Intergenerational Social Mobility in Mexico and its Regions

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Results from Rank-Rank Regressions

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December 2017

Abstract

With data from the ESRU Social Mobility Survey (EMOVI) 2011 we run rank-rank regressions to estimate relative and absolute upward intergenerational social mobility in the dimensions of wealth, education, and occupational status in Mexico at national and regional levels. The estimations yield a clear regional pattern: the degree of social mobility is higher than the national average in the North and North-Central regions, similar to the national average in the Central region, and lower than average in the South region. In particular, it is estimated that the children of poor parents (i.e. parents in the 25th percentile rank in the national distribution of wealth of their generation) achieved greater than average progress if they grew up in the North region, and smaller than average progress if they grew up in the South region. The same results are found for the case of education and occupational status. These findings are consistent with a negative relationship between social mobility and inequality (a Great Gatsby Curve), and a positive relationship between social mobility and economic growth, at the regional level in Mexico.

JEL Codes: J62, E23, R10, N96, N36

1. Introduction

This paper presents estimates of intergenerational social mobility in wealth, education, and occupational status for the case of Mexico, at the national level and by region.[1] The data used in this study are indices of years of schooling, occupational status, and household assets first calculated by Behrman and Vélez-Grajales (2015) with information from the ESRU Social Mobility Survey (EMOVI) of 2011, and recalculated by the authors of this document. The regionalization of Mexico corresponds to that defined by the Bank of Mexico. Both relative and absolute upward intergenerational social mobility are estimated in a consistent way from rank-rank regressions as in Chetty et al. (2014).

There are very few studies of intergenerational social mobility using regression analysis for the case of Mexico, and even fewer studies have estimated social mobility at the regional level. This is partly due to a limitation of CEEY's "ESRU Social Mobility Survey" (EMOVI, 2006 and 2011), which does not provide data on household income, the main variable that has been used in regression analysis. EMOVI provides data which are representative of the socioeconomic status of head-of-households aged 25-64 years by gender at the national level.

EMOVI's indicators of socioeconomic status are categorical variables for education and occupation of head of household, and for household's ownership of durable goods and access to services and utilities, for both the current and the past generation. Therefore, the analysis of EMOVI data has mostly involved the estimation of intergenerational transition matrices for education and occupation (i.e. across levels of education and types of occupation). Indices for "wealth" were estimated from information on households' assets, home characteristics, appliances, and access to services, and this allowed for the estimation of transition matrices for measures of wealth as well (Vélez-Grajales and Stabridis, 2014). More general indices of socioeconomic status were also estimated, based on all of these factors: education, occupation, and wealth components (Torche, 2012).

Transition matrices provide an estimate of "absolute" social *immobility*; namely, the degree of persistence in low socioeconomic status over the generations. Vélez-Grajales et al. (2013) report, among the main results of this literature for Mexico, that persistence in the lowest quintile is as high as 48 % for general socioeconomic status measured by household assets and head-of-households' occupation and

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[1] Intergenerational social mobility is defined by the degree to which the social and economic opportunities of the children depend on the social status of the parents. The greater the dependence (correlation) between the opportunities of the children and the status of their parents the lower social mobility is, and the children tend to occupy in the "social scale" a place similar to the one which was occupied by their parents (Chetty et al., 2014). Empirical studies of intergenerational social mobility generally seek to establish a relationship between the current situation of children and the past situation of their parents in terms of income, occupation or education. This is mainly due to the lack of data on opportunities or social status, which are more difficult to measure.

education (with additional 22 % moving from quintile 1 to quintile 2 across generations). The degree of persistence in quintile 1 is 35 % for a wealth index based on household's assets, access to services and home appliances only. Other results are: 28 % of adults with unschooled parents are also unschooled or have incomplete elementary education (an additional 33 % have completed elementary education only). And 52 % of adults with a father in the agricultural sector now work in the agricultural sector or have become low-skilled manual laborers. These findings highlight the high degree of social immobility across generations in Mexico.

Jere Behrman and Viviana Vélez-Grajales (2015) is the first study in which, using EMOVI 2011 data, indices for wealth, education and occupational status are computed in order to estimate relative intergenerational social mobility with regression analysis. These authors transformed educational levels into years of education, and estimated an index of occupational status from occupational categories and job titles based on the ISEI (Socio-Economic Index of Occupational Status), to compute continuous variables useable in regression analysis of intergenerational social mobility. *Relative* intergenerational social mobility is computed using the value of the (slope) coefficient of the log-log regression of the indices in the current generation on those of the past generation. The coefficient measures the degree of persistence of inequalities across generations. For the case of the wealth index, they found a coefficient of around 0.60; for education it was 0.33; and for occupational status 0.21 (these coefficients were higher for rural and indigenous populations and somewhat higher for males than for females). Therefore, and in accordance with much of the literature, they found that intergenerational social mobility in Mexico is higher in terms of occupational status than it is in terms of education and wealth.

In this paper we extend the regression analysis of the EMOVI data of Behrman and Vélez-Grajales (2015) in two important dimensions: firstly, to estimate *relative* and *absolute upward* intergenerational social mobility in a consistent way and, secondly, to compute these social mobility indicators across the regions of Mexico.

Rank-rank regressions are used. That is, rather than regressing the indices of socioeconomic status of children on that of their parents, it's the percentile rank of children in the national distribution of socioeconomic status that is regressed on the percentile rank of their parents' in the corresponding distribution. Rank-rank regressions have many advantages over log-log regressions (see Dahl & Deleire, 2008, and Chetty et al., 2014). In particular, one can get fully comparable estimates of intergenerational social mobility across regions of a country; relative intergenerational social mobility is actually an estimate of the correlation between levels of socioeconomic status across generations; and, finally, absolute upward and relative intergenerational social mobility are estimated consistently.

The regionalization of Mexico corresponds to that defined by the Bank of Mexico (2016). In the context of the EMOVI, whose representativeness is national and not regional, this regionalization has the advantage that the country is divided in only four but very different regions (North, North-Central, Central and South). This makes it possible to estimate the degree of intergenerational social mobility with a large enoughr number of observations in each region. As it is discussed below, our results are consistent with intergenerational transition matrices which have been estimated by region using regionally representative data.

The main result of the estimation is that the three measures of socioeconomic status show a similar regional pattern: the degree of intergenerational social mobility is higher than the national average both in the North and North-Central regions; close to the national average in the Central regional; and lower than average in the South region. In particular, it is estimated that the children of poor parents (i.e. parents in the 25th percentile rank in the national wealth distribution of their generation) achieved greater progress if they grew up in the North region; their average percentile rank is 41 in the national wealth distribution of the current generation. On the other hand, the expected improvement is lower in the South region, where the children of poor parents are on average in the 28th percentile rank, that is, they hardly improved their situation compared to that of their parents. In the North-Central and Central regions the corresponding figures are the 37th percentile and the 33th percentile.

The results presented here are consistent and complementary to those reported in Vélez-Grajales et al. (2017), where matrices of intergenerational wealth transition are estimated for the 32 states of Mexico. The estimation at the state level is possible because the data of the EMOVI 2011, whose representativeness is at national level, are combined with those of the National Nutrition and Health Survey (ENSANUT) of 2012, whose representativeness is at the state level. Both surveys provide enough information to compute a household wealth index for the interviewed adult, but in the ENSANUT that information is representative at the state level. On the other hand, the EMOVI has the retrospective information that allows estimating an index of wealth for the parents of the interviewee. Thus, this information from the EMOVI is used to impute the wealth of the household of origin for those who were surveyed by the ENSANUT. The imputation is made by matching the respondents in both surveys by their percentile rank in the distribution of the wealth index of the current generation, their year of birth, and their gender.

The findings in Vélez-Grajales et al. (2017) and the ones presented here are consistent with each other because they show the same regional gradient for social mobility in wealth: South - Central – North-Central - North. This is so despite the fact that the wealth index used in the analysis was estimated by a different method in each case. The results from both studies are complementary because, while Vélez-Grajales et al. (2017) estimate transition matrices, and obtain information, for example, on the degree of child persistence in the father's wealth quintile, the

results presented here allow direct estimation of well-known and easily comparable measures of relative and absolute upward intergenerational social mobility. Together, both studies allow greater possibilities of comparison between the degree of intergenerational social mobility in Mexico and in other countries.

From the perspective of macroeconomists, social mobility is important because it is related to inequality and economic growth. Various authors have found a negative relation between inequality and social mobility [Krueger (2012), Corak (2013a)] and a positive one between social mobility and economic growth (Hassler and Rodríguez Mora, 2000). On the other hand, there is evidence of a negative relation between inequality and economic growth (OECD, 2015). Thus, economic theory predicts multiple equilibria in which different combinations of these variables are generated [Galor and Zeira (1993), Hassler and Rodríguez Mora (2000), Hassler et al. (2007)]. These multiple equilibria would generate combinations in which low (high) social mobility is associated with a high (low) degree of inequality and a low (high) rate of economic growth.[2]

The results presented in this paper are effectively consistent with a negative association between intergenerational social mobility and income inequality by region, and a positive association with the rate of economic growth. That is, the highest degrees of social mobility are observed in the regions that have grown the most and where the inequality is lowest. This indicates the desirability of analyzing in more detail in further research the mechanism that has been operating in the regions of Mexico, by which inequality and economic growth have been factors associated with social mobility.

The article is organized as follows. Section 2 presents a brief and simple discussion on rank-rank regressions and their great utility to simultaneously estimate relative and absolute upward intergenerational social mobility; the discussion closely follows the presentation of this topic in Chetty et al. (2014). Section 3 contains a presentation of the data used in this study; it discusses the main characteristics of the indices of wealth, education and occupational status that were estimated for this study. This section also presents the regionalization of Mexico that will be used in the analysis, its advantages and disadvantages. The

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[2] Intergenerational social mobility analyzed in terms of progress relative to the family of origin in measures such as wealth, education or occupational status presents a more restricted characterization of the impact of "family background" than the equal opportunities approach [Corak (2013b), Brunori et al. (2013), Ferreira and Peragine (2015)]. However, both concepts are closely related and this allows linking social mobility with public policies. Social mobility is related to equal opportunities in the access to education, health and the labor market, and these in turn are related to factors such as the nature and quality of public policies in these areas, as well as other factors, such as social discrimination (especially by skin color or appearance, and by gender). In this way, differences in public policies on education, health and labor between regions of a country (social discrimination is perhaps less variable among them) generate differences in the degree of social mobility. These policies also promote a relationship between social mobility, inequality, and economic growth.

results are presented in section 4, and are discussed in section 5. Section 6 is a brief conclusion.

2. Methods

There are two measures of intergenerational social mobility: "absolute" and "relative" mobility. The first is a measure that answers the question: how are children from families of a given income level doing, better or worse than their parents? For example, in this paper we estimate children's percentile rank in the distribution of wealth of the current generation given that their parents' percentile rank was the 25th in the distribution of wealth of the previous generation. On the other hand, relative mobility is a measure that responds to the question: how are the children of high-income families doing relative to the children of low-income families? In the context of the present work, we estimate the difference between the expected position of the children of rich parents in the distribution of wealth of the present generation and the corresponding position in this distribution of the children of poor parents. (The above examples, of course, could also be restated in terms of the position or location in the distribution of years of schooling and occupational status).

For the case of income, the usual measure of relative intergenerational social mobility is the so-called intertemporal income elasticity; obtained by estimating the coefficient β in the linear regression $log(Y_{i1}) = \alpha + \beta log(Y_{i0}) + \epsilon_{it}$ where Y_{i1} and Y_{i0} are the (permanent) income of family i members in the present and past generation, respectively; with $i = 1, \cdots, N$. In this way, for any two different families, i and j, we have $E\left[log(Y_{j1}) - log(Y_{i1})\right] = \beta\left[log(Y_{j0}) - log(Y_{i0})\right]$; i.e. the expected percentage difference between the incomes of the two families in current generation is a proportion β of the percentage difference in the previous generation; so relative social mobility is lower the higher the estimated coefficient of the regression.

Relative social mobility measures estimated by log-log regression have biases and limitations that can be addressed by improving income data and sample representativeness [see Solon (1992) and Chetty et al. (2014)]. On the other hand, some authors have proposed replacing, in the regression, the income of parents and children by the position of these parents and children in the distribution of income in each generation. These regressions, called rank-rank, solve additional linearity and zero income problems, and yield more stable estimates [Dahl and Deleire (2008)]. Another advantage of rank-rank regressions over log-log regressions is that β, the slope of the regression, is in general an estimate of the correlation coefficient between the variables analyzed. The coefficient of correlation, rather than elasticity, is the primary object in the study of social mobility.

More important for the present study, in the context of a regional analysis, rank-rank regressions allow us to obtain absolute upward social mobility estimates that are not only comparable across regions, but also clarify and give precision to results on relative mobility (Chetty et al., 2014). For this reason, we use rank-rank regressions to study intergenerational social mobility in the regions of Mexico. In this way, for the variable of interest (education, occupation, wealth, etc.), we estimate the relationship between the percentile rank that the children occupy in the distribution of the present generation and the corresponding one that their parents occupied in the distribution of the previous generation.

For region c and family i, we define (following the notation in Chetty et al. 2014) the linear relation $R_{ic} = \alpha_c + \beta_c P_{ic} + \varepsilon_{ic}$, where R_{ic} is the percentile rank occupied by the son of that family and region in the national distribution of the current generation, and P_{ic} is the percentile rank occupied by the father of that family and region in the national distribution of the previous generation. The intercept and the slope of the regression vary by region.

In this context, the degree of relative intergenerational social mobility is the difference between the expected percentile rank (in the national distribution of the present generation) of the children born to parents at the top and at the bottom in the national distribution of the previous generation; namely, $\overline{R_{100,c}} - \overline{R_{0,c}} = 100\beta_c$. On the other hand, absolute mobility in the percentile p of origin refers to the average rank in the national distribution of the current generation that children whose parents were in the percentile p in the national distribution of the previous generation- have achieved, and it is given by $\overline{R_{p,c}} = \alpha_c + \beta_c p$. In particular, "absolute upward mobility" is the expected rank in the distribution of the current generation of those children whose parents were on average below the median in the distribution of the previous generation. This is equivalent to estimating the expected rank in the distribution of the present generation of children with parents in the 25th percentile in the national distribution of the previous generation, or $\overline{R_{25,c}} = \alpha_c + \beta_c 25$.

In conclusion, rank-rank regressions allow us to obtain estimates of absolute upward intergenerational social mobility comparable across geographic areas of a country. It also makes it possible to determine the source of the advantage of one geographical area relative to another in terms of relative mobility: whether it is improvements among the children of poor households or a worsening condition among the children of wealthy households.

3. Data

The estimation of these measures of social mobility that we propose for Mexico and its regions is carried out with data from the ESRU Social Mobility Survey for Mexico (EMOVI) of 2011. The survey reports representative data at national level on education, occupation, and access to goods and services in the household of

the population between 25 and 64 years of age, masculine and feminine, and also of their parents. Retrospective information on the personal and household characteristics of their parents is provided by the interviewees at the time of the survey.[3]

Among other data from the interviewees' household of origin, the survey reveals their place of residence at 14 years of age. Thus, the variable "region" in the present study refers to the geographic zone of Mexico where the state in which the interviewee lived at the age of 14 years is located. Note that this state may differ from the one in which the interviewee had his residence at the time of the survey. The reason for this choice is the assumption that the regional dimension is important to understand social mobility to the extent that it potentially reflects differences in the degree of equality of opportunity in different parts of the country. And the impact of these differences is more likely to be greater during the period of accumulation of human capital than in adult life. Thus, when reporting the results of our estimates on the differences between regions in absolute upward social mobility, these will be interpreted as attributed to the fact of having grown up in a certain region.

For the definition of the regions we adopt the one used by the Bank of Mexico (2016). In this regionalization, the states of Mexico are grouped into 4 regions (Figure 1). North: Tamaulipas, Nuevo León, Chihuahua, Coahuila, Sonora, and Baja California. South: Guerrero, Oaxaca, Chiapas, Quintana Roo, Yucatán, Campeche, Tabasco, and Veracruz. Central: Morelos, Puebla, Tlaxcala, Hidalgo, Guanajuato, Querétaro, State of Mexico and Mexico City. North-Central: Michoacán, Colima, Jalisco, Baja California Sur, Nayarit, Aguascalientes, Zacatecas, San Luis Potosí, Sinaloa, and Durango.

The advantage of this classification with only 4 regions is that it yields a higher number of observations per region; which is a condition for the estimation of the regressions because the EMOVI is representative at the national level. Other regionalizations that have been proposed for Mexico yield a greater number of regions. On the other hand, this regionalization allows for a sufficient regional differentiation in terms of several dimensions: per capita GDP, productive structure, educational levels, poverty, etc.

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[3] For a discussion of the questionnaire, sample design and general results of the survey see Vélez Grajales et al. (2013).

Figure 1
Regions of Mexico

Source: Banco de México.

The original data reported by the EMOVI in the dimensions of education, occupational status, and household wealth are not suitable for the analysis of social mobility using regression analysis. This type of analysis requires continuous variables, while the EMOVI reports: for the case of education, years of schooling associated with levels of education achieved; for the case of occupation, information on the function, job or job position of the interviewees; and for the case of wealth, assets of the household and goods and services to which it has access.

The same problem confronted Behrman and Vélez-Grajales (2015) when analyzing social mobility in Mexico with a regression model. These authors transformed these "discrete" variables into "continuous" ones by constructing indices with the necessary characteristics. For a justification, design and construction of the indices please see the referred document.

In this paper we follow the methodology of Behrman and Vélez-Grajales (2015). The indices obtained by these authors were replicated for the purpose of this paper using the original EMOVI data; their findings were also fully replicated. In this way, it is verified that the data used in the present work are exactly the same as those used by them. The indices obtained we simply refer to as "wealth", "education" and "occupational status". Subsequently, for the interviewees in the EMOVI and for their parents, we determined the percentile rank they occupy in the national distribution of each generation. In the case of "occupational status", the indices were only calculated for the male population because the labor participation rate

among the Mexican female population is very low (this was also the case in previous research).

A graphical analysis of the national distribution of these indices provides a preliminary result of the degree of intergenerational social mobility at the national level. Figure 2 (panel a) depicts the average percentile rank of the children in the national distribution of wealth (vertical axis) against the percentile rank of the parents in the national distribution of wealth of the previous generation (horizontal axis). The relationship between the rank of children and parents approaches the linear form postulated by the theory, with deviations in the queues of the distribution. A regression line (in blue) was added to simplify the discussion that follows. The slope of the regression line is less than 1 (the slope of the 45° degree line, in black), which indicates that there is social mobility in relative terms: the smaller the slope of the regression line, the greater the relative intergenerational mobility. An intercept greater than zero indicates that there is absolute upward social mobility: the larger the intercept, the greater the absolute upward mobility among the children of poor parents.

In Figure 2, in the panels b and c respectively, the information corresponding to the schooling index and the occupational status index is presented. The relation between children's and parents' percentile rank is linear; however, there are gaps in the data that indicate that the indices computed from the original data show important discontinuities or jumps in their values. Relative intergenerational social mobility in occupational status is greater than social mobility in education, and both are higher compared to that observed for wealth. These results and those concerning absolute mobility will be discussed in more detail in the next section.

Figure 2
Average Percentile Rank of Children vs Percentile Rank of Parents
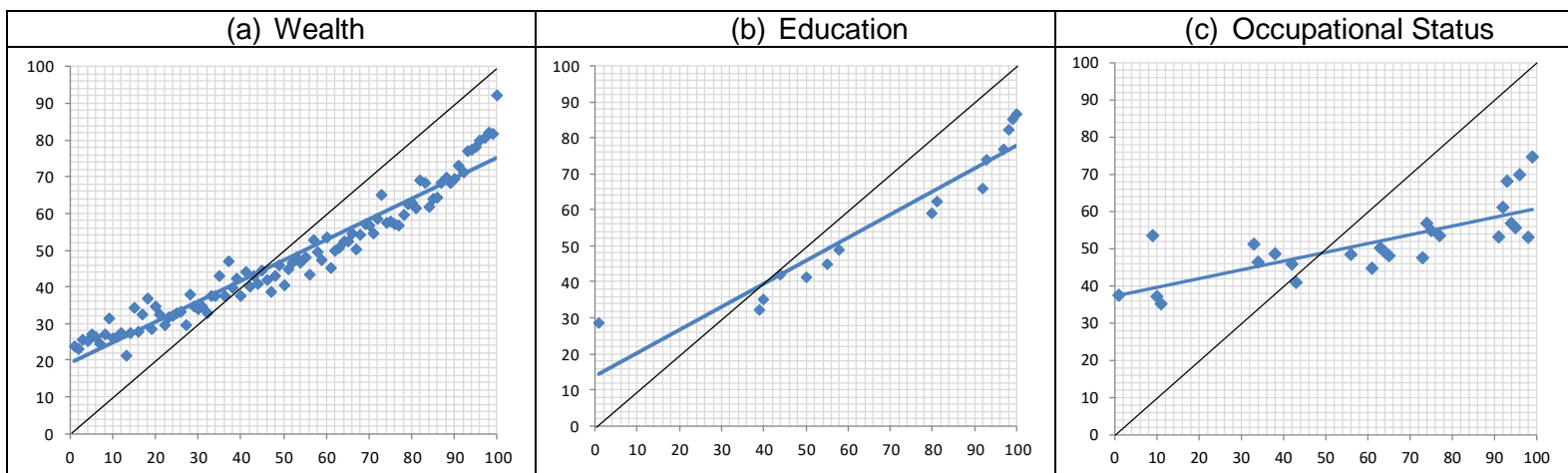
Source: EMOVI 2011 and Behrman and Vélez-Grajales (2015).

4. Results

Table 1 presents estimates of relative and absolute upward social mobility in wealth and education for men and women, while Table 2 presents the estimates for the case of occupational status of men (as already mentioned, no indices of occupational status were estimated for women).

Relative intergenerational social mobility in wealth is 54.1 points at the national level: that is the expected difference in percentile rank between the children of the richest and the poorest families in the national distribution of wealth of the current generation. Estimates indicate that in the South region the lowest relative mobility is observed, 59.6, while in the North-Central region the highest mobility is observed, 44.2; which is similar to that of the North region (46.3). The Central region estimate is only slightly above the national average.

Regarding the intergenerational social mobility of those who grew up in poor households (whose parents were in the 25th percentile rank in the distribution of wealth of the parents), at the national level they are on average at the 33.5th percentile rank in the distribution of the current generation. That is, they advanced 8.5 percentiles in relation to the position that their parents had. Progress is greater than average in the North (41.1) and North-Central (36.6) regions, and similar to the average in the Central region (33.1); the lowest progress was observed in the South region (28.2).

Differences in the results by region in relation to the national average are graphically observed for the two polar cases: the North region (Figure 3,a) and the South region (Figure 3,b).

The relative and absolute advantages in intergenerational social mobility of the North region over that of the South are observed in the slope and in the intercept, respectively, of the regression line. In the case of the North (South) the slope is lower (higher) than that of the national data, indicating that the difference in the expected rank between the children of the rich and the poor in the distribution of wealth is smaller (larger) in that region than at the national level (Figure 3, a and b).

Regarding the intercept of the line of regression, in the North (South) it has a larger (smaller) magnitude with respect to the intercept of the line estimated with national data. Thus, adults in the EMOVI 2011 sample whose parents were poor (25th percentile in the distribution of wealth of parents) and who grew up in the North (South) reached a higher (lower) rank in the wealth distribution of the current generation compared to the national average of those born in equally poor households.

Table 1

Intergenerational Social Mobility in Mexico and its Regions

Linear Relation between Child and Parent Ranks

Population Aged 25-65, 2011

Wealth						
	α	β	R^2	$r_{100} - r_0$	r_{25}	Obs.
Mexico	*19.9*	*0.54*	*0.31*	***54.1***	***33.5***	*6,626*
North	29.6	0.46	0.24	**46.3**	**41.1**	1,059
North-Central	25.5	0.44	0.24	**44.2**	**36.6**	1,439
Central	19.3	0.55	0.30	**55.0**	**33.1**	2,446
South	13.3	0.60	0.35	**59.6**	**28.2**	1,558

Education						
	α	β	R^2	$r_{100} - r_0$	r_{25}	Obs.
Mexico	*25.9*	*0.44*	*0.26*	***44.0***	***36.9***	*9,421*
North	27.7	0.41	0.24	**40.8**	**38.0**	1,587
North-Central	25.3	0.40	0.24	**39.9**	**35.3**	1,958
Central	26.5	0.44	0.27	**44.5**	**37.6**	3,366
South	24.7	0.48	0.28	**48.0**	**36.7**	2,325

Source: EMOVI 2011

Note: These are the results of the regression $R_{ic} = \alpha_c + \beta_c P_{ic} + \varepsilon_{ic}$ (see Section 2). The expressions $r_{100} - r_0$ and r_{25} refer to the estimates of relative and absolute upward social mobility, respectively.

Figure 3

Average Percentile Rank of Children vs Percentile Rank of Parents: Wealth
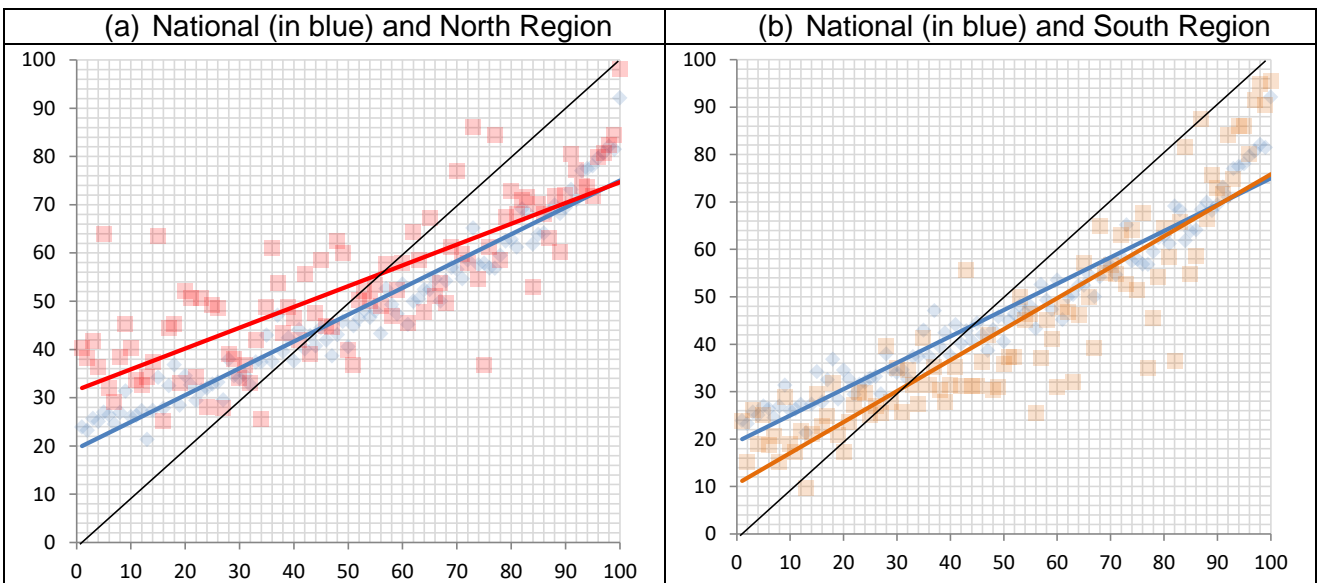
Source: EMOVI 2011 and Behrman y Vélez-Grajales (2015).

Relative intergenerational social mobility in education is somewhat larger than that estimated for the case of wealth, but it shows the same regional pattern (Table 1, lower panel). Relative social mobility in education is 44.0 at the national level: this is the expected difference between the rank of the children of the richest and the poorest families in the national distribution of years of schooling (the figure for the case of wealth, referred to in the previous paragraphs, is 54.1). Estimates indicate that in the South region the lowest relative mobility in education is observed, 48.0, while in the North-Central region the highest mobility is observed, 39.9 -which is similar to that of the North region (40.8). The Central region is only slightly above the national average (44.5).

Absolute upward social mobility in education at the national level is also slightly higher than that estimated for wealth: 36.9 against 33.5. As for the regional pattern, the results for years of schooling show two differences in relation to the estimates for wealth. First, the differences between regions in the degree of mobility are smaller in the case of education. Second, it is in the North-Central region, and not in the South region, where upward social mobility is lowest (35.3). For the rest of the regions, the following pattern, from lowest to highest, is observed in absolute upward social mobility in education: South (36.7), Central (37.6), and North (38.0).

Data on occupational status present a greater challenge for the measurement of social mobility. In addition to the lack of data for the women interviewed (the analysis is only representative for the male national population), in the North region the relationship between the average percentile rank of the children and the percentile rank of the parents deviates from the linear pattern (Figure 4). This may be due to the method by which data on occupations in Mexico are translated into the occupational status index. This method is based on the ISEI.[4]

The result is that the average percentile rank of the children does not increase with the percentile of the parents for low values of the latter variable. Linearity is recovered by eliminating the observations corresponding to these low values of the percentile rank of the parents (those under the 20th percentile). However, as shown below, the results of the estimation change noticeably. Therefore, in the case of occupational status, two estimates are presented for the North region.

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[4] The International Socioeconomic Index of Occupational Status (ISEI) allows the stratification of occupations using a continuous scale. Occupations are classified based on the skills and abilities to perform certain jobs, ordered in a linear fashion. The continuous dimension of the index facilitates its analysis through different statistical models. However, as it is an international index, it may be that stratification does not reflect the particularities of the occupations in Mexico and may underestimate the status of certain occupations (Behrman and Velez-Grajales, 2015). For details regarding this index see Ganzeboom et al (1992).

Figure 4

Average Percentile Rank of Children vs Percentile Rank of Parents: Occupational Status, National (in blue) y North Region (in red)
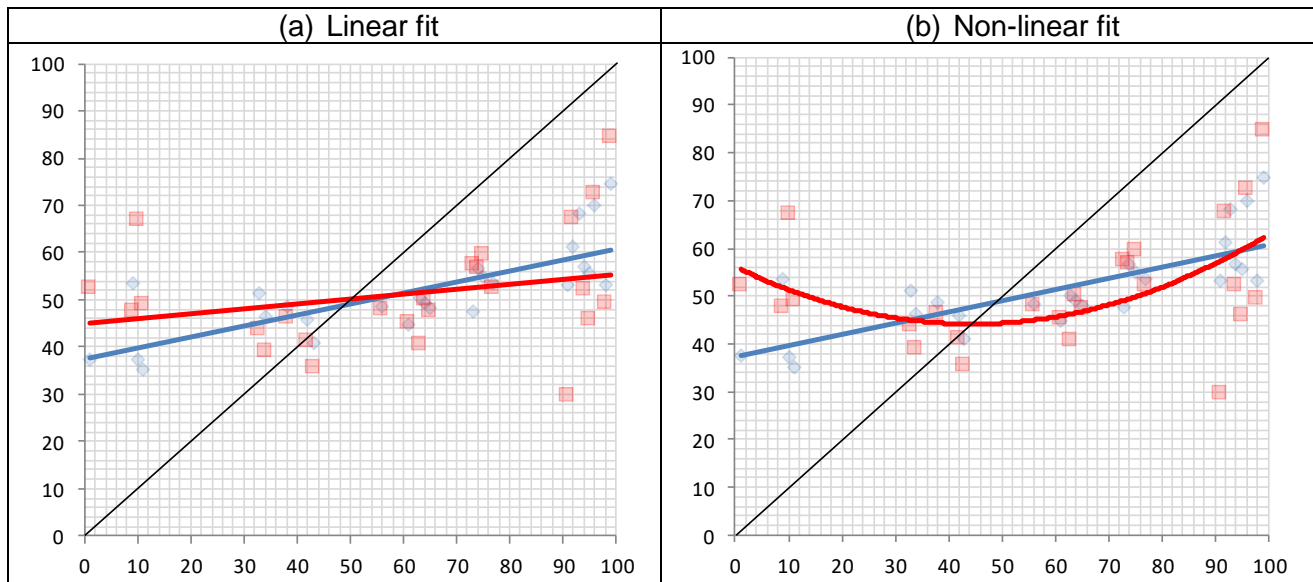
Source: EMOVI 2011 and Behrman y Vélez-Grajales (2015).

When all the observations in the North region are used in the estimation, the results concerning relative intergenerational mobility in occupational status are, in general, similar to those found for wealth and education: mobility in occupational status reaches its highest value in the North region (7.6) and the lowest in the South region (35.3); the Central and North-Central regions have intermediate values (25.9 and 27.6, respectively). As for the absolute upward mobility, this is also higher in the North region, and has very similar values in the rest of the regions (Table 2, upper panel).

However, if we restrict data from the North region to those interviewees whose parents were at a percentile rank equal to or greater than 20 in the national distribution of occupational status of the previous generation, the results change significantly (Table 2, bottom panel). The North region now has the lowest intergenerational mobility, both relative and absolute, in the national ranking. This contrasts with the results presented above, and they are not very credible. This result, more precisely, indicates that the effects of the non-linearity in the occupational status data of the North region cannot be easily controlled for if the group of observations with less linearity is eliminated. Thus, the low stability of the estimated coefficient of regression leads us to discard for the moment the estimates of social mobility in occupational status for the case of the North region, and to recommend that the definition and construction of occupational status indexes calculated using EMOVI data and the ISEI methodology be revised for the case of Mexico.

Table 2

Intergenerational Social Mobility in Mexico and its Regions
Linear Relation between Child and Parent Ranks
Male Population Aged 25-65, 2011

				Occupation (a)		
	α	β	R^2	$r_{100} - r_0$	r_{25}	Obs.
Mexico	*33.8*	*0.26*	*0.08*	*26.4*	*40.4*	*3,822*
North	44.8	0.08	0.01	**7.6**	**46.7**	631
North-Central	32.9	0.28	0.10	**27.6**	**39.8**	827
Central	34.0	0.26	0.07	**25.9**	**40.4**	1,316
South	30.3	0.35	0.14	**35.3**	**39.1**	963
				Occupation (b)		
	α	β	R^2	$r_{100} - r_0$	r_{25}	Obs.
Mexico	*33.8*	*0.26*	*0.08*	*26.4*	*40.4*	*3,822*
North	24.9	0.37	0.07	**36.8**	**34.1**	458
North-Central	32.9	0.28	0.10	**27.6**	**39.8**	827
Central	34.0	0.26	0.07	**25.9**	**40.4**	1,316
South	30.3	0.35	0.14	**35.3**	**39.1**	963

Source: EMOVI 2011

Note: These are the results of the regression $R_{ic} = \alpha_c + \beta_c P_{ic} + \varepsilon_{ic}$ (see Section 2). The expressions $r_{100} - r_0$ and r_{25} refer to the estimates of relative and absolute upward social mobility, respectively. Results in panel (a) are for the whole sample, while those in panel (b) are for the North region restricted sample.

5. Discussion

The South - Central - North-Central - North regional gradient in intergenerational social mobility in wealth found in this work is consistent with the estimates presented in Vélez - Grajales et al. (2017). In that paper, as it was already mentioned in a previous section, an intergenerational transition matrix in wealth for each of Mexico's 32 states is estimated as a result of an exercise of imputation of a household wealth index using data at the national level of the EMOVI 2011 and at state level of ENSANUT 2012.

One of the main results in Vélez-Grajales et al (2017) refers to the percentage of the adult population that remains in the same wealth quintile of their parents. The greater the persistence in the lowest quintile in a given state, the lower social mobility is in that state. If, as a regional measure, the simple average of the estimates by state is used, the South - Central - North-Central - North gradient reported in this paper is also found there. For example, in the South region 55.2 % of the children who grew up in households of the first quintile remained in that quintile when they reached adult age; but only 34.3% did so in the Central region,

24.0% in the North-Central region, and 22.1% in the North region. The national figure is 34%.

Therefore, the results in Vélez-Grajales et al. (2017) not only show the same regional profile of intergenerational social mobility in wealth we find here, but the differences in the degree of mobility between regions, the proximity of the estimates in the Central region and at National level, and the similarity that exists in the degree of mobility in the North and North-Central regions, are also present in both sets of results.

The South - Central – North-Central - North regional gradient in intergenerational social mobility in wealth reported in this paper is also consistent with the existence of a "Great Gatsby Curve" (Corak, 2013a) for the regions of Mexico. That is, social mobility and economic inequality are negatively associated across regions (Figure 5, a). Economic inequality here is measured by the GINI coefficient of household income calculated by CONEVAL from the INEGI Socioeconomic Conditions Module at the state level in 2014; the regional GINI is the simple average of the measures per state.

Estimates of social mobility in wealth by region are positively related to the GDP per capita growth rate; but the relationship is non-linear (Figure 5, b). The South region stands out from the rest of the regions as it presents both the lowest rate of economic growth and the lowest degree of intergenerational social mobility in wealth. The rest of the regions do not present big differences in the average economic growth rate among themselves, in comparison with those they present in terms of social mobility. The growth rate of GDP per capita of each region was calculated from INEGI data on GDP and population by state in 1995 and 2010, and corresponds to the annual average of the percentage change in the logarithm of GDP per capita during that period.

The combination of these results allows us to explore the role that social mobility might play in the negative relationship between economic growth and inequality, highlighted by the OECD (2015). Combining the aforementioned results on the regional relationship between social mobility and inequality, on the one hand, and between economic growth and social mobility, on the other, it is found that intergenerational social mobility is higher in regions of Mexico with relatively low levels of economic inequality and relatively high rates of economic growth (Figure 6). In this Figure, for the sake of clarity, the data on economic growth, inequality, and social mobility for the North region correspond to the average values of these variables in the North and North-Central regions.

Figure 5

Social Mobility in Wealth, the "Great Gatsby Curve" and Economic Growth across Mexican Regions

(a) Relative Social Mobility vs Gini   (b) Relative SM vs Growth Rate

◆ North ■ North-Central ◆ Central ◆ South
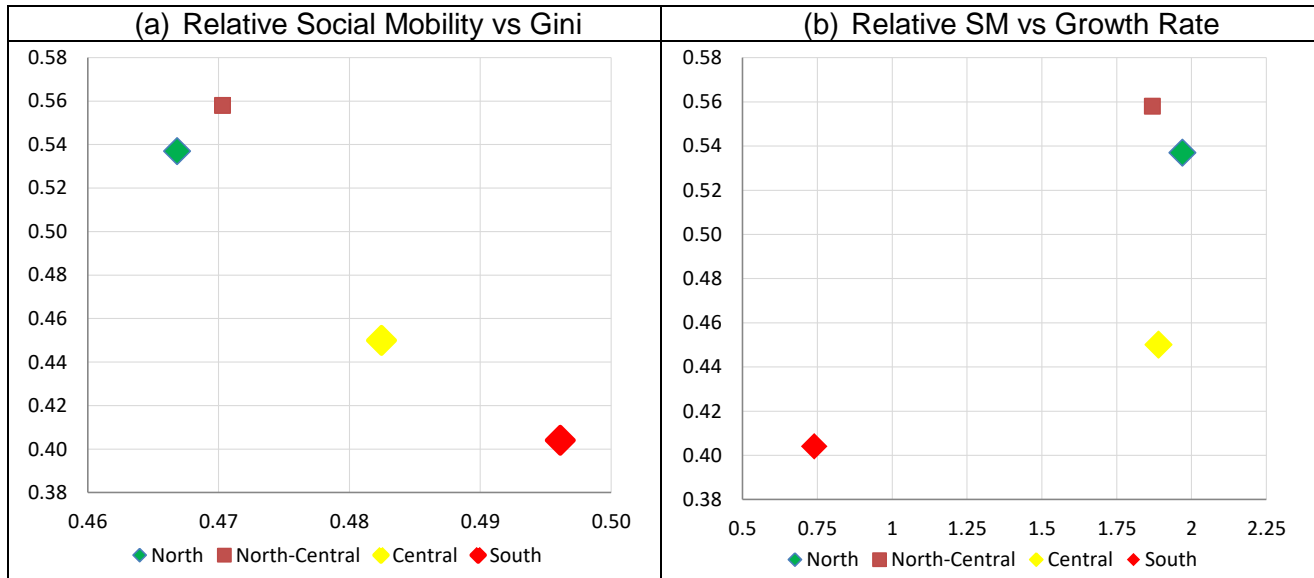
Source: Table 1 and INEGI.

Figure 6

Social Mobility in Wealth, Inequality and Economic Growth by Region

Degree of regression to the mean / poor children's percentile in the distribution of children

● South ● Central ● North

0.40 / 28

0.45 / 33

0.55 / 39

Per Capita GDP Growth Rate (%)
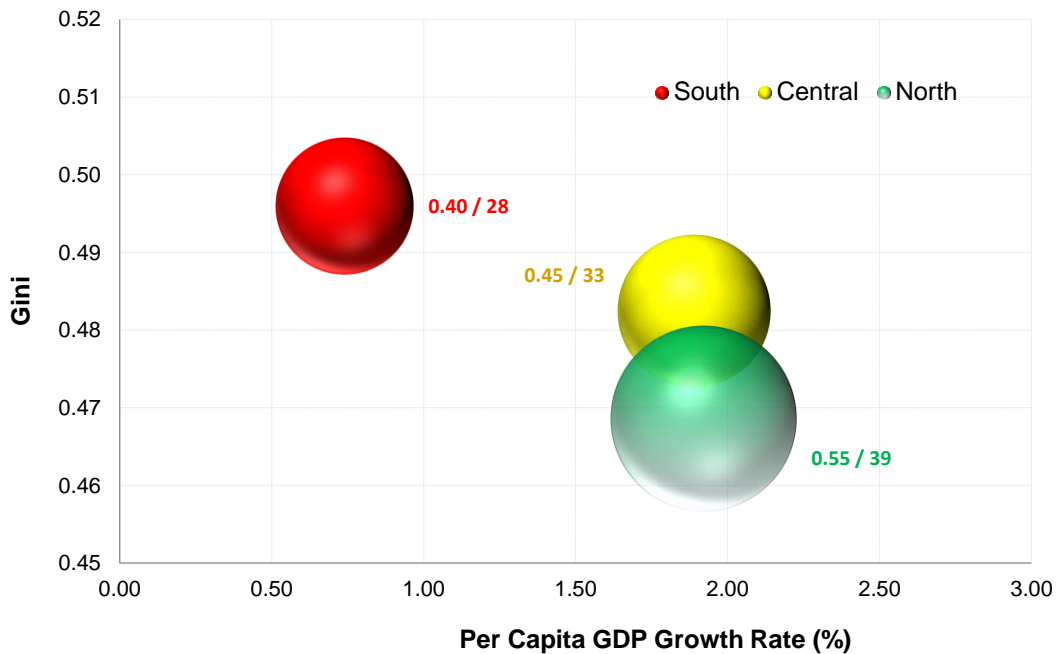
Source: EMOVI 2011 and INEGI.

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6. Conclusion

The analysis of the data from the ESRU Social Mobility Survey in Mexico (EMOVI) 2011 using rank-rank regressions reveals significant statistical and economic differences in intergenerational social mobility in terms of wealth, education, and occupation across the regions of the country. The main result is that social mobility presents a regional gradient: (from lowest to highest) South - Central - NorthCentral - North. These results are consistent with the degree of social mobility by region that can be inferred from the matrices of intergenerational transition in wealth estimated by Vélez-Grajales et al. (2017) for the states of Mexico.

In the case of relative intergenerational social mobility in wealth the region with the greatest mobility is the North-Central region, while absolute upward social mobility is highest in the North region. Both relative and absolute estimates for the North and North-Central regions do not differ significantly between them, especially when compared to the estimates for the South and Central regions of the country.

Relative intergenerational social mobility in education presents the same regional pattern as relative social mobility in wealth. On the other hand, absolute upward social mobility in education is higher in the Central and North regions than in the North-Central and South regions. The differences across regions in social mobility in education are small when compared to those observed in the case of wealth.

Regarding intergenerational social mobility in occupational status, the results are similar to those found for wealth and education. However, in this case the estimation has got important limitations: 1) The results are only valid for men; 2) The indices used in the estimation capture the occupational status with inaccuracies; which is reflected in problems of nonlinearity in the percentile rank relation between children and parents, especially in the North region.

These results allow evaluating the regions of Mexico in terms of their place in the relation between social mobility, economic growth and inequality and, thus, to have a first approximation at a much aggregate level of the indicators associated with the geographical variability in social mobility. In particular, the estimates are consistent with an incipient "Great Gatsby Curve" for the regions of Mexico, where social mobility has a negative relationship with inequality. Likewise, social mobility and the average economic growth rate by region present a direct albeit non-linear relationship.

The findings reported in this paper suggest future lines of research. The extension of EMOVI's representation at the regional level would be advisable and would allow for more precise results. Similarly, the methodology for constructing the indices of wealth, education and occupation can be improved in order to obtain greater linearity and continuity between parents' and children's percentile ranks. This is particularly important in the case of occupational status.

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