

INCOME MOBILITY: EVIDENCE IN A DEVELOPING COUNTRY USING TAX RETURN DATA

Raymundo M. Campos [^]

Alvaro Melendez [♦]

Abstract

This paper analyzes income mobility for high-income taxpayers in Mexico for the period 2002-2011; it is the first study of its kind to use anonymized individual taxpayer panel data. The 6.3 million observations in the dataset allow us to calculate different measures of mobility, including the variance of permanent and transitory income, the Shorrocks index, and the rank correlation index, as well as the probabilities of remaining in the top 1%, 10%, and 75% of the income distribution after one, three, and five years. The main findings of the study are the following: i) Shorrocks and rank correlation coefficients show low degrees of mobility; ii) the one-year, three-year, and five-year probabilities of remaining in the top 1% are between 60% and 80%, similar to those of developed countries; iii) all of the increase in the variance of income is due to permanent income; and iv) less developed regions in Mexico face larger captures by elites.

Keywords: Mobility; High-Income; Tax Returns; Persistence; Mexico

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[^] El Colegio de México, Department of Economics. Camino al Ajusco 20, Col. Pedregal de Santa Teresa, México D.F., C.P. 10740, Tel.: +52-55-5449-3000, ext. 4153. Email: rncampos@colmex.mx.

[♦] At the time of this research the author was affiliated with Columbia University. Email: am3901@columbia.edu.

Income mobility is an issue of great importance for market economies and meritocratic societies. A certain level of inequality may be tolerated by societies when there is a chance that low-income individuals can reach higher income levels through hard work and individual effort. Indeed, this is one of the main tenets of capitalism and competitive markets. Latin American countries have attempted to move in such a direction through reforms improving educational outcomes and expanding the social safety net. Latin America is characterized by a high level of inequality dating to the establishment of elite institutions after the colonization of the Americas (Engerman and Sokoloff, 1997; Sokoloff and Engerman, 2000; Ferreira et al. 2004). There is scant evidence, however, of the degree to which elite groups have kept their relative income position over time. Using a newly-obtained panel dataset of anonymized high-income tax returns, we fill this gap for Mexico.

Mexico is an important country for the study of income mobility. It is a nation of contrasts, with many very wealthy individuals but also a high level of poverty. It has the highest average income among billionaires on the 2013 Forbes list of the wealthy and the world's richest person, according to the 2014 list. Mexico also has a high poverty rate: approximately 46% of the population (CONEVAL, 2011). Yet it is considered an upper middle income country, with a per-person GDP of \$13,000 USD in 2012 (constant 2005 PPP, World Bank 2012).

There are several reasons why it is important to study income mobility in a developing country like Mexico. Institutions and their persistence explain economic development. One of the explanations for this persistence is capture by the elites (Acemoglu and Robinson, 2006; Robinson, 2012). Persistence in income levels may consequently be higher than in more developed regions. Also, public economics is interested in how government policies affect

income generation and concentration processes, which can be illuminated by analysis of income mobility among high-income taxpayers.

Income mobility is one of the most widely used measurements of the opportunity to move up or down in the income distribution. Methodologies for calculating income mobility have been proposed by various investigators, including Hart (1976), Shorrocks (1978), Atkinson et al. (1992), Fields and Ok (1996, 1999), Jenkins and Van Kerm (2006), and Genicot and Ray (2013). In this study we estimate the variance of permanent and transitory income, the Gini coefficient of those variables, the Shorrocks index, and the rank correlation index. Perhaps the most intuitive index we measure is the probability that a taxpayer stays in the same income percentile.

Previous literature using tax returns to analyze the mobility of high-income individuals is scarce and has focused mainly on the United States.¹ Kopczuk, Saez, and Song (2010) analyze income mobility using social security records since 1937. They find that after 1970, the increase in inequality is driven primarily by the permanent component, and that mobility in top income groups is stable and relatively high (they find the rank correlation in incomes between one year and the next to be 0.9). In a similar study that uses a panel of tax returns for the period 1987-2009, Debacker et al. (2013) also find that the increase in inequality is driven by the permanent earnings component. In addition, Auten and Gee (2009) and Auten, Gee, and Turner (2013) use tax return data for the periods 1987-1996 and 1996-2005 to analyze long-term and intergenerational mobility in the U.S. They find substantial movement: more than half of taxpayers who begin in the bottom income quintile move to a higher income quintile in the period, and approximately 60% of those in the top 1% in the beginning year dropped to a lower

¹ There is an extensive literature analyzing mobility and estimating the permanent and transitory components of earnings inequality using longitudinal household surveys. See, for example, Buchinsky and Hunt (1999), Gottschalk and Moffitt (2009), and Heathcote, Perri, and Violante (2010). For Latin America, although there are no studies using tax returns, there are studies that use household surveys. See Ferreira et al. (2013) and Torche (2014).

level after a decade. They also establish that the percentage of taxpayers remaining in the top 1% for five consecutive years is approximately 30%.

[Table 1 about here]

There are some country studies of mobility using tax returns (see Table 1). Saez and Veall (2005) examine high income taxpayers in Canada since 1982 and find that the probability of remaining in the top 0.1% is about 60% after one year, 50% after two years, and 45% after three years, a mobility they describe as “quite modest” (p. 842). They do not calculate mobility for other groups. For Norway, Aaberge and Atkinson (2010), and Aaberge, Atkinson, and Modalsli (2013) estimate that income mobility has increased since the early 1990s. However, they do not use persistence of taxpayers in different percentiles, so it is difficult to compare their results with the rest of the literature. Landais (2008) uses income tax return data for France between 1990 and 2006. The probability of remaining in the top 0.1% is approximately 65% after one year and 40% after three years, similar to the values found by Saez and Veall (2005) for Canada. Finally, Jenderny (2013) analyzes mobility in top incomes for Germany for the period 2001-2006. The data used are a representative 5% sample of a balanced panel of all income tax filers and include about 85% of all high-income taxpayers. She finds that the probability of remaining in the top 1% is approximately 78% after one year and 68% after three years; the probability is approximately 70% after one year and 58% after three years for the top 0.1%.

For Mexico, as for the rest of Latin America, there are no studies of income mobility using tax returns.² We use a newly-obtained large, longitudinal, anonymized dataset in which we follow over 600,000 individual taxpayers for each year in the period 2002-2011. In Mexico, tax

² The Centro de Estudios Espinosa Yglesias (CEEY) carried out social mobility surveys in 2006 and 2011 that show low social mobility: roughly half of the households kept their relative position across generations (CEEY Report, 2013).

returns are filed mainly by high-income taxpayers; we are thus able to assess income mobility within this group. Our analysis is a significant contribution to the understanding of income mobility in different countries and the question of how much mobility there is at the top of the income distribution.

We obtain five main findings. First, we find that most of the variance in income is explained by the permanent component. Second, the Shorrocks and rank correlation coefficients show low degrees of mobility. Third, persistence at the top 10% is fairly constant over time. Our results are similar to those of Kopczuk, Saez, and Song (2010) for the U.S. We find that the probability of remaining in the top 10% is between 70% and 75% after three-year and five-year periods and about 80% after a one-year period. This result indicates that income mobility among the rich in Mexico is low. Fourth, mobility is lower for women at the top of the income distribution, and older individuals have higher persistence in top income groups. Finally, persistence in the top income share is similar, regardless of the level of national development.

The paper is organized as follows. Section 1 describes our dataset, and Section 2 the methodology used. Section 3 focuses on general probabilities of mobility and transition, as well as some implications for gender and age, and the relationship between mobility and development; it ends with an international comparison. In Section 4 we offer some conclusions.

1. Data

The data used are from anonymized individual income tax returns provided by the Mexican Tax Administration Service (SAT). They form a longitudinal dataset that contains a large sample of all individual taxpayers who submitted annual tax declarations from 2002 to

2011. The panel contains more than 631,000 taxpayers for each of ten years; altogether the dataset has approximately 6.3 million observations. This is the first time that panel data of tax returns has been used for such an analysis of Mexico.

Tax returns for individuals in Mexico must be filed in April of each year. Nevertheless, some individuals are not obliged to file tax declarations. Those with income in excess of \$400,000 pesos (approximately \$31,000 USD) and those receiving interest income in excess of \$100,000 pesos (approximately \$8,000 USD) are required to file. Taxpayers who do not file have no right to refunds, even if their withholding is greater than the tax owed. Due to the relatively high minimum annual income requiring a taxpayer to submit a return, the number of filers in Mexico is small: slightly more than 1% of the population over 20 years of age.

As is common with tax data, the information in the dataset is rich in details of taxes and income but limited in terms of demographic information; it includes information only on the state of residence, gender, and age of each taxpayer. For mobility measures, we use annual gross income.

Our dataset of permanent taxpayers is highly representative of the number of taxpayers in Mexico. It includes close to 40% of all taxpayers who submitted an annual tax return. Moreover, the tax revenue from the individuals in our dataset represents 25% of total tax revenue (including tax revenue from firms). An important limitation of the data is that we were not provided with sampling weights. It is thus problematic to estimate mobility among top income groups with respect to total population. In this study we analyze mobility only with respect to taxpayers in the

sample.³ Instead of focusing only on mobility among the very rich, we provide a more complete picture of mobility among permanent taxpayers.

Finally, to concentrate on the working population, we restrict the total sample to individuals aged 25-60 years in 2011, the same restriction applied by Kopczuk, Saez, and Song (2010) in their analysis of U.S. data. We also restrict the sample to taxpayers with annual gross incomes greater than \$25,000 pesos (approximately \$2,000 USD). With these restrictions, the final sample includes approximately 4.9 million observations for the full period.

2. Methodology

We estimate different measures of mobility including the Shorrocks index, the rank correlation index, variance of permanent and transitory income, the Gini coefficient, and the probability that a taxpayer stays in the same percentile of the income distribution. In the following paragraphs we describe each statistic.

First, Shorrocks (1978) defines mobility by comparing inequality of short-term to long-term earnings. Borrowing notation from Kopczuk, Saez and Song (2010) and Shorrocks (1978), Shorrocks index is measured as follows:

$$I_{LT} = I_{ST} * (1 - M) \quad (1)$$

where I_{LT} and I_{ST} are long-term and short-term earnings inequality, respectively, and M is the mobility index, which is between zero and one. If there is mobility within a society, then earnings inequality in the long term will be lower than that in the short term. In other words:

³ Given that the data covers 25% of taxpayers, our data only covers up to the top 1% of the income distribution of total population (above 20 years old).

$$G(\bar{z}) \leq \frac{\sum_{t=1}^n G(z_t)}{n} \quad (2)$$

where $G(\cdot)$ can be the variance of log earnings or the Gini index, z_t is the vector of earnings at time t , \bar{z} the vector of long-term earnings (calculated as average income of z_t for a specific window of time), and n is the number of periods (Kopczuk, Saez and Song, 2010). Using (1) and (2), we define the mobility index (Shorrocks 1978) as:

$$1 - M = \frac{G(\bar{z})}{\sum_{t=1}^n G(z_t)/n} \quad (3)$$

Equation (3) is key to understanding changes in inequality patterns. If long-term inequality increases, with short-term inequality constant, then mobility decreases. In practice, we calculate the Shorrocks mobility index as the ratio of the Gini coefficient for permanent three-year average income from $t - 1$ to $t + 1$, to the Gini coefficient for average annual income for years $t - 1, t$, and $t + 1$.

Rank correlation is a direct mobility index defined as the Spearman rank correlation between incomes in periods t and $t + k$ for $k = 1, \dots, D$, where D is the maximum span possible due to data limitations. A higher correlation implies that incomes across periods are more closely related, which we interpret as a decrease in income mobility. If incomes across periods are completely unrelated, the correlation of income across periods should be zero, which is a state of total income mobility.

We also calculate the variance of permanent and transitory income. As before, permanent income is defined as the average of three-year income in the period $t - 1$ to $t + 1$, while transitory income is the difference between observed total income in year t and permanent income. As before, in the presence of mobility, inequality in the long term is lower than inequality in the short term. Annual permanent variance is defined as the variance of permanent average (log)

income from $t - 1$ to $t + 1$, annual observed variance (short-term inequality) is the average of the variance of annual (log) income from $t - 1$ to $t + 1$, and transitory variance is the difference between the annual permanent variance and the annual observed variance. It is thus possible that an increase in short-term earnings inequality may have no effect on long-term earnings inequality, if mobility increases.

Transition probabilities provide a more intuitive view of mobility. In particular, we are interested in how many individuals stay at the top after 1, 3, and 5 years. To give a more complete picture of mobility in Mexico, we also present results for the bottom level of taxpayers: how many individuals stay at the bottom after a given period. We show probabilities conditional on the initial state, $\Pr(Y_{i,t+k} \in G_{t+k} | Y_{i,t} \in G_t)$, where $Y_{i,t+k}$ is the income of individual i in year t for a comparison span k , and G denotes the income group (bottom 25%; top 25%, 10% and 1%). Following previous literature, these transition probabilities can also be seen in terms of the probability of persistence of the initial state.

3. Results

A. Mobility results

[Figures 1 and 2 about here]

The Shorrocks index and rank correlations between year t and $t+1$ are short-term relative mobility measures; these are presented in Figure 1. Mobility, as measured by the Shorrocks index series, remains fairly constant and above 0.95 throughout the period of analysis, similar to the results for the U.S. in Kopczuk, Saez, and Song (2010). The rank correlation in Mexico increased from 0.89 to 0.93 from 2002 to 2004 and thereafter remained constant at 0.92. These results are

also similar to those cited for the U.S., where the rank correlation is stable and approximately 0.9. Indeed, it is astonishing how neither series shows fluctuation even after the macroeconomic crisis of 2008, suggesting that the crisis did not have differential effects on Mexican taxpayers. Generally speaking, the Shorrocks index series and rank correlation results indicate that Mexico is a low-mobility country.

Figure 2 shows mobility results using rank correlations for spans of 1, 3, and 5 years. The figure shows the Spearman rank correlation between incomes in year t and years $t+1$, $t+3$, and $t+5$ respectively. The x-axis shows the base year of the calculation. The correlations decrease as the span of comparison increases. The correlation of incomes between years t and $t+3$ is less than that of incomes between t and $t+1$, but still large and above 0.85 after 2004. Also, the correlation of incomes between t and $t+5$ is larger than 0.8 after 2004. As in Figure 1, the trends are highly stable.

[Figures 3 and 4 about here]

Figure 3 shows the variance of permanent and transitory (log) income. The first y-axis shows total and permanent variance, while the second shows transitory income variance. As with the previous measures for the period 2003-2005, the variance of permanent income increases, while transitory income variance decreases. After 2006, both permanent and transitory income variance remain constant. Most of the variation in the observed variance of (log) income is due to the permanent component. The results for the U.S. in Kopczuk, Saez, and Song (2010) are similar, except that in Mexico the transitory component is a less important factor. It accounts only for approximately 5% of the observed variance, while the figure for the U.S. in the early 2000s is approximately 10%. Hence, the permanent variance of log income for Mexico is higher than the permanent variance of log earnings for the U.S. Figure 4 shows that the results are similar using

the Gini coefficient. Most of the observed inequality is due to the permanent component of income, once again highlighting that Mexico is a less mobile country than the United States.

B. Transition probabilities

[Figure 5 about here]

Figure 5 displays transition probabilities for different percentiles. Panel A shows the probability of remaining in the bottom 25% of the income distribution, Panel B that of remaining in the top 25%, and Panels C and D those of remaining in the top 10% and 1%, respectively. We include calculations after one, three, and five years. It is important to emphasize that these transition probabilities are based on the taxpayers in the dataset, as we do not have weights to generalize to the full population.

Panel A shows that the probability of remaining in the bottom 25% is 80%, 60%, and 50% after one, three, and five years, respectively. The transition probabilities for the top 25% are greater, especially after three and five years. Panels A and B both illustrate the low levels of mobility among Mexican taxpayers, but they show that the probability of upward mobility out of the bottom 25% is larger than the probability of downward mobility from the top 25%.

Panels C and D analyze mobility patterns among very rich taxpayers. The probability of persistence in the top 10% is between 70% and 75% after three and five years, and the probability after one year is between 80% and 84% (Panel C). Similar results are found for the top 1%. The transition probabilities suggest that across income groups the probability of obtaining the same income in the subsequent year is close to 80%. This probability decreases if the comparison is to three or five years later, but even for the very rich the probability of remaining in the same

percentile is higher than for individuals in the bottom 25%. Mobility levels are generally low and constant over the period.

[Table 2 about here]

Finally, Table 2 shows the transition probabilities by income quintiles for the entire period from 2002 to 2011. The probabilities are conditional on the initial income quintile (columns add to 100%). Mobility at the top and bottom of the income distribution is lower than in the middle. Taxpayers who start at the top or bottom quintile have a probability of remaining in the same quintile of slightly more than 60%, but in the middle the probability is close to 40%.

C. Extensions: Differences by Gender and Age

In Mexico, the female labor force participation rate is 45% (World Bank, 2012), which may imply a gender difference in mobility patterns. If selectivity to obtain a higher income is different and women overcome discriminatory barriers to obtain higher positions, we should expect lower mobility among women than men. Table 3 shows the average of transition probabilities for all years. Indeed, they show that mobility among top income taxpayers (top 10 and 1%) is slightly lower for women, that is, that women have a higher rate of persistence in the top income groups than men. For the top 25% taxpayers, mobility is approximately the same irrespective of gender. From 1990 to 2010 there has been a narrowing of the gender wage gap in Mexico, driven especially by increases in income of women at the top of the income distribution (Arceo and Campos, 2014). Our results showing a slightly higher persistence of women's income at the very top are consistent with a hypothesis that the "glass ceiling" effect has decreased.

[Tables 3 and 4 about here]

For the sake of completeness, we also show heterogeneity results by age in Table 4. However, the mobility results are fairly similar across age groups. The main difference is for the mobility results comparing incomes with 5 years of difference. Older individuals show higher persistence in top income groups than younger individuals, which is understandable given their higher rate of capital accumulation and experience for longer periods of time.

D. Is mobility related to development?

Political economists have often analyzed how the capture of institutions by elite groups retards economic development (Acemoglu and Robinson, 2006; Robinson, 2012). One possible conclusion from this literature is that less developed countries have substantially lower mobility than developed countries because of the economic power of elites. Applying this logic to the regional level in Mexico, we hypothesize that poorer regions have lower mobility rates--or greater persistence of elites--than more developed regions. Previous studies have not analyzed this regional dimension of income mobility and how it might be related to differences in economic development.⁴

[Figure 6 about here]

Figure 6 shows the relationship between the Human Development Index (HDI) in 2000 for each state in Mexico and the average probability of remaining in the top 10% for each five-year period from 2002 to 2011 (2002-2007, ..., 2006-2011). The figure includes a regression of that relationship weighted by state population. There is a negative relationship between persistence (lower mobility) and higher levels of development. Although a proper causal analysis

⁴ Chetty et al. (2014) is an exception. However, they analyze intergenerational mobility, as opposed to the intragenerational mobility described here.

is needed, this correlation is consistent with the theory that less developed regions face larger captures by elites. Further research is needed to determine whether the difference in persistence among elite groups is sufficient to explain institutional differences.

E. International comparison

[Figure 7 about here]

Figure 7 shows persistence rates in the top 1% for Germany, Mexico, and the U.S. Kopczuk, Saez, and Song (2010) find that the one-year and three-year probabilities of remaining in the top 1% in the U.S. are approximately 78% and 68%, respectively, though the values found by Auten, Gee, and Turner (2013) are lower (65% and 40%). Jenderny (2013) finds values for Germany that are similar to those of Kopczuk, Saez, and Song (2010) for the U.S. We obtain similar probabilities for Mexico: the one-year and three-year probabilities of remaining in the top 1% are approximately 68% and 77%, respectively (see Figure 7).

These results are puzzling. We would expect that lower levels of development in Mexico would mean lower levels of mobility. However, as we have noted, our calculations are of mobility among tax filers and not of the entire population,⁵ meaning that our mobility figures are not strictly comparable to those of other countries. On the other hand, the result goes against the assumption that elites have more power--understood as the ability to maintain economic status over time--in developing than in developed countries.

⁵ Even if we could calculate the mobility of the entire population, it is not clear that those numbers would be meaningful. As the number of taxpayers in Mexico is relatively small compared to the adult population, even with sampling weights we would only be able to compute mobility for the top 1%.

4. Conclusion

This paper expands on the previous literature on income mobility by using personal income tax returns to analyze income mobility in a developing country, with important findings and contributions. First, the findings underline the description of Mexico as a low-mobility and high-inequality country. The probabilities of remaining in the top 1% or top 10% after one, three, or five years are high and stable over the period of analysis. Even during difficult economic situations, such as the financial crisis of 2008-2009, these probabilities were stable, and the macroeconomic crisis did not have any differential effect on the income of the rich. Second, mobility is greater at the bottom of the income distribution than at the top, but overall mobility remains low and stable throughout the period. Third, analysis of mobility by age and gender establishes that at the top of the income distribution, older individuals have higher persistence and women have lower mobility. Fourth, an international comparison shows, remarkably, that levels of persistence are similar among countries regardless of their levels of development.

Political economic models generally assume that persistence of elites in top income shares is higher in less developed countries with weaker institutional systems. However, our analysis demonstrates that Mexico, a country with relatively high poverty rates and high inequality, has persistence at the top that is similar to more developed countries. This observation suggests a question for further research: How is it possible that elites in less developed countries have greater political and economic power than those in developed countries, given the fact that their levels of persistence are similar?

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Table 1. Probability of remaining in the same income share: international comparison

Country	Author	Data	Years	Sample restrictions	Top income share studied	Probability of remaining in the top income share		
						After 1 year	After 3 years	After 5 years
United States	Kopczuk, Saez, and Song (2010)	Social Security Administration longitudinal earnings micro data	1937-2004	Individuals aged 25-60. Employment earnings above one-fourth of a full year minimum wage in 2004.	1%	Approx. 78%	Approx. 68%	Approx. 62%
	Auten, Gee, and Turner (2013)	Tax returns and administrative records	1987-2005	Filers aged 25 or older.	1%	65%	40%	30%
Canada	Saez and Veall (2005)	Tax return data	1982-2000	Adults aged 20 or older.	0.1%	Approx. 60%	Approx. 45%	N.A.
France	Landais (2008)	Tax return data	1998-2006	Households with taxable income threshold of approx. €200,000.	0.1%	Approx. 65%	Approx. 40%	N.A.
Germany	Jenderny (2013)	Panel data of income tax files, a representative sample of 5% of all German tax filers	2001-2006	Contains only taxpayers who filed in all six years of analysis.	1% and 0.1%	Approx. 78% and 70% for the top 1 and top 0.1%, respectively.	Approx. 68% and 58% for the top 1 and top 0.1%, respectively.	N.A.

Notes: Authors' compilation. N.A. = not available. Probabilities of remaining in the top income share are related to the average period of each study. Does not include the results of Debacker et al. (2013) for the U.S. or the results of Aaberge and Atkinson (2010) or Aaberge, Atkinson, and Modalsli (2013) for Norway because these studies did not calculate the probability of remaining in the top income share.

Table 2. Transition probabilities by income quintiles: 2002-2011

Year / Quintile		2011				
		Q1	Q2	Q3	Q4	Q5
2002	Q1	61.2%	21.9%	7.5%	5.0%	4.4%
	Q2	24.5%	38.8%	19.4%	10.8%	6.5%
	Q3	5.8%	21.5%	42.2%	23.1%	7.5%
	Q4	4.8%	11.3%	23.4%	41.2%	19.3%
	Q5	3.7%	6.6%	7.5%	19.9%	62.4%

Notes: Authors' calculation. Transition probabilities are conditional probabilities based on income quintiles in 2002 (columns add to 100%). The dataset is restricted to a balanced panel of taxpayers aged 20-65 years with gross income greater than \$25,000 pesos annually.

Table 3. Persistence in the same level of the income distribution after one, three, and five years, by gender.

Gender	Probability after 1 year	Probability after 3 years	Probability after 5 years
A. Top 1%			
+ Male	76%	67%	63%
+ Female	79%	69%	65%
B. Top 10%			
+ Male	82%	74%	70%
+ Female	83%	75%	71%
C. Top 25%			
+ Male	86%	79%	75%
+ Female	86%	78%	74%

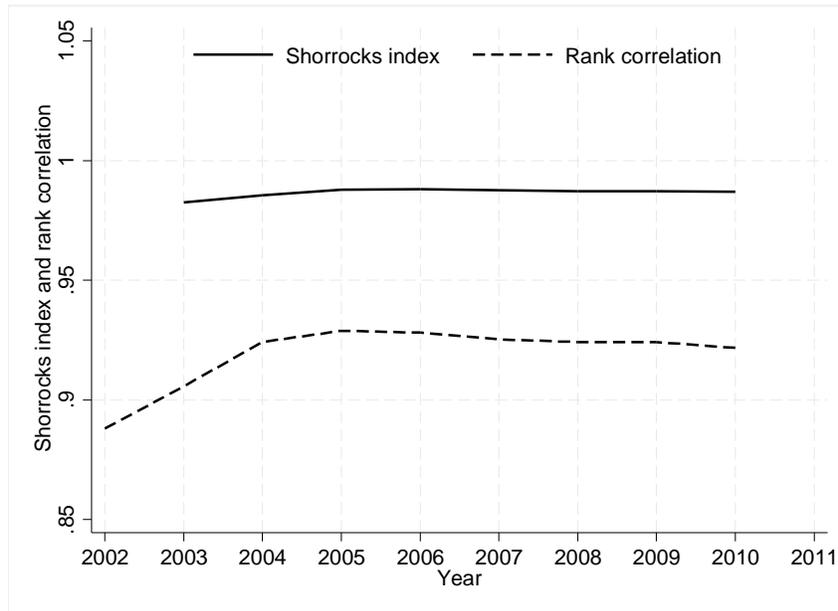
Notes: Authors' calculation. Transition probabilities are conditional probabilities based on initial income group. Each statistic is the average across all possible statistics calculated in the period 2002-2011. The dataset is restricted to a balanced panel of taxpayers aged 20-65 years with gross income greater than \$25,000 pesos annually.

Table 4. Persistence in the same level of the income distribution after one, three, and five years by age group.

Age groups	Probability after 1 year	Probability after 3 years	Probability after 5 years
A. Top 1%			
+ 20-35 years	77%	64%	58%
+ 36-50 years	76%	65%	59%
+ ≥ 51 years	76%	71%	72%
B. Top 10%			
+ 20-35 years	81%	71%	66%
+ 36-50 years	82%	74%	69%
+ ≥ 51 years	82%	77%	76%
C. Top 25%			
+ 20-35 years	84%	75%	71%
+ 36-50 years	86%	79%	75%
+ ≥ 51 years	86%	80%	79%

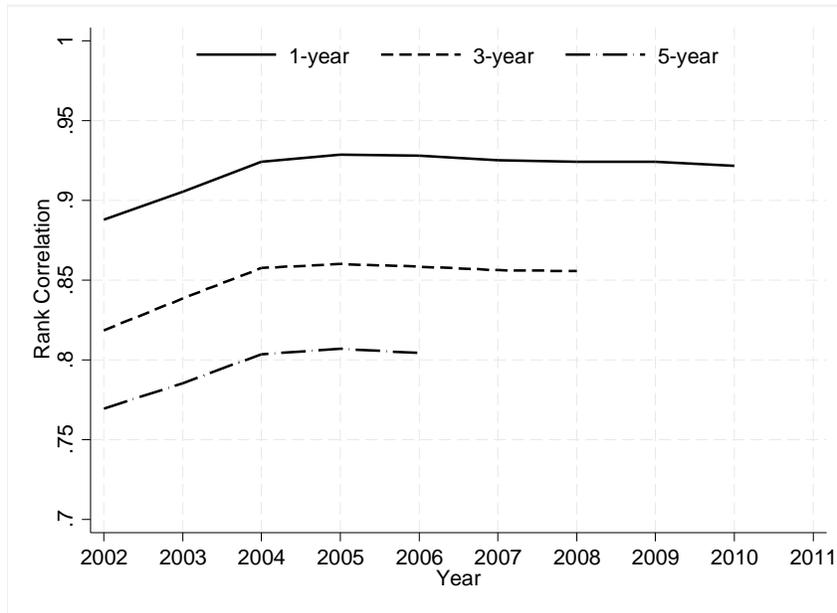
Notes: Authors' calculation. Transition probabilities are conditional probabilities based on initial income group. Each statistic is the average across all possible statistics calculated in the period 2002-2011. The dataset is restricted to a balanced panel of taxpayers aged 20-65 years with gross income greater than \$25,000 pesos annually.

Figure 1: Short-term mobility: Shorrocks index and rank correlations



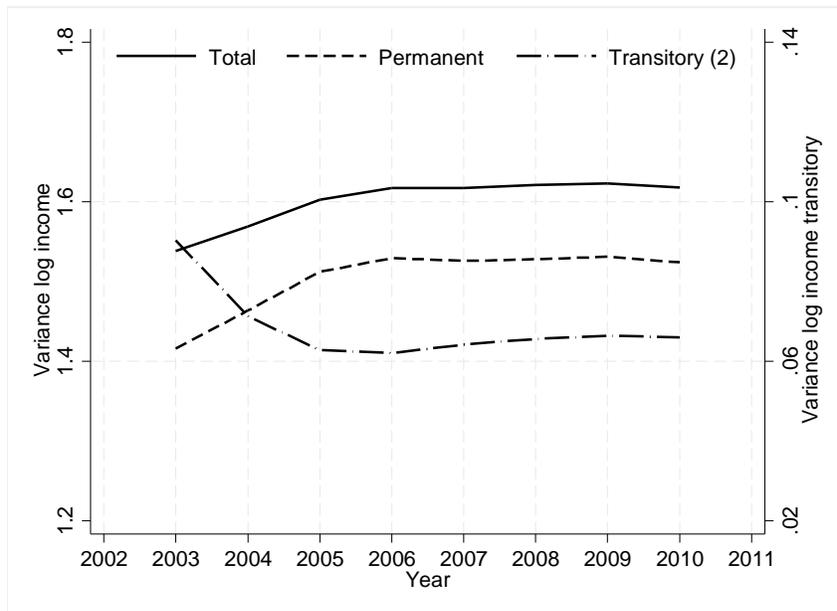
Notes: Authors' calculation. The Shorrocks mobility index in year t is defined as the ratio of the permanent three-year income Gini coefficient (from $t - 1$ to $t + 1$) to the average annual income Gini for years $t - 1$, t , and $t + 1$. The rank correlation is the Spearman correlation between incomes in periods t and $t + 1$. The dataset is restricted to a balanced panel of taxpayers aged 20-65 years with gross income greater than \$25,000 pesos annually.

Figure 2: Rank correlation after one, three, and five years



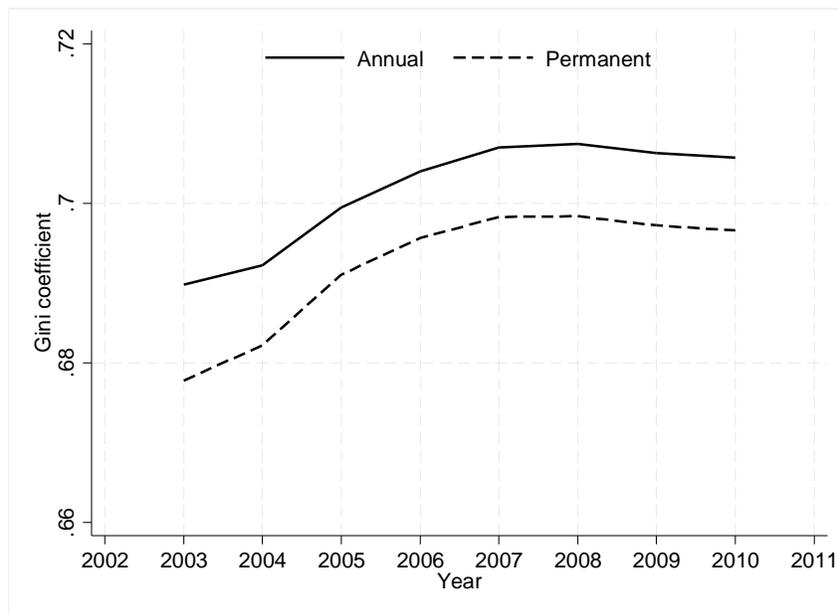
Notes: Authors' calculation. This figure displays the rank correlation between average incomes in period t and periods $t+1$, $t+3$, and $t+5$. The dataset is restricted to a balanced panel of taxpayers aged 20-65 years with gross income greater than \$25,000 pesos annually.

Figure 3: Variance of log permanent income and log transitory income



Notes: Authors' calculation. Permanent income is defined as the average of three-year income in the period from $t - 1$ to $t + 1$. Transitory income is the difference between total income and permanent income. The annual permanent variance is calculated as the variance of log permanent income from $t - 1$ to $t + 1$. The dataset is restricted to a balanced panel of taxpayers aged 20-65 years with gross income greater than \$25,000 pesos annually.

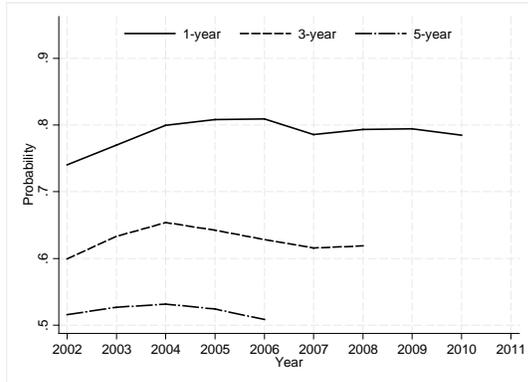
Figure 4: Gini coefficient, total and permanent



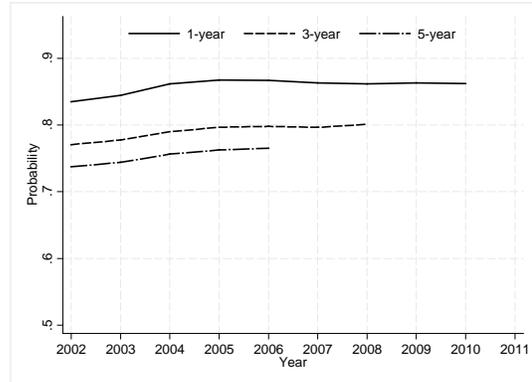
Notes: Authors' calculation. Permanent income is defined as the average of three-year income in the period from $t - 1$ to $t + 1$. The annual permanent Gini coefficient is calculated as the Gini coefficient of permanent income from $t - 1$ to $t + 1$. The dataset is restricted to a balanced panel of taxpayers aged 20-65 years with gross income greater than \$25,000 pesos annually.

Figure 5: Probability of remaining in the same level of the income distribution after one, three, and five years

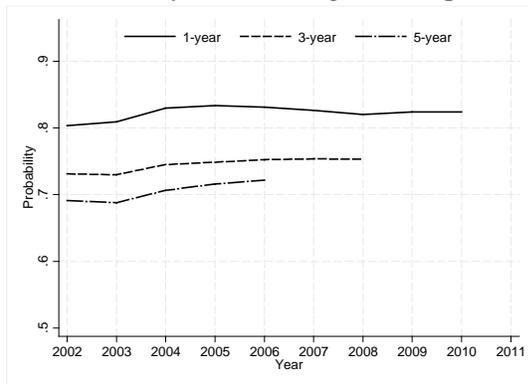
A. Probability of remaining in the bottom 25%



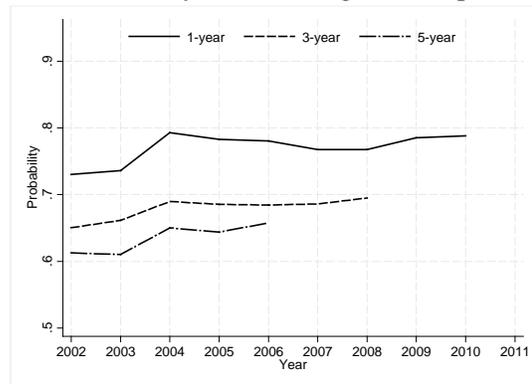
B. Probability of remaining in the top 25%



C. Probability of remaining in the top 10%

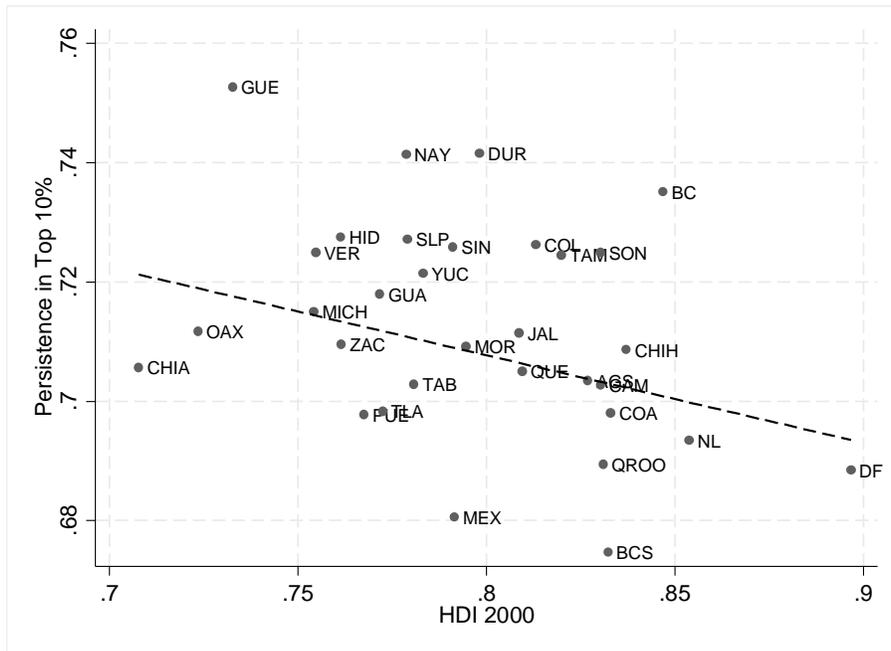


D. Probability of remaining in the top 1%



Notes: Authors' calculation. The dataset is restricted to a balanced panel of taxpayers aged 20-65 years with gross income greater than \$25,000 pesos annually.

Figure 6: Relationship between persistence in the top 10% and Human Development Index by state in Mexico.

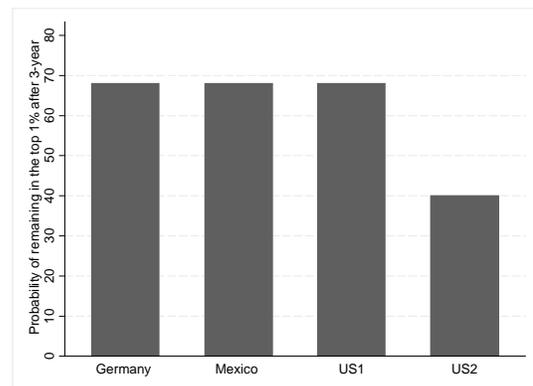
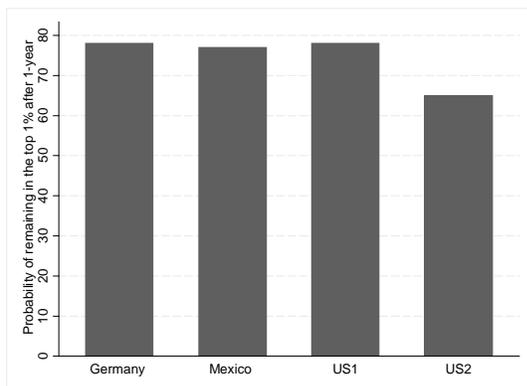


Notes: Authors' calculation. Each dot represents one of the 32 states in Mexico. Persistence in the top 10% is defined as the average probability of remaining in the top 10% for each five-year period from 2002 to 2011 (2002-2007, ..., 2006-2011). HDI = Human Development Index. The dashed line is a regression weighted according to state population in 2000.

Figure 7: Persistence in the top 1% by country

A. After one year

B. After three years



Notes: Mexico from authors' calculation. US1 from Kopczuk, Saez, and Song (2010), US2 from Auten, Gee, and Turner (2013), and Germany from Jenderny (2013).