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Layers of Inequality: Social Mobility, Inequality of Opportunity and Skin Colour in Mexico

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Abstract

Using a nationally representative survey on intergenerational social mobility for Mexico, we document the role of skin colour in quantifying social mobility and inequality of opportunity in wealth. Using transition matrices and rank regressions we find differential patterns of relative social mobility by skin colour at the tails, with lighter skin tones featuring relatively more upward mobility and less downward mobility than darker tones. Meanwhile, our Ferreira-Gignoux estimates of inequality of opportunity as a share of total wealth inequality show that once parental wealth is included as a circumstance variable, the share of inequality of opportunity rises above 40 per cent. By contrast, the contribution of skin tone to total inequality remains minor, whether we consider parental background variables in the estimation or not.

Keywords: Inequality of opportunity, wealth index, ethnicity, Mexico.

JEL code: D31, D63.

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1. Introduction

Since the early seminal works of Van de Gaer (1993) and Roemer (1993, 1998) the *economics* literature on inequality of opportunity has expanded substantially both in terms of theoretical and methodological developments, as well as empirical applications.[4] And yet one aspect pending to be fully addressed thoroughly is the role of skin colour as a circumstance affecting the access to advantages.[5] So far, most of the empirical studies quantifying the level of inequality of opportunity in different countries and regions[6] focus on the effects of parental education attainment, parental occupation, region of birth (urban or rural) and whether the person speaks or not an indigenous language.[7] This gap in the literature stems from the unavailability of information on people's skin colour in most countries, especially in developing ones.

For the countries for which information is available, the literature identifies substantial differences in terms of social mobility across skin colour groups. The case that has been studied in most detail is the United States, where the main result of the literature is that the black population (or regions where there are larger concentrations thereof) experiences lower rates of upward intergenerational income mobility (Battacharya and Mazumder, 2001; Mazumder, 2014; Chetty et al. 2014).

The same pattern is observed in the Brazilian case, where the literature has found that the black population faces a higher degree of intergenerational income immobility, than the white population (Ferreira and Veloso, 2006). Likewise, in terms of occupational class mobility, the transition probabilities faced by the white population are higher than those experienced by the black population, and the evidence suggest that skin colour acquires more importance at the upper echelons of the Brazilian distribution (Carvalho and Neri, 2000; Costa, 2007; Hasenbalg and Silva, 1988; Hasenbalg, Lima and Silva, 1999).

In the Mexican case, there is a recent wave of studies focused on identifying the effects of skin-colour-based discrimination on different aspects of life. Arceo-Gómez and Campos-Vázquez (2014) show that women of darker skin tones face a lower probability of being called back while looking for employment vis-a-vis their lighter skin-tone equivalents. Using experimental data, Campos-Vázquez and Medina-Cortina (2018) show that skin colour stereotypes have a negative effect on life achievement expectations of female teenagers in middle school. Meanwhile, the

[4] For recent surveys of the literature emphasizing economists' contributions see Ramos and Van de Gaer, (2016); Ferreira and Peragine, (2016) and Roemer and Trannoy (2015).
[5] One noteworthy exception is the study by Marrero and Rodriguez (2013) for the US. Due to data restrictions, the authors consider two circumstances: the father's educational attainment and the interviewee's race (as per the US Census definition), distinguishing the "white" from the non- "white" population.
[6] Brunori et al. (2013) survey this literature.
[7] Although in countries like Mexico there is a correlation between skin colour and speaking an indigenous tongue, the populations affected by each circumstance are substantially different. Not all individuals with a darker skin tone necessarily speak an indigenous tongue in the countries where there is still a substantial indigenous population.

literature reports that people with darker skin tones have systematically lower educational attainment and lower earnings than those with lighter skin tones (Flores and Telles, 2012; Telles, 2014 and Villarreal, 2010) while they are more likely to report having been discriminated than the other population groups (Aguilar, 2011).

So far, the recent study by Campos-Vázquez and Medina-Cortina (forthcoming) is the only one that, to the best of our knowledge, explores the relationship between skin colour and social mobility in the Mexican context. Their results show that Mexican urban areas[8] follow a similar pattern to that observed in Brazil: individuals of lighter skin colour have, on average, higher wages and a higher educational attainment. In terms of social mobility, they find that, conditional on the parents' household wealth, individuals of darker skin tones end up in lower positions in the wealth distribution compared to those with lighter skin tones. And, just as in the United States, they report that the population with darker skin tones experiences higher rates of downward social mobility. However, the data employed in the study is only representative for the urban population in Mexico, where most of the population with lighter skin tone lives, which may lead to a downward bias in the estimations of the transition probabilities of the population with darker skin tones.

All this evidence suggests that skin colour is an important circumstance in determining an individual's access to advantages in life in societies where skin colour is among the dimensions of social stratification. In this paper we provide the first estimations of inequality of opportunity accounting for skin colour in Mexico, a country with high levels of inequality (Cortés and Vargas, (2017); Castillo (2017); Bustos and Leyva (2017); Reyes, Teruel and López (2017)), low social mobility rates for those located at the extremes of the wealth distribution (for a survey of the literature on social mobility in Mexico see Vélez-Grajales and Monroy-Gómez-Franco, 2017),[9] and for which increasing evidence points to skin colour as an important factor of stratification. Relying on the *Intergenerational Social Mobility Module* (MMSI 2016) of the *National Household Survey*, we are able to provide estimations of both social mobility and inequality of opportunity, which are nationally representative for the Mexican population between 25 and 64 years old.

The existing literature on inequality of opportunity in Mexico documents an unequal distribution of opportunities among the population (Wendelspiess-Chávez-Juárez, 2015; Vélez-Grajales, Monroy-Gómez-Franco and Yalonetzky, forthcoming). The estimates that are comparable with those of other Latin American countries suggest that Mexico is among the countries with higher levels of inequality of opportunity in the region. By including skin colour to the set of

[8] Defined as those over 100,000 inhabitants.
[9] For compilations of work on social mobility in Mexico see Vélez-Grajales, Campos-Vázquez and Huerta-Wong (2015); Campos-Vázquez, Huerta-Wong and Vélez-Grajales, (2012); and Serrano y Torche (2010).

circumstances analysed, we expect to provide a more accurate estimation of inequality of opportunity in the country.

As a first assessment, we build transition matrices,[10] and find differentiated intergenerational wealth mobility rates by skin tone. In particular, those with "dark" skin tone experienced lower upward mobility from the bottom of the wealth ladder vis-à-vis people with "light" skin tone. At the same time, those with "dark" skin tone also show a higher rate of downward wealth mobility from the top of the wealth ladder. In the second part of the study we measure inequality of opportunity as a share of total inequality following the method proposed by Ferreira and Gingoux (2011). We find that once wealth of origin is included as a circumstance variable, alongside both parents' education and father's occupation, inequality of opportunity reaches over 40 per cent. However, including skin tone barely adds to the overall proportion of inequality of opportunity in total inequality. That is, despite its statistically significant contribution to the level of inequality of opportunity, skin tone is nowhere nearly as important as other circumstance variables in practical terms. Moreover, this minor contribution of skin tone to inequality of opportunity remains largely unaffected by the inclusion or omission of parental wealth, education, and occupation in the estimations. Therefore, we are hard pressed to find any indirect contributions of skin tone to current wealth variation via family background circumstances. These social mobility and inequality of opportunity results pose open questions for future research on the mechanisms behind the relationship between variables such as current wealth, wealth of origin and skin tone.

The rest of the paper proceeds as follows. Section 2 provides the methodological discussion. Section 3 describes the dataset and the variables used. Section 4 presents and discusses our results. Finally, the paper concludes with some remarks.

2. Methodology

To conduct the analysis of relative (positional) social mobility we use two approaches. The first one, which can be considered the traditional approach to the analysis of social mobility, is to construct the transition matrix for the whole population. The transition matrix captures the degree of fluidity in society as a whole, as it shows the behaviour of both upward and downward social mobility at each quantile of the distribution.

As we are interested in the relationship between social mobility and skin colour, we construct a transition matrix for the whole population, and distinct transition matrices for each of three groups based on skin tone. The skin-tone transition matrices capture the movements of

[10] The transition matrices document relative social mobility. That is, movements of the individuals position across the household wealth distribution with respect to the position occupied by their parents. It is worth noting that we are analyzing the movements of the individuals of each skin colour group in the general population wealth distribution.

individuals belonging to each group through the whole household wealth distribution. That is, we do not construct group-specific household wealth distributions for the group-specific transition matrices. This enables us to compare the mobility of the different groups *in the same distribution*, and thus identify whether there are any differences in the mobility patterns.

The second approach we use to analyse relative social mobility in a society is to estimate the rank-to-rank regression coefficient, which captures the average degree of dependence between the position occupied by the household of origin in the corresponding wealth distribution, and the position occupied by the respondent in the wealth distribution of the respondents' households. This approach was suggested by Chetty et al. (2014) as a way to summarize the information provided by the transition matrices as well as to gain insight into the absolute mobility of subnational social groups. The estimated regression is the following:

$$R_{1i} = \alpha + \rho P_{0i} + u_i$$

Where P_{0i} is the percentile of the origin household in the corresponding wealth distribution, and R_{1i} is the percentile where the respondent's household lies in the corresponding wealth distribution. The coefficient ρ is called the rank-rank slope, as it captures the correlation between the rank of the parental household in the national household wealth distribution and the corresponding position of the respondents' household in the current household wealth distribution. Thus, it constitutes a measure of relative social mobility, and in that sense, it is a summary measure of the information presented on the transition matrices. Rank-rank regressions also enable us, , to estimate absolute mobility for subnational groups (Chetty et al., 2014). Since we are analysing the movements of individuals across the national distributions of household of origin and current household, movements in that sense for subnational groups imply gains in absolute terms, particularly for those at the bottom of the distribution. Thus, we can characterize the degree of absolute mobility for these individuals through the rank predicted by the regression for individuals whose origin household is located at the 25th percentile.

For our analysis of inequality of opportunity, we follow the seminal work by Ferreira and Gignoux (2011) in using the "types method", as it constitutes a direct operationalization of the so-called "weak" equality of opportunity criterion derived from Roemer (1998). It is worth noting that although Roemer (1998) never defines equality of opportunity formally, his proposal of an opportunity-equalizing policy implies that equality of opportunity is attained whenever individuals of different types, but in the same percentile of their respective effort distribution, receive the same advantage. Formally, as Ferreira and Gignoux (2011) show, this means:

$$y^k(\pi, \rho) = y^l(\pi, \rho), \forall\, \pi \in [0,1];\ \forall\, T_k, T_l \in \Pi, \quad (1)$$

where $y^k(\pi, \rho)$ is the advantage level enjoyed by a person in quantile π of the effort distribution conditional on being of type *k*, under the policy rule ρ. Equation 1 must be valid for all types T_k, T_l in the extensive partition Π of the population. Thus, equation 1 states that the advantage level of individuals in the same quintile of their respective type-conditioned effort distributions must be equal if equality of opportunity is to hold.

As shown by Ferreira and Gignoux (2011), from this definition it is possible to derive both a strong[11] and a weak criterion for equality of opportunity. The "weak criterion" for equality of opportunity requires the expected value of each type's conditional advantage distribution to be equalized across all types. This criterion stems from the ex-ante approach to inequality of opportunity, originally proposed by Van de Gaer (1993) and operationalized by Checci and Peragine, (2010). As Ferreira and Gignoux (2011) show, this approach is equivalent to the types approach. Let $\mu^k(y) = \int_0^\infty y dF^k(y)$ be the average level of advantage among individuals of type *k*, then the criterion implies:

$$\mu^k(y) = \mu^l(y) \; \forall \; l, k \mid \; T_k, T_l \in \Pi, \quad (2)$$

where $\mu^k(y)$, $\mu^l(y)$ are the average advantage levels in types *k* and *l* and both types are part of the extensive partition of the distribution Π.[12] Under this approach, measuring inequality of opportunity requires quantifying the degree to which the mean advantages differ between types.

The empirical application of this approach suffers from a clear limitation: it is highly unlikely that the full set of circumstances that may influence the access to advantages is available in any dataset (Ferreira and Gignoux, 2011). This automatically restricts downwards the feasible number of partitions (types) of the total population that can be generated from the combination of the circumstances, with respect to the theoretical level. This means that our estimations of the share of total inequality due to inequality of opportunities are a lower bound of the true value stemming from the estimation with the full vector of circumstances[13].

[11] Although not discussed at length in this paper, Bourguignon et al. (2008) and Lefranc, Pistolesi and Trannoy (2008), define the "strong" criterion as equality of advantage through the whole advantage distributions across all types in the society. Although more directly connected to the definition of equality of opportunity derived from Roemer (1998), its operationalization is data intensive, and thus, when used, allows only for a small number of circumstances to be considered in order to obtain robust estimations. This leads to a large underestimation bias of the size of inequality of opportunity (for an application, see Lefranc, Pistolesi and Trannoy, 2008).

[12] Note that the weak criterion is implied by the strong criterion of equality of opportunity, but the reverse is not true.

[13] As Kanbur and Wagstaff (2016) point out, this underestimation bias could lead to difficulties in terms of designing public policies to reduce inequality of opportunity in any country. As only information about the lower bound is available, variations through time of the inequality of opportunity index do not provide enough information about the exact behavior of inequality of opportunity, they only describe the behavior of the lower bound of all the possible values. Thus, signaling the need for further empirical refinements in order to reach a measure that can be more useful for tracking the performance of public policy.

We follow the operationalization of this criterion developed by Bourguignon, Ferreira and Menéndez (2009) and Ferreira and Gignoux (2011) in order to estimate the share of total inequality in household wealth accrued by inequality of opportunities. The first step of the parametric estimation method proposed by Ferreira and Gignoux (2011) consists of computing a smoothed distribution of the advantage variable in which its value for each individual is substituted with the predicted mean value of the advantage for the individual's type. Formally, this implies estimating a regression of the advantage variable y on the set of circumstance variables considered, that is: $y = C\beta + u$, where *C* is the vector of circumstances, and u can be considered the element of the advantage accrued to effort and luck.[14]

Using the estimated coefficients for each circumstance (the vector of $\hat{\beta}$ coefficients), the values of the advantage variable for each individual are replaced by the predicted values for each type, thereby eliminating the individual variance but retaining the group differences, as equation 3 shows:

$$\tilde{\mu}_i = C_i\hat{\beta} \text{ , (3)}$$

where $\tilde{\mu}_i$ is the counterfactual advantage level of individual i, according to her type, determined by the values observed in the circumstance vector C_i. The last step consists of estimating an inequality index over this counterfactual distribution and then dividing the resulting value by the value of the inequality index over the observed raw distribution of the advantage. This ratio is the lower bound of the share of total inequality represented by inequality of opportunity.

A restriction for the last step is that not all inequality measures fulfil all the properties desirable for a measure of inequality of opportunity. These properties are symmetry, the transfer principle (the index increases with any regressive transfer in the advantage variable); scale invariance; population principle; additive decomposability, taking a value of zero if $\{\tilde{\mu}_i\}$ follows a degenerate distribution (such that the weak criterion holds); and invariance to any permutation in the advantage variable between individuals of the same type (Ferreira, Gignoux and Aran, 2011). For continuous variables with arbitrary mean and dispersion,[15] Ferreira, Gignoux and Aran (2011) show that the variance, and in particular the R^2 , fulfil all these properties and thus they constitutes an adequate index for the estimation of share of total inequality explained by

[14] It is important to note that if the vector of circumstances is not made of the full set of circumstances, then part of the effect of circumstances on the advantage will be captured by *u*. Thus, the estimations of inequality of opportunity based on the coefficients in vector $\hat{\beta}$ can only be considered a lower bound of the true level of inequality of opportunity (Ferreira and Gignoux, 2011).

[15] By arbitrary we mean that the variables' summary measures depend on the criteria used to construct them. Such is the case, for instance, of wealth indices or indices based on test results.

inequality of opportunity.[16] As the advantage variable employed is a wealth index (described below), these measures will be employed.

3. Data

The main data source employed is the *2016 Intergenerational Social Mobility Module* of the *National Household Survey* (MMSI 2016) conducted by Mexico's National Institute of Statistics and Geography (INEGI). The survey is representative for the Mexican population (all genders) between 25 and 64 years old. Designed for the study of intergenerational social mobility, the survey has a large set of retrospective questions enabling it to capture information concerning the characteristics of the household of origin when the respondent was 14 years old, as well as the educational level and work characteristics of the respondent's parents. It also includes a colour palette designed to allow the self-identification of the respondent's skin colour. The palette corresponds to the tone categorization designed for the Project on Race and Ethnicity in Latin America (PERLA), (Telles, 2014), which was also used by Campos-Vázquez and Medina Cortina, (forthcoming). This allows us to compare our results with the recent studies on inequality of opportunity in Mexico and with Campos-Vázquez and Medina Cortina, (forthcoming).[17]

With information on the assets available both in the respondent's household of origin when she was 14 and her present household, we can construct wealth indices for both households. To do so we follow the common practice in mobility analysis of using Principal Components Analysis (PCA) (Torche, 2015; Mckensey, 2005; Vélez-Grajales, Campos-Vázquez and Huerta-Wong, 2013). It has to be noted that for the present purposes, the resulting indices were standardised to zero mean.

Table 1a. Binary variables for the wealth index of the origin household

Household had a stove	Household had a blender
Household had a washing machine	Household had cable TV
Household had a refrigerator	Household had clean water

[16] As the authors state, when a variable with mean zero is used as an outcome variable, it is not possible to compute the relative inequality measures, since most of them are divided by the mean. Also, if the variable includes negative values, then it is not possible to use logarithmic measures. The variance is both additively decomposable and translation invariant, rendering it suitable for the analysis of inequality of opportunity when variables' domains are not restricted to the strictly positive segment of the real line.

[17] It is worth noting that a difference between the data employed by Campos-Vázquez and Medina-Cortina (forthcoming) and the MMSI 2016 is that in the first case the interviewer reported the skin colour category of the respondent, while in the MMSI 2016 the skin color category was self-reported by the respondent. Specifically, the respondent was asked to compare the skin color of the inner part of the forearm with the colors present on the palette, and then select the closest one to the color observed.

Household had a television	Household had a landline telephone
Household had a computer	Household had electricity
Household had a DVD/VHS player	Household had a microwave
A member of the household owned real estate for commercial use	A member of the household owned another house/apartment (0,1)
A member of the household owned land for agricultural use	A member of the household owned land for a non-agricultural use
A member of the household owned an automobile	A member of the household owned a tractor
A member of the household owned draft animals	A member of the household owned stock animals
A member of the household had a bank account	A member of the household had a credit card

Table 1b. Binary variables for the wealth index of the current household

Household had a computer	Household had a blender machine
Household had a washing machine)	Household had internet service
Household had a refrigerator	Household had clean water access
Household had a DVD	Household had a landline telephone
Household had an automobile	Household had cable TV service
Household had a boiler	Household had land floor
Household had a microwave	Household had a bank account
Household had a stove	Household had a work vehicle
Household had a domestic employee	Household had a credit card
Either you or your partner/spouse own another house/apartment	Either you or your partner/spouse own real estate for commercial use
Either you or your partner/spouse own land for agricultural	Either you or your partner/spouse own land for non-agricultural uses
Household owns draft animals	Household owns stock animals

In order to take full advantage of the data set, we define several sets of circumstances. The first set corresponds to the one used by Ferreira and Gignoux (2011), so that it is possible to compare our results for inequality of opportunity with theirs. The second set of circumstances includes the origin household's wealth alongside those used in the previous set. A third set of circumstances adds the skin colour to the ones already mentioned.

The set of circumstances used by Ferreira and Gignoux, (2011) in their estimations of inequality of opportunity for Brazil, Colombia, Guatemala, Panama and Peru considers the following: parents' education, father's job status, indigenous status, sex, and whether the respondent lived in an urban or rural community.

For parental education they consider three categories: incomplete primary education, complete primary education, and complete secondary or upper levels of education. We also consider a more detailed categorization of parental education, which consist of six categories: no formal education, incomplete primary education, complete primary education, completed middle school, completed high school, college or graduate education. Furthermore, they consider two categories for the father's job status: agricultural workers and the rest of occupations. Indigenous status is defined as having at least one parent that speaks an indigenous language. The criterion to assign urban or rural status was defined in terms of the respondent's perceived population in the community where the respondent was born. If the perceived population was below 2,500 inhabitants, it is deemed a rural community. If the perceived population was above that number, the community is considered urban.

For the second circumstance set, which includes the household of origin's wealth, we consider two alternative measures. First, the quintile to which the household of origin belonged in the corresponding household wealth distribution. Second, taking full advantage of the fact that we are presenting only parametric estimations, we use the continuous range of the wealth index variable as circumstance, thus allowing for a finer partition of the population and a better grasp of the level of inequality of opportunity.

The third circumstance set includes the skin tone of the respondent. We consider two categorizations of the variable: the first one uses the full PERLA scale of 11 tones, which allows for a finer partition of the population. Our second categorization groups the 11 tones into three groups. We merge categories six to 11 of the PERLA scale, which correspond to the darker tones. The second category binds together categories three to five of the PERLA scale, which can be considered the *mestizo* tones. And finally, the two lightest tones in the PERLA scale, one and two, are grouped together[18]. For future reference, in table 2 we present a summary table with the composition of the distinct circumstance sets, according to the variables that compose each set and the classification scheme employed in each one.

[18] In the MMSI the scale of colors is inverted, in the sense that the two lightest colours correspond to tones 10 and 11, the intermediate colors go from 7 to 9 and the darkest tones correspond to values 1 to 6. We label all our graphs according to the PERLA scale to make comparison more easy with other studies that do not necessarily use the MMSI as its data source.

Table 2: Circumstance sets.

Set	Composition	Set	Composition
1	Set of circumstances used by Ferreira and Gignoux (2011)	5	Set 3 plus the skin tone variable using the full PERLA scale
2	Set 1 plus the position of the origin household in the corresponding wealth distribution.	6	Set 2 plus the skin tone variable with three categories
3	Set 1 plus the household wealth index of the origin household	7	Set 3 plus the skin tone variable with three categories
4	Set 2 plus the skin tone variable using the full PERLA scale	8	Set 7 using disaggregated variables for parental educational attainment.

Table 3 shows the sample proportions in the survey by specific circumstance categories. Among some noteworthy features, nearly three quarters of respondents report mestizo skin tones, about half are born un urban areas, and more than half grew up with fathers or mothers without complete primary education.

Table 3: Partition of the population by circumstances

Circumstances	Total sample
Skin colour group I (Categories 6-11 of PERLA scale)	20.3%
Skin colour group II (Categories 3-5 of PERLA scale)	72.7%
Skin colour group III (Categories 1-2 of PERLA scale)	7.0%
Born in urban setting.	51.1%
At least one parent speaks an indigenous tongue.	15.1%
Father was agricultural worker	25.9%
Father with no formal education	22.9%
Father with at most incomplete primary education	29.7%
Father with complete primary education.	21.9%
Father with complete secondary education.	11.3%
Father with complete tertiary education.	7.3%
Father with complete college education or more	6.9%
Mother with no formal education	27.3%

Mother with at most incomplete primary education	26.1%
Mother with complete primary education.	24.9%
Mother with complete secondary education.	11.4%
Mother with complete high school	6.5%
Mother with complete college education or more	3.8%
Women	52.5%

Notes: Born in urban setting is defined as those interviewees that considered the location where they were born as having more than 2,500 inhabitants (subjective response). Total number of observations: 22,063 respondents

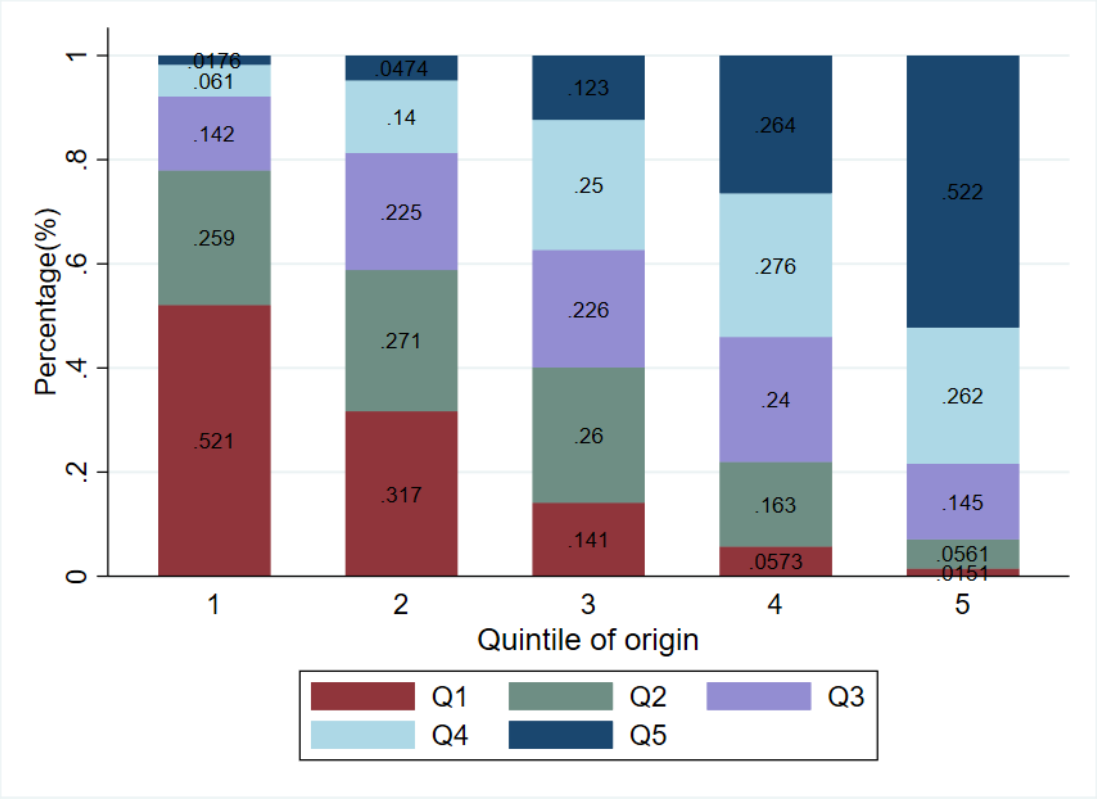
4. Results

The first subsection provides the social mobility and the inequality of opportunity analysis. We start with the inequality-of-opportunity results for the categorization that renders them comparable to those of Ferreira and Gignoux (2011) and Vélez-Grajales, Monroy-Gómez-Franco and Yalonetzky (2018) (the continuous wealth index case), respectively. Then we present the categorization that includes each skin colour variables, followed by our preferred categorization, which includes the disaggregated parental education variable, the continuous wealth index, and the grouped skin colour indicators. In the second subsection we delve in the role played by skin colour in determining both social mobility and inequality of opportunity, and its' relationship with the other circumstance variables.

4.1. Social mobility and inequality of opportunity.

Our first results concern the differences in social mobility, both in the aggregate population and by skin colour. Figure 1 shows the general transition matrix for the whole Mexican population from 25 to 64 years old. The data shows a substantial persistence at the extremes of the distribution of household wealth, which is consistent with has been previously documented in the literature (Vélez-Grajales and Monroy-Gómez-Franco, 2017). In the case of the first quintile, more than half of the population that started in such position remained there. The same occurs at the top quintile of the distribution, where more than a half of the population that had its origin in such quintile, stays there. This contrast heavily with what occurs in the three middle quintiles in which more fluidity is observed.

Figure 1: Transition matrix for the general population
(Percentage of the population in each quintile with respect to their quintile of origin)

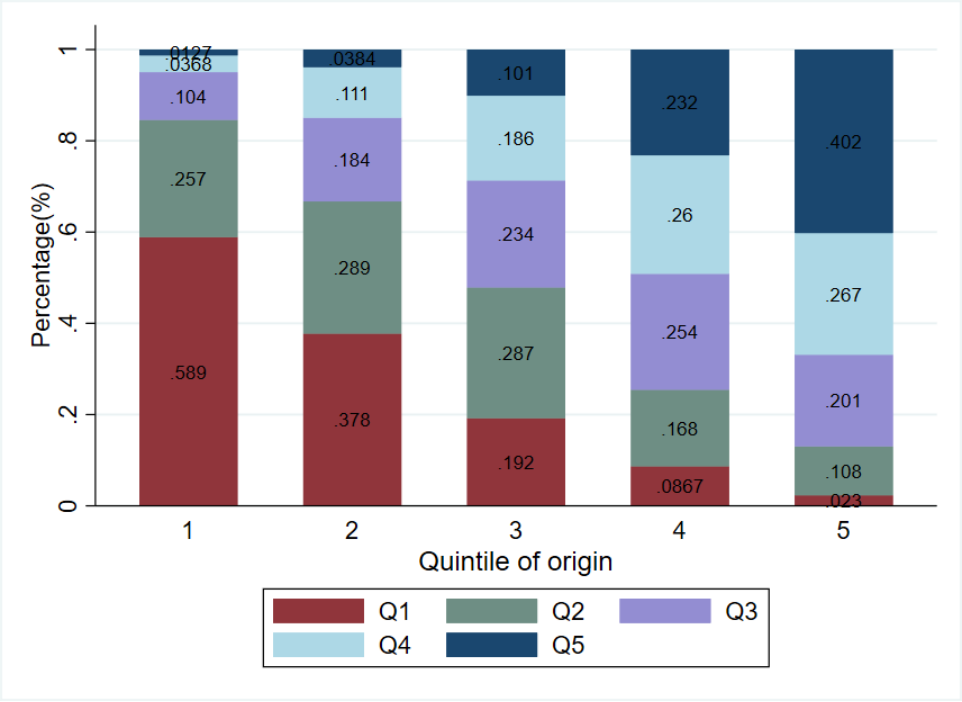


Source: Authors calculations with the MMSI 2016.

Another characteristic is that the reach of the upward mobility of those located at the bottom does not manage to put them at the top of the distribution, while at the same time, the reach of the downward mobility experienced by those at the top is also small. Around 1% of the population at the bottom quintile of the distribution reaches the fifth quintile of the distribution, and a very similar percentage falls from the fifth to the first quintile. This suggest a very rigid society in which opportunities are not equally distributed, which is consistent with has been reported in the literature on social mobility in Mexico.

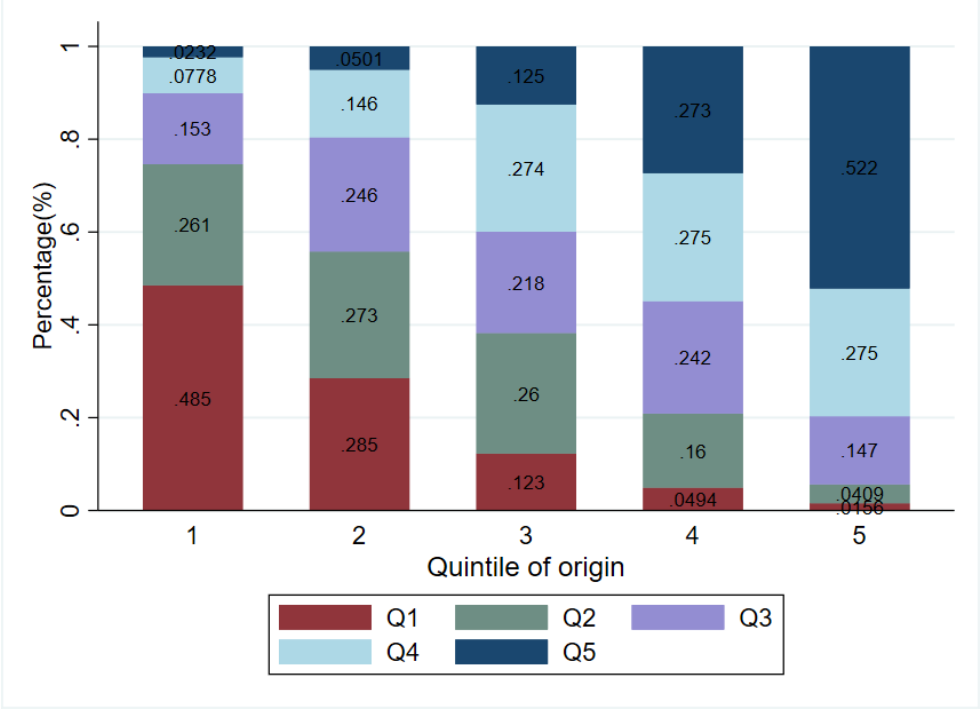
Figures 2-4 present the transition matrices for the three large categories into which we grouped the more disaggregated categories from the PERLA scale. The first thing to notice is that the transition matrix of the individuals with a "dark" skin shows more persistence at the bottom of the distribution than the distribution of the general population, while at the same time showing a lower degree of persistence at the top.

Figure 2: Transition matrix for the population with "dark" skin tones
(Percentage of the population in each quintile with respect to their quintile of origin)



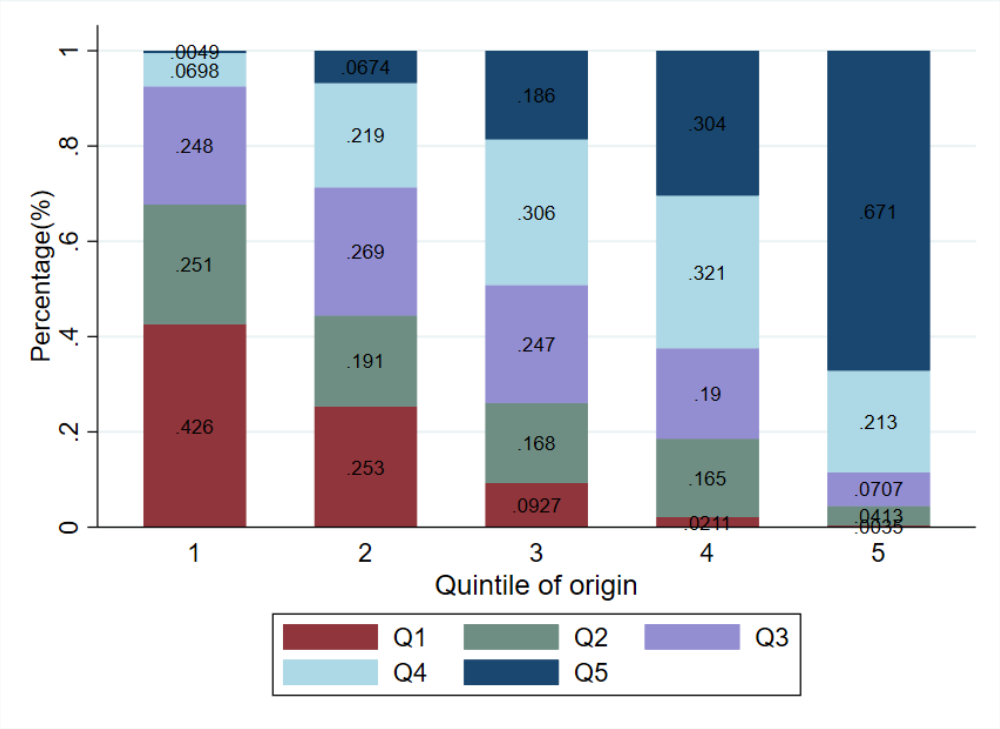
Notes: "Dark" skin tones correspond to the 6-11 categories of the PERLA scale in our analysis.
Source: Authors calculations with the MMSI 2016.

Figure 3: Transition matrix for the population with "medium" skin tones
(Percentage of the population in each quintile with respect to their quintile of origin)



Notes: "Medium" skin tones correspond to the 3-5 categories of the PERLA scale in our analysis.
Source: Authors calculations with the MMSI 2016.

Figure 4: Transition matrix for the population with "light" skin tones
(Percentage of the population in each quintile with respect to their quintile of origin)

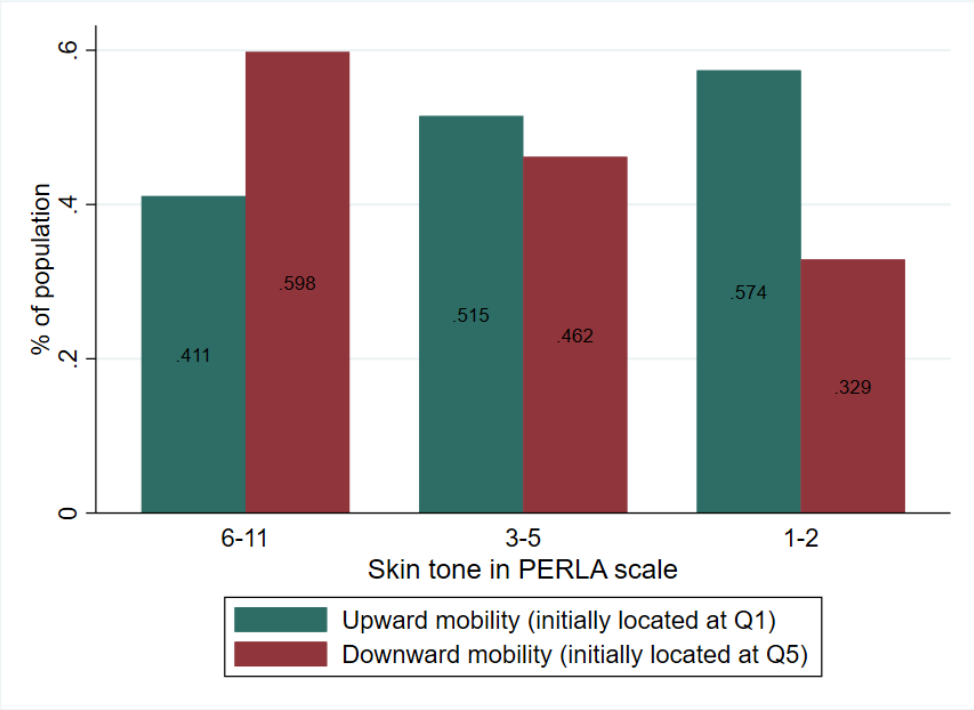


Notes: "Light" skin tones correspond to the 1-2 categories of the PERLA scale in our analysis.
Source: Authors calculations with the MMSI 2016.

This is a mirror image of the case of individuals with the "lighter" skin tones, for whom the rate of persistence at the top quintile of the distribution is substantially larger than at the bottom (67% vs 43%). Meanwhile the population with "medium" skin tones, which is the majority of the population, presents mobility rates closer to the average. Notice however, that notwithstanding skin tone, less than 2% of the population crosses the whole distribution in either direction. That is, in Mexico "rags to riches" and "riches to rags" stories are extremely uncommon.

Additionally, we find that individuals with "dark" skin tones face more obstacles to move upwards in the wealth distribution with respect to individuals with "light" skin tones, while simultaneously being less able to remain at the top of the distribution than those with "lighter" skin tones. This can be seen more clearly in figure 5, which shows the percentage of individuals who experience upward mobility having started at the first quintile, and the percentage of individuals who experience downward mobility having started at the top of the distribution.

Figure 5: Upward mobility from the bottom, downward mobility from the top
(Percentage of the population of each skin tone group in each quintile who experienced upward or downward mobility)



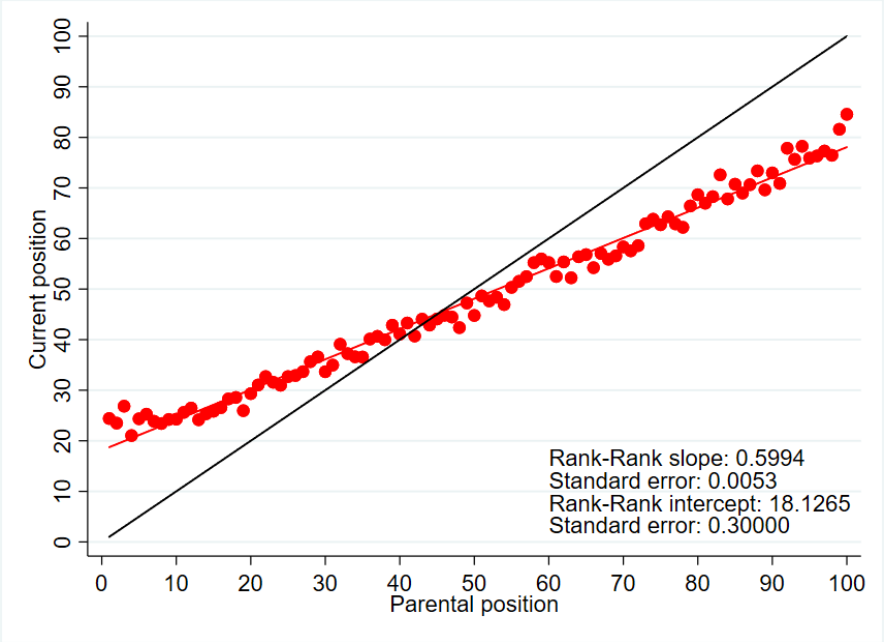
Notes: "Dark" skin tones correspond to 6-11 "medium" skin tones correspond to 3-5 and "light" skin tones correspond to the 1-2 categories of the PERLA scale in our analysis.
Source: Authors calculations with the MMSI 2016.

While a third of the individuals with light skin tones who started at the top of the distribution experienced downward mobility, almost twice as many percentage points of individuals with "dark" skin tones fell from such position in the distribution. In the other direction, individuals with lighter skin tones experienced upward social mobility starting from the bottom more frequently than individuals with "dark" skin tones, albeit the difference is not as big as in the case of downward mobility. As the transition matrix confirms, individuals with "medium" skin tones are the ones who observe a higher degree of fluidity through all the distribution. In a nutshell, as the skin tone becomes lighter, upward mobility increases and downward mobility decreases.

As a complementary analysis, we probe the existence of substantial differences in the degree of mobility by skin colour group, with scatter plots related to the rank-rank regressions. As Chetty et al. (2014) show, the rank-rank slope is not affected by changes in the variance of the origin and current outcome distributions, so it constitutes a simple way to summarize the degree of mobility in a society. Figure 6 corresponds to the total population, while figure 7 analyses the distinct rank-rank correlations by skin tone group.[19].

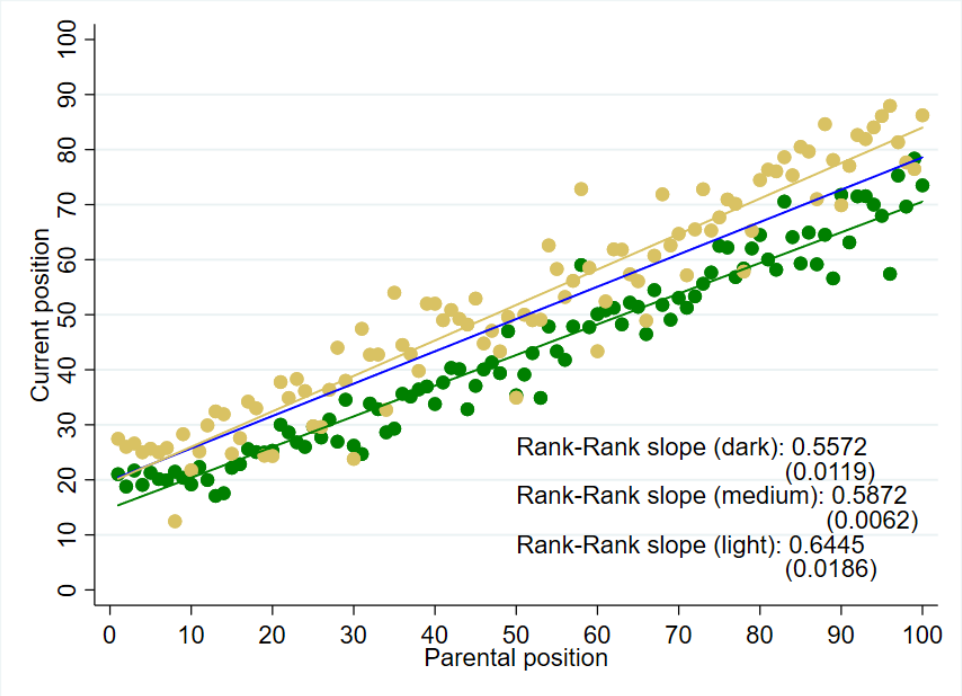
[19] The regression estimates for the OLS fit presented in both graphs are in the Appendix All mobility statistics and best-fit lines are estimated on the underlying microdata (not the binned means).

Figure 6: Rank-Rank regression of the total population
(Bin scatter plot by percentile)



Source: Authors calculations with the MMSI 2016.

Figure 7: Rank-Rank regression by skin colour group
(Bin scatter plot by percentile)



Note: The "dark" skin colour category groups categories 6-11 of the PERLA scale. The "medium" skin colour category groups categories 3-5 of the PERLA scale. The "light" skin colour category groups categories 1-2 of the PERLA scale.
Source: Authors calculations with the MMSI 2016.

In general, the rank-rank correlations show that there is a high degree of intergenerational persistence in terms of positions on the household wealth distribution. We test whether differences in the slope and intercept coefficients across skin-tone groups are statistically significant (see table 4). Wald test results show that, even though slopes from the regressions are not statistically different (and thus, we cannot distinguish in general between the degree of positional persistence across skin-tone groups), the intercepts are statistically different.

Table 4: Wald test on the significance of the differences between coefficients.

Null hypothesis	$\chi 2$ value	Probability
$\alpha_{0,d} = \alpha_{0,m} = \alpha_{0,l}$	55.76	0.0000
$\rho_{0,d} = \rho_{0,m} = \rho_{0,l}$	1.96	0.3748

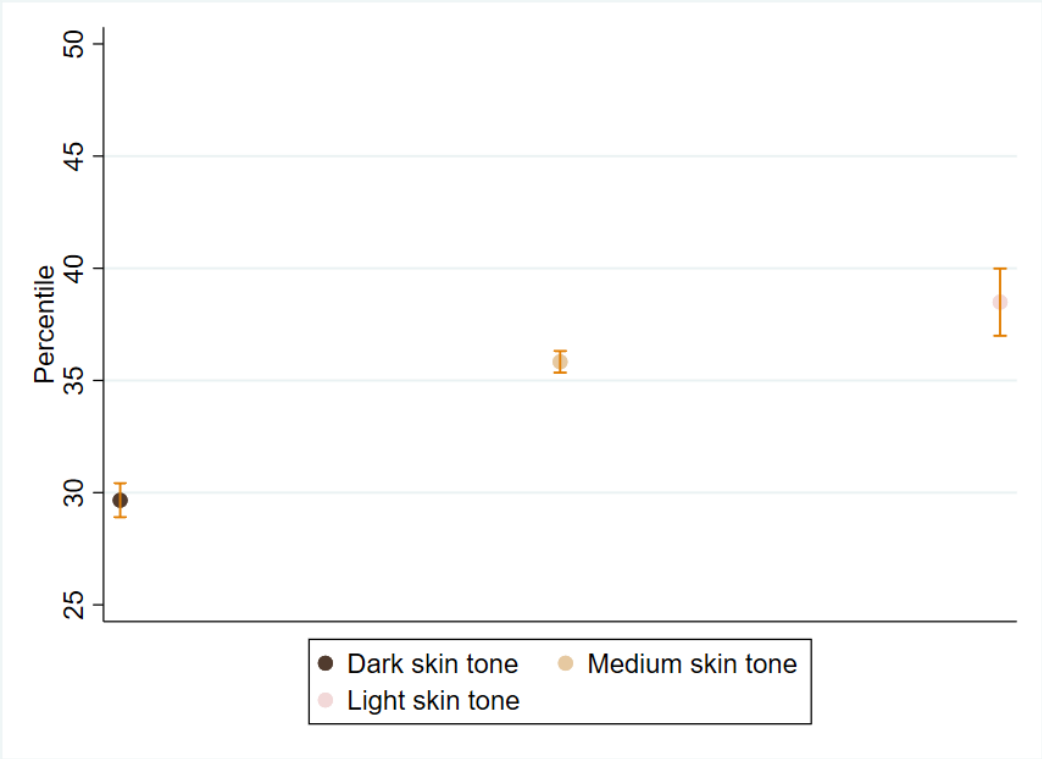
Note: Authors calculations based on data from the MMSI 2016. The regressions are estimated on the underlying microdata not the binned means.

Here we must note that rank correlation quantifies the degree of persistence for the whole distribution. Therefore, extant similarity between distributions across most of their common domain will be picked up by the summary statistic. As a result, the very similar degree of fluidity shown by all three skin tone transition matrices (Figures 2-4) in the middle part of the distribution (quintiles 2 to 4), translates into estimates of the respective rank-rank slopes which are statistically insignificantly different from each other. Thus, this statistic fails to capture the large persistence of statusfor light skin-tone individuals located at the top of the distribution, which we observed using transition matrices. Hence, the mobility profiles obtained from rank-rank correlations should be complemented with those observed from transition matrices.[20]

Meanwhile, as reported above, the intercepts are statistically significantly different across groups. Therefore, there are differences in the measures of absolute social mobility across skin-tone groups. For example, Figure 8 presents the estimates of the predicted rank in the current household wealth distribution for those located at the 25th percentile of the origins' household distribution alongside its standard errors. Conditional on being at the 25th percentile in the origin, individuals with a clearer skin tone have a higher expected rank with respect to those with a dark one. This suggests that individuals with a clearer skin tone have experienced a higher degree of upward absolute social mobility than those with dark skin tones, confirming the findings from the transition matrices.

[20] It is also worth noting that both the transition matrices and the Rank-rank correlations constitute the most robust statistics available with regards to life-cycle bias of the respondents.

Figure 8: Predicted rank for those individuals who started at the 25th percentile (Predicted percentile)



Note: The "dark" skin colour category groups categories 6-11 of the PERLA scale. The "medium" skin colour category groups categories 3-5 of the PERLA scale. The "light" skin colour category groups categories 1-2 of the PERLA scale. Standard errors in brackets.
Source: Authors calculations with the MMSI 2016.

The combined evidence from transition matrices and rank-rank regressions suggests a non-linear relationship between skin tone and social mobility. In particular, there seems to exist a larger gradient of influence by skin colour at the extremes of the distribution, while in the middle (and thus the largest number of individuals for the present case) similar degrees of fluidity regardless of skin tone prevail across groups. This pattern suggests that skin colour constitutes one of the circumstances according to which opportunities are distributed among Mexican society.

Table 5 shows results for the share of total inequality on the household assets distribution explained by inequality of opportunity.[21] Estimations are performed with eight different sets of circumstances (see details on Table 2). Set 1 includes the same circumstances used by Ferreira and Gignoux (2011). The subsequent sets include more circumstances variables; in some cases, just by using different variable categorizations. The following results are noteworthy: Firstly, using Set 1, the share represented by inequality of opportunity (0.3267) in Mexico is one of the largest among the countries analysed by Ferreira and Gignoux (2011). Secondly, once the origin wealth index is added as a circumstance (Sets 2 and 3), the share of inequality of opportunity

[21] The regressions required for the first part of the estimation of the level of inequality of opportunity appear in the Appendix.

increases significantly: from 0.3267 to over 0.42. Thirdly, keeping the wealth index as one of the variables in the estimation, skin tone increases the share of inequality of opportunity, but only marginally (Sets 5 to 7).

Table 5: Parametric estimations of inequality of opportunity.

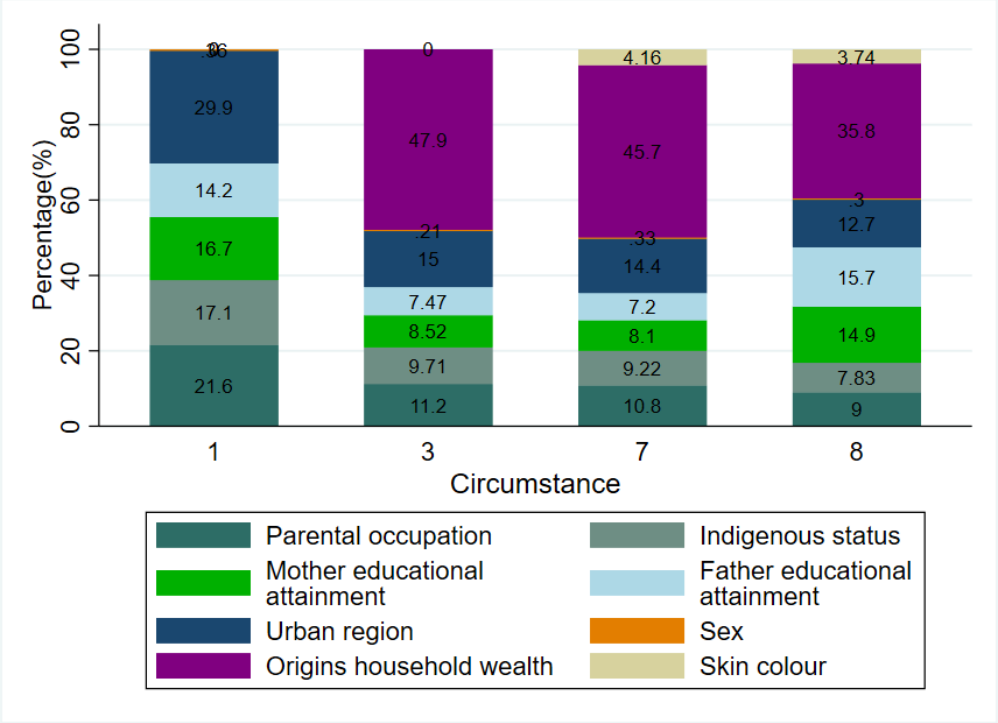
Set of circumstance variables	Set 1	Set 2	Set 3	Set 4
IOR_{VAR}	0.3267 (0.0096)	0.4206 (0.0090)	0.4261 (0.0088)	0.4320 (0.0088)
Set of circumstance variables	Set 5	Set 6	Set 7	Set 8
IOR_{VAR}	0.4378 (0.0086)	0.4312 (0.0086)	0.4373 (0.0089)	0.4477 (0.0091)

Notes: IOR_{VAR} stands for the ratio of the variance explained by the circumstances to the total variance of the wealth index distribution. That is, the R^2 of the regression of the wealth index on the circumstance variables. Bootstrap standard errors in parentheses, calculated with 1000 repetitions.

Figure 9 shows the contribution of each circumstance to inequality of opportunity for sets 1, 3, 7, and 8 according to the Shapley decomposition method. We knew from Table 5 that including wealth of origin increases the share of inequality of opportunity in total wealth inequality, but now comparing the columns of sets 1 against 3, we note that wealth of origin features the largest contribution to inequality of opportunity among the observed circumstances in the set. By contrast, the columns of sets 7 and 8 tell us that the contribution of skin tone is among the least important; only greater than sex.

The fact that skin tone ends up having a residual effect once origin household wealth and parental education are considered is surprising, given the results obtained for social mobility.. The association between lighter skin tones and higher persistence at the top and higher social mobility rates would suggest that skin tone is one of the main circumstances that generate an unequal distribution of opportunities in Mexico. Its seemingly marginal contribution to the lower bound estimation of inequality of opportunity leads us to question whether skin tone actually provides new information to the estimation in statistically significant terms, i.e. above and beyond the information captured by household of origin wealth and the rest of circumstance variables.

Figure 9: Contributions to inequality of opportunity by specific circumstance and sets



Notes: The numbers on the x-axis correspond to the circumstance sets as defined in table 3.
Source: Authors calculations with the MMSI 2016.

To do so, we perform two likelihood ratio tests. First, we consider as the restricted model the one that only considers the circumstances employed by Ferreira and Gignoux (2011), i.e. set 1, while the unrestricted model includes the wealth index of the origin household (set 3) and the position of the origin household in the corresponding wealth distribution (set 2). The second test considers as the restricted model the one that excludes the skin tone and considers the wealth index in the two forms respectively, together with the Ferreira and Gignoux (2011) circumstance variables (sets 2 and 3), while the unrestricted model includes the skin tone (sets 6 and 7). The results of these tests are shown in table 4.

Table 4: Likelihood ratio test

Models tested	$\chi 2$ value	Probability
Unconstrained model: Circumstance set 2 Constrained model: Circumstance set 1	3238.23	0.0000
Unconstrained model: Circumstance set 3 Constrained model: Circumstance set 1	3471.33	0.0000
Unconstrained model: Circumstance set 6 Constrained model: Circumstance set 2	308.55	0.0000
Unconstrained model: Circumstance set 7 Constrained model: Circumstance set 3	288.31	0.0000

Authors calculations.

Our results show that including both the origin household wealth and the skin colour variables add information to the model, so that they should be included in the analysis of inequality of opportunity. Although this was clear from our decomposition analysis for the case of the origin household wealth, our test shows that including skin colour adds new information. Therefore, even though skin colour determines the unequal distribution of opportunities in Mexico, it seems to be only a residual determinant. This seems counterintuitive next to the clear skin tone gradient observed in the social mobility analysis; and begs the question as to what explains the less relevant role of the skin tone in producing inequality of opportunity.

We now check whether the inclusion of another circumstance variable leads to an upward bias of the lower bound of inequality of opportunity in Mexico. As discussed in previous sections, the impossibility of accounting for all the circumstances that exert an influence on the live of a person generates a downward bias in the estimations, as the effect of the non-considered circumstances ends up being accrued by the individual variation instead of the between-types variation. However, as Brunori et al. (2016) point out, increasing the number of variables measuring circumstances may generate an upward bias in the estimations due to the positive effect of ensuing finer sample partitions on the variance. As a criterion to choose the best specification, they propose to perform a cross-validation test and select the model that minimizes the mean square error. Table 5 presents the mean square errors of each model. The minimum square error is minimized with the models that include skin colour. Thus, we can conclude that the estimations do not suffer from an upward bias.

Table 5: Mean square error

Set 1	**Set 2**	**Set 3**
0.849	0.788	0.784
Set 6	**Set 7**	**Set 8**
0.781	0.777	0.765

Authors calculations.

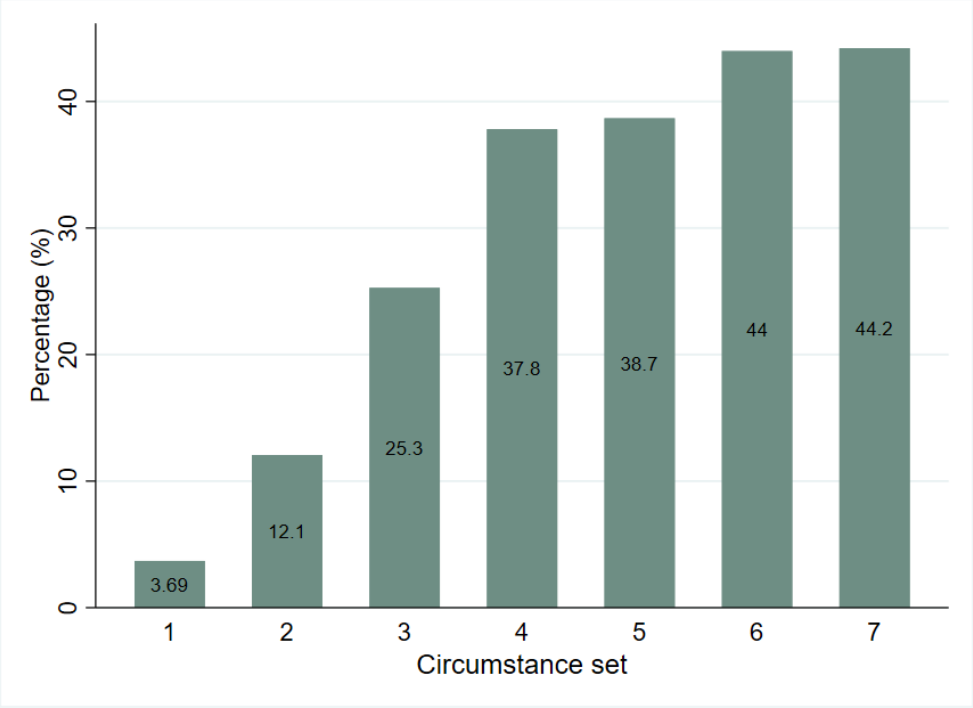
4.2. Layers of inequality of opportunity: skin colour and household wealth.

What if skin colour operates through a different channel? Or, moreover, what if skin colour operates through other circumstances? The latter would imply that, for example, skin colour could be one of the main determinants of the distribution of education and wealth, which in turn increase the degree of inequality of opportunity. As Navarrete (2016) states, this would explain the association between light skin colour and "higher social status" (in terms of wealth and education) observed in Mexico. If that were the case, the minor effect of skin colour observed in

our analysis would represent an underestimation of the total effect which would operate partially through some of the other origin circumstances; thus remaining hidden.

In order to test this hypothesis, the circumstance variables are included progressively in the model, computing in each case the share of the effect that corresponds to each of them. If the hypothesis held, including skin colour alone, or alongside indigenous status, should yield a value for the share of inequality of opportunity not too different from the one produced by the model estimated with all circumstances (skin colour, indigenous status, origin wealth, parental education and parental occupation). Figure 10 presents model results by adding circumstances variables in the following sequence: sex and skin tone (set 1); indigenous status (set 2); community of origin (set 3); parental education (set 4); father's occupation (set 5); and origin wealth (sets 6 and 7).

Figure 10: Inequality of opportunity
(Proportion of inequality in household wealth explained by circumstances)

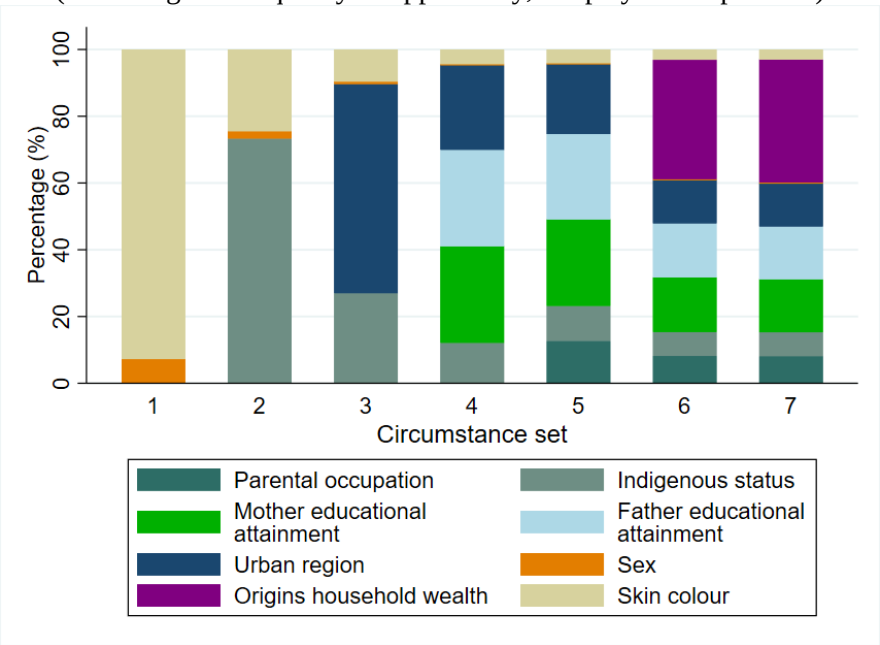


Notes: The circumstance sets are composed as follows: Set 1 includes sex of the respondent and the skin tone variable with three categories. Set 2 adds to set 1 the indigenous status variable. Set 3 adds to set 2 the type of community of origin (urban or rural). Set 4 adds to set 3 the disaggregated variable of parental education. Set 5 adds to set 4 the variable of occupational sector of the father. Set 6 adds to set 5 the position of the origin household in the household wealth distribution. Set 7 adds to set 5 the value of the household wealth index. The corresponding regressions are included in the appendix.
Source: Authors calculations with the information of the MMSI 2016.

As figure 10 shows, including only skin colour (and sex) as circumstance variable explains little of the inequality of opportunity observed in Mexico once the full set of circumstance variables are included. If the distribution of household wealth were based on people's skin tone, the

difference between the share of total inequality explained by set 1 and by set 6, or set 7, should not be so large, as skin tone would be capturing nearly the same variability as household-of-origin's wealth. The same argument applies to both parental education and parental occupation. Thus, the hypothesis that different rates of social mobility by skin tone reflects this pre-distribution of advantages by skin tone is not supported by the data under the scheme of the selected model. Figure 11 shows the Shapley decomposition of each bar of Figure 10 into the contributions of its included circumstance variables.

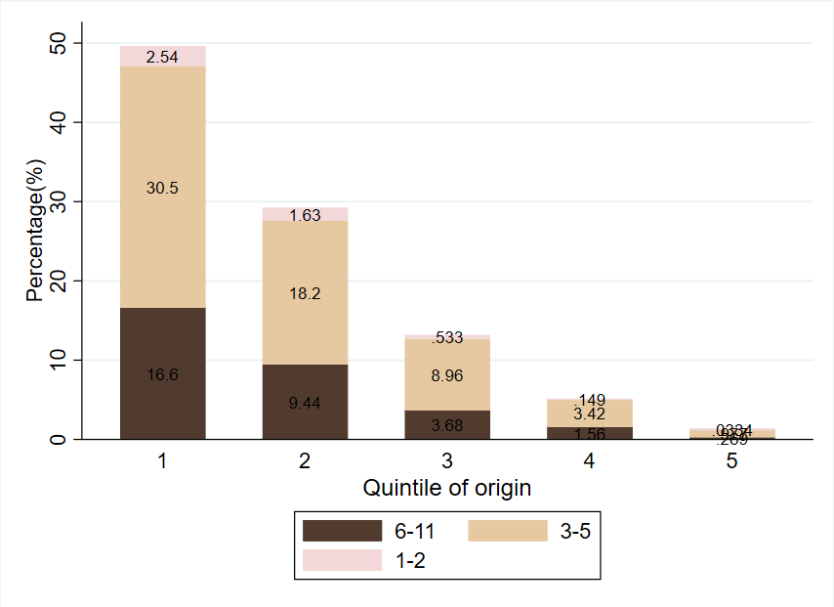
Figure 11: Contributions to inequality of opportunity by specific circumstance and sets
(Percentage of inequality of opportunity, Shapley decomposition)



Notes: The circumstance sets are composed as follows: Set 1 includes sex of the respondent and the skin tone variable with three categories. Set 2 adds to set 1 the indigenous status variable Set 3 adds to set 2 the type of community of origin (urban or rural). Set 4 adds to set 3 the disaggregated variable of parental education. Set 5 adds to set 4 the variable of occupational sector of the father. Set 6 adds to set 5 the position of the origin household in the household wealth distribution. Set 7 adds to set 5 the value of the household wealth index.
Source: Authors calculations with the information of the MMSI 2016.

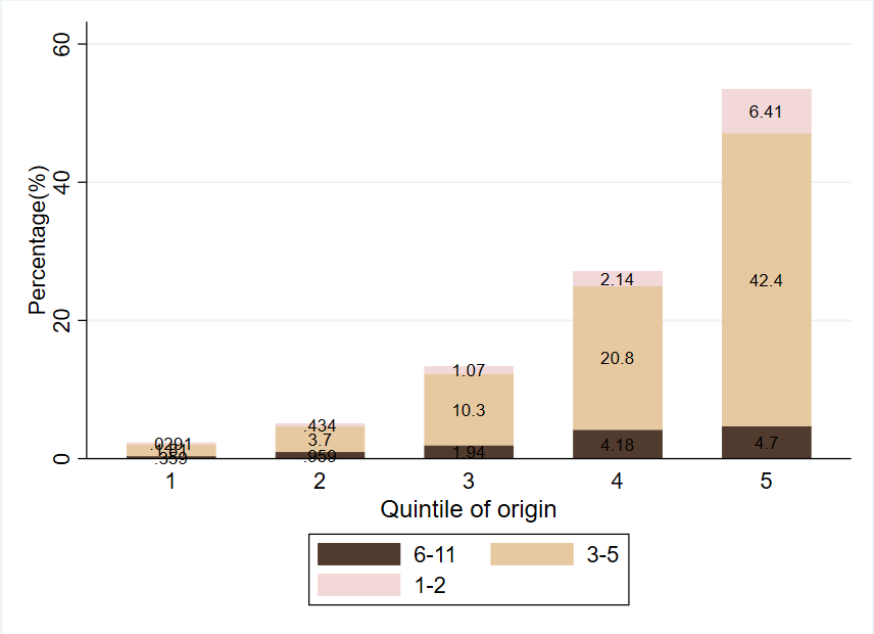
An alternative hypothesis is that skin colour acts as a secondary variable upon which the Mexican society is stratified. That is, skin colour matters in terms of inequality of opportunity and social mobility only after disparities in education and wealth have stratified Mexican society, as these variables explain the main share of the lower bound of inequality of opportunity (as shown in Figure 10 and 11). This would explain the large differences in social mobility rates by skin colour at the extremes of the wealth distribution (Figures 2 to 4). To provide more evidence in this sense, Figures 12 and 13 decompose the top and bottom quintiles of the respondents' wealth distribution according to the quintile of origin and skin colour.

Figure 12: Skin tone composition of the first quintile of the wealth distribution
(Percentage of the population of each skin tone and their quintile of origin in the first quintile)



Notes: "Dark" skin tones correspond to 6-11 "medium" skin tones correspond to 3-5 and "light" skin tones correspond to the 1-2 categories of the PERLA scale in our analysis.
Source: Authors calculations with the MMSI 2016.

Figure 13: Skin tone composition of the fifth quintile of the wealth distribution
(Percentage of the population of each skin tone and their quintile of origin in the fifth quintile)

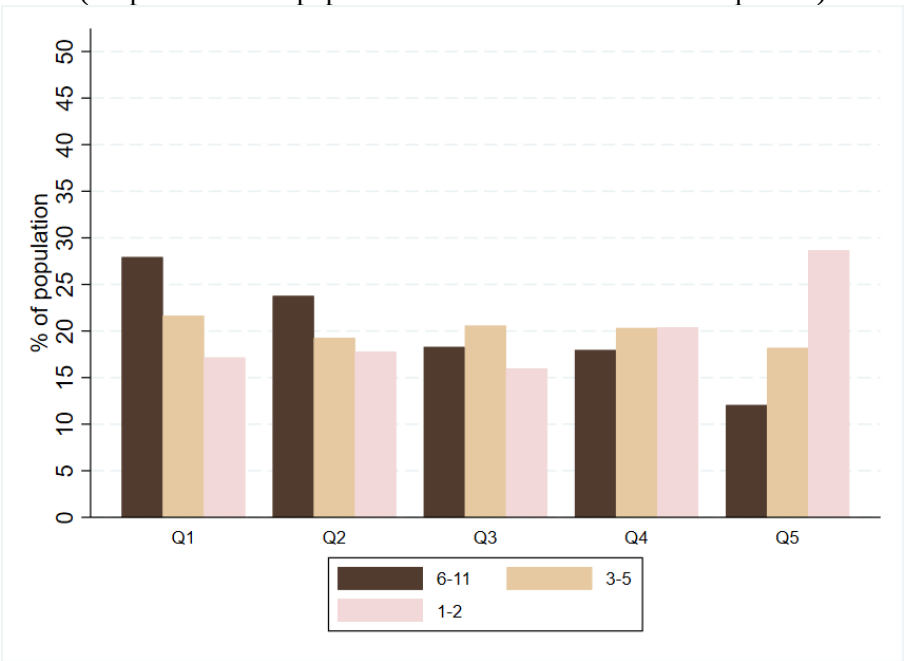


Notes: "Dark" skin tones correspond to 6-11 "medium" skin tones correspond to 3-5 and "light" skin tones correspond to the 1-2 categories of the PERLA scale in our analysis.
Source: Authors calculations with the MMSI 2016.

As documented in the transition matrix for the general population (Figure 1), the persistence of household wealth position is substantial at both extremes of the distribution, as the majority of individuals located both at the top and the bottom come from the same position in terms of their household of origin. However, Figures 12 and 13 show another important feature, which is that the skin colour composition of the top and bottom quintiles is radically different. As figure 12 shows, less than 5% of those located at the bottom of the household wealth distribution are part of the lightest skin colour group. Meanwhile, around 30% are from the darkest skin tone group, of which around half come from origin households at the same position. As a contrast, in the case of the top quintile, less than 10% of those located in that position are part of the darkest skin colour group, whereas 8% are part of the lightest skin tone group.

It is also important to note that the proportion of individuals from the darkest skin tone group that were already born in such position is very similar to the proportion of individuals from the same skin tone group that moved upwards from other quintiles. While in the case of the lightest skin tone group, most of the individuals that currently are at the top, were already born there. This suggest that the skin tone pattern in terms of the skin colour observed in the transition matrices has more to do with the persistence of economic position than with rigid barriers imposed by the skin tone. This would also explain the distribution of each skin tone group through the origin households, which is shown in Figure 14.

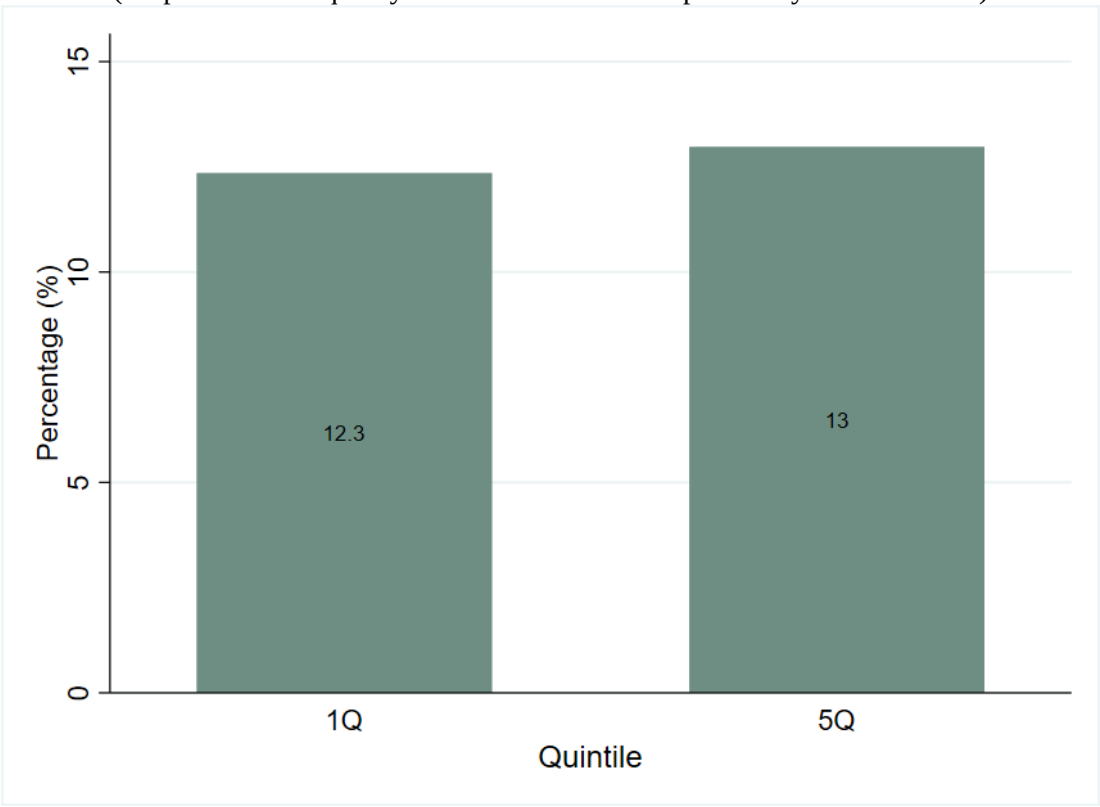
Figure 14: Skin colour and initial wealth
(Proportion of the population of each skin tone in each quintile)



Notes: “Dark” skin tones correspond to 6-11 “medium” skin tones correspond to 3-5 and “light” skin tones correspond to the 1-2 categories of the PERLA scale in our analysis.
Source: Authors calculations with the information of the MMSI 2016.

Figure 14 shows that the lightest skin tone group is heavily concentrated at the top quintile of the origin wealth distribution, while the darkest tone group is concentrated at the bottom of it. Given the persistence rates observed in the Mexican economy with respect to the position on the household wealth distribution, this concentration at the extremes will replicate itself through time, just because of the persistence of wealth status. This does not mean that skin tone does not matter, but that the primary source of stratification in Mexico is wealth. A way to observe this is by analyzing inequality of opportunity inside each one of the quintiles, particularly at the top and bottom quintiles. Since inside each quintile the individuals come from more homogenous households in terms of wealth of the origin household, we expect other circumstances to have a greater weight in explaining within-quantile variability, among which, skin colour is included. This exercise is performed in Figures 15 and 16.

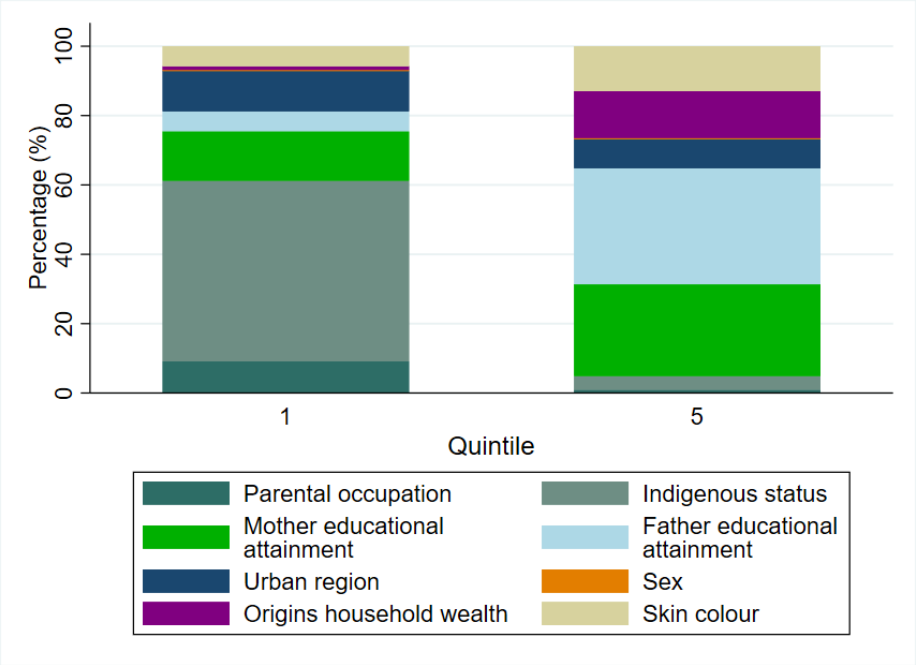
Figure 15: Inequality of opportunity inside the first and fifth quintile
(Proportion of inequality in household wealth explained by circumstances)



Notes: The circumstance set employed corresponds to the set 8 in table 2.
Source: Authors calculations with the information of the MMSI 2016.

Firstly, note that the share of total within-quantile inequality in current household wealth explained by circumstances (around 13%) is very similar between both extreme quantiles of origins. Such fact confirms that inequality in origin wealth is one of the main drivers of inequality in Mexico. It is worth emphasizing that we are including as a circumstance variable the index of the origins household wealth, so that we are accounting for inequality in wealth inside the quintiles.

Figure 16: Contributions to inequality of opportunity by specific circumstance and sets
(Percentage of inequality of opportunity, Shapley decomposition)



Notes: The circumstance sets employed corresponds to set 8 in table 2.
Source: Authors calculations with the information of the MMSI 2016.

Secondly, note that, inside each quintile, skin colour has a more substantial role. In the case of the first quintile, almost half of the lower bound of the inequality explained by circumstances is driven by indigenous status and by skin colour, while origin household wealth only explains a marginal part. At the top, skin colour explains a very similar proportion than differences in origin household wealth, while the main driver of the difference is parental educational attainment.

5. Conclusion

We sought to analyse the role played by skin colour as a circumstance variable (partly) explaining the share of inequality of opportunity in total inequality. Given the intimate relationship between inequality of opportunity and social mobility, by the fact that the former determined the latter, we built social mobility transition matrices before estimating inequality of opportunity in Mexico.

Controlling for three categories of skin tone, our results show that skin colour makes a difference in terms of relative intergenerational social mobility. In particular, those with “dark” skin tone experienced lower upward mobility from the bottom of the wealth ladder compared to people with “light” skin tone. At the same time, those with “dark” skin tone also show a higher rate of downward mobility from the top of the wealth ladder.

In the second part of the study, we found that even though the contribution of skin tone to inequality of opportunity is statistically significant, its small magnitude (particularly vis-à-vis other circumstance variables) contrasts with the noteworthy role of skin tone in producing differential trends of social mobility in wealth. Meanwhile, when added, wealth of origin both increases significantly and becomes the most important contributor to the share of inequality of opportunity.

While only suggestive, our results do not point to a major role of skin tone as a source of inequality of opportunity in wealth in Mexico. Neither directly nor indirectly through its correlation with family background circumstances like wealth, parental education or occupation. It would seem then that, unlike the neighbouring country north of the Rio Grande, suppressing colour discrimination in Mexico could have at best a minor instrumental role in reducing inequality of opportunity (while being intrinsically warranted and necessary). Rather, tackling the economic inequalities in family circumstances (wealth, parental background, etc.) appears to be a more promising route.

References

Aguilar, Rosario (2011). "The Tones of Democratic Challenges: Skin Color and Race in Mexico." Centro de Investigación y Docencia Económicas (CIDE), Working Paper No. 231.

Arceo-Gomez, Eva, and Raymundo M. Campos-Vazquez (2014). "Race and Marriage in the Labor Market: A Discrimination Correspondence Study in a Developing Country." *The American Economic Review*, vol. 104, no. 5, pp- 376-380.

Bhattacharya, Debopam and Bhaskar Mazumder (2011) "A nonparametric analysis of black-white differences in intergenerational income mobility in the United States" *Quantiative Economics*, vol. 2, no. 3, pp. 335-379.

Bourguignon, Francois, Francisco H.G. Ferreira and Marta Menéndez (2007) "Inequality of Opportunity in Brazil" *Review of Income and Wealth*, vol. 53, no. 4, pp. 585-618.

Brunori, Paolo; Francisco H.G. Ferreira, and Vito Peragine (2013) "Inequality of opportunity, income inequality, and economic mobility: some international comparisons", chapter 5 in Paus, Eva (editor) *Getting development right*, Springer.

Brunori, Paolo; Vito Peragine and Laura Serlenga. (2016). "Upward and downward bias when measuring inequality of opportunity" ECINEQ Working Paper #2016-406, ECINEQ.

Bustos, Alfredo and Gerardo Leyva (2017) "Towards a More Realistic Estimate of the Income Distribution in Mexico", vol. 8, no. 1, pp. 114-126.

Campos-Vázquez, Raymundo and Eduardo Medina-Cortina (2018). "Identidad social y estereotipos por color de piel. Aspiraciones y desempñeo en jóvenes mexicanos" *El Trimestre Económico,* vol. 85, no. 1, pp. 53-79.

Campos-Vázquez, Raymundo and Eduardo Medina-Cortina (forthcoming). "Skin Color and Social Mobility; Evidence from Mexico" *Demography*.

Campos-Vázquez, Raymundo; Juan Huerta-Wong y Roberto Vélez-Grajales, *Movilidad social en México: constantes de la desigualdad*, México: Centro de Estudios Espinosa Yglesias

Carvalho, Alexandre, and Marcelo Neri (2000), "Mobilidade Ocupacional e Raça: Origens, Destinos e Riscos dos Afro-Brasileiros". *Ensaios Econômicos*, nº 392, EPGE/Fundação Getulio Vargas Editora

Castillo Negrete Rovira, Miguel (2017) "Income inequality in Mexico, 2004-2014" *Latin American Policy*, vol. 8, no. 1, pp. 93-113.

Checchi, Daniele and Vito Peragine. (2010). "Inequality of Opportunity in Italy" *Journal of Economic Inequality*, vol. 8, no. 4, pp. 429-150.

Chetty, Raj; Nathaniel Hendren, Patrick Kline and Emmanuel Saez (2014) "Where is the land of Opportunity? The Geography of Intergenerational Mobility in the United States" *The Quarterly Journal of Economics,* vol. 129, no.4, pp. 1553-1623.

Costa, Carlos (2006). "Class, race, and social mobility in Brazil" *Dados,* vol. 49, no. 4, pp. 833-873.

Ferreira, Francisco H.G. and Jeremie Gignoux (2011) "The measurement of inequality of opportunity: Theory and an application to Latin America" *Review of Income and Wealth,* vol. 57, no. 4, pp. 622-657.

Ferreira, Francisco H.G. and Vito Peragine. (2016). "Individual responsibility and equality of opportunity" in Adler, Matthew and Marc Fleurbaey (eds.) *The Oxford Handbook of Well-being and Public Policy,* Oxford: Oxford University Press, pp. 746-784.

Ferreira, Francisco H.G., Jeremie Gignoux and Meltem Aran. (2011). "Measuring Inequality of Opportunity with imperfect data: The case of Turkey" *Journal of Economic Inequality,* vol. 9, no. 4, pp. 651-680.

Ferreira Sergio and Fernando Veloso (2006) "Intergenerational mobility of wages in Brazil" *Brazilian Review of Econometrics,* vol. 26, no. 2, pp. 181-211.

Flores, René, and Edward Telles (2012). "Social stratification in Mexico disentangling color, ethnicity, and class." *American Sociological Review*, vol. 77, no. 3, pp. 486-494.

Hasenbalg, Carlos and Nelson do Valle Silva(eds.). (1988), Estrutura Social, Mobilidade e Raça. Rio de Janeiro: Iuperj/Vérti

Hasenbalg Carlos; Marcia Lima, Márcia and Nelson do Valle Silva (1999), Cor e Estratificação Social. Rio de Janeiro, Contracapa.

Kanbur Ravi and Adam Wagstaff. (2016) "How Useful Is Inequality of Opportunity as a Policy Construct?". in Basu Kaushik and Joseph Stiglitz, (eds) Inequality and Growth: Patterns and Policy. International Economic Association Series. Palgrave Macmillan, London, pp. 131-150.

Marrero, Gustavo and Juan Rodriguez (2013) "Inequality of Opportunity and Growth" *Journal of Development Economics*¸vol. 104, pp. 107-122.

Mazumder, Bhashkar (2014). "Black-White differences in intergenerational economic mobility in the U.S." Economic Perspectives, no. 38, pp. 1-18.

Lefranc, Arnaud; Nicolas Pistolesi and Alain Trannoy. (2008). "Inequality of Opportunities vs. Inequality of Outcomes: Are Western Societies All Alike?" *Review of Income and Wealth,* vol. 54, no. 4, pp. 513-546.

McKenzie, David (2005). "Measuring Inequality with Asset Indicators." *Journal of Population Economics,* vol. 18 no. 2, pp. 229–60.

Navarrete, Federico (2016), México racista. Una denuncia. Mexico City, Mexico: Grijalbo.

Ramos, Xavier and Dirk van de gaer. (2015). "Approaches to inequality of Opportunity: Principles, measures and Evidence" *Journal. of Economic Surveys,* vol. 30, no. 51, pp. 855-883.

Reyes, Miguel; Graciela Teruel and Miguel López. (2017). "Measuring true income inequality in Mexico", *Latin American Policy,* vol. 8, no. 1, pp. 127-148.

Roemer, John. (1993). "A Pragmatic Theory of Responsibility for the Egalitarian Planner." *Philosophy & Public Affairs,* vol. 22, no. 2, pp. 146-166.

Roemer, John. (1998). *Equality of Opportunity*. Cambridge, MA: Harvard University Press.

Roemer, John and Alain Trannoy. (2015). "Equality of Opportunity" in Atkinson, Anthony and Francois Bourguignon (ed.). *Handbook of Income Distribution*, Amsterdam, Holland: Elsevier, vol. 2, pp. 217-300.

Serrano, Julio and Florencia Torche (eds.) (2010). *Movilidad social en México: Población, desarrollo y crecimiento*" México, D.F.: Centro de Estudios Espinosa Yglesias.

Telles, Edward (Ed.) (2014). Pigmentocracies: Ethnicity, Race, and Color in Latin America. The University of North Carolina Press.

Torche, Florencia (2015). "Intergenerational Mobility and Gender in Mexico." *Social Forces*, vol. 94, no. 2, pp. 563-587.

Van de Gaer, Dirk. (1993). "Equality of Opportunity and Investment in Human Capital." Ph.D. dissertation. Katholieke Universiteit Leuven.

Vélez-Grajales, Roberto and Luis Monroy-Gómez-Franco. (2017). "Movilidad social en México: Hallazgos y pendientes", *Revista de Economía Mexicana. Anuario UNAM*, no. 2, pp. 97-142.

Vélez-Grajales, Roberto, Luis Monroy-Gómez-Franco and Gastón Yalonetzky (forthcoming). "Inequality of Opportunity in Mexico", *Journal of Income Distribution.*

Velez-Grajales, Roberto, Raymundo Campos-Vazquez and Juan E. Huerta-Wong (2014). *Report on Social Mobility in Mexico: Imagine Your Future*. Mexico: The Espinosa Yglesias Research Centre (CEEY).

Vélez Grajales, Roberto; Juan Enrique Huerta Wong y Raymundo Campos Vázquez (eds.) (2015). *México: ¿El motor inmóvil?,* México, Centro de Estudios Espinosa Yglesias

Villarreal, Andrés (2010). “Stratification by Skin Color in Contemporary Mexico.” *American Sociological Review*, vol. 75, no. 5, pp. 652–78.

Wendelspiess-Chávez-Juárez, Florian. (2015). “Measuring Inequality of Opportunity with Latent Variables”, *Journal of Human Development and Capabilities: A Multi-Disciplinary Journal of People Centered Development,* vol. 16, no. 1 pp. 106-121.

Appendix:

A1: Rank-rank regressions

Variables	Total population	"Dark" skin tone group	"Medium" skin tone group	"Light" skin tone group
		Dependent variable: Rank position of the current generation		
Rank of the origin household	0.5994***	0.5572***	0.5871***	0.6454***
	(0.0053)	(0.0189)	(0.0062)	(0.0186)
Intercept	18.1265***	14.8097***	19.8514***	19.5363***
	(0.3001)	(0.5877)	(0.3643)	(1.1339)
Observations	22,063	4,631	15,877	1,555
R-squared	0.3697	0.3218	0.3596	0.4358

Notes: The "dark" skin colour category groups categories 6-11 of the PERLA scale. The "medium" skin colour category groups categories 3-5 of the PERLA scale. The "light" skin colour category groups categories 1-2 of the PERLA scale. Robust standard errors in parenthesis. *** p<0.01, ** p<0.05, * p<0.1.

A2: Regression of household wealth index of the respondent on different sets of circumstances

Variables	Set 1	Set 2	Set 3	Set 6	Set 7
			Dependent variable: Household wealth index of the respondent		
Father with completed primary education.	0.149***	0.0228	0.0272	0.0247	0.0293
	(0.0238)	(0.0225)	(0.0223)	(0.0223)	(0.0222)
Father with complete secondary or above education level	0.282***	0.0782***	0.0649***	0.0807***	0.0678***
	(0.0235)	(0.0221)	(0.0217)	(0.0219)	(0.0216)
Mother with completed primary education.	0.241***	0.0619***	0.0599***	0.0605***	0.0593***
	(0.0231)	(0.0221)	(0.0217)	(0.0220)	(0.0216)
Mother with complete secondary or above education level	0.419***	0.125***	0.0995***	0.114***	0.0897***
	(0.0247)	(0.0235)	(0.0234)	(0.0233)	(0.0232)
Born in urban setting	0.499***	0.229***	0.220***	0.227***	0.219***
	(0.0199)	(0.0195)	(0.0193)	(0.0194)	(0.0192)
At least one parent speaks an indigenous tongue.	-0.514***	-0.368***	-0.356***	-0.354***	-0.343***
	(0.0260)	(0.0248)	(0.0248)	(0.0247)	(0.0246)
Sex	0.0274	0.0268*	0.0266*	0.0543***	0.0531***
	(0.0170)	(0.0157)	(0.0156)	(0.0157)	(0.0156)

Father was agricultural worker	-0.351*** (0.0219)	-0.141*** (0.0208)	-0.120*** (0.0207)	-0.136*** (0.0206)	-0.117*** (0.0204)
Origins household wealth index			0.475*** (0.0107)		0.464*** (0.0108)
Quintile 2		0.284*** (0.0259)		0.281*** (0.0257)	
Quintile 3		0.593*** (0.0291)		0.580*** (0.0290)	
Quintile 4		0.883*** (0.0305)		0.868*** (0.0307)	
Quintile 5		1.306*** (0.0328)		1.278*** (0.0328)	
Skin color group 2				0.218*** (0.0197)	0.208*** (0.0197)
Skin color group 3				0.324*** (0.0317)	0.316*** (0.0320)
Constant	-0.263*** (0.0193)	-0.618*** (0.0250)	-0.0196 (0.0187)	-0.801*** (0.0284)	-0.206*** (0.0245)
Observations	21,293	21,293	21,293	21,293	21,293
R-squared	0.326	0.421	0.428	0.430	0.435

Notes: The omitted variables are quintile 1, mother with incomplete primary education and father with incomplete primary education, and skin color group 1 (6-11 categories of the PERLA scale, categories 1-6 in the MMSI order). Born in urban setting is defined as those interviewees that considered the location where they were born as having more than 2,500 inhabitants. Robust standard errors in parenthesis. *** p<0.01, ** p<0.05, * p<0.1

A3: Regression of household wealth index of the respondent on different sets of circumstances

Variables	Set 4	Set 5
Dependent variable: Household wealth index of the respondent		
Father with completed primary education.	0.0253 (0.0222)	0.0298 (0.0221)
Father with complete secondary or above education level	0.0802*** (0.0219)	0.0664*** (0.0216)
Mother with completed primary education.	0.0606*** (0.0220)	0.0595*** (0.0216)
Mother with complete secondary or above education level	0.111*** (0.0232)	0.0872*** (0.0232)

Born in urban setting	0.226*** (0.0194)	0.218*** (0.0192)
At least one parent speaks an indigenous tongue.	-0.351*** (0.0247)	-0.340*** (0.0246)
Sex	0.0609*** (0.0158)	0.0592*** (0.0157)
Father was agricultural worker	-0.136*** (0.0206)	-0.116*** (0.0204)
Origins household wealth index		0.461*** (0.0109)
Quintile 2	0.278*** (0.0257)	
Quintile 3	0.577*** (0.0291)	
Quintile 4	0.862*** (0.0307)	
Quintile 5	1.269*** (0.0330)	
PERLA 10	-0.102 (0.276)	-0.111 (0.280)
PERLA 9	0.0959 (0.256)	0.0796 (0.262)
PERLA 8	0.116 (0.247)	0.0975 (0.253)
PERLA 7	0.242 (0.248)	0.229 (0.255)
PERLA 6	0.238 (0.244)	0.216 (0.250)
PERLA 5	0.387 (0.243)	0.360 (0.250)
PERLA 4	0.447* (0.243)	0.416* (0.250)
PERLA 3	0.454* (0.246)	0.421* (0.252)
PERLA 2	0.529** (0.245)	0.502** (0.252)
PERLA 1	0.529**	0.505**

	(0.247)	(0.254)
Constant	-1.003***	-0.393
	(0.243)	(0.250)
Observations	21,293	21,293
R-squared	0.431	0.437

Notes: The omitted variables are quintile 1, mother with incomplete primary education and father with incomplete primary education, and PERLA category 11 (category 1 in the MMSI order). Born in urban setting is defined as those interviewees that considered the location where they were born as having more than 2,500 inhabitants. Robust standard errors in parenthesis. *** p<0.01, ** p<0.05, * p<0.1

A4: Regression of household wealth index of the respondent on different sets of circumstances

Variables	Set 8
Dependent variable: Household wealth index of the respondent	
Father with incomplete primary education.	0.150***
	(0.0242)
Father with complete primary education	0.152***
	(0.0277)
Father with complete secondary education.	0.182***
	(0.0361)
Father with complete high school	0.298***
	(0.0419)
Father with complete college or more	0.397***
	(0.0448)
Mother with incomplete primary education	0.166***
	(0.0240)
Mother with complete primary education	0.158***
	(0.0271)
Mother with complete secondary education.	0.157***
	(0.0340)
Mother with complete high school	0.326***
	(0.0414)
Mother with complete college or more	0.284***
	(0.0523)
Born in urban setting	0.236***
	(0.0202)
At least one parent speaks an indigenous tongue.	-0.315***
	(0.0268)

Sex	0.0545***
	(0.0164)
Father was agricultural worker	-0.0952***
	(0.0219)
Origins household wealth index	0.387***
	(0.0123)
Skin color group II	0.197***
	(0.0208)
Skin color group III	0.319***
	(0.0341)
Constant	-0.411***
	(0.0297)
Observations	18,927
R-squared	0.447

Notes: The omitted variables are quintile 1, mother with no formal education and father with no formal education, and skin color group 1 (6-11 categories of the PERLA scale, categories 1-6 in the MMSI order). Born in urban setting is defined as those interviewees that considered the location where they were born as having more than 2,500 inhabitants. Robust standard errors in parenthesis. *** p<0.01, ** p<0.05, * p<0.1

A5: Regression of household wealth index of the respondent on different sets of circumstances

Variables	Set 1	Set 2	Set 3	Set 4	Set5
			Dependent variable: Household wealth index of the respondent		
Father with incomplete primary education.				0.241***	0.221***
				(0.0253)	(0.0252)
Father with complete primary education				0.335***	0.301***
				(0.0290)	(0.0290)
Father with complete secondary education.				0.450***	0.403***
				(0.0375)	(0.0374)
Father with complete high school				0.651***	0.600***
				(0.0435)	(0.0436)
Father with complete college or more				0.810***	0.761***
				(0.0463)	(0.0462)
Mother with incomplete primary education				0.275***	0.259***
				(0.0252)	(0.0250)
Mother with complete primary education				0.373***	0.348***
				(0.0284)	(0.0280)

Mother with complete secondary education.				0.463***	0.434***
				(0.0356)	(0.0356)
Mother with complete high school				0.708***	0.682***
				(0.0423)	(0.0421)
Mother with complete college or more				0.770***	0.745***
				(0.0536)	(0.0534)
Born in urban setting			0.760***	0.486***	0.422***
			(0.0184)	(0.0196)	(0.0205)
At least one parent speaks an indigenous tongue.		-0.827***	-0.613***	-0.447***	-0.411***
		(0.0289)	(0.0274)	(0.0278)	(0.0274)
Sex	0.135***	0.130***	0.0926***	0.0527***	0.0565***
	(0.0200)	(0.0197)	(0.0183)	(0.0173)	(0.0172)
Father was agricultural worker					-0.244***
					(0.0227)
Skin color group II	0.467***	0.407***	0.342***	0.240***	0.234***
	(0.0248)	(0.0246)	(0.0227)	(0.0220)	(0.0218)
Skin color group III	0.668***	0.569***	0.456***	0.356***	0.356***
	(0.0417)	(0.0413)	(0.0374)	(0.0352)	(0.0351)
Constant	-0.336***	-0.153***	-0.505***	-0.853***	-0.717***
	(0.0238)	(0.0241)	(0.0243)	(0.0274)	(0.0298)
Observations	22,063	21,477	21,293	18,927	18,927
R-squared	0.040	0.123	0.255	0.384	0.392

Notes: The circumstance sets are composed as follows: Set 1 includes sex of the respondent and the skin tone variable with three categories. Set 2 adds to set 1 the indigenous status variable Set 3 adds to set 2 the type of community of origin (urban or rural). Set 4 adds to set 3 the disaggregated variable of parental education. Set 5 adds to set 4 the variable of occupational sector of the father. Robust standard errors in parenthesis. *** p<0.01, ** p<0.05, * p<0.

Source: Authors calculations with the information of the MMSI 2016.

A6: Regression of household wealth index of the respondent on different sets of circumstances

Variables	Set 6	Set7
Dependent variable: Household wealth index of the respondent		
Father with incomplete primary education.	0.152***	0.150***
	(0.0243)	(0.0242)
Father with complete primary education	0.150***	0.152***
	(0.0279)	(0.0277)
Father with complete secondary education.	0.180***	0.182***
	(0.0364)	(0.0361)
Father with complete high school	0.315***	0.298***

	(0.0426)	(0.0419)
Father with complete college or more	0.440***	0.397***
	(0.0454)	(0.0448)
Mother with incomplete primary education	0.172***	0.166***
	(0.0241)	(0.0240)
Mother with complete primary education	0.161***	0.158***
	(0.0273)	(0.0271)
Mother with complete secondary education.	0.164***	0.157***
	(0.0343)	(0.0340)
Mother with complete high school	0.366***	0.326***
	(0.0411)	(0.0414)
Mother with complete college or more	0.408***	0.284***
	(0.0512)	(0.0523)
Born in urban setting	0.234***	0.236***
	(0.0203)	(0.0202)
At least one parent speaks an indigenous tongue.	-0.320***	-0.315***
	(0.0269)	(0.0268)
Sex	0.0541***	0.0545***
	(0.0164)	(0.0164)
Father was agricultural worker	-0.105***	-0.0952***
	(0.0221)	(0.0219)
Origins household wealth index		0.387***
		(0.0123)
Quintile II	0.228***	
	(0.0282)	
Quintile III	0.492***	
	(0.0314)	
Quintile IV	0.759***	
	(0.0335)	
Quintile V	1.048***	
	(0.0370)	
Skin color group II	0.240***	0.197***
	(0.0220)	(0.0208)
Skin color group III	0.356***	0.319***
	(0.0352)	(0.0341)
Constant	-0.912***	-0.411***
	(0.0324)	(0.0297)

Observations	18,927	18,927
R-squared	0.445	0.447

Notes: The circumstance sets are composed as follows: Set 6 adds to set 5 the position of the origin household in the household wealth distribution. Set 7 adds to set 5 the value of the household wealth index. Robust standard errors in parenthesis. *** p<0.01, ** p<0.05, * p<0.

A7: Regression of household wealth index of the respondent on different sets of circumstances for quintile 1

Variables	Set 1	Set 2	Set 3	Set 4	Set5
			Dependent variable: Household wealth index of the respondent		
Father with incomplete primary education.			0.167***	0.161***	0.161***
			(0.0438)	(0.0436)	(0.0436)
Father with complete primary education			0.0547	0.0539	0.0556
			(0.0768)	(0.0767)	(0.0766)
Father with complete secondary education.			0.0600	0.0189	0.0242
			(0.141)	(0.134)	(0.134)
Father with complete high school			0.00913	-0.0611	-0.0599
			(0.230)	(0.235)	(0.236)
Father with complete college or more			0.208	0.109	0.108
			(0.424)	(0.420)	(0.422)
Mother with incomplete primary education			0.186***	0.181***	0.183***
			(0.0444)	(0.0441)	(0.0411)
Mother with complete primary education			0.242***	0.235***	0.237***
			(0.0740)	(0.0737)	(0.0735)
Mother with complete secondary education.			0.0487	0.0264	0.0290
			(0.151)	(0.153)	(0.153)
Mother with complete high school			1.054***	1.096***	1.105***
			(0.150)	(0.166)	(0.168)
Origins household wealth index					-0.0438
					(0.111)
Born in urban setting		0.315***	0.342***	0.301***	0.303***
		(0.0684)	(0.0719)	(0.0714)	(0.0713)
At least one parent speaks an indigenous tongue.	-0.494***	-0.477***	-0.436***	-0.418***	-0.418***
	(0.0382)	(0.0379)	(0.0431)	(0.0430)	(0.0431)
Sex	-0.009	-0.0087	-0.0379	-0.0342	-0.0335
	(0.0364)	(0.0371)	(0.0414)	(0.0416)	(0.0417)
Father was agricultural worker				-0.144***	-0.147***

				(0.0399)	(0.0406)
Skin color group II	0.265***	0.260***	0.218***	0.212***	0.212***
	(0.0379)	(0.0378)	(0.0418)	(0.0416)	(0.0418)
Skin color group III	0.214***	0.214***	0.211***	0.216***	0.216***
	(0.0733)	(0.0744)	(0.0884)	(0.0895)	(0.0892)
Constant	-0.787***	-0.822***	-0.919***	-0.820***	-0.877***
	(0.0382)	(0.0386)	(0.0446)	(0.0508)	(0.154)
Observations	4,513	4,505	3,721	3,721	3,721
R-squared	0.096	0.108	0.135	0.141	0.141

Notes: Robust standard errors in parenthesis. *** p<0.01, ** p<0.05, * p<0.
Source: Authors calculations with the information of the MMSI 2016.

A8: Regression of household wealth index of the respondent on different sets of circumstances for quintile 5

Variables	Set 1	Set 2	Set 3	Set 4	Set5
			Dependent variable: Household wealth index of the respondent		
Father with incomplete primary education.			0.0401	0.241***	0.0587
			(0.128)	(0.0253)	(0.127)
Father with complete primary education			0.0748	0.335***	0.0894
			(0.124)	(0.0290)	(0.123)
Father with complete secondary education.			0.150	0.450***	0.152
			(0.129)	(0.0375)	(0.128)
Father with complete high school			0.280**	0.288**	0.271**
			(0.129)	(0.130)	(0.128)
Father with complete college or more			0.417***	0.426***	0.399***
			(0.129)	(0.130)	(0.128)
Mother with incomplete primary education			0.365***	0.373***	0.385***
			(0.0979)	(0.0976)	(0.0979)
Mother with complete primary education			0.460***	0.471***	0.470***
			(0.0876)	(0.0876)	(0.0879)
Mother with complete secondary education.			0.439***	0.451***	0.436***
			(0.0923)	(0.0921)	(0.0923)
Mother with complete high school			0.605***	0.616***	0.581***
			(0.0941)	(0.0939)	(0.0944)
Mother with complete college or more			0.706***	0.717***	0.642***
			(0.0974)	(0.0972)	(0.0990)

Origins household wealth index					0.174***
					(0.0301)
Born in urban setting		0.238***	0.177***	0.182***	0.172***
		(0.0460)	(0.0444)	(0.0447)	(0.0441)
At least one parent speaks an indigenous tongue.	-0.291***	-0.256***	-0.209***	-0.211***	-0.200***
	(0.0716)	(0.0729)	(0.0773)	(0.0776)	(0.0767)
Sex	0.0819***	0.0750***	0.0434	0.0437	0.0470*
	(0.0306)	(0.0304)	(0.0287)	(0.0287)	(0.0283)
Father was agricultural worker				0.103	0.116*
				(0.0698)	(0.0227)
Skin color group II	0.267***	0.269***	0.203***	0.202***	0.194***
	(0.0533)	(0.0541)	(0.0517)	(0.0517)	(0.0516)
Skin color group III	0.510***	0.494***	0.393***	0.392***	0.381***
	(0.0688)	(0.0698)	(0.0684)	(0.0683)	(0.0680)
Constant	0.736***	0.540***	-0.0427	-0.0677	-0.283***
	(0.0530)	(0.0670)	(0.133)	(0.134)	(0.138)
Observations	4,297	4,177	4,020	4,020	4,020
R-squared	0.035	0.047	0.149	0.150	0.161

Notes: Robust standard errors in parenthesis. *** p<0.01, ** p<0.05, * p<0.
Source: Authors calculations with the information of the MMSI 2016.