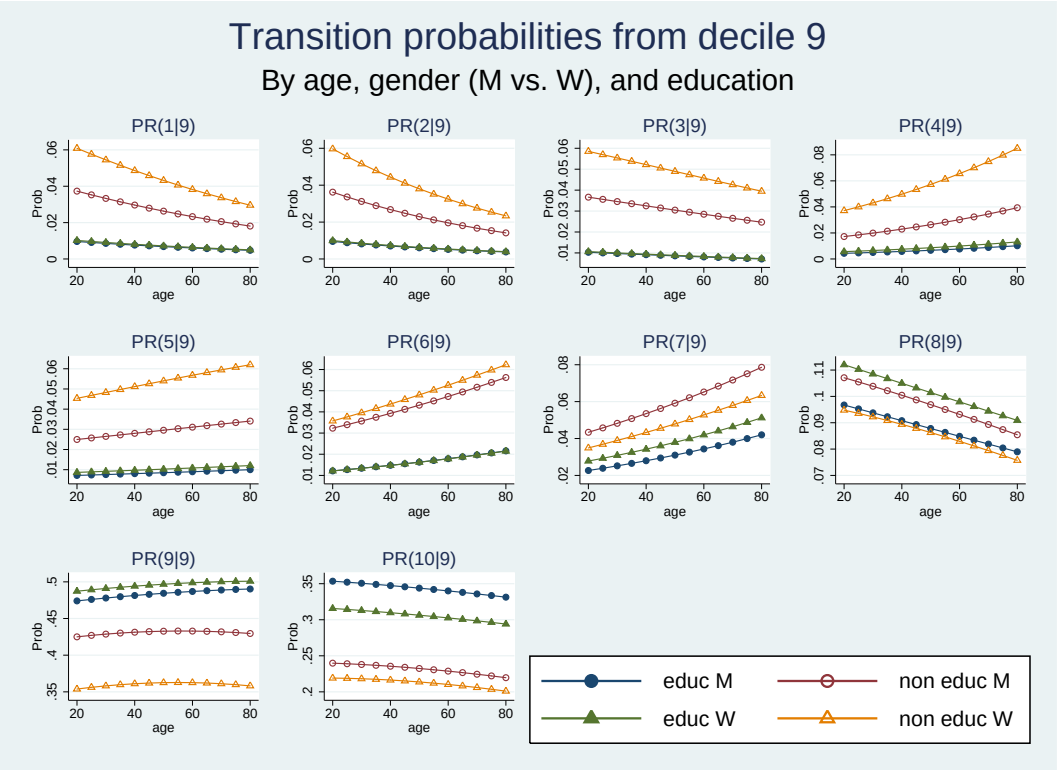
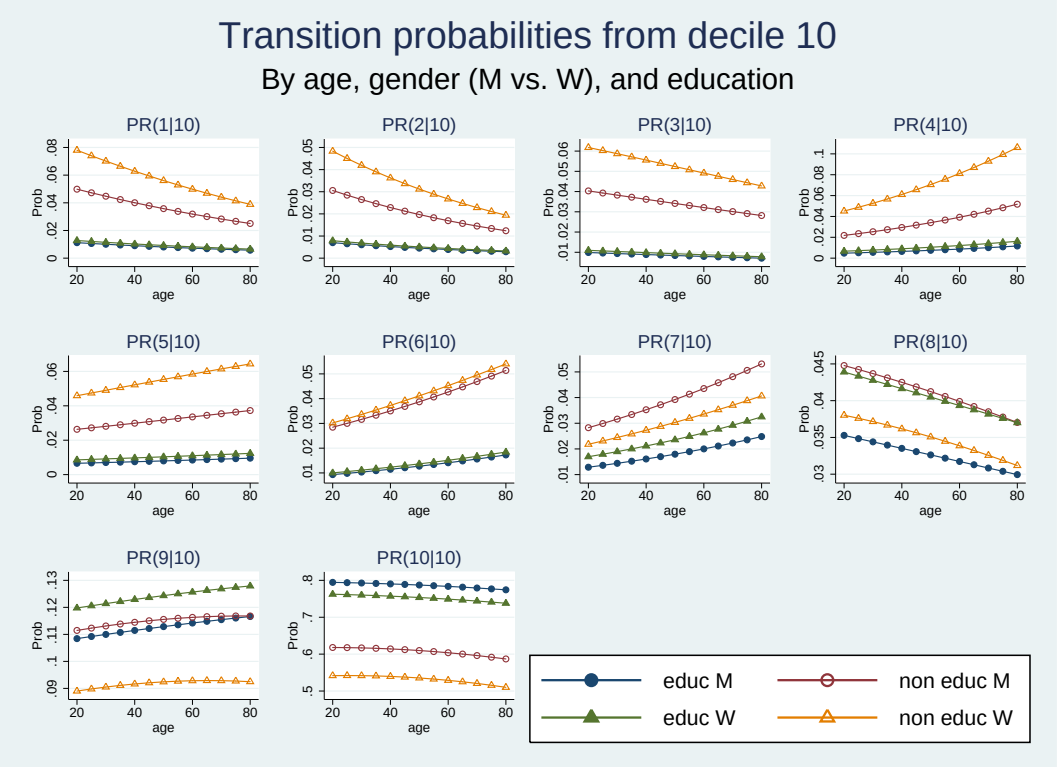


Figure 15



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