Unequal opportunities in Nuevo León, Mexico

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Abstract

This paper used a new source of information (ESRU-EMOVI NL) to estimate, for the first time, the lower limit of unequal opportunities in a federal state in Mexico. Using the former criterion concerning unequal opportunities, a lower threshold indicated 35% inequality in economic resources in the state. As at the national level, the main contributors to unequal opportunities in the state are unequal economic resources by origin and parental education. However, in contrast to what has been observed, for the country as a whole, inequalities associated with people's skin tone account for 5% of observed unequal opportunities.

Keywords: unequal opportunities; Mexico; Nuevo León; economic inequality.

1. INTRODUCTION

There is a recurrent discussion on the importance and justification of inequality in society. On the side of those who argue for the need to reduce it, one reason given is that not all inequality observed can be explained by differences in effort between individuals, and therefore it is neither fair nor efficient. In this respect, it is established that part of the total inequality of results is due to factors beyond the control of individuals, i.e., circumstances for which they are not responsible. For example, in the context of the absence of public services with equivalent coverage and quality for all people, such as those related to education and health, the fact of being born and growing up in a group of society without access to them negates the possibility of acquiring the necessary skills to compete on equal terms.[1] The last ten years have seen substantial growth in the economic literature on the factors associated with the distribution of a society's economic resources among its members, and one of the main branches of this literature is precisely that which deals with estimating the magnitude of inequality of opportunities in a society.

In the case of Mexico, there are estimates of its magnitude on a national level (Vélez-Grajales et al., 2018; Monroy-Gómez-Franco et al., 2021) and for large subnational regions (Monroy-Gómez-Franco, 2023; Plassot et al., 2022). However, a finer disaggregation on a state level is still pending.

This article aims to contribute to rectifying this gap by providing the first series of estimates on the magnitude of the inequality of opportunities in a federal state, in this case, Nuevo León. For this purpose, the ESRU Survey on Social Mobility in Nuevo León (ESRUEMOVI-NL) by the Centro de Estudios Espinosa Yglesias (CEEY) was used, which collects information on the current and original socioeconomic conditions of the population between 25 and 64 years of age living in the state in 2021. Based on the *ex-ante* definition of the equality of opportunities derived from the approach proposed by Van de Gaer (1993), following Ferreira and Gignoux (2011) and Ferreira et al. (2011) for its implementation, it was found that the minimum level of the proportion of total inequality in economic resources represented by inequality of opportunities is 35%. This result is higher than in previous exercises for the northern region (to which Nuevo León belongs) (Monroy-Gómez-Franco, 2023; Plassot et al., 2022). As in previous exercises, the results point to inequality in the resources of the household of origin and inequality in the level of education of the parents as the main contributors to the inequality of opportunities.

The article is structured as follows. The second section presents a conceptual discussion of the inequality of opportunities and reinforces the approach. The following section develops the Mexican context on the state of the inequality of opportunities. The fourth section explains the empirical strategy of the analysis. The following section describes the source of information used. The sixth section presents the results obtained. Finally, it closes with a series of conclusions regarding the results obtained.

2. INEQUALITY OF OPPORTUNITIES: A CONCEPTUAL DISCUSSION

Following Roemer (1998), it is possible to generally define that person i's access to an advantage or life outcome (income, wealth, education, etc.) denoted by y_i, depends on two sets of factors. On the one hand, factors outside the person's control but which, either because of the organization of society or because of its intrinsic characteristics, affect the person's life outcomes and trajectories. These factors, referred to in the literature as circumstances, can be grouped in the C_i vector as the rows of such vector. Each row's exact value varies from individual to individual, depending on their circumstances. The other factor that is assumed to affect people's results is the degree of effort they exert, denoted by π_i. Strictly speaking, π_i is the percentile that individual i occupies in the distribution of effort of the people with whom individual i shares circumstances. However, the degree of effort does not occur in a vacuum but is affected by people's circumstances insofar as these at least partially affect people's expectations and aspirations. Formally, this can be expressed as:

$$y_i = f\big(C_i, \pi_i(C_i)\big) \tag{1}$$

As established by Ooghe et al. (2007), two concepts of equality of opportunity can be derived from this theoretical framework: one, associated with the work of Roemer (1998), which can be called strict equality of opportunities, and the second, based on the work of Van de Gaer (1993), which consists of

equalizing sets of opportunities. In the first case, the regulatory principle against which the observed distribution of advantages/outcomes is compared is that the reward/outcome should be the same for the same degree of effort made. Therefore, this principle of equality of opportunities is also known as *ex-post equality of opportunities* since it can only be verified after the effort has been made. Conversely, the second criterion establishes that the reward expected by all people before undertaking any effort must be the same. For this reason, it is known as the *ex-ante equality of opportunities* criterion.

In this paper, the second criterion was adopted to maintain comparability with most of the existing empirical exercises for the case of Mexico (Vélez-Grajales et al., 2018; Monroy-Gómez-Franco, 2021; Monroy-Gómez-Franco, 2023), as well as because of the lower sample size requirements imposed for the estimations (Ferreira and Gignoux, 2011).[2]

According to Ferreira and Gignoux (2011), the *ex-ante* criterion can be expressed as follows. Let Y be the distribution of the outcome variable y. Then we define YJ as the reward/outcome y distribution among members sharing the same vector of circumstances $C = C_J$. i.e., $Y^J = F(Y \mid C = C_J)$. If there are k sets of circumstances, then it is possible to generate the complete division of the population into k subsets of individuals, each subset being composed of individuals sharing equal circumstances. Therefore, the principle of equality of sets of opportunities or the *ex-ante* equality of opportunities principle involves:

$$E[F(Y|C = C_1)] = \cdots = E[F(Y|C = C_J)] = \cdots = E[F(Y|C = C_K)]$$

$$\mu_{C_1} = \cdots = \mu_{C_J} = \cdots = \mu_{C_k}$$

(2)

Where $\mu_{C_1} = E[F(Y|C = C_J)]$ In other words, the expected value of the conditional distribution of reward y must be the same in all subgroups generated by the full participation of the population from all possible sets of circumstances. If this condition is not met, it can be established that there is no equal opportunity in the observed society under this criterion.

Equation 2 allows us to understand directly how this criterion can be empirically operationalized, as shown by Ferreira and Gignoux (2011). Assuming that the parameters of the relationship between circumstances and life outcomes given by equation 1 is linear, then we estimate the conditional expectation on C of that relationship using the ordinary least squares estimator of the regression

$$y_i = \beta C_i + u_i$$

(3)

Where u_i would correspond to the effect that effort has on attaining life outcomes if and only if the vector of circumstances C_i includes all circumstances that affect the attainment of outcome y. Otherwise, u_i would capture the effect of the omitted circumstances and the effort expended. Assuming that this condition is met, then

$$E[\widehat{y_i|C}] = \hat{\beta}C$$

Based on the foregoing, the conditional expectation of equation 2 can be calculated by substituting $C = C_i \quad \forall i = 1, \ldots k$ which would generate

$$\hat{\mu}_t = E[y_i\widehat{|C} = C_t] = \hat{\beta}C_i = \hat{y} \qquad \forall i = 1, \ldots k$$

(4)

The degree of inequality observed in the values of these estimates is the degree of the inequality of opportunities in the society for which the estimation was made. The following section will discuss how this approach has been applied to Mexico and then describes the database to be used, as well as the inequality indicator to estimate the magnitude of the inequality of opportunities in Nuevo Leon.

3. INEQUALITY OF OPPORTUNITIES IN MEXICO

The first estimates of the inequality of opportunities in the Mexican adult population correspond to the work of Wendelspiess-Chávez-Juárez (2015). The author estimates the inequality of opportunities in access to a joint indicator of economic status and educational attainment. This multidimensional indicator is a better approximation to a measure of well-being than those based on only one dimension. The results of this work indicate that at least 40% of inequality in access to this welfare indicator is associated with differences in the circumstances of the population.

This last aspect is one of the limitations of the article since the estimate only considers male heads of households aged between 25 and 64.

The first work to estimate the inequality of opportunities for the population of both genders aged 25 to 64 in Mexico is that of Vélez-Grajales et al. (2018), who developed said work based on access to two outcome variables: income and an index of economic household assets. For both dimensions, the authors find that the minimum level of inequality of opportunities represents 37% of the inequality in the distribution of household per capita income and its distribution of economic resources. In this analysis, the authors consider as circumstances an index of economic resources of origin, the occupation of the father, the maximum education level of the parents, the ethnic origin of the person and the type of locality of origin. It should be noted that these authors use the ESRU Survey of Social Mobility in Mexico 2011 (ESRUEMOVI 2011), a sister survey to the one used in this article, as a source of information for their estimates.

In a subsequent paper, these authors add the skin tone of the person being interviewed as a circumstance, finding that this factor provides statistically significant information for calculating the inequality of opportunities in Mexico (Monroy-Gómez-Franco et al., 2022). Thus, they show that the skin tone and ethnicity of the person operate as different circumstances in their association with people's life outcomes. Using the Intergenerational Social Mobility Module of the 2016 National Household Survey of the National Institute of Statistics and Geography (INEGI), the authors find that the minimum cutoff representing the inequality of opportunities in an index of economic resources for the population of both sexes aged 25 to 64 is 42%.

Another significant contribution of this article is that it provides a decomposition of the minimum level of the inequality of opportunities in the contributions of each of the circumstances considered to the total. In this analysis, the authors find that the circumstances with the most significant direct contribution are the economic resources of origin and the level of education attained by the parents, followed in third place by the type of community of origin, whether it was urban or rural. In turn, these three circumstances are life outcomes for the previous generation, which makes it difficult to estimate the direct effect of other circumstances associated with immutable characteristics of the person, such as gender, skin tone and ethnic origin. These circumstances probably also influenced the unequal outcomes in terms of the economic resources attained by the parents, their education and the region in which they live.

Finally, the works of Monroy-Gómez-Franco (2023) and Plassot et al. (2022) provide a series of estimates of the minimum level of the inequality of opportunities on a national level, as well as for five large regions of the country, defined according to CEEY (2019) and for which the ESRU-EMOVI 2017 is representative. Plassot et al. (2022) employ fewer circumstances selected according to machine learning methods and, particularly, regression trees. On the other hand, Monroy-Gómez-Franco (2023) seeks to exploit the maximum number of circumstances present in the sample, turning it into a study that considers the most extensive vector of circumstances for Mexico. Although different methods are used, the two articles share several significant findings. On the one hand, they find that the economic resources of the household of origin and the parents' education are the main circumstances in terms of their influence on individuals' trajectories/outcomes, followed by territorial circumstances and, in fourth place, the immutable characteristics of individuals. As in the previous case, this makes it impossible to estimate the overall effect of immutable characteristics since these probably also influenced the trajectories of parents.

The second finding they share is the ordering of the regions according to the magnitude of the minimum level of the inequality of opportunities in each one. In both cases, the north and northwest regions of the country have the lowest lower level of inequality of opportunities.

In the case of Monroy-Gómez-Franco (2023), using a vector of circumstances (which includes the occupation and education of both parents, the type of region of origin, the characteristics of the neighborhood of origin, the economic resources of the household of origin, gender, skin tone and ethnicity of the person), the author finds that the minimum level in the northern region is 35% of the inequality of economic resources.

4. EMPIRICAL STRATEGY

In this article, the outcome variable is an index of economic resources constructed based on available goods and services in the household of origin and the current household. Given the methodology used to construct the index, the possibility that some of the considered values are zero cannot be ruled out. Likewise, its calculation method makes it impossible to rule out *a priori* that the index may have an expected value of zero. For both reasons and following Ferreira et al. (2011), we chose to estimate the variance of the conditional means as an indicator of inequality in the distribution. As an indicator of inequality in the current distribution of the economic resources index, the variance of this distribution is considered. Therefore, it is possible to formally express the variance of the conditional distributions as a proportion of the variance in the outcome variable.

$$IOR_{VAR} = \frac{var(E[Y_i|C = C_i])}{var(y_i)} = \frac{var(\hat{\beta}C)}{var(y_i)} = \frac{var(\hat{y})}{var(y_i)} \qquad (5)$$

Where the last element on the right in equation six is the definition of the R2 of a regression where the dependent variable is the outcome variable (in this case, the wealth index) and the regressors are the circumstances considered.

In this analysis, three sets of circumstances are considered. The first considers only the index of economic resources of the household of origin. The second adds a series of circumstances related to the characteristics of the respondent's parents and their life outcomes to the index of economic resources of origin. These circumstances are the average education of the parents, whether the respondent lived outside Nuevo León at age 14, whether they lived in a community with more than 2,500 inhabitants, whether their father was an agricultural worker, and whether at least one of the parents spoke an indigenous language. The third set adds the person's gender and skin tone to the second set.

The following section will describe the characteristics of the ESRU-EMOVI NL database and its implications for selecting both the outcome variable and the vector of circumstances considered.

5. THE ESRU-EMOVI NL DATABASE

Table 1 shows the distribution of the aforementioned circumstances, which will be used in the analysis. As can be seen, the sample is primarily of urban origin, with parents mainly employed in the agricultural sector. Nearly a quarter of the population lived outside Nuevo León at age 14. The average education of the respondents' parents in the sample is almost nine years of schooling. In the case of skin tone composition, the sample distribution is similar to that observed on a national level in previous studies for the ESRU-EMOVI 2017 and for the Intergenerational Social Mobility Module 2016.[3] In other words, most of the population is concentrated in the intermediate skin tones, and about 10% of the population is at each extreme of the skin tone distribution.

Table 1. Distribution of circumstances in the population

Circumstances	Complete sample	Men	Women
Community of origin at age 14 was urban	84.5%	85.08%	84.03%
	(1.48)	(2.13)	(1.85)
At least one parent spoke an indigenous language	4.95%	5.06%	4.85%
	(0.82%)	(1.48)	(0.89)
Father was an agricultural worker	72.11%	64.61%	78.75%
	(2.61)	(4.25)	(2.38)
Average years of education of parents	8.82	8.79	8.85
	(0.32)	(0.38)	(0.43)
At age 14, lived outside of NL	22.56 %	20.62%	24.28%
	(1.85)	(2.41)	(2.27)
Women	53.02%	-	-
	(2.72)	-	-
Tone PERLA 1	-	-	-
	-	-	-
Tone PERLA 2	1.58%	0.98%	2.13%
	(0.56)	(0.46)	(0.91)
Tone PERLA 3	5.29%	3.26%	7.08%
	(0.97)	(1.09)	(1.56)
Tone PERLA 4	23.40%	19.35%	27%
	(1.87)	(2.47)	(2.33)
Tone PERLA 5	31.19%	34.05%	28.65%
	(1.82)	(2.86)	(2.23)
Tone PERLA 6	19.80%	18.94%	20.57%
	(1.63)	(2.13)	(2.35)
Tone PERLA 7	8.37%	10.47%	6.52%
	(1.09)	(1.80)	(1.23)
Tone PERLA 8	8.62%	10.58%	6.89%
	(1.21)	(2.23)	(0.94)
Tone PERLA 9	1.54%	2.12%	1.03%
	(0.39)	(0.71)	(0.37)
Tone PERLA 10	-	-	-
	-	-	-
Tone PERLA 11	-	-	-
	-	-	-

| Observations | 2 985 | 1 091 | 1 894 |

An interesting feature of the sample is that the percentage of women who report having a lighter skin tone is higher than that of men with the same tones. In the case of darker tones, there is a higher proportion of men than women. Unlike what was observed in the rest of the country, in the case of Nuevo León, considering the information from the sample, no sizable proportion thinks that their skin tone belongs to the extremes of the PERLA scale.

The outcome variable on which the magnitude of the inequality of opportunities will be calculated is an index that summarizes the household's economic resources based on information about goods and services available in the original and current household. The specific goods and services are shown in Table 2. These are dichotomous variables in all cases, so the multiple correspondence method was used to construct the economic resources index. This method uses the information available in the vector of goods and services owned by each respondent to generate a variable that summarizes the economic status underlying the information available in that vector. Unlike the principal component method, in the case of multiple correspondences, the weightings with which each entry in the vector of properties is weighted are constructed from the relative frequencies of each of the goods and services in the total sample. For a more detailed description of the method, see chapter two of Monroy-Gómez-Franco (2022).

Table 2. Goods and services considered in the economic resources index

Good or service	Origin	Current	Good or service	Origin	Current
Piped water inside the home	X	X	Mobile phone	X	X
Electricity	X		Computer	X	X
Bathroom inside the home	X	X	Internet connection	X	X
Water heater	X	X	VHS/DVD	X	
Domestic service	X	X	Other house or apartment	X	X
Gas/electric stove	X	X	Commercial premises	X	X
Washing machine	X	X	Commercial land or property	X	X
Refrigerator	X	X	Vehicle	X	
Landline phone	X	X	Credit card	X	X
Television	X	X	Not overcrowded home	X	
Toaster	X	X	Own home	X	X
Vacuum cleaner	X	X	Floor material		X
Cable TV	X	X	Electronic tablet		X
Microwave oven	X	X	Videogame console		X

Note: all variables considered are binary variables.

Source: ESRU-EMOVI NL, 2021.

6. RESULTS

Table 3 presents the results of the regressions of the current household economic resources index on the three sets of circumstances mentioned in the previous section. The R-squared of these regressions indicates the relative inequality of opportunities. This is because R-squared expresses the percentage of the total variation in the outcome variable, which is explained by the circumstances in this analysis. A sequential approach was followed in the introduction of circumstances into the analysis. The first set includes only the index of economic resources of origin. The second set adds a series of circumstances linked to the respondent's parents' characteristics and their life outcomes. Specifically, it included the average years of education of the parents,[4] the occupation of the father of the respondent at age 14, whether they lived in an urban community at that time [5] and whether they lived in a state other than Nuevo León. The last circumstance considered in this set is whether either parent spoke an indigenous language to indicate the respondent's ethnicity. The third set adds two circumstances linked to the immutable characteristics of the respondent to the second set: skin tone and gender.

Table 3. Regression of the index of current household economic resources on the circumstance variables

Variables	Set 1	Set 2	Set 3
Index of economic resources of the household of origin	0.551	0.456	0.444
	(0.050)	(0.052)	(0.052)
Average years of education of parents		0.021	0.020
		(0.006)	(0.006)
Father was an agricultural worker when the respondent was 14 years old		0.036	0.061
		(0.070)	(0.067)
Lived outside NL at age 14		-0.194	-0.187
		(0.084)	(0.082)
Lived in an urban context at age 14		0.040	0.033
		(0.088)	(0.085)
At least one parent spoke an indigenous language		-0.238	-0.235
		(0.158)	(0.158)
Respondent is female			-0.155
			(0.056)
Skin tone of respondent			-0.051
			(0.024)
Constant	0.060	-0.245	0.100
	(0.047)	(0.104)	(0.162)
Observations	2 985	2 985	2 985
R^2	0.320	0.344	0.353

Note: the average years of education of the parents is the average years of schooling if both parents were present in the household inhabited by the respondents at age 14 or the years of education of the parent present if one was not. Whether the father was an agricultural worker is an indicator that takes a value equal to 1 for respondents who report that their parents were engaged in an agricultural occupation. The variable of living outside NL at age 14 is a binary variable that takes a value of 1 if the respondent lived outside of Nuevo León at age 14. The urban context variable is a binary variable that takes a value equal to 1 if the respondent lived in a town with more than 2,500 inhabitants at age 14. The variable regarding indigenous status is a binary variable that takes a value of 1 for respondents with at least one parent who speaks an indigenous language. The variable regarding the respondent's skin tone corresponds to the values of the PERLA scale, where a lighter tone implies a darker skin tone.

Source: ESRU-EMOVI NL, 2021.

One concern when adding circumstances to the estimates is that they do not include statistically significant information. A series of logarithmic likelihood ratio tests were performed between the different estimated models to verify whether this is the case. The results of these tests, presented in Table A1 in Appendix A, show that the null hypothesis that restricted models (i.e., those that consider smaller sets of circumstances) find support in the data can be rejected.

A second concern is whether including more circumstances leads to an upward bias of the inequality of opportunities estimate due to the reduction of observations in each of the cells considered, i.e., the increase in the sampling variance. Two model selection criteria were followed based on Brunori et al. (2019) to select the model less liable to suffer from this type of bias. The first one is a k-divisions cross-validation test. This test randomly divides the sample into k divisions, and in each division, the model parameters to be validated are estimated by their ability to predict the data from the rest of the

divisions. The model selected is the one whose out-of-sample estimates have the lowest mean square error. The second criterion is cross-validation by lasso. As Table A2 shows, both criteria indicate that the model with set 3 of circumstances is the most suitable for estimating the magnitude of the inequality of opportunities without increasing the risk of upward bias in the estimator.

Table 4 presents the results corresponding to the estimation of the minimum level of the magnitude that the inequality of opportunities represents in terms of inequality in the household's economic resources for the three sets of circumstances. The preferred estimate, corresponding to set three, places this minimum level at 35% of the inequality observed in the current distribution of economic resources.

Table 4. Estimates of the lower limit of the magnitude of the inequality of opportunities in Nuevo León, ESRU-EMOV NL (as a proportion of the inequality of economic resources)

Set of circumstances	Set 1	Set 2	Set 3
IOR $_{VAR}$	0.320	0.344	0.353
	(0.033)	(0.034)	(0.032)
Observations	2 985	2 985	2 985

Note: IOR VAR corresponds to the R2 of the regressions presented in Table 3. In other words, it represents the variability in the outcome variable, the index of the economic resources of the current household, which can be explained by the variability observed in the circumstance variables. The standard errors are in parentheses and correspond to the resampling standard errors (Bootstrap). Set 1 of circumstances corresponds to the index of economic resources of the household of origin. Set 2 includes the average years of schooling of the parents, if the respondent lived in Nuevo León at age 14, if they lived in an urban area, if their father was an agricultural worker and if at least one of their parents spoke an indigenous language. Set 3 adds the respondent's skin tone and gender to set 2.
Source: ESRU-EMOVI NL, 2021.

Table 5 shows the Shapley decomposition of the estimate for set 3. This decomposition allows us to assign the corresponding fragment of explained variation to each of the variables considered in the model, regardless of the order in which it is performed since it is an iterative process on the variance and covariance matrix of the model (Grömping, 2007; Shorrocks, 2013). The circumstance that explains a greater degree of inequality of opportunities is the economic resources of the household of origin, with 56.48% of the lower limit of the magnitude of inequality of opportunities. In second place is the parents' years of schooling with 20.38%. In both cases, these are outcome variables for the parents' generation, implying that the previous generation's unequal economic and educational outcomes are transmitted to the current generation as inequality of opportunities. In other words, the previous generation's life outcomes substantially affect the current respondents' life trajectories.

Table 5. Shapley decomposition of inequality of opportunities (percentage of estimated inequality of opportunities)

Circumstance	Set 3 (%)
Economic resources of the home of origin	59.48
Average years of schooling of parents	20.38
Father: agricultural worker	0.31
Respondent living outside of NL at age 14	4.45
At least one parent speaks an indigenous language	2.83
Community of origin was urban	6.76
Respondent is female	1.44
Respondent's skin tone	4.34

Note: set two of circumstances includes the household economic resources index, the average years of schooling of the parents, whether the respondent lived in Nuevo León at age 14, whether they lived in an urban area, whether their father was an agricultural worker, and whether at least one of their parents spoke an indigenous language. Set 3 adds the respondent's skin tone and gender to set 2.
Source: ESRU-EMOVI NL, 2021.

A second dimension includes circumstances such as the type of community where the person lived at age 14 and whether or not that community was located in Nuevo León. In both cases, parents' life outcomes influence the next generation's economic outcomes. The sum of the contribution of these four variables to the inequality of opportunities represents 91% of the minimum level of such magnitude. This is evidence of the degree of intergenerational persistence that exists in multiple dimensions in the state, in the sense that life outcomes of parents in dimensions as varied as economic, educational, and home location are associated with the economic outcomes of the current generation.

The remaining 10% of the minimum level of inequality of opportunities is related to immutable characteristics of the individual, such as skin tone, ethnicity and gender. It is worth noting that these variables do not, in themselves, result in a difference in people's life outcomes. They are variables on which, socially, rules have been constructed to allocate resources among members of society, favoring certain characteristics over others (Monroy-Gómez-Franco and Villagómez-Ornelas, 2023). The 10% mentioned at the beginning of this paragraph is the direct effect that the stratification associated with these characteristics has on the minimum inequality of opportunities. It is important to note that, given that the data is limited to only two generations, it is not possible to estimate the degree of influence of these circumstances on the life trajectories of parents and, therefore, what role they played in the achievement of certain educational and economic outcomes. In this respect, part of the effect of these circumstances on the life trajectory of individuals operates through the impact of inequalities on the economic and educational resources of origin. To estimate the total impact of these individual characteristics on life outcomes, long-term information is needed to determine the role of ethnic affiliation and skin tone on the allocation of resources in the past and how this allocation has crystallized over time.

Finally, we chose to compare the results of the estimates with those corresponding to the Northern Region (comprising Tamaulipas, Nuevo León, Chihuahua, Coahuila, Sonora and Baja California) of the 2017 ESRU Survey of Social Mobility in Mexico (ESRU-EMOVI 2017). The ESRU-EMOVI NL and the ESRU-EMOVI 2017 share several characteristics, such as the target population, the retrospective design and a substantial part of the questions referring to the conditions of the household of origin and the current household. Therefore, it is possible to construct an index of economic resources for the ESRU-EMOVI 2017 based on the same variables and method as those described in the previous sections of this article. Similarly, information on the same circumstances is available for both surveys. In other words, it is possible to carry out a comparison using the same outcome variable and circumstances.

Table 6 shows the results of estimating the minimum benchmark of inequality of opportunities for the northern region of the ESRU-EMOVI 2017. The regressions that served as the basis for these estimates can be found in Table B1. The minimum limit representing inequality of opportunities of total inequality in the northern region is lower than the minimum dimension estimated for Nuevo León. Given that the economic resources index and the circumstances considered and the mechanism for obtaining the information are the same, this difference in results would indicate that several of the states in the northern region have a lower minimum level of equality of opportunities than Nuevo León. However, given the characteristics of the selected indicator, as well as the statistical representativeness of the ESRU-EMOVI 2017, it is not possible to break down this regional result into state results. Once again, this limitation highlights the importance of having information that goes beyond the regional level, as it shows that even among states with similar economic characteristics, there are likely to be differences in the magnitude of the minimum inequality of opportunities.

Table 6. Estimates of the lower limit of the magnitude of the inequality of opportunities in the northern region, ESRU-EMOVI 2017.

(As a proportion of the inequality of economic resources)

Set of circumstances	Set 1	Set 2	Set 3
IOR $_{VAR}$	0.235	0.251	0.269
	(0.022)	(0.021)	(0.022)
Observations	1 806	1 806	1 806

Note: IOR $_{VAR}$ corresponds to the R^2 of the regressions presented in Table 3. In other words, it represents the variability in the outcome variable, the index of the economic resources of the current household, which can be explained by the variability observed in the circumstance variables. The standard errors are in parentheses and correspond to the resampling standard errors (Bootstrap). Set 1 of circumstances corresponds to the index of economic resources of the household of origin. Set 2 includes the average years of schooling of the parents, if the respondent lived in Nuevo León at age 14, if they lived in an urban area, if their father was an agricultural worker and if at least one of their parents spoke an indigenous language. Set 3 adds the respondent's skin tone and gender to set 2. The northern region comprises Tamaulipas, Nuevo León, Chihuahua, Coahuila, Sonora and Baja California.

Source: ESRU-EMOVI NL, 2021.

7. FINAL COMMENTS

The analysis presented on the weighting of the inequality of opportunities on the total inequality of economic resources is unique in terms of its possibilities of disaggregation, in this case, state by state for Nuevo León. Based on the *ex-ante* approach to inequality of opportunities, the results indicate a relatively significant importance of the circumstances of origin and immutable characteristics of the population in determining the distribution

of economic outcomes in Nuevo León society. Although this level is below that observed at the national level, the same does not occur in comparison with that observed for the northern region as a whole, to which the federal state belongs.

Regarding the composition of the inequality of opportunities, the economic resources of the household of origin are of significant importance. In terms of immutable characteristics, skin tone maintains an absolute weight in line with what is observed on a national level but is greater in relative terms within Nuevo León than other circumstances and immutable characteristics. In terms of the former, the implication is that there is a significant absence of the State as a mechanism for redistributing opportunities. As for skin tone, its greater relative weighting in terms of the composition of the inequality of opportunities invites a greater focus on active and regulatory policies to eliminate biases that generate reward allocation schemes determined by this factor.

If the composition of the circumstances of origin in relation to their weighting in the inequality of opportunities were proportional regardless of the regional disaggregation of the analysis, we would expect a lower weighting of skin tone in Nuevo León. However, this is not the case. One possible explanation is that the mechanisms related to unequal treatment in different areas of Nuevo León are exceptional and more intense than the national average. Some factors suspected of encouraging said unequal treatment, considering the sociodemographic characteristics of the state, are the mechanisms of insertion, wage assignment and labor trajectories of individuals. However, the methodology used and the information in the database do not allow us to characterize the above.

The comparative analysis has certain limitations. It must be recognized that, although this is an intergenerational analysis from which some stability in the trend is expected, the difference in years between the carrying out of the two surveys (state and national), as well as the fact that the Covid-19 pandemic began between them, may limit the comparability of the results presented. In addition, given that this is a cross-section that only includes information for two generations, it should be recognized that it is impossible to identify the mechanism through which the economic resources of origin have constituted the greatest weighting for inequality of opportunities. In this respect, it is not possible to establish whether this weighting has been achieved over several generations through, for example, immutable characteristics such as skin tone or ethnic affiliation.

The recognized limitations call for collecting qualitative information to identify the aforementioned potential mechanisms. Likewise, it is worth carrying out quantitative surveys during the same moment in time to allow comparisons with the national and regional reality, as well as with other states. Concerning the analysis, if larger sample sizes were available, it would also be more feasible to carry it out using an *ex-post* approach to the inequality of opportunities in order to obtain a more solid result.

ACKNOWLEDGMENTS

APPENDIX A

Table A1. Likelihood ratio test

Models to compare	χ^2	Probability
Full model: Set 2 of circumstances	105.60	0.00
Restricted model: Set 1 of circumstances		
Full model: Set 3 of circumstances	150.34	0.00
Restricted model: Set 1 of circumstances		
Full model: Set 3 of circumstances	44.73	0.00
Restricted Model: Set 2 of Circumstances		

Note: set 1 of circumstances corresponds to the index of economic resources of the household of origin. Set 2 adds the average years of schooling of the parents; if the respondent lived in Nuevo León at age 14, if they lived in an urban area, if their father was an agricultural worker and if at least one of their parents spoke an indigenous language. Set 3 adds the respondent's skin tone and gender to Set 2.
Source: ESRU-EMOVI NL, 2021.

Table A2. Robustness tests for upward bias due to sample variability

Cross-validation test based on k-divisions

Model	Mean square error
Set 1	0.8388
Set 2	0.8289
Set 3	0.8197

Lasso covariate selection test

Selected Lambda	R^2 out of sample	Mean prediction error	Selected set
0.506	0.307	0.6319	Conjunto 3

Note: set 1 of circumstances corresponds to the index of economic resources of the household of origin. Set 2 adds the average years of schooling of the parents, if the respondent lived in Nuevo León at age 14, if they lived in an urban area, if their father was an agricultural worker and if at least one of their parents spoke an indigenous language. Set 3 adds the respondent's skin tone and gender to set 2.

Source: ESRU-EMOVI NL, 2021.

APPENDIX B

Table B1. Regression of the index of current household economic resources on the circumstance variables

Variables	Set 1	Set 2	Set 3
Index of economic resources of the household of origin	0.469	0.411	0.398
	(0.028)	(0.034)	(0.032)
Average years of schooling of parents		0.022	0.021
		(0.005)	(0.006)
Father was an agricultural worker when the respondent was 14 years old		0.042	0.015
		(0.072)	(0.072)
Lived outside NL at age 14		-0.026	-0.041
		(0.080)	(0.081)
Lived in an urban context at age 14		0.105	0.083
		(0.083)	(0.078)
At least one parent spoke an indigenous language		-0.111	-0.111
		(0.144)	(0.126)
Respondent is a woman			-0.144
			(0.037)
Skin tone of respondent			-0.101
			(0.039)
Constant	-0.001	-0.245	0.284
	(0.056)	(0.104)	(0.219)
Observations	1 806	1 806	1 806
R^2	0.235	0.251	0.270

Note: The average years of education of the parents is the average years of schooling if both parents were present in the household inhabited by the respondents at age 14 or the years of education of the parent present if one was not. Whether the father was an agricultural worker is an indicator that takes a value equal to one for respondents who report that their fathers performed an agricultural occupation. The variable of living outside NL at age 14 is a binary variable that takes a value of one if the respondent lived outside of Nuevo León at age 14. The urban context variable is a binary variable that takes a value equal to one if the respondent lived in a town with more than 2,500 inhabitants at age 14. The variable regarding indigenous status is a binary variable that takes a value of one for respondents with at least one parent who speaks an indigenous language. The variable regarding the respondent's skin tone corresponds to the values of the PERLA scale, where a lighter tone implies a darker skin tone.

Source: ESRU-EMOVI NL, 2021.

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[1] This becomes even more complicated if, in addition, there are schemes for assigning results that reward groups in society differently based on factors such as socioeconomic origin, regardless of the effort and skills acquired.

[2] For a more detailed discussion of the implications of each of the criteria, see Ooghe et al. (2007) and Fleurbaey and Peragine (2013).

[3] See, among others, Campos-Vázquez and Medina-Cortina (2019); Monroy-Gómez-Franco and Vélez-Grajales (2021); Monroy-Gómez-Franco et al., 2022; Monroy-Gómez-Franco (in press).

[4] In the event that both parents were in the household inhabited by the respondent at the age of 14, the average value of their years of schooling is considered. In the case where only one parent was present, his or her schooling is considered.

[5] Communities with more than 2,500 inhabitants are considered urban communities.