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Pigmentocracy, Social Mobility and Inequality of Opportunity in Mexico

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Abstract

Wealth inequality in Mexico has gained attention in recent years, with a public responding to economic realities that precipitate less security and a more narrow horizon of opportunity for its citizens. This paper examines 2016 MMSI data on a variety of mobility indicators to illuminate the mechanisms that lead to better or worse socioeconomic outcomes, including by occupation, education and wealth. The inequality of opportunity is used to indicate justifiable and unjustifiable disparities.

This paper addresses the current situation in Mexico, studying existing inequalities in wealth by a variety of individual traits, as well as the opportunities for improvement of situation by education, occupation, or wealth. Importantly, this work takes on a variety of measures from the specific perspective of skin colour based on the uniquely compelling feature of the PERLA survey for individual self-identification, which builds on existing literature around *pigmentocracy*.

There is also evidence, among growing inequality, that the average Mexican is not aware of their true socioeconomic positioning (61% of Mexicans reported being in the middle class but only 12% are), which happens across the entire wealth distribution. Cross-sectional data is used to calculate measures that show movement between 2 generations, parent and child, or a short-run mobility expectation. Absent income data, a wealth index is also constructed based on reported presence of various material resources in 2 generations. Notably, the effect of urbanicity is generally on par with skin color differences. There is persistence at the extremes of the wealth distribution, indicating security for the wealthiest Mexicans, and a consistent instability among the middle of distribution, where evidence suggests a high probability to fall in their standing.

Keywords: Social mobility, inequality of opportunity, pigmentocracy, wealth index.

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1 Introduction

Why is social mobility important? When people from low-income families have little chance of moving up, while those from well-off families are almost guaranteed to retain their privileged positions, we say that the "social elevator" is broken. This can have harmful economic, social and political consequences.

Intergenerational social mobility refers to gains or losses in socioeconomic status between parents and their children, it usually considers income or earnings, but it can also be measured in terms of education, occupation or health. *Relative* social mobility considers people's position on the social ladder comparing their rank with that of their parents, whereas *Absolute* social mobility considers by how much the level of a socioeconomic outcome has improved or deteriorated. As countries reach high levels of development, progress in absolute mobility necessarily slows down.

For context, in Mexico's neighboring United States, the last 40 years have seen the share of wealth owned by the richest 1 percent doubled, the collective net worth of the bottom half has dropped to almost zero; the median weekly pay for a full-time worker has increased by just 0.1 percent a year, and so on (Andersen 2020).

Low social mobility can erode the foundations of economic growth, as a lack of upward mobility for those at the bottom implies that many talents remain under-developed and that potentially profitable investment opportunities go unexploited. A lack of downward mobility for those at the top promises persistent rents for a few at the expense of the many, at high efficiency costs.

Mobility prospects are an important determinant of life satisfaction and well being, persons who gain in socioeconomic status compared to their parents tend to fare better along a wide range of social and well-being dimensions, such as civic participation, personal relationships or subjective well-being, than those stuck at the bottom. Inversely, higher risks of downward mobility tend to reduce life satisfaction by increasing perceived financial insecurity.

Opportunities also color the discussion on immigration, on the end of low-skilled individuals as well as educated professionals. Mexico's supply of educated individuals is growing almost five times faster than overall population growth, and domestic opportunities are not expanding as quickly. This creates an incentive for skilled Mexicans to migrate to the United States. Projections suggest that the domestic supply of professionals will exceed demand until about 2025, after which demand will outstrip supply and a shortfall of highly skilled individuals is likely to emerge. Until that point, emigration is a natural response to the mobility situation for such individuals (Zúñiga and Molina 2008).

Mobility prospects also matter for social cohesion and democratic participation. Research suggests that perceived equality of opportunities can reduce the likelihood of social conflict (OECD, 2018). Perspectives of upward mobility weaken economic discontent, while more stagnant societies more easily give rise to feelings of social exclusion. Low chances of upward mobility may reduce democratic participation, an people facing the risk of downward mobility or status loss are less likely to feel that their voice counts. This is associated with lower levels of trust in government.

Although there is nothing inevitable about socioeconomic privilege or disadvantage being passed from one generation to another, large differences in mobility outcomes across countries indicate that there is room for policies to make societies more mobile ad protect households from adverse income shocks. For instance countries which in the past spent more on education or health tend to have higher educational

or health mobility. What matters, however, is not only the overall level of public resources devoted to education or health, but also their effective use and targeting to disadvantaged groups. Policy responses should therefore not be confined to raising overall spending, but rather o targeting spending to effective programmes.

According to Kuhn et al. (2018), historical data reveals that no progress has been made in reducing income and wealth inequalities between black and white households over the past 70 years, and that close to half of all American households have less wealth today in real terms than the median household had in 1970.

2 Literature Review

We will be focusing on three main issues: social mobility, inequality of opportunity and, moreover, pigmentocracy. In this section we will review some of the literature on this topics, both in Mexico and elsewhere.

2.1 On social mobility

Social mobility is a widely discussed topic, as it is highly dependent on the overall structure of social statuses and occupations in a given society (Grusky et al. 1984) and proved to be closely related to income inequality (Schütz et al. 2008). Although generally accepted that some level of mobility in a society is desirable, there is no consensus agreement upon "how much" social mobility is good for or bad for a society. Given that there is no international benchmark of social mobility, the literature on this topic aims to compare measures of mobility across societies or groups.

Caballé (2016) reviewed different existing methods to measure social mobility, focusing on constructing stochastic transition matrices[1] from the data and then summarizing said matrices into a single number to compare across cohorts, including relative mobility, average quantile movement and Shorrocks' normalized trace index. Other popular measures of social mobility that do not require constructing transition matrices, are the intergenerational correlation (IC) and the intergenerational elasticity (IE). The first used by Hertz et al. (2008) to estimate the IC of education attainment, where he found that the countries presenting the most persistence are the ones in South America with an IC of 0.6, which can be attributed to the existence of pervasive borrowing constraints to finance children's education. He also found that the Western European countries exhibit an IC of 0.4, which is even lover than that from Nordic countries, and these lower numbers tend to be associated with the strength of the welfare state. The second measure, IE, has been used in several studies such as those of Mazumder (2005), Nicoletti and Ermisch (2007), Blanden et al. (2004) and Cervini-Plá (2015). Their results give values of the IE between 0.5 and 0.6 for the US, 0.3 for UK, 0.43 for Spain and 0.25 for Nordic countries[2].

[1] As used in studies for the US (Isaacs 2007), Spain (Cervini-Plá 2011) and Sweden (Jäntti et al. 2006).

[2] Interested reader can consult the survey of Jäntti and Jenkins (2015), presenting the previous and other measures of social mobility.

Wilkinson and Pickett (2009), conducted an exhaustive analysis of social mobility in developed countries. In addition to other correlations with negative social outcomes for societies having high inequality, they found a relationship between high social inequality and low social mobility. From the countries studied, the US had both the highest economic inequality and lowest economic mobility. Another study comparing social mobility between developed countries by Corak (2006), found that the four countries with the lowest intergenerational income elasticity, i.e. the highest social mobility, were Denmark, Norway, Finland, and Canada with less than 20% of advantages of having a high income parent passed on to their children.

The Economist also stated that "evidence from social scientists suggests that American society is much 'stickier' than most Americans assume. Some researchers (Mitnik et al. 2016) claim that social mobility is actually declining." In spite of this low mobility Americans have had the highest belief in meritocracy among middle- and high-income countries (Isaacs 2008).

Piketty (2014) found that wealth-income ratios seem to be returning to very high levels in low economic growth countries, similar to what he calls the "classic patrimonial" wealth-based societies of the 19th century wherein a minority lives off its wealth while the rest of the population works for subsistence living.

Social mobility can also be influenced by differences in education. The contribution of education to social mobility often gets neglected in social mobility research although it really has the potential to transform the relationship between origins and destinations (Brown et al. 2013). Recognizing the disparities between strictly location and its educational opportunities highlights how patterns of educational mobility are influencing the capacity for individuals to experience social mobility. There is some debate regarding how important educational attainment is for social mobility. Literature by Bernardi et al. (2016) argued that there is a direct effect of social origins which cannot be explained by educational attainment. However, Sullivan et al. (2018) suggested that, using a sufficiently fine-grained measure of educational attainment, taking on board such factors as university status and field of study, education fully mediates the link between social origins and access to top class jobs.

In the Mexican context, a report published by Mexico City's Centro de Estudios Espinosa Yglesias (CEEY) on social mobility in the Mexican society. On the bright side, they say, there is a significant amount of mobility in Mexico's middle three economic quartiles. In contrast, few of the richest and the poorest leave their origins behind, with a full 50% staying put on each end of the economic ladder.

In international comparisons, Mexico falls far behind industrialized countries, such as those in the European Union. But studies are more mixed when comparing Mexico to its Latin American neighbors. Ferreira et al. (2013), from the World Bank, found Mexico to have one of the lowest proportions of upwardly-moving social "climbers" in Latin America, but another study (Calonico 2006) that tracks individuals over several periods of time ranks Mexico's mobility at the top of the region. Moreover, Angulo et al. (2012) from the Universidad de los Andes found that while overall levels of mobility were higher in Chile, intergenerational mobility was progressing much faster in Mexico than in either Chile or Colombia, for example.

2.2 On inequality of opportunity

Philosopher John Rawls (Rawls, 1971) attempted to provide a moral theory alternative to utilitarianism and addressed the problem of distributive justice (the socially just distribution of goods in a society). Also on an early philosophical debate, when asked the question "What is equality?", Dworkin (1981) argued essentially that certain types of preferences should not elicit an egalitarian redistributive response.

Roemer (1998) addresses the question of how exactly to calibrate the effort of an individual, and argues that the rank of an individual in the effort distribution across individuals with the same circumstances should be the relevant metric. The central conceptual distinction of Roemer is to "separate the influences on the outcome a person experiences into circumstances and effort: the former are attributes of a person's environment for which he should not be held responsible, and effort is the choice variable for which he should be held responsible"

On more recent work, and applying Roemer's concepts, Jusot et al. (2012) explored the importance of the correlation between circumstances and effort and Torche (2014) explored these socioeconomic disparities and their implications for mobility in the Latin American context.

2.3 On pigmentocracy

Pigmentocracy is a word used to explain the stratification of societies, mainly mixed-race, and how hierarchies are created based on socio-racial structure and skin colour. According to Navarrete (2017), many sociologists adopted the word to refer to the discrimination by skin colour prevalent in Mexico and Latin America. According to the researcher, the success of the word lies in the fact that it encompasses and strongly links the humiliations and prejudices that frame social inequalities and power differences, it encloses discrimination and social inequality between people only because of the colour of their skin, pointing out that privileges are greater the lighter the colour of the skin. For the author, the true power of the pigmentocracy concept is that it tries to "naturalize inequality, make the marginalized invisible and exterminate them, convince us that the unacceptable is inevitable, get us used to inequity."

Several studies have shown that in Latin America, a region where the ideologies of miscegenation have denied the importance of race without, at the same time, erasing racism, a peculiar version of racism without races, of identities without borders, has developed. Telles (2014) argues that culture in this region is hampered by not considering black and indigenous populations, and states that skin colour, rather than ethno-racial labels, is the likely prism through which produces discrimination and, therefore, the best variable to measure inequality. A specific set of survey questions asked whether respondents witnessed or experienced identity-related discrimination, and identity was broken down into factors such as language, social class, and skin colour. These questions do not measure actual events, but rather respondents' perceptions of events, which is not easy in social settings characterized by silence and shame surrounding racism. Among the most significant findings of the study is that, despite public of mixed-race ideologies, Latin Americans continue to behave as if race were real, and race is substantially about skin colour, not about social class, as it has been argued so often. For all the countries studied in the region, the correlations

between skin colour and socioeconomic status show substantial advantages for lighter skin and very significant disadvantages for darker skin. A favorable result was the fact that, although the minority among the respondents agreed with a wide variety of explanations for the persistence of poverty, the majority recognized that structural barriers were the main cause.

Another research (Sue, 2013) found that Mexicans reproduce the national ideology of their country's elites regarding skin colour even when it seems to harm them rather than benefit them. In the referred work, which deals with racism, miscegenation and blackness, from a microcosmic perspective, Sue presents the results of an ethnography carried out in two cities on the coast of Veracruz, Mexico, between 2003 and 2005, and talks about how people deal with these issues in a society in which, according to Sue, there is a stratification by race and skin colour, and "whiteness" is privileged. Sue points out that Veracruz population speak easily in terms of colour; however, they are reluctant to do so in terms of race, since one of the pillars of their ideology is that there is no racism in Mexico. She emphasizes that conversations about colour are the opposite of conversations about race and in this way people allow themselves to escape the accusations of racism in their entity. In her research, Sue found that a person can be categorized in various ways at work, at home, etc., including skin colour, which makes racial identities very fluid and hides discrimination based on this quality. The conceptual association between race and colour occurs when there is a strong link in popular thought between terms that refer to race colour, socioeconomic status, and physical attractiveness. For the people of Veracruz, for example, rich, handsome and white, are terms that are associated. On the other hand, discursive slippage occurs when the association between words is so strong that they are used as if they were interchangeable. Sue explores the racial identities of mestizos and discovers that Veracruzanos of various skin tones have to distinguish aspects of their identities and negotiate issues such as racial ideologies, nation-building, or national identity formation. Those furthest from the prototype of the mestizo due to the lightness or darkness of their skin must adopt strategies to reaffirm their national identities; however, although they choose parts of the national ideology, they do not accept it completely.

The author also analyzes the attitudes of mestizos in interracial relationships. She exposes that mestizos are not opposed to interracial marriages, however, they establish limits: they impose great demands to marry those with darker skin, they object to cultural aspects regarding black and indigenous persons, they show their preference for interracial marriages when it comes of light-skinned people, etc. The contradictions between these attitudes and the ideology of miscegenation that Veracruz citizens must assume are evident. Also, behaviors differ according to skin tone. Darker-skinned mestizos see this type of relationship as a way to "whiten" themselves, to "improve the race", while those with lighter-coloured skin try to avoid associating with people of darker colour. In conclusion, the Veracruz people of the cities under study affirm in the collective that there is no racism in Mexico, that there is no difference in the treatment of people according to their skin colour, but when analyzing their ideology in small and intimate social units, often in families, the discrimination by race and colour described above is observed. As a community, Veracruz is not aware of the discrimination of which is victim due to its skin tone.

3 The Data

The data we use comes from the *Intergenerational Social Mobility Module 2016 (MMSI)* conducted by Mexico's National Institute of Statistics and Geography (INEGI). This module is a survey representative to all the Mexican population between 25 and 64 years of age. The data set contains information for 25,384 households and 42,705 individuals, which represents the 61,827,459 individuals between said age range in the country.

It is designed to capture sociodemographic and socioeconomic information from the population, which allows us to compare the origin and destination of the individuals in three dimensions: **education, occupation, and economic**. Given that the module is aimed specifically at measuring social mobility, the questionnaire asks the target individuals not only about their current circumstances, but also about the characteristics of their household of origin[3] and their parents' education and occupation levels.

Additionally, the survey included a colour palette designed to allow the self-identification of the respondent's skin tone. The palette corresponds to the tone categorization designed for the *Project on Race and Ethnicity in Latin America (PERLA)*. Using the captured information on skin tone self-assessment, along with the other circumstances and characteristics aforementioned, we should be able to scrutinize on weather if skin tone is a relevant circumstance in determining an individual's access to advantages in life in societies where skin colour is among the dimensions of social stratification.

4 Wealth Index

There are several ways in which wealth, economic status of households and living standards can be measured. Income, expenditure and consumption are three common measurements. Nevertheless, one of the limitations of the *MMSI Survey* is that it does not capture any of these, and it is usually the key dimension when talking about mobility and inequality. One immediate solution to this could be using the perceived (self-assessed) socioeconomic status, which is a question included in the survey, yet the mismatch between real and perceived socioeconomic status leads to impossibility in using this metric. In a striking article published in July 2020 by the New York Times,Viri Rios writes,

> "61 percent of the population identified as middle class but only 12 percent is. Half of the country lives with a serious misunderstanding about their income level, confusion shared by rich and poor alike. Mexicans who earn 120,000 pesos a month, for example, believe that they have an 'average' salary when in fact they earn more than 90% of the country."

An alternative solution for this, in order to make a more precise assessment of socioeconomic status, is to use the variables in the dataset on asset ownership and housing characteristics and combine this information into a proxy indicator such as *the wealth index*, which we create by performing principal component analysis (PCA). The advantage of a wealth index like this one is that asset ownership gives an indication

[3]This is when the respondent was 14 years old, so that temporal reference is not the same for all individuals.

of the longer-term economic status of a household and is less dependent on short-term economic changes compared with other wealth or poverty measures. As in a 2018 article "Income and Wealth Inequality in America, 1949-2016" by Moritz Kuhn et al. makes distinctions of class specifically hinging on asset ownership with household-level archival U.S. data from the Survey of Consumer Finances, arguing that portfolio composition and asset prices, rather than income or occupation, are the defining features of class in the contemporary economic landscape. For this reason and others, it is justified to look at the material circumstances and ownership of the Mexican population rather than the basic analysis of education, occupation, or income as indicators of class and mobility.

One important note to keep in mind is that the wealth index measures *relative* wealth and, unlike a poverty line based on income, is not an absolute measure of poverty or wealth. When referring to the wealth of households based on the wealth index we can talk about *poorer* and *wealthier* households but we cannot conclude who is absolutely poor and wealthy. When dividing the population into wealth index quintiles, we are splitting up the whole population into five equally large groups, based on their wealth rank. This means that, for example, in a region where only 10% of households fall below the poverty line, 40% of households will still fall into the two poorest quintiles and therefore be classified as the poorest.

4.1 Variable selection for wealth index

The asset ownership variables selected for the construction of the wealth indices are the following:

Table 1: Welath Index - Variables

Productive Assets	Non-Productive Assets	Household utilities and other
Land for agricultire	Blender	Bank account
Livestock	Car	Cedit card
Second house	***Cellphone***	Crowding
Work animals	***Computer***	Department store card
	Internet	***Domestic service***
	Phone	Electricity
	Radio	Gas
	Refrigerator	Land (not for agricultire)
	Toaster	Water supply
	TV	
	Washing machine	

Several notes should be made on the selection of variables in the data set to contribute to the index. While including more variables leads the model to have more explanatory power for the variance of outcomes, it consequently follows that less importance will be granted to any individual elements found to have significant influence in the PCA.

Consider the impact of one factor - domestic service hired by households. Due to Mexico's demographic status and overpopulation, many choose to participate in the labor force in flexible and direct service to other households like construction or domestic work; the supply of labor drives down the price and makes it more widely accessible. As a result, it is much more common to encounter middle-income families employing domestic workers than a similarly positioned household in other countries, or economies.

Another variable indicated by the data is the presence of technology, which is obviously an evolving target as the complexity and availability of technology grows and progresses each year. Intuitively, a 45-year-old individual may be in the middle class in their origin household at age 14 and similarly at the current age of 45; however, while it was very unreasonable to expect a computer or mobile phone to be considered standard in 1989, rapid computing advances and market spread/saturation have made these more likely to be fixtures in a middle class household in 2020. Mobile phones in particular enjoy widespread popularity globally even among low-income households in the global South due to decentralized networks.

In the data, technological assets like appliances have a very high correlation with the index overall, in fact contributing more than access to utilities like electricity or consumables like meat. Analyzing the origin household data, technology has less effect, per the temporal nature of technological progress explained earlier, whereas these variables become much more important in the present-day household. In fact, the younger/current generation using these widespread mobile technologies proves that whichever households are "left behind" have a true lag in socioeconomic privilege; therefore, the presence of appliances and technology (especially mobile, internet and computers) have a much higher correlation with the index when performing the PCA. The internet in particular is a highly indicative variable: while it is hardly significant in the household of origin, its presence accounts for the top indicator that tracks with the wealth index movement in the current household. Therefore, we can look to access to the internet as the key vehicle of mobility.

Lastly, the tests used to indicate the suitability of the index are the *Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO)*, which indicates the proportion of variance in the variables selected that might be caused by underlying factors[4]; and *Bartlett's test of sphericity*, which tests the hypothesis that the correlation matrix is an identity matrix, which would indicate that the variables are unrelated and therefore unsuitable for structure detection. Both of the indices, parent and child wealth, yielded optimal values for the KMO test[5], 0.928 and 0.888 respectively, while also being statistically significant by the Bartlett's test[6]. Full results of the PCA can be found in the appendix.

[4]Values closer to 1.0 generally indicate that the results of the factor analysis are useful for the data.
[5]Typically, if the value is less than 0.50, the results of the factor analysis probably won't be very useful.
[6]Approx. Chi-squared significance level of less than 0.05

5 Descriptives

Before getting into the analysis of social mobility and inequality of opportunity we will take a look at some important descriptives to better understand the distribution of the population. We will look at the general overview of the population as well as the skin tone grouping from the Perla color palette. Specifically comparing the three dimensions for the analysis with the skin tone distribution we hope to get an initial idea on if there are some perceived significant differences amongst individuals belonging to different skin tone groups and their outcomes.

5.1 Population overview

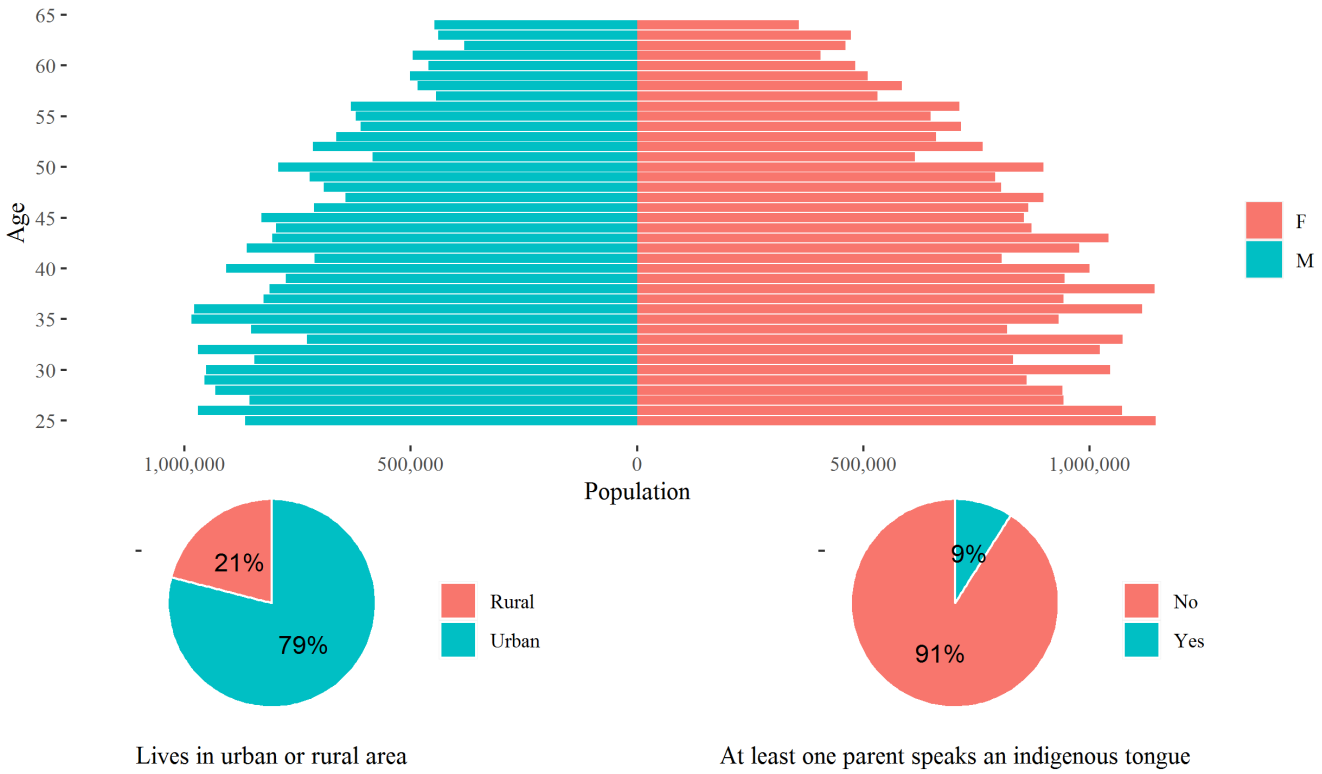

Figure 1: Basic population distribution

In *Figure 1* it's shown the most general overview of the Mexican population between 25 and 64. As mentioned before the total number of individuals in the data set is around 62 million from which 47% are men and 53% women. The population pyramid shows the majority of the population is between 25 and 40 years of age, with a larger portion of the young population being women. Also relevant for the analysis of mobility and inequality is the distribution between urban and rural areas, which in the Mexican case is 79% of individuals living in urban locations while the remaining 21% lives in rural areas[7]. Additionally only 9% of the population reported to have at least one parent that speaks in indigenous tongue.

[7] An area is defined as rural if it has a population under 2,500 people.

Moving forward with the analysis we will divide the calculations conditioning on the self-assessed skin color, so it is important to know how the population is distributed. Given that the *PERLA* color palette is comprised of 11 different skin tones, we grouped them into three categories: light skin (tones 1 through 3), medium skin (tones 4 and 5) and dark skin (tones 6 through 11), the same grouping Edward Telles and *PERLA* use in their book *Pigmentocracy*. Figure 2 shows the distribution for the 11 categories and the three groups. The majority of the population fall into the medium skin tone group with 67%, then 21% in the dark skin group and only 12% in the light skin group.

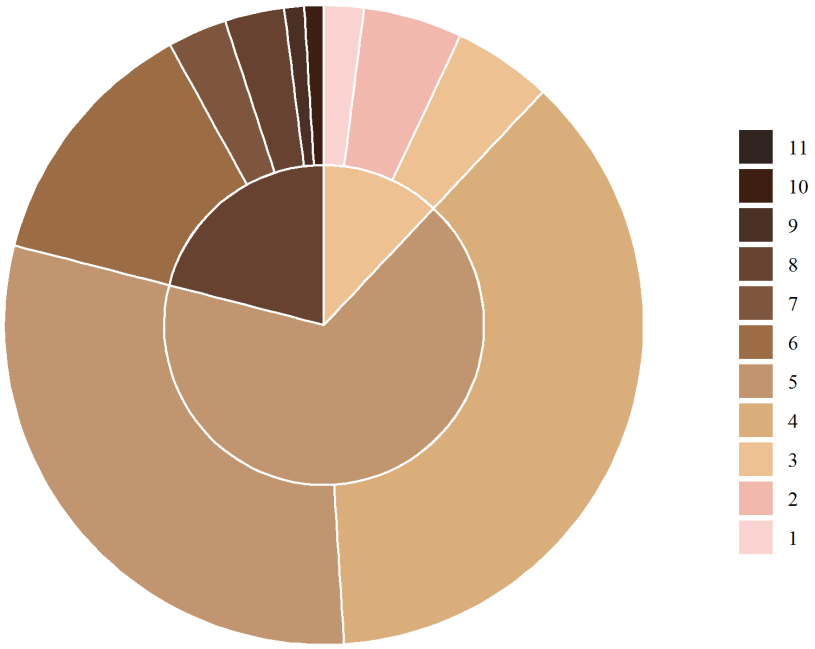

Figure 2: Skin tone distribution

5.2 Socioeconomic variables and skin tone distribution

After looking at the overall distribution of the population, it is important to understand the distribution of the socioeconomic variables under study as across the skin tone palette, as to get an initial intuition of the pigmentocracy existing in the country. For this we proceed to display the distributions of education, occupation and the wealth index as heat maps, to visualize how each of these three dimensions behave with respect to self-assessed skin colour.

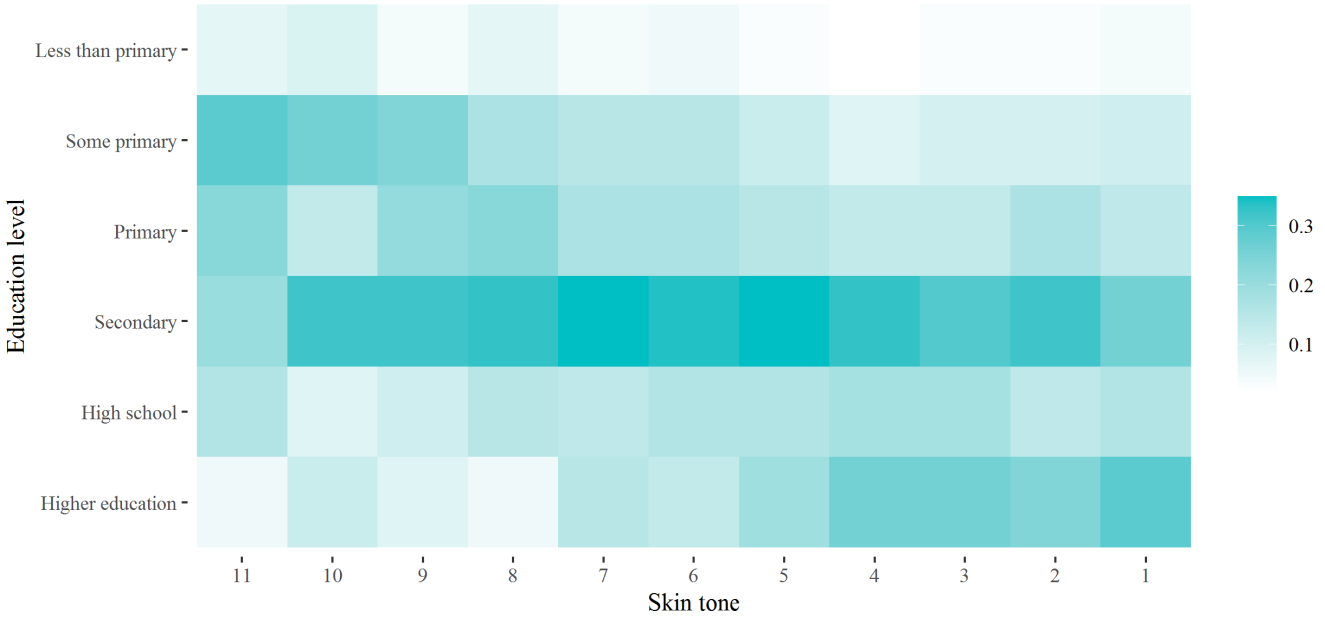

Figure 3: Education level and skin tone distribution

Starting with education, *Figure 3* shows that the average school level completed regardless of skin tone is Secondary. The heat map also reveals that there is a tendency showing that there is a difference between individuals' education attainment as skin tone changes. For those in the darker tones there is a much higher concentration in the *some primary* category and very few individuals above the average level, whereas for those with the lighter tones the higher concentration is in the *higher education* level with very few individuals below the average.

In fact, less than 10% of the individuals in the darker tones reach the higher education level whereas for those in the lighter tones it is 26%. For people in the medium-tones these number falls in between, at 22%. Surprisingly a third of the Mexican population between 25 and 64 have reached only secondary or middle school.

Then, to obtain the distribution displayed in *Figure 4*, for the occupation level of the individuals first we have to determine an order for the levels, as this is not an obvious ordinal variable, i.e. the occupation categories do not follow a particular order from worst to best. This order is usually determined in terms of the average income of the individuals in each of the occupation groups. In this case, and throughout the rest of the analysis, it will be classified in the same way as INEGI does in the survey module documentation.

Looking at the heat map in *Figure 4* we see that there is a clear tendency for those in the lighter tones to have higher ranked jobs, i.e. officials or directors, whereas the bulk of the population in the darker tones are in the elementary and support activities category. Also looking at the agriculture, farming, and fishing occupations we see that there is a negligible proportion of individuals with medium and light skin in these kind of jobs and almost all of this segment is comprised by darker skin tone individuals. People in the medium tones are almost equally distributed amongst the top two and bottom two categories, with 22% into former and 21% in the latter.

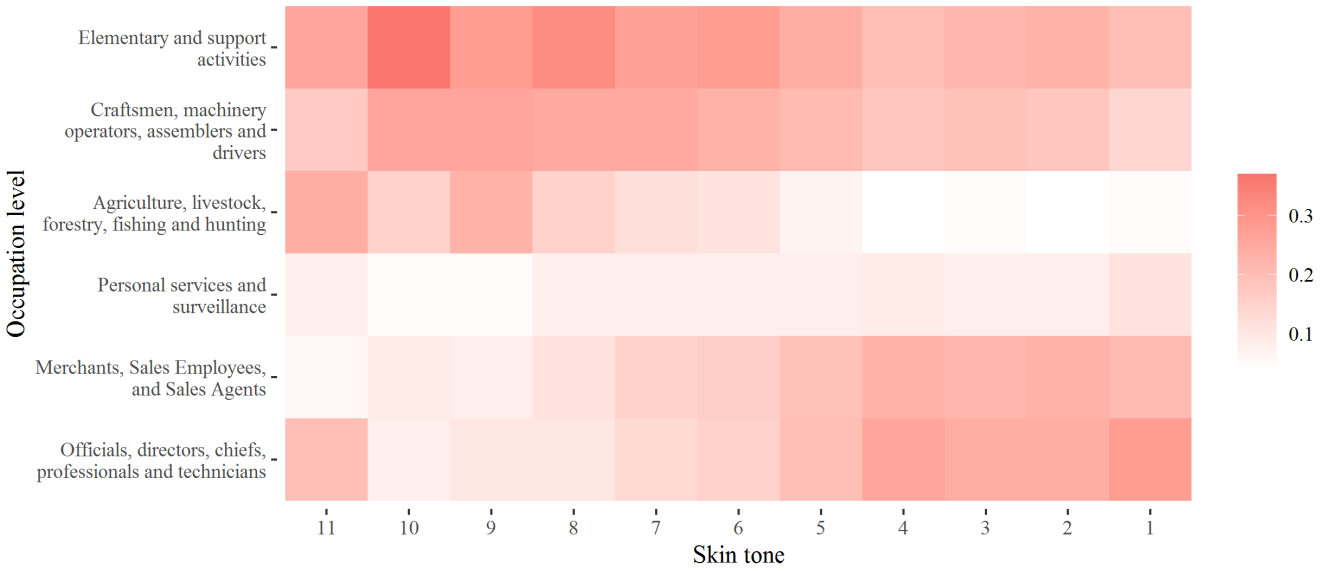

Figure 4: Occupation level and skin tone distribution

Finally, we take look at the distribution of the wealth index amongst the population. The population is grouped into wealth index quintiles for easier and more intuitive conclusions, as this allows us to talk about the richer class (fifth quintile), upper middle class (fourth), middle class (third), lower middle class (second) and poorer class (first quintile).

The heat map in *Figure 5* shows that the vast majority of people in poverty are concentrated in the darker tones, while almost none of them are in the middle class and up. While the rest of the population is more equally distributed amongst the quintiles in the medium and lighter skin tones, there is a slight concentration around the middle class in the medium tones, as well as a somewhat more noticeable concentration of individuals with light skin in the top quintiles.

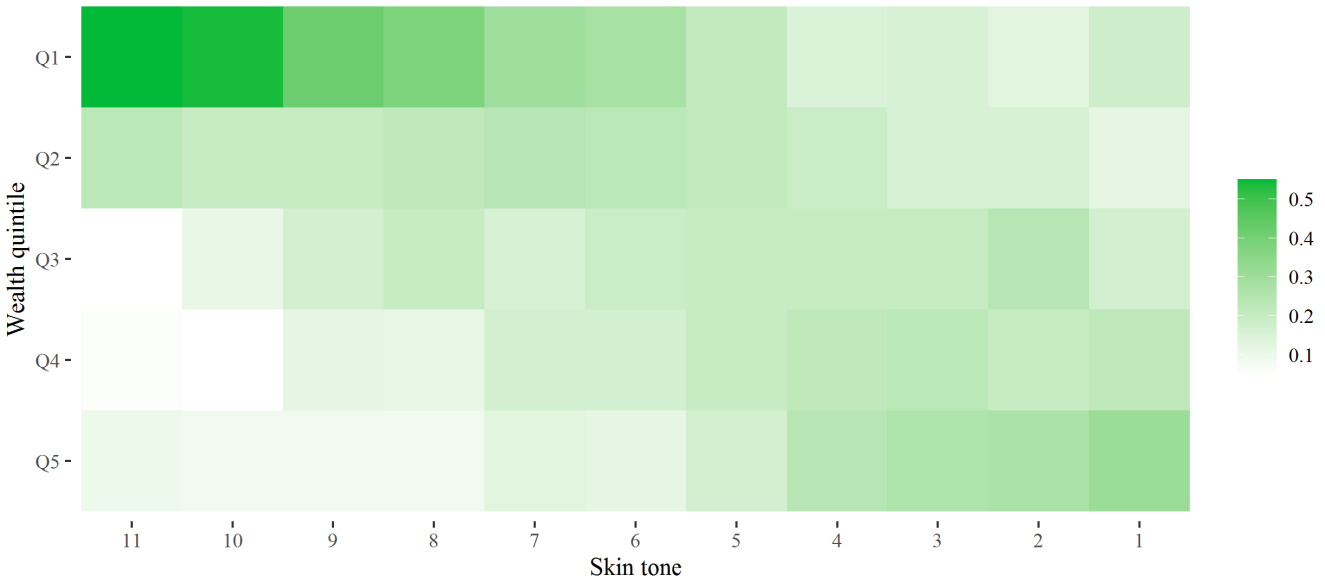

Figure 5: Wealth quintile and skin tone distribution

6 Social Mobility

The following section analyses the data to understand the degree of social mobility in the population and among different groups. Here we will take a deeper look at the differences in mobility probabilities for individuals in different skin tone groups to determine to what extend the concept of *pigmentocracy* prevails in Mexico.

To empirically measure intergenerational social mobility, first we need to create a stochastic transition matrix for an economic variable, where the values of the variable under study are divided in class intervals so that each value p_{ij} of the matrix P gives us the relative conditional frequency that the value of the relevant variable for the child lies in the bin j given that the value of the same variable for his parent lies in the bin i. This means that a transition probability matrix with the values concentrated around the diagonal will be a signal of persistence (or immobility).

As an additional analysis, we compute two of the measures for mobility matrices reviewed by Caballé (2016) and first proposed by Shorrocks (1978) in order to summarize all the information contained in the transition matrices into a single number (index) that can be easily compared. Although these indices result in a severe loss of information and one should always analyse the matrices as a whole, they still provide a baseline for comparison to other groups within the population. The first measure results in an indicator for relative mobility, which considers the level of a socioeconomic outcome improvement or deterioration;

the second indicates absolute mobility, which considers someone's position on the social ladder comparing their rank with that of their parents.

Relative mobility is calculated by first computing the eigenvalues of the particular matrix, and then taking the difference between the second largest eigenvalue and *1*. The second largest eigenvalue is used for calculation because the largest, in a transition matrix, the largest is always one. Calculating the relative mobility implicit in a given transition matrix this way is similar to considering the "distance" of the particular matrix with respect to the identity matrix. These results indicate only if there is more movement in one matrix or another, however it does not capture the direction of said moves.

Then, absolute mobility is calculated using the Average Quantile Movement (AQM), which is simply the sum of the transition probabilities weighted by the jump in the number of quantiles between parents and children. It is given by:

$$AQM = \frac{\sum_{i=1}^{Q} \sum_{j=1}^{Q} |i-j| p_{ij}}{Q}$$

6.1 Occupation

First mobility is analyzed in terms of occupation, as it is a qualitative variable and categories are not necessarily ordered, so the analysis of mobility between groups is not as straightforward. The transition matrix for the occupations for the national population is shown in *Figure 6*. It is possible to see that those whose parents work in elementary and support activities have a 37% probability that they will do the same, whereas individuals whose parents are officials and directors have a 52% probability to end up working in the same level. On this level, the access to managerial positions can be seen as an inheritance.

Even though certain occupation levels empirically imply higher income associated to them, policymakers cannot say that one level is better than another in absolute terms, and diversification or balance across all categories is more justifiable and necessary than in other social measures like wealth. A population of only CEOs, for example, is not close to being ideal and the population should be distributed amongst the different sectors of the economy to be sustainable.

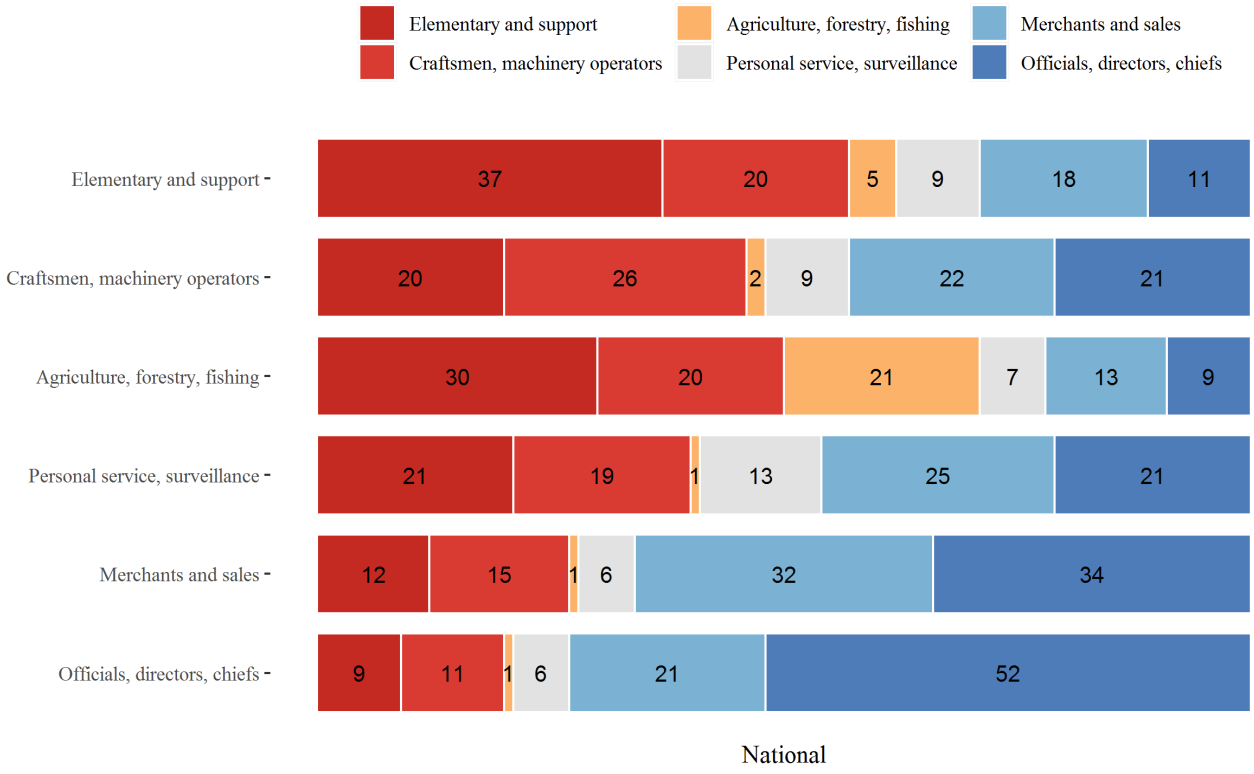

Figure 6: Transition matrix for occupation

However, as the previous matrix is time independent, we can easily compute its associated ergodic stochastic probability vector, which is the vector of frequencies of the different occupations in the long run. It is independent of the initial distribution of frequencies. That being the case, from the previous transition matrix of occupations we compute the following distribution of the occupational categories in the long run:

Table 2: Occupation Distribution Vector in Stable State

Elementary and support	Craftsmen, machinery operators	Agriculture, forestry, fishing	Personal service, surveillance	Merchants and sales	Officials, directors, chiefs
0.21	0.18	0.04	0.08	0.22	0.26

In the vector we see that in Mexico, in the long run, will have over a quarter of the population working as officials, directors and chiefs considering current mobility. Comparably, only 4% of the population will work in agriculture, forestry and fishing - hardly an appropriate proportion for the amount of agricultural production of the country. This measure can be used by policymakers to implement policies to incentivize a sector of the economy in step with longer term development plans and projections.

6.2 Education

Next, reviewing the results on education is relevant because education attainment provides one of the most promising chances of upward social mobility, regardless of current social standing. However, the intense stratification of social classes and high wealth inequality in Mexico directly affects the educational opportunities people are able to obtain, and therefore limits their chances for upward social mobility. In other words, social class and a family's socioeconomic status directly affect a child's chances for obtaining a quality education and succeeding in life. Studies have found that by age five, there are significant developmental differences between low, middle, and upper class children's cognitive and non-cognitive skills (Greenstone et al. 2016). In contrast to the previous analysis, these are ordered categories in which higher education level is in fact a desired outcome.

This type of analysis can also be used by policymakers to implement various policies that could take the form of universal provision of public education (currently it is provided but not accessible or considered quality in many areas), remove the borrowing constraints that prevent the investment in skill acquisition courses, tax reforms favoring families dealing with educational debt, or other programs of educational financial aid. In *Figure 6* we can see the transition matrices for education mobility[8] for the whole population and then disaggregation by urbanicity and skin color group[9].

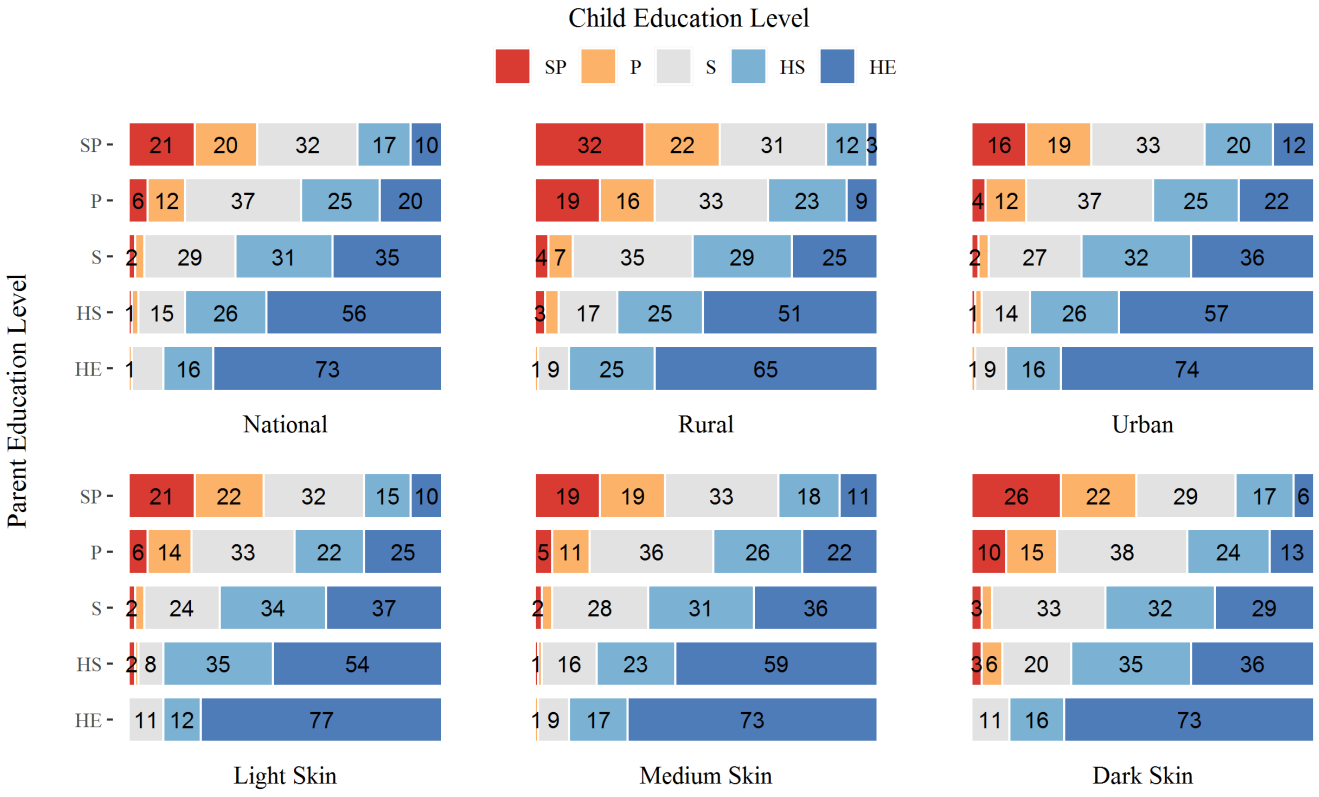

Figure 7: Transition matrices for parent to child education

[8] HE= "Higher education", HS= "High school", S= "Secondary", P= "Primary", SP= "Some primary"

[9] *Less than primary* is aggregated with *some primary* for the analysis.

For the general population, we observe that there is a very high degree of stickiness in the higher education level: children of parents with a *higher education* have 73% probability of achieving this level. The lower level of education, *some primary*, is less sticky at the bottom, with only 21% probability of children achieving this education level if their parents did; in fact, the highest probable outcome for these individuals is to reach *secondary* level (the population average). Also, individuals whose parents achieved *secondary* have 35% chance to reach *higher education*, and 29% chance of remaining in the *secondary education* level. It is interesting to note that, for parents with a higher education, there is a 0% probability that their children will fall to the lowest degree of educational attainment.

When conditioning on urbanicity, the probabilities vary quite a bit. The bottom level for those in rural areas is more persistent than the national average, at 32% probability of staying in that level, whereas the probability of going from *some primary* all the way to *higher education* is only 3%. Individuals living in urban areas have half the probability (16%) of remaining at the bottom and a 12% chance of going all the way to the top, four times more than those in rural areas. In both cases, upward mobility in the two highest levels of education and the stickiness of the top level is high. Even so, the probability of an individual achieving *higher education* given that their parent did is 9% less in rural areas as compared to urban areas.

Looking at the differences between skin color groups in *Figure 7*, we see that for light-skinned people whose parent reached the *secondary* level, the most likely outcome is to attain *higher education*, whereas for those in the dark skin group the most likely outcome is to remain in the *secondary* education level. Differences in the top level are minimal as all three skin tone groups have between 73% and 77% chances of remaining in the top level, similar to the national average. The chances of achieving *higher education* for dark-skinned people is notably less at any level, though the difference by skin tone group is more pronounced in the middle levels than in the extremes. Therefore, when considering education, living in a rural area can be seen as a much stronger conditioning factor than skin tone.

Summarizing the information of the matrices demonstrating these measures of mobility, the relative mobility for the national population is 0.63 and then, for rural and urban configurations, 0.58 and 0.66 respectively. The light skin matrix has a relative mobility of 0.68, medium skin 0.65 and dark skin 0.56. These numbers give us further confirmation that rural areas have less mobility than those urban areas, and that lighter skin individuals are presented with higher chances of moving than darker skin individuals.

Measuring absolute mobility with the AQM yields the following results: 1.11 (national), 0.97 (rural), 1.15 (urban), 1.10 (light skin), 1.14 (medium skin), 1.01 (dark skin). It can be inferred that population density in cities leads to opportunity presence, and other mechanisms should be named to justify differences by skin tone. Results indicate that, if mobility happens, an individual in the dark skin group would expect to move on average 1.01 levels, which is less than those in other skin tone groups and 0.10 less than the national average.

6.3 Wealth

Lastly, we will take an in-depth look at mobility in terms of wealth. We will use the origin and current wealth indices constructed and divide the population into five equal bins or quintiles. As mentioned before, the most salient economic variable to measure social mobility is wealth, so in this case we make a more thorough analysis than that which was made for occupation and education.

Mobility opportunities in Mexico are very low. Persistence of poverty is extreme: almost half of the Mexicans born in the bottom fifth of the wealth scale remain there. If there were no "initial advantages" or inequality was not inherited, the probability of getting to the top quintile while being born in the bottom one would be 20%, but is far from it, in fact, it is nearly impossible at only 3%. Using data from the Brookings Institution, we compare this to other countries and get that this probability in the US is 7% and 9% in the UK. Developed countries have more than four times the probability of Mexico, like Denmark at 12% or Canada at 14%.

Similar to previous figures, *Figure 8* shows the transition matrices from origin wealth quintile to current wealth quintile, divided by population groups.

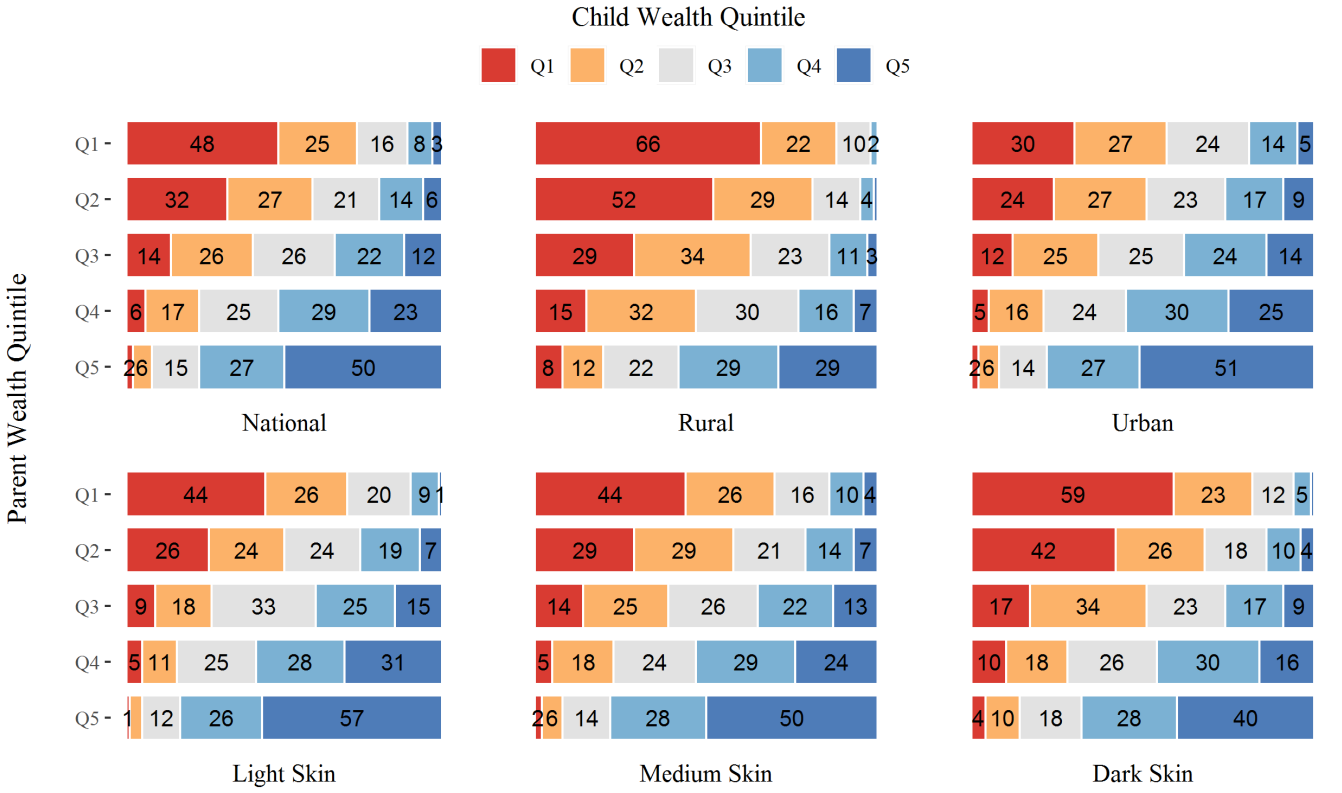

Figure 8: Transition matrices for origin to current wealth

The matrices provide some expected results after the intuition gained from the wealth heat map seen before, and some interesting, less expected results as well.

There is a notable result when looking at the middle class: the probability of remaining in the middle quintile is the same as that of falling to the poorer quintile, at 26%. The national transition matrix shows

the current *middle class crisis*[10], it is shrinking and inequality is growing. Those in middle class are very likely to become poorer, those that are poor have little chance of overcoming poverty, with only 16% chance of reaching middle class, and rich individuals are almost guaranteed to remain rich, having 15% probability of falling to the middle class.

Nonetheless, this middle class crisis is not the same for all. The difference between groups is remarkable. For instance, individuals from rural areas that grew up in middle-quintile families have 34% probability of falling to the second quintile and 29% of going all the way to the poorest quintile, meanwhile the chance of remaining in the middle quintile is only 23%. Even for those coming from upper middle class households, it is more likely to fall to the lower middle class (32%) than to remain in the fourth quintile (16%).

Skin tone group disaggregation shows that white middle-class individuals are most likely to remain in the middle class with a probability of 33%, and the second most likely outcome is to go up the scale with 25% chance of reaching the fourth quintile. The situation is not the same for darker-skinned individuals as they have a 34% probability of falling into the lower middle class compared to 23% of maintaining their middle class status.

Then, applying the measures for relative mobility, we get that for the national population it is 0.57, for rural configurations 0.53 and urban areas 0.60. The light skin matrix has a relative mobility of 0.62, medium skin 0.69 and dark skin 0.56. Again, we see more evidence of rural areas having less mobility opportunities than urban areas and that lighter skin yields higher chances of moving, although in this case medium skin has the highest relative mobility.

Applying the AQM gives us the following results: 1.01 (national), 0.95 (rural), 1.04 (urban), 0.91 (light skin), 0.97 (medium skin), 0.97 (dark skin). Urbanicity again shows difference in opportunities, although not as much as in terms of education. Comparing skin tone groups, results indicate that jumps in wealth are slightly larger for medium and dark skin tones than for lighter skin individuals. However, as it is shown next, this is due to greater jumps downwards for those medium and dark skin groups.

Probably the most relevant metric to assess mobility is directional mobility, which is taking the probabilities of a given transition matrix and focusing on the probability of moving up the scale or down the scale. *Upward mobility* is the probability that individuals at the bottom of the wealth distribution have to move towards the top, i.e. to get out of the bottom quintile and overcome poverty. The opposite case would be *downward mobility* and it is important to examine as it shows wealth persistence. Directional mobility is not only a simpler, more intuitive way to identify the differences between population groups, but also the way it is most perceived by the population. As described by the OECD: people are increasingly concerned about their ability to improve their financial situation over the life course, and the perceived risk of "sliding down the social ladder" is also increasing across countries.

Figure 9 shows the directional mobility for the Mexican population. *Upward mobility* is calculated as

[10]The OECD calculates that real, disposable income for the middle class has not grown since the middle of last decade, while that for the top 10% is hitting new highs.

the probability of getting out of the poorest quintile, regardless of the end position in the distribution and, similarly, *downward mobility* is the probability of moving down from the top quintile.

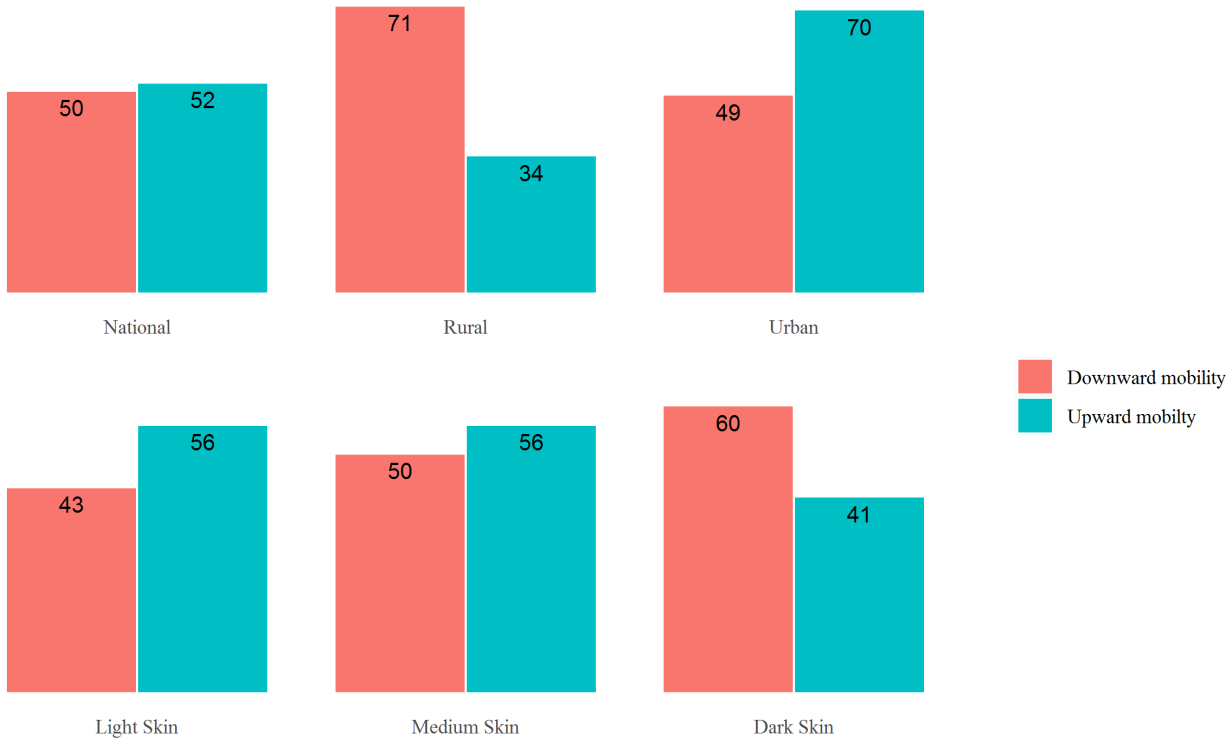

Figure 9: Upward (from the bottom) and downward (from the top) mobility

The results for the national population show that the chances of moving up are ever so slightly better than those of moving down, 52% and 50% respectively. The more relevant results are those of comparing the population groups, as we see clear evidence of conditioning factors. First of all, the population of rural areas have much lower opportunities of moving up at 34%, but the most striking result is that the persistence of wealth is very low, as rich individuals in rural configurations have more than 70% probability of moving down the wealth distribution. In urban regions the case is almost the opposite, as the chances of moving out of poverty are 70% while those of staying at the richest portion of the population is almost the same than the national average at 49%.

The evidence confirming the existence of pigmentocracy is also very clear. *Figure 9* shows that the expectations of moving out of poverty are 15 percentage points lower for individuals in the dark skin tone group. Not only do lighter skin signifies better outcomes, but also the continuity of them. Downward mobility is the same as the national average for the medium skin tone group (50%), whereas lighter skin individuals have only 43% probability of losing their wealth. In the case of dark skin individuals the probability of moving down is 60%, i.e. 40% more than those with lighter skin. People with darker skin have not only a harder path to overcome poverty, but also a more difficult time trying to maintain their wealth when at the top.

The works of Raj Chetty (2014), an economist in Harvard and expert in social mobility, allows us to also compare centile to centile. *Figure 10* shows mobility by percentile (from the poorest 1% to the richest 1%). In a country where parent's wealth had no influence on their children's wealth, we would see a straight horizontal line, but that is not the case. Individual's who grew up in poor households are now under the median wealth, whereas those coming from rich households much more opportunities to end up in the richest portion of the population.

In the US, for example, children of households in the 10^{th} centile end up on average in centile 34, while those in Denmark or Canada go all the way to centile 42. In Mexico, they reach on average the 30^{th} centile. With rich households, of course, the opposite occurs: rich households, 90^{th} centile, in the US see their children reach on average centile 67, Denmark and Canada get to the 57^{th} and, in Mexico, the end up around the 60^{th} centile.

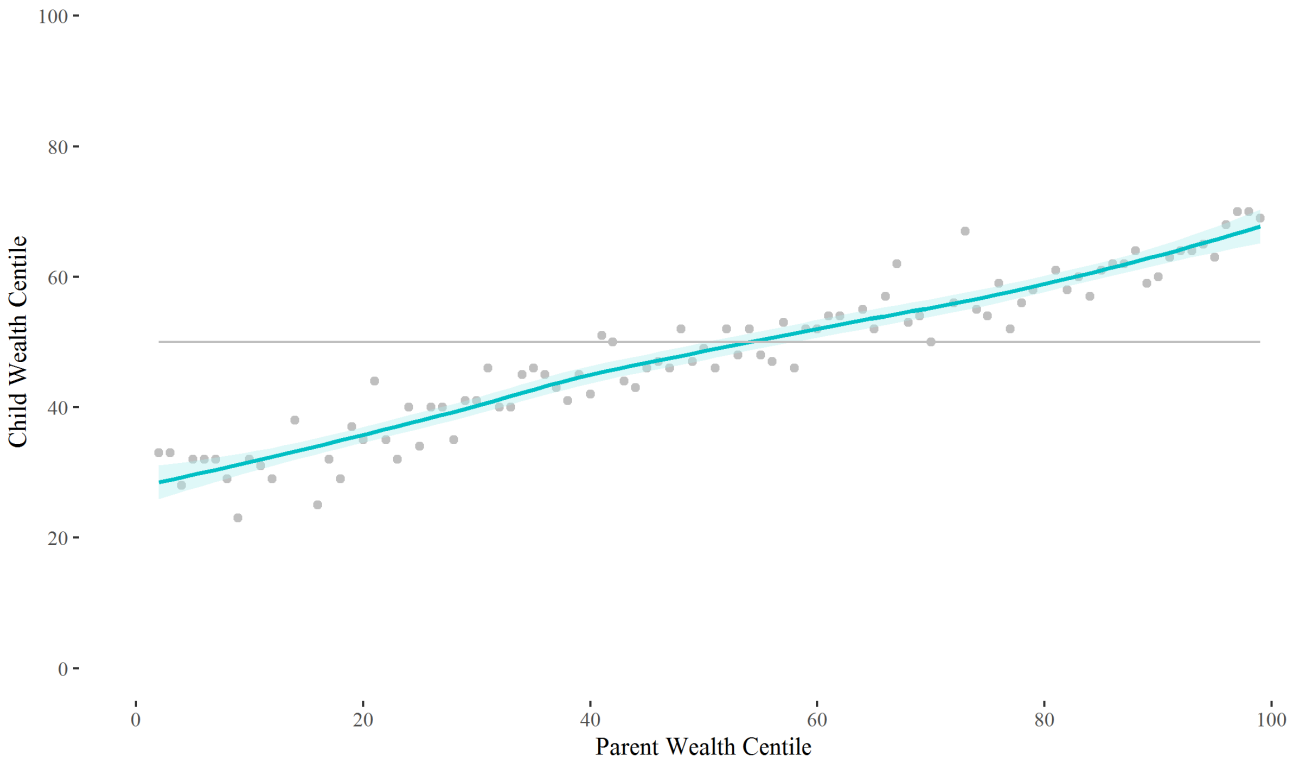

Figure 10: Average wealth conditioned on parent's wealth

As we have seen so far, parent's wealth is very significant, forasmuch as individuals' wealth will largely depend on their household of origin's wealth, but not only that, another key factor is the region in which they live, as growing up in different states proves to be relevant to determine wealth mobility.

In *Figure 11* we see mobility by centile for the nine largest states by population, compared to the national average in grey. The differences amongst different states is huge. The percentage of children of poor families that grew up to become rich is much higher in states like Nuevo León (40%), Mexico City (32%) and Jalisco (27%) than in Puebla (10%), Michoacán (9%), or Coahuila (4%), for example, and this differences are clearly evidenced in *Figure 11* when comparing to national mobility. States like Mexico State, Veracruz and Guanajuato experience wealth mobility much closer to the national average.

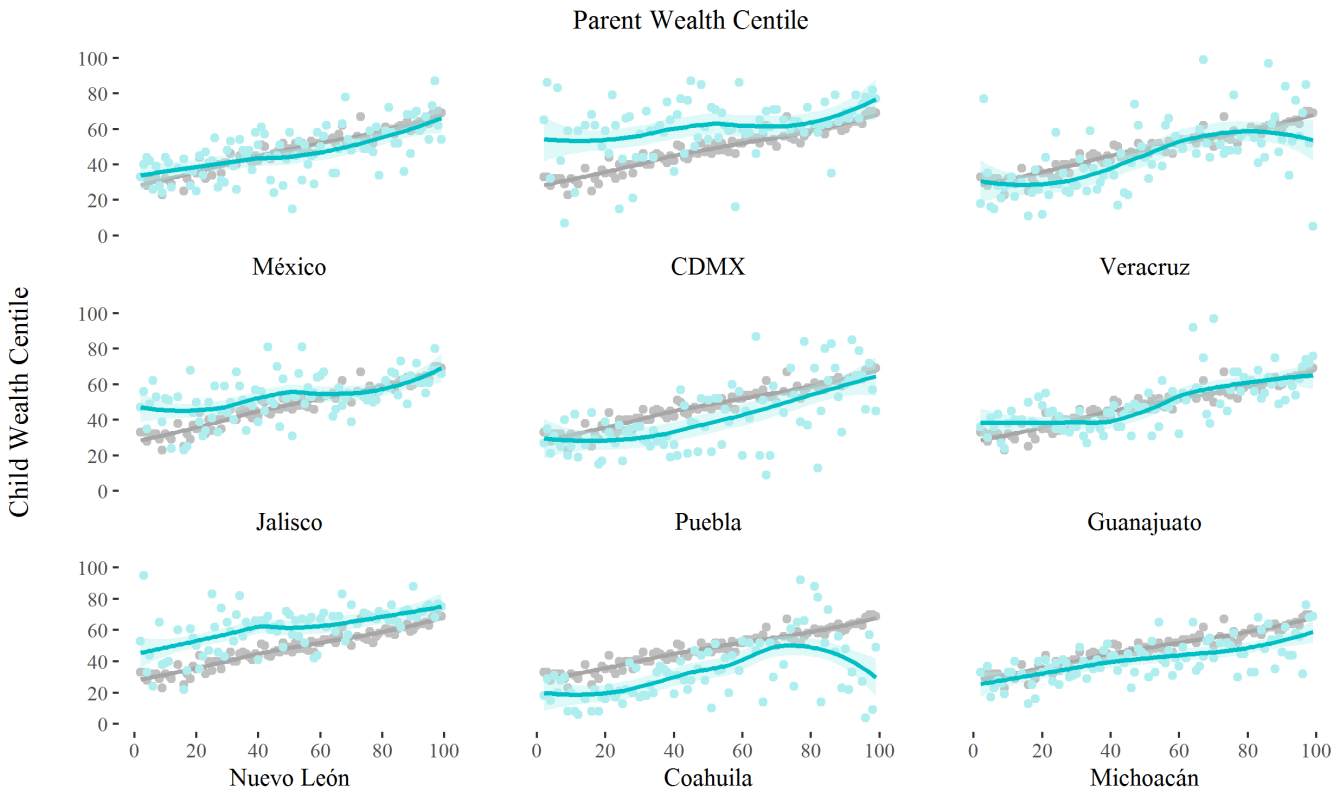

Figure 11: Average wealth conditioned on parent's wealth - State comparison

7 Inequality of Opportunity

In this section we make an assessment on inequality of opportunity, the aim is to determine which factors affect outcome in terms of wealth.

The core premise of equality of opportunity is the idea that inequalities in outcomes can be partitioned into justifiable (or legitimate) sources of inequality, resulting from unequal individual effort and luck and unjustifiable (or illegitimate) sources, resulting from circumstances beyond the individual's control. Applications all rely on the assumption that effort and circumstances can indeed be separated, which takes assumptions of causality and some loss of information. While the separation of concepts is clear in principle, there is a question of whether they can ever be separated in practice, or even conceptually.

Here, the method aims to understand the predictive power of exclusively circumstantial factors versus assumed effort. Note that other mechanisms that account for such outcomes can still hold power at the meta level; that is, a prediction for an individual's sorting into an outcome will not inherently be explained by the characteristic circumstance or the effort; this is why theory is crucial to inference in the given case. Still, we proceed on the sound basis that larger inequalities based on circumstance indicate more severely unjustifiable inequalities.

In the literature[11] this is made by using the rank-rank regression approach described by Dahl and DeLeire (2008), and it has been already discussed with the Mexican case using the *MMSI 2016* data set in a paper by Monroy-Gómez-Franco, Vélez and Yalonetzky (2018), where they show that there is a high degree of intergenerational persistence in terms of positions on the household wealth distribution.

In our analysis, however, we take a different approach. We aim to apply the machine learning classification algorithm of *proportional odds logistic regression*, which is useful to predict multi-class ordered variables such as the wealth index quintiles created previously.

7.1 The model

Ordinal logistic regression builds off of the idea of binary logistic regression: that is, taking a probability, transform it into odds, taking the log of that value and conducting a regression on that transformed value. However, ordinal regression requires thinking of cumulative probabilities instead of individual categorical probabilities. We have to assume that one makes it to one particular category and then we know the probability of being in that category or having been in any category lower.

First is the cumulative probability. Assuming we take our categorical dependent variable, and label it from 1 to J (J categories), the probability of reaching category j would be defined by the cumulative probability,

$$F_j(x_i) = P(Y_i \leq j | x_i)$$

then, we take that probability, transform it to odds and taking logarithms gives us the *logit* (*stochastic component*),

$$Y_i^* = Logit\left(F_j(x_i)\right) = log\left(\frac{F_j(x_i)}{1 - F_j(x_i)}\right)$$

to which we add an observation mechanism (τ cuts)

$$Y_i = j \quad \text{if} \quad \tau_{j-1} \leq Y_i^* \leq \tau_j \quad \text{for} \quad j = 1, ..., J$$

then, the multiple regression model to fit is:

$$Y^* = \alpha_j - \beta_1 x_1 - \beta_2 x_2 - ... - \beta_k x_k$$

where there will be $J - 1$ equations in total, as the probability of being in at least the last category is 1.

Lastly, to make sense of the results, a *systematic component* relating the coefficients and the τ cuts has to be used. This component has the form of

$$Pr(Y \leq j) = Pr(Y^* \leq \tau_j) = \frac{\exp(\tau_j - x_i\beta)}{1 + \exp(\tau_j - x_i\beta)}$$

[11] See Chetty et al. (2014) and Caballé (2016).

which implies

$$\pi_j = \frac{\exp(\tau_j - x_i\beta)}{1 + \exp(\tau_j - x_i\beta)} - \frac{\exp(\tau_{j-1} - x_i\beta)}{1 + \exp(\tau_{j-1} - x_i\beta)}$$

To assess inequality of opportunity, in this case, we will be focusing on the effect of *circumstances* on wealth outcomes, as to empirically get a sense of the unjustifiable inequalities. For this, the explanatory variables (set of circumstances) used to fit the model are *parent wealth, parent education, parent occupation, skin tone, urbanicity, gender and parent speaks indigenous tongue*[12]. It should be noted that fitting this kind of model generates only a *t value*, but we can generate an estimate for a traditional *p value* by comparing it against the standard normal distribution.

Table 3: Ordered Logistic Regression - Results

Coefficients:	Value	Std. Error	t value	p value
Parent wealth	0.50911	0.012610	40.3719	0.000
Parent education	0.15849	0.013891	11.4094	0.000
Parent occupation	0.11968	0.009517	12.5754	0.000
Skin tone	-0.26059	0.024547	-10.6160	0.000
Urbanicity	1.21167	0.036068	33.5938	0.000
Gender	0.04751	0.027440	1.7314	0.083
Indigenous tongue	-0.66956	0.044287	-15.1186	0.000

τ cuts:	Value	Std. Error	t value	p value
1Q - 2Q	0.4789	0.0998	4.8010	0.000
2Q - 3Q	1.8750	0.1002	18.7130	0.000
3Q - 4Q	3.0952	0.1017	30.4237	0.000
4Q - 5Q	4.3847	0.1042	42.0858	0.000

Looking at the results we see that, as expected, parent's wealth, education and occupation have positive impact on the individual's wealth outcome; the most notable is the impact of urbanicity, where living in a denser area positively impacts wealth quintile outcome, almost twice as much as speaking an indigenous tongue harms it. From these two values, we can infer a link between the concentration of wealth and/or opportunity available to individuals gravitating to urban life. Parent wealth predictably indicates higher wealth outcomes, which tracks with the persistence and so-called inherited security from past results. We also get that the coefficient for skin tone group is negative, giving us the indication that darker skin tones have a negative impact on wealth. All the coefficients, except for gender, are statistically significant. This is a very surprising result as, in the field of labor economics, models that use income as the latent variable do tend to reveal the presence of a gender gap as significant.

[12]Dummy variables for states were included to capture the differences in regions separate from the set of circumstances.

To interpret results of the model, we calculate expected and predicted values for the probability of being in each wealth quintile given the set of circumstances of the individual by simulating the outcomes with the fitted model. First, the *predicted probabilities* are drawn from the logit distribution described by μ_i, or the mean value of the covariates, and observed as one of the J discrete outcomes. *Figure 12* shows that these calculations based on the sample means are slightly weighted toward the lower end, with quintiles two and three (middle and lower middle class) being more probable for the average Mexican citizen.

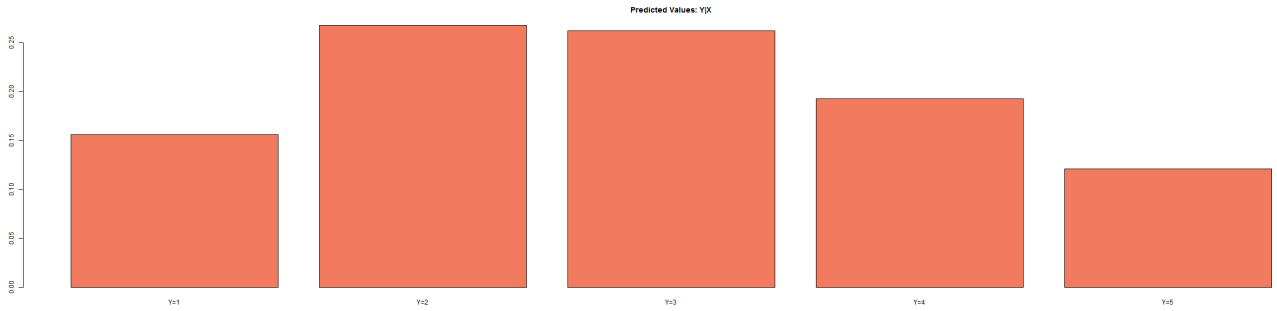

Figure 12: Predicted probabilities for μ_i

Then, the *expected probabilities* are the simulations of the predicted probabilities for each category: $E(Y = j) = \pi_j$ given a draw of β from its sampling distribution (i.e. around μ_i). This gives us the empirical distribution of the expected probabilities of being in each wealth quintile for the average Mexican in *Table 4*. Following intuition, there is less probability for either extreme (landing in the first or fifth quintile) for the average citizen, with balanced middle quintiles.

Table 4: Distribution of the expected probabilities

Quintile	Probability	Std. Error	Lower (2.5%)	Upper (97.5%)
1Q	0.131	0.008	0.116	0.147
2Q	0.250	0.034	0.190	0.325
3Q	0.293	0.024	0.243	0.334
4Q	0.204	0.019	0.158	0.233
5Q	0.122	0.041	0.052	0.211

The following *Figure 13* illustrates this empirical distribution for each wealth quintile, which allows to show that the fifth quintile (presented in the first row) is as a much flatter, dispersed distribution. This distribution of probabilities (to land in the top quintile) is spread out so that predicting a rich outcome proves to be more challenging than predicting a poor outcome. It results more likely to consistently predict a poor outcome, as indicated by the lower standard error (0.008) of the expected probability, indicating a more consistent estimation in the lowest row.

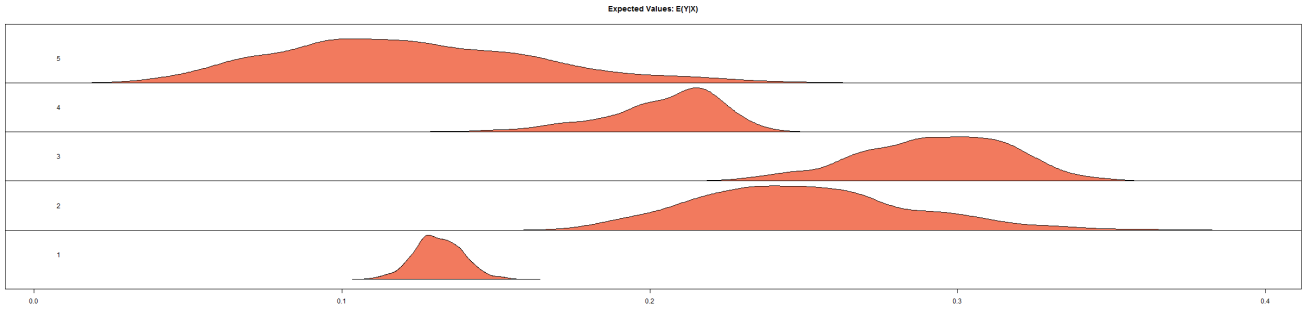

Figure 13: Distribution of the expected probabilities

7.2 Inequality: first differences

This is done by simulating the predicted and expected probabilities for a fixed value of x and x_1 of one of the explanatory variables. Then calculating the difference in each of the probabilities by

$$Pr(Y = j|x_1) - Pr(Y = j|x) \quad \text{for } j = 1, ...J$$

7.2.1 By parent's wealth

This lets us see how parent's wealth affects the wealth outcome for the individuals: that is, if the rich remain rich and poor remain poor. For this, we fix x as parent's wealth in the lower quintile, and x_1 as parents being in the top wealth quintile. Running numerous simulations allows us to scale much larger than the given sample of the data, while still taking draws of the other covariates considering their sample distributions per the logit model. The results of the simulation with 10,000 iterations are as follows:

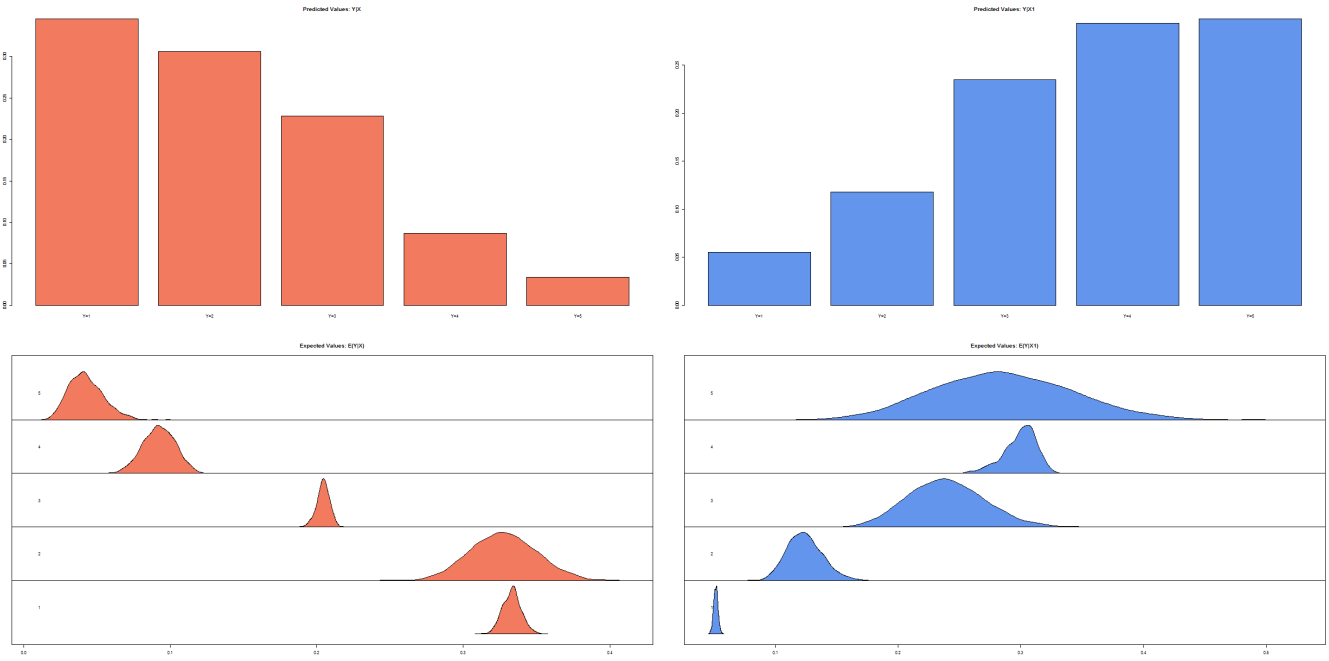

Figure 14: Predicted and expected probabilities, top and bottom origin wealth

The red portion indicates those starting in the lowest quintile, and their most probably outcome is to remain in the lowest quintile, evident by the leftmost column. On the blue portion, those in the highest quintile can expect by a large probability to remain in the highest or, very closely, the second-highest quintile. Notice those with fixed value of starting in the first quintile have consistently less probability to move to their opposite extreme.

Table 5 below shows the probabilities of ending up in each of five wealth quintiles based on the fixed variable being *parent's wealth* in the bottom quintile or the top quintile, and then isolates just the differences between those probabilities in the last section. By doing so, we isolate the effect of starting in a particular quintile and looking at the differences in movement across an entire distribution. Earlier analysis of the transition matrices was a snapshot in time of the real wealth outcomes intergenerationally. So, it can be said that the first differences approach brings into focus the nature of the inequality specifically by simulating the generalized log odds, rather than just reported wealth differences.

Table 5: Expected probabilities, fixed origin quintiles and first differences

Quintile	Probability	Std. Error	Lower (2.5%)	Upper (97.5%)
Parents Wealth: Bottom Quintile				
Q1	0.333	0.007	0.319	0.346
Q2	0.327	0.022	0.285	0.369
Q3	0.204	0.005	0.195	0.213
Q4	0.093	0.011	0.072	0.114
Q5	0.043	0.012	0.024	0.070
Parents Wealth: Top Quintile				
Q1	0.051	0.002	0.048	0.055
Q2	0.123	0.014	0.098	0.153
Q3	0.238	0.030	0.181	0.296
Q4	0.299	0.015	0.265	0.321
Q5	0.287	0.056	0.189	0.400
First Differences				
Q1	-0.282	0.007	-0.296	-0.267
Q2	-0.204	0.009	-0.219	-0.185
Q3	0.034	0.031	-0.022	0.098
Q4	0.207	0.024	0.153	0.242
Q5	0.245	0.044	0.164	0.332

As we see, the differences (considering their absolute values) are most pronounced in the extrema, with a greater difference in probabilities (28.2 ppoints) to end up in the first quintile. As tracks with the other results on inequality here, the standard error and resulting range from the rightmost columns indicate much more variability for attaining the fifth quintile regardless of starting in the rich or poor quintile. This adds to the evidence of the persistence of the poor to stay poor, and for even well-off individuals to face more volatility that results in pointing them toward lower wealth quintiles.

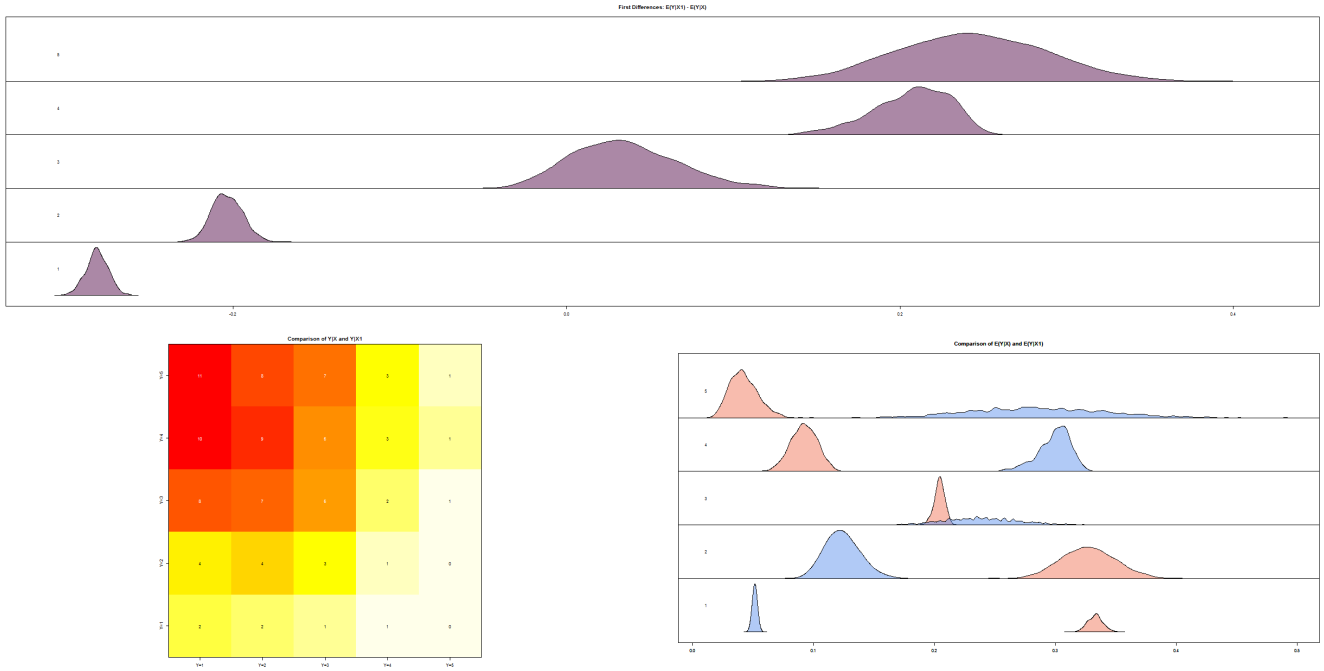

Figure 15: First differences, top and bottom origin wealth

7.2.2 By skin tone

Finally, to understand to what extent skin tone is a conditioning factor, the same procedure as before is followed: we will simulate 10,000 times the wealth outcome, but now for the differences resulting from different skin tone groups by fixing *being the light skin group* as x, and x_1 as *being in the dark skin group*. The predicted probabilities for each, as well as the results of the simulation are as follows in *Figure 16*. The distributions in red show the predicted and expected probabilities when fixing skin tone as light skin, whereas those in blue show the probabilities when fixing it to dark skin.

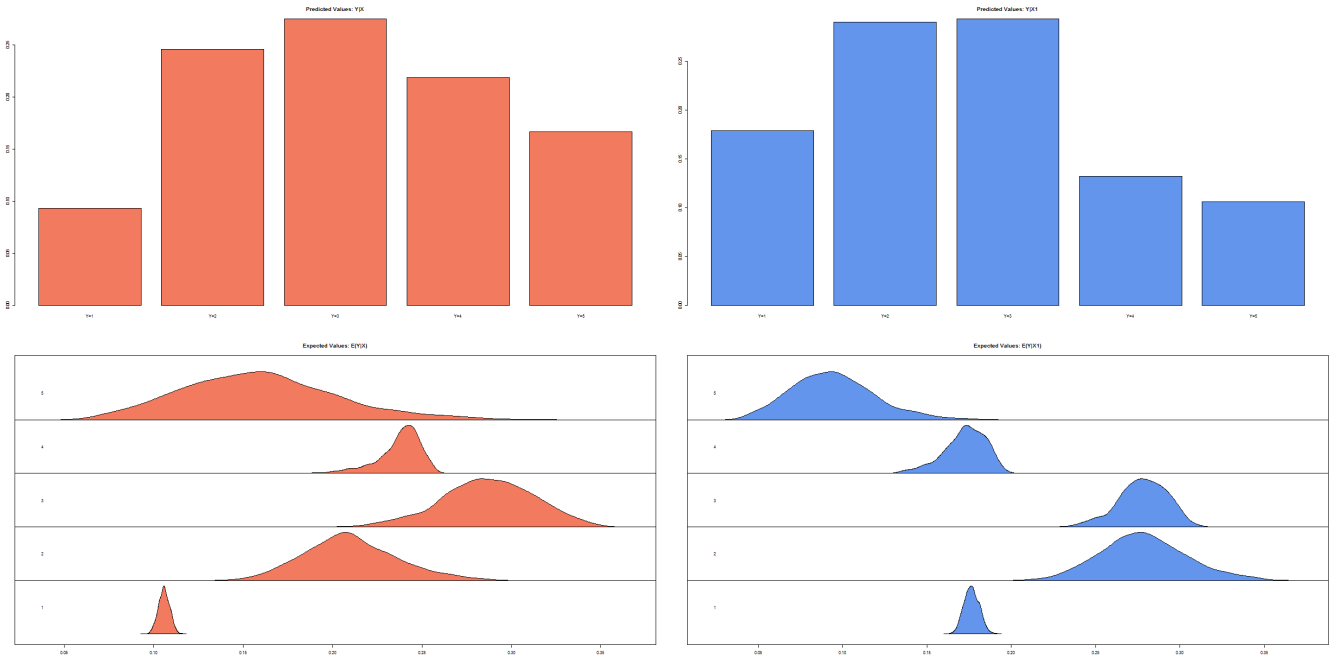

Figure 16: Predicted and expected probabilities, light and dark skin groups

The following table shows first differences for the light and dark skin groups. When conditioning on being light skinned, there is more probability to attain the higher wealth status, for example 16.1% probability to access the top quintile compared to 9.5% for dark skin.

There is a similar probability, around 28%, to end up in the middle quintile for both groups. So, we see the differences demonstrate a baseline inequality between the two skin tone groups which is more pronounced in the outcomes for the first and last quintiles.

Table 6: Expected probabilities, fixed skin tones and first differences

Quintile	Probability	Std. Error	Lower (2.5%)	Upper (97.5%)
Light Skin Group				
Q1	0.106	0.003	0.099	0.112
Q2	0.209	0.023	0.167	0.258
Q3	0.286	0.023	0.238	0.329
Q4	0.238	0.011	0.211	0.255
Q5	0.161	0.039	0.094	0.247
Dark Skin Group				
Q1	0.177	0.004	0.168	0.186
Q2	0.277	0.022	0.236	0.322
Q3	0.278	0.013	0.250	0.301
Q4	0.173	0.011	0.149	0.192
Q5	0.095	0.022	0.059	0.143

Table 6 continued from previous page

Quintile	Probability	Std. Error	Lower (2.5%)	Upper (97.5%)
First Differences				
Q1	0.071	0.006	0.060	0.082
Q2	0.069	0.004	0.061	0.076
Q3	-0.009	0.011	-0.029	0.012
Q4	-0.065	0.005	-0.074	-0.055
Q5	-0.066	0.017	-0.104	-0.036

These simulations show that parent wealth is a much stronger predictor for an individual's current wealth than that of skin tone alone. Still, we cannot diminish the notable (roughly 7 ppoint) difference in probabilities for light skin to reinforce *pigmentocracy* mechanisms in catapulting individuals both out of the lowest quintile and into the highest wealth quintile. Generational wealth standing generates more differences in outcome to a much greater degree than skin tone, as the difference in probabilities of being in the wealthiest quintile resulting from skin tone difference is expected to be 10.4% at most, while that resulting of different origin wealth is expected at minimum 16.4%. Despite this trend overall, these variables could be seen to influence inequality in similar ways: those with parents in the bottom quintile and those in the dark-skinned group face under 10% probability to attain top quintile wealth.

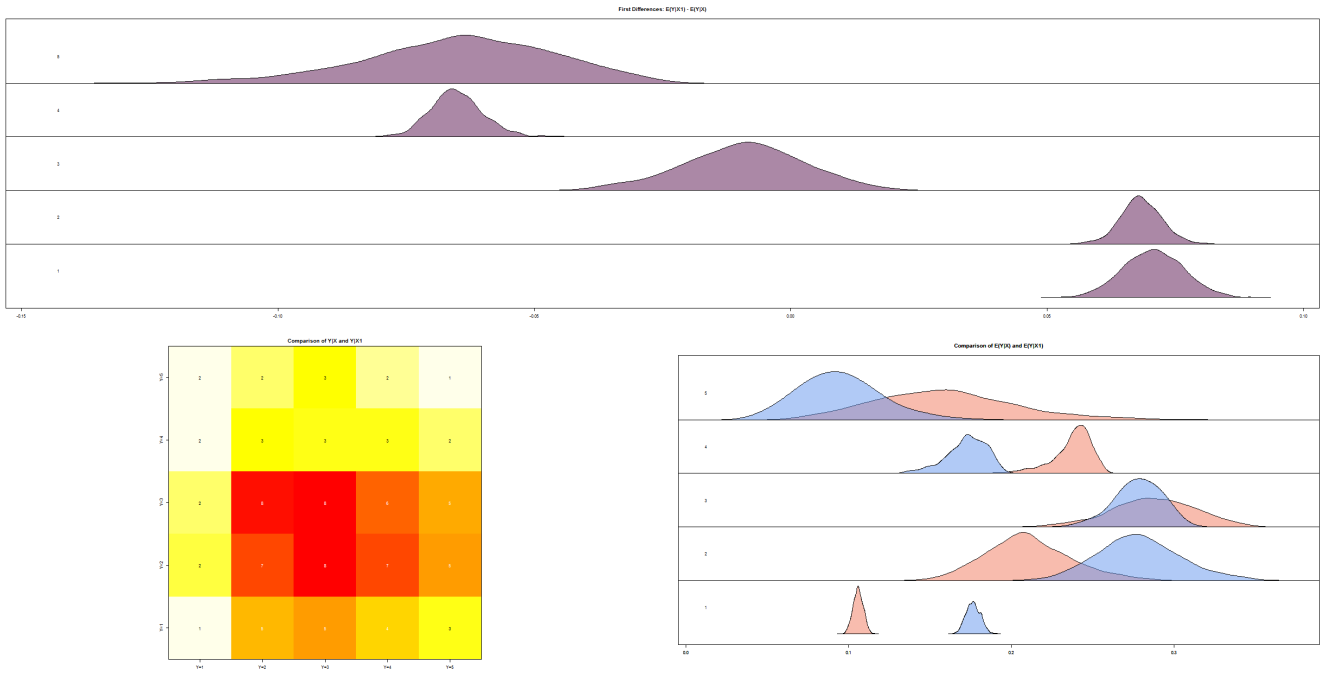

Figure 17: First differences, light and dark skin groups

8 Conclusions

In all, thorough analysis on the aspects of mobility in Mexico using 2016 MMSI data have shown fairly consistent trends, most expected and others surprising. Survey responses evaluated individuals' status and also the self-reported one of their parents, thus allowing evaluation for intergenerational mobility; this lens shows that many outcomes are highly dependent on circumstances, and that opportunity for advancement can be considered an inheritance.

Constructing a material deprivation-based wealth index to resolve the problem of unavailable income information (for both respondents and their parents), the population's division into quintiles was critical to see that both poor and rich status have degrees of persistence. Volatility was also seen throughout, in that middle-class standing is much more likely to face a decline than a chance to advance.

In assessing the transition matrices for movement among categories of occupation, an interesting finding was the long-run stochastic probability vector shows an eventually unbalanced population, with over a quarter of the population working as officials, directors and chiefs, while only 4% of the population will work in agriculture, forestry and fishing. We note that, despite the ever-present championing of upward mobility, too much movement in a particular direction, as illustrated by occupational striving here, has detrimental effects.

For educational attainment, it was found that, with a national average of 0.63, relative mobility is less in rural areas (0.58) and dark skinned individuals (0.56). By absolute measures, given the *average quartile movement* of 1.11 levels by national average, urban dwellers gain advantage (1.15 levels) and dark skin can expect penalty (1.01). Those living in rural areas have four times less likelihood to reach a top education level and are twice as likely, and notably higher than by any other disaggregation, to attain primary education levels if their parents did; similar effects of persistence are seen in the dark-skinned group.

Ultimately these trends have consequences for Mexico, as emigration has reduced pressure on the Mexican labor market, but the Mexican economy's inability to create sufficient opportunities to retain its most educated individuals may have a detrimental effect on long-term growth (Zúñiga and Molina 2008).

Analyzing these matrices for overall wealth yields similar results, characterized by persistence in the poor, who have only a 3% chance to advance to the top, whereas it would be 20% if there was no evidence of any initial advantages. While such jumps between extreme origin and destination quintiles are indeed rare across countries, other so-called developed nations have benchmarks three or four times this rate. Light-skinned individuals have the highest chances (57%) to hold onto high wealth status, compared to just 40% probability for dark skin and a stunning 29% for those in rural areas. There are notable differences by region: the states of Nuevo León, Mexico City and Jalisco have much more mobility than Puebla, Michoacán or Coahuila, and this effect could be seen as related to their urbanization.

Urbanicity and *indigenous tongue* emerged as notably influencing explanatory variables in the ordered logistic regression model. Living in a densely populated area is by far the most impactful (toward the positive), speaking an indigenous tongue negatively impacts outcomes and parent wealth does so positively. From this, it is a given to conclude that opportunity does lie in cities, is predicated on generational wealth, and disconnection from indigenous (commonly rural) lifestyle. It is interesting to note that difference for gender was not significant for mobility here, though other research has much more to say on the matter; we can assume that it doesn't outweigh the importance of other factors in the model, which consistently and dramatically impact mobility.

Beyond the results from the existing sample, the simulation that generalized the probabilities for mobility was performed for general wealth quintile movement as well as conditioning on skin tone. The probability distributions were more consistent for becoming poor than becoming rich, proving again that upward mobility is an unstable target for the average Mexican. Movement into the extrema (poorest or richest quintile) is more likely upward for light skin and, concurrently, less likely for dark skin. By this we see reinforcement of the work of *Pigmentocracy* as developed by Telles and others.

In all, these various measures of mobility and opportunity paint a picture that personal progress in Mexico is strongly tied to generational wealth, city living, and light skin. Payoffs from education are overstated if conditioning on urbanicity and skin tone, corrupting traditional reasoning that education is a way to lift the circumstances and outcomes of individuals. Besides, from 2000 to 2010 the amount of Mexicans with advanced degrees has doubled, though this tracks exactly with an exponential growth of those individuals to move out of the country in a "brain drain." The evidence by multiple mobility measures show volatility in the middle class, narrow opportunity to advance significantly, and inequalities.

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10 Appendix

Table A1: KMO and Bartlett Test - Origin Wealth Index

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.928
Bartlett's test of sphericity	Approx. Chi-Squared	552217747.23
	df	190
	Sig.	0.000

Table A2: Total Variance Explained - Origin Wealth Index

Factor	Initial Eigenvalues		
	Total	% of Variance	Cumulative %
1	7.064	35.318	35.318
2	2.479	12.396	47.714
3	1.610	8.049	55.762
4	0.968	4.841	60.603
5	0.903	4.516	65.119
6	0.799	3.993	69.112
7	0.709	3.544	72.656
8	0.629	3.144	75.800
9	0.608	3.040	78.840
10	0.531	2.653	81.493
11	0.510	2.549	84.042
12	0.472	2.359	86.400
13	0.469	2.345	88.746
14	0.415	2.077	90.823
15	0.394	1.971	92.794
16	0.358	1.792	94.586
17	0.300	1.500	96.087
18	0.284	1.420	97.507
19	0.268	1.341	98.848
20	0.230	1.152	100

Table A3: Factor Matrix - Origin Wealth Index

	Factor
Refrigerator	0.814
Blender	0.798
TV	0.793
Gas	0.775
Water supply	0.739
Washing machine	0.736
Radio	0.684
Electricity	0.683
Phone	0.660
Crowding	0.554
Car	0.545
Bank account	0.502
Toaster	0.500
Credit card	0.454
Department store card	0.418
Second house	0.256
Land (not for agriculture)	0.047
Livestock	-0.370
Land for agriculture	-0.427
Work animals	-0.448

Table A4: KMO and Bartlett Test - Current Wealth Index

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.888
Bartlett's test of sphericity	Approx. Chi-Squared	246087838.51
	df	210
	Sig.	0.000

Table A5: Total Variance Explained - Current Wealth Index

Factor	Initial Eigenvalues		
	Total	% of Variance	Cumulative %
1	4.827	22.985	22.985
2	1.718	8.183	31.168
3	1.295	6.165	37.333
4	1.157	5.512	42.844

Table A5 continued from previous page

Factor	Initial Eigenvalues		
	Total	% of Variance	Cumulative %
5	0.968	4.608	47.453
6	0.915	4.359	51.812
7	0.894	4.259	56.071
8	0.873	4.156	60.227
9	0.858	4.084	64.312
10	0.821	3.909	68.221
11	0.788	3.751	71.972
12	0.747	3.557	75.529
13	0.697	3.321	78.850
14	0.682	3.248	82.098
15	0.661	3.149	85.246
16	0.659	3.136	88.383
17	0.560	2.666	91.048
18	0.540	2.570	93.619
19	0.526	2.504	96.123
20	0.487	2.320	98.442
21	0.327	1.558	100

Table A6: Factor Matrix - Current Wealth Index

	Factor
Internet	0.734
Computer	0.704
Phone	0.617
Washing machine	0.587
Bank account	0.566
Gas	0.559
Credit card	0.553
Car	0.552
Toaster	0.532
Refrigerator	0.522
Department store card	0.427
TV	0.415
Cellphone	0.405
Blender	0.394
Domestic Service	0.371

Table A6 continued from previous page

	Factor
Radio	0.370
Crowding	0.331
Second house	0.273
Land (not for agriculture)	0.094
Livestock	-0.250
Land for agriculture	-0.252