

# Ageing, Inequality and Social Security in Mexico

## A Micro-Simulation Approach

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*Abstract:* The aim of this paper is to analyze the impact of ageing on labor and pension income distribution in Mexico under different scenarios of social security coverage. Static and accounting micro-simulations are used to build synthetic populations in 2025 and 2050. The main findings of the work are, firstly, that, in spite of the critical increase in the elderly population share predicted by the main national and international economic institutions, the level of income dispersion is not likely to dramatically increase in the coming decades. On the contrary, inequality might be reduced in the next few decades because of the higher educational attainment and female activity rates observed among young cohorts at the present moment. Secondly, an upward shift in pension coverage—either through an increase in the share of the population receiving contributory pensions or the establishment of non-contributory old-age benefits—could be an effective tool to achieve improvements in income distribution figures.

*Keywords:* ageing, pensions, inequality, Mexico, micro-simulation.

### ***Envejecimiento, desigualdad y seguridad social en México: Un enfoque de microsimulación***

*Resumen:* El objetivo de este artículo es analizar el impacto del proceso de envejecimiento poblacional sobre la distribución de las rentas procedentes del trabajo y las pensiones en México, en diferentes escenarios de cobertura del sistema de seguridad social. Para ello, se construyen poblaciones sintéticas para los años 2025 y 2050 usando técnicas de microsimulación. Los principales resultados del trabajo apuntan a que, primero, pese al importante incremento de la población de edad avanzada que se prevé para las próximas décadas, el nivel de dispersión de la ren-

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ta no se incrementará dramáticamente. Por el contrario, es posible que la desigualdad se reduzca debido a los mayores niveles educativos y tasas de actividad femenina que se observan entre las cohortes más jóvenes de trabajadores en la actualidad. En segundo lugar, se muestra que un incremento de la cobertura del sistema de pensiones (ya sea a través de un aumento de la proporción de adultos mayores recibiendo pensiones contributivas o mediante el establecimiento de prestaciones no contributivas) podría ser una herramienta efectiva para generar mejoras distributivas en México.

*Palabras clave:* envejecimiento, pensiones, desigualdad, México, microsimulación.

*JEL classification:* D30, H55, J18.

## Introduction

Ageing is sometimes considered a phenomenon exclusively linked to highly developed economies. However, according to all forecasts, some low and middle-income economies will experience an impressive increase in the share of total population represented by the elderly. Latin America, and particularly Mexico, is not unconnected to this issue. The aim of this paper is to explore how income distribution in Mexico might be affected by demographic ageing in the coming decades, in a context of considerable low pension coverage among the elderly. According to the United Nations (2009), while the share of world population aged 60 and over will rise from roughly 25 to 35 per cent, in Latin America and the Caribbean, and in Mexico this proportion will increase from 10 to 25 per cent and from 9 to 28 per cent respectively. This demographic change and the subsequent increase in the proportion of individuals out of the labor market for reasons of age, together with the low social security coverage of the Mexican pension system, could lead us to think that inequality will increase in the future because of a growing proportion of individuals without labor market or pension income.

To the author's knowledge, this is the first work to adopt this perspective and whose objective is to test this apparently simple hypothesis in the Mexican case. However, there have been several authors who have tried to model the relationship between inequality and age structure. On the one hand, for example, Deaton and Paxson (1994, 1997) point out that, according to the permanent income hypothesis, as income and consumption dispersion within a certain cohort increases with age, an older population can lead to a rise in both consumption and income inequality. These authors find some support for their hypothesis in the United States, Taiwan and the United Kingdom. Following a similar argument, Chu and Jiang (1997) explain that the demographic transition in Taiwan, which took

place from the seventies through the nineties, produced an increase in the percentage of the working age population that resulted in a reduction of income inequality. Nonetheless, Dahan and Tsiddon (1998), using a model of endogenous fertility, suggest an inverted U-shaped relationship between demography and inequality. They argue that, in the first stages, income dispersion rises because of a growing fertility, but then, when fertility rates decrease with development, inequality does as well. This alternative hypothesis is successfully tested by Higgins and Williamson (2002), using a panel data for a cross-section of countries.

To the author's knowledge, there is no work trying to analyze the validity of this hypothesis for the Mexican case, which is interesting mainly for two specific reasons. First, the Mexican pension system shows quite a low coverage among the population aged 65 years or over, with barely 35 per cent of employed individuals effectively contributing to any social security scheme between 2000 and 2006 (Rofman, Lucchetti and Ourens, 2008). Second, in 1997 this country undertook a major social security reform, replacing a government-run pay-as-you-go system with individual private accounts, a model inspired by the pioneering Chilean pension reform in 1981. Although there is a significant amount of literature dealing with different aspects of pension reform, none of these studies explores the potential distributional implications of low social security coverage in a society where the elderly represent an increasing proportion of the population. In addition, the paper explores to what extent a higher coverage—achieved either by lower informality or by a system of non-contributory old-age pensions—could lead to a reduction of inequality in the future.

These results might be useful for other countries that, at the moment, are evaluating how to reform their pension systems and suffer from high levels of inequality, particularly in Latin America. The results obtained suggest that, if one wants to take into account the income distribution issue in a pension reform, the most relevant variable is pension coverage. This means that proposed changes should consider mechanisms for extending non-contributory pension coverage, or introducing effective incentives for enlarging the proportion of workers actively contributing to regular pension systems. Up to now, this has been an unsolved issue in most of Latin America and the Caribbean.

In order to accomplish the above-mentioned objective, this paper unfolds in four parts that follow these introductory remarks. First, the databases used in the paper in order to explore the relationship between ageing and inequality are described. Second, the micro-simulation methodology used

in the article is explained in detail. Third, the main results from the research are presented and discussed. As usual, the final section summarizes the main findings and policy implications of the paper. A preliminary caution should be kept in mind: micro-simulation is a time-consuming and arduous task; therefore, the aim of this research is to present the main results of the analyses performed, whereas, regarding methodology, the article only pretends to provide the reader with the basics of the technique, illustrating the main intermediate steps when needed and outlining the assumptions made and the sensitivity analyses when considered appropriate. Detailed information on all parts of the exercise performed here, including the results of sensitivity analyses, is presented in chapter 2 of Antón (2008).

## **I. Data**

This paper makes use of quite diverse databases. In the first place, Mexican household surveys (*Encuesta Nacional de Ingresos y Gastos de los Hogares*, ENIGH) represent the main source of information in terms of past and present income distribution, age structure, activity and employment rates, educational attainment and pension coverage. This survey was run by the Institute of Statistics and Geography (whose Spanish acronym is INEGI), and their micro-data can be freely accessed by researchers at the INEGI website.

Second, the micro-simulation strategy requires a set of predictions on demographic trends and activity rates, which are taken from calculations made by the National Council of Population (Conapo, 2003a, 2003b). The World Bank, the Economic Commission for Latin America and the Caribbean (ECLAC) and the United Nations also produce their own projections. They do not substantially differ from the Conapo projections and do not alter the results shown here. The total population is projected by Conapo using data from Census 2000, whereas the projections of active population are based on Census 2000 and National Employment Surveys (*Encuesta Nacional de Empleo*) together with a model of probabilities of transition from inactivity to work and from work to retirement.

## **II. Methodology**

### *II.1. The Micro-Simulation Approach*

Micro-simulation has become an increasingly popular tool for evaluating public policies in the last decades, especially on an *ex ante* basis. The main

advantage of this technique is the possibility of taking into account a high degree of heterogeneity of economic agents, apart from the opportunity of accurately account for the cost of social policy (Bourguignon and Spadaro, 2006). Nowadays, micro-simulation is a core instrument in the *ex ante* evaluation of anti-poverty programs and tax pension reforms.<sup>1</sup>

The objective of the exercise presented in this article is (taking the year 2004 as a base, which corresponds to the last wave available when this research was begun) to construct a synthetic Mexican population for 2025 and 2050, when population ageing will be a relevant issue in the country.<sup>2</sup> The focus of the simulation is only on labor income and pensions, which are treated as deferred wages among the population aged 18 or older. In order to isolate the demographic and labor market effects on inequality, the unit of analysis is not the household but the individual, so no income pooling or redistribution at household level is considered here. Moreover, to try to simulate household structures in the future would have been a cumbersome task, far from the spirit of the paper. The construction of such synthetic populations proceeds in several steps which are described below.

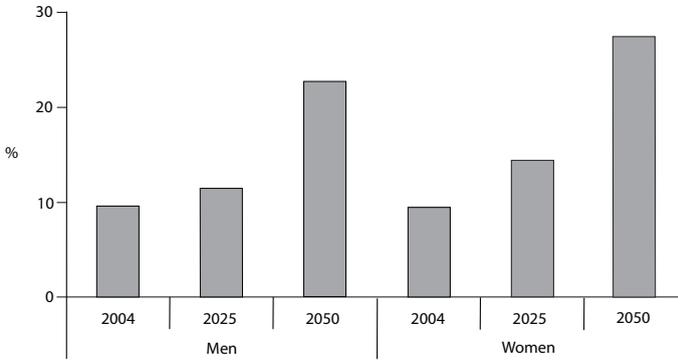
Before beginning to explain the main stylized features of the simulation model, it is worth highlighting somewhat the usual work assumptions of this type of exercise. To devise projections of future scenarios is always a very difficult task and requires many assumptions on the evolution of a relevant range of parameters. When the simulations include some heterogeneity, as in the case of micro-simulations, the assumptions can be even more difficult to make. The procedure is basically to choose a (reasonable) baseline scenario and, according to our knowledge of the economic world, carry out a sensitivity analysis of the most controversial assumptions in order to test the robustness of the results. The following pages are devoted to outlining the micro-simulation exercise, providing the results obtained for the baseline scenario. The robustness of the results to the most rele-

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<sup>1</sup> In this respect, Spadaro (2007) provides the interested reader with several examples of applications of micro-simulations to policy evaluation. Particularly on the use of micro-simulations for studying the effect of anti-poverty programs see, among others, Bourguignon, Ferreira and Leite (2003), and Todd and Wolpin (2006). Authors like Dang *et al.* (2006) present an excellent insight into the study of aging and public policies using these sorts of analytical tools. Furthermore, it is worthy to mention that several governments of OECD countries, like Canada, Sweden or Norway, rely on large and detailed micro-simulation models for studying the budgetary and distributional implications of pension reforms.

<sup>2</sup> Choosing another year (for example 2000 and 2005) as baseline is not likely to affect the results, as long as during the period 2000-2005 there have not been any dramatic changes in income distribution or returns to education. In addition, one should keep in mind that the sample design of ENIGH 2004 is based on the Census 2000.

**Figure 1.** Population aged 65 and over as a percentage of population aged 18 and over in Mexico, according to Conapo projections (2004, 2025 and 2050)



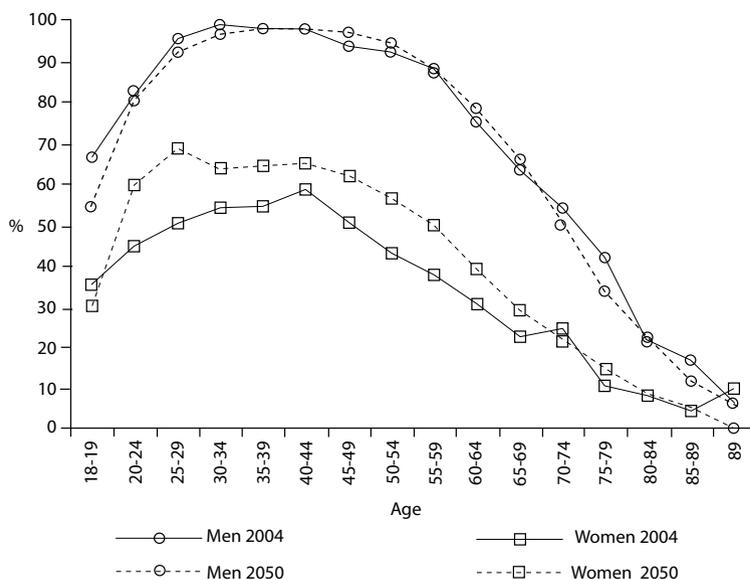
*Source:* Author's analysis from Conapo projections.

vant assumptions on returns to education or the earnings penalty on women is also discussed. For the sake of brevity, the results presented in tables and figures are limited to the baseline scenario, only explicitly reviewing the results under other assumptions when they imply changes of substantial relevance. When the use of alternative assumptions does not affect the main results, this issue is noted in the main text without overloading it with the corresponding tables and graphs.

First, the age structure of the population in Mexico in 2025 and 2050 has to be simulated. This is not a difficult task, as Conapo projections provide this information disaggregated by sex and age. These figures suggest that the Mexican population will undergo quite a significant ageing process in the coming decades up to 2050 (figure 1).

Second, one has to address the question of what the distribution of population might be in terms of activity and employment. Conapo projections also comprise predicted activity rates, so one can derive the (likely) active population by sex and age for 2025 and 2050. According to the Conapo, whereas there will be no dramatic changes in male activity rates, this magnitude will considerably rise in the case of women, with the only exception of very old females (figure 2). Regarding employment, it is assumed that the proportion of active population receiving a non-zero labor income by sex and age remains constant over time. This economic scenario is previous to the crisis; a clearly exceptional situation.

**Figure 2.** Activity rates of population aged 18 and over in Mexico according to Conapo projections (2004 and 2050)

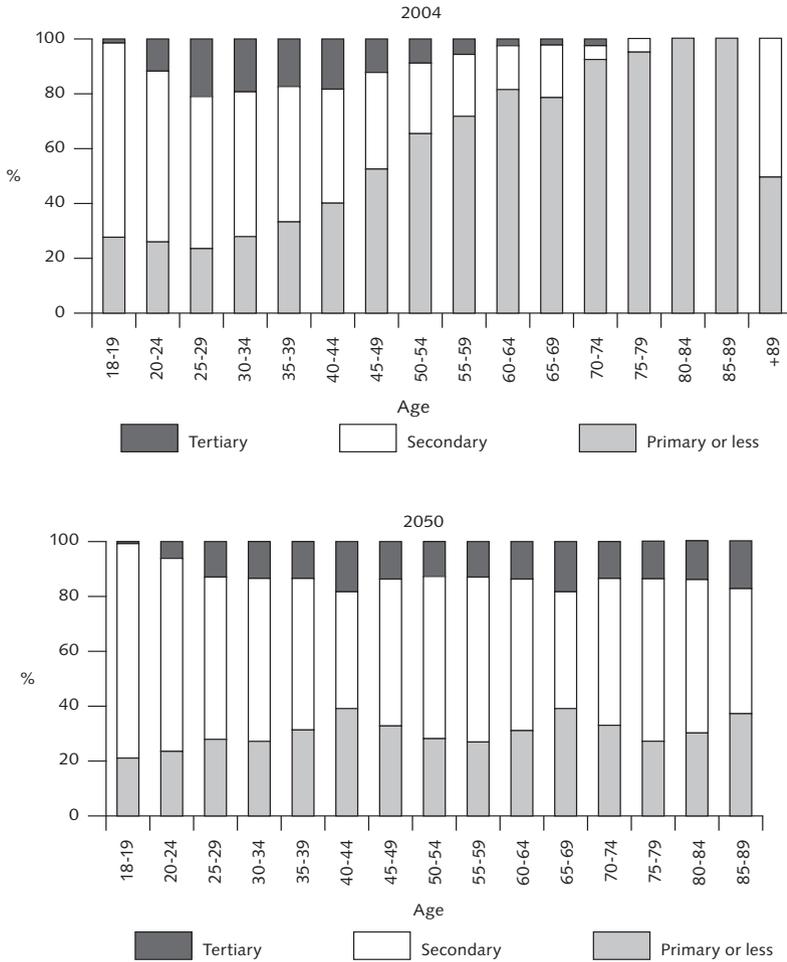


Source: Author's analysis from Conapo projections.

The third step involves assigning schooling levels to such synthetic populations. Considering that education is usually complete at the age of 25, it is assumed that the educational level of workers aged  $x$  years old in 2004 determines the human capital endowments of employed population aged  $x + 21$  years old in 2025 and  $x + 46$  in 2050. For reasons of space and clarity, the presentation of such data is limited to the case of men from 2004 to 2050 (figure 3). The graph shows that, even in the absence of any kind of educational improvement in the next few decades (something quite unlikely), the educational levels of the employed population will dramatically improve in the future. Furthermore, since it is possible that schooling levels will increase in the coming decades, the additional assumption of improvement of human capital levels according to the pattern observed during the period 1994-2004 is introduced. In order to derive this trend, transition matrices for men and women computed from ENIGH 1994 and 2004 are used.

Fourth, the earnings distributions of the counterfactual populations are simulated. In order to do so, a Mincerian regression that includes

**Figure 3.** Distribution of employed population by level of completed schooling in Mexico, according to simulations (2004 and 2050)



Source: Author's analysis.

basic socio-demographic variables and human capital endowments (gender, age, age squared, educational level —using dummies— and interactions of these covariates) is carried out. The estimation is performed using Ordinary Least Squares (OLS) by regressing the labor income of each individual (in logs) on the set of characteristics mentioned above. One should keep in mind that the econometric specification does not control for sample selection bias, and the number of variables is kept at the min-

imum in order to make the simulation feasible.<sup>3</sup> Then, predicted earnings over the life cycle are calculated by applying the estimated econometric coefficients to the available observable characteristics in each time period. In particular, earnings are predicted following the methodological approach suggested by Wooldridge (2003, pp. 202-204) and assuming a real wage increase of 1 per cent for all workers each year.<sup>4</sup> As the predicted earnings distribution is much less disperse than the actual one, the same methodology is applied to the 2004 population, that is, predicted labor incomes instead of real ones are used in order to obtain a comparable time reference. Whereas this methodological option certainly biases downwards the absolute level of income inequality, the same should not apply to its evolution across time, which represents the main focus of interest of the paper. Two final additional assumptions are made: first, considering that Mexico is likely to experience an improvement in terms of human capital training in the next few decades, it is assumed that the returns to education among the different schooling levels will narrow as a result of a larger supply of graduates; specifically, it is assumed that returns to college education will decrease by 10 per cent from 2004 to 2050;<sup>5</sup> second, assuming higher economic development and, thus, a better labor market functioning in the future, mean earnings differentials by

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<sup>3</sup> Not controlling for unobserved ability can yield inconsistent estimates. Nevertheless, it is possible that OLS estimates are roughly consistent if, because of the endogeneity of education, the upward bias is compensated by the downward bias that might be present because of a measurement error in education (Card, 1999).

<sup>4</sup> Wooldridge (2003) suggests, first, obtaining the fitted values from the regression of the log earnings; second, carrying out the exponentiation of each value; third, regress earnings (without logs) on the values obtained in the previous step without including an intercept; fourth, computing the prediction by multiplying the predicted log earnings by the estimated coefficient obtained in the third step. Regarding the assumption of a 1-per cent increase in real wage per year, it is worth mentioning that it is quite common in simulations involving pension features to assume such a productivity increase (and, thus, the same applies to minimum wages). This is the case, for example, of the simulations carried out by the Social Security Administration in the United States, which is also used in most of the studies performed by academic researchers. In the case of Mexico, the economic turbulence experienced in the previous decades makes it impossible to extrapolate any reasonable trend. Therefore, the 1-per cent increase in real wages is also assumed. In any case, the results presented here hold if no real rise is considered.

<sup>5</sup> Even though the evolution of human capital returns is uncertain, this assumption is consistent with the speculations of Contreras (2000), Lustig, Arias and Rigolini (2002) and Legovini, Bouillon and Lustig (2005), which point out that the persistent high levels of inequality in Latin America respond to very high returns to tertiary education associated with a labor demand biased against low-skilled workers in the last decades. Therefore, as some of these authors suggest, it is expected that, if the levels of human capital rise in the future, the gap in educational returns will decrease.

**Table 1.** OLS estimates of the determinants of labor income in Mexico (2004)

	<i>Coefficients</i>	<i>Robust standard errors</i>
Sex (Man = 0)	-0.400*	0.123
Age	0.073*	0.004
Age squared	-0.001*	0.000
Education (no education = 0)		
Primary incomplete	0.442*	0.071
Primary complete	0.789*	0.068
Secondary incomplete	0.950*	0.072
Secondary complete	1.017*	0.068
Preparatory incomplete	1.091*	0.071
Preparatory complete	1.246*	0.070
Tertiary incomplete	1.352*	0.077
Tertiary complete	1.941*	0.069

$R^2 = 0.329$

$F(20, 31, 843) = 280.72^*$

Observations = 31 866

*Source:* Author's analysis from ENIGH 2004. *Note:* An intercept and interactions among variables are also included in the model. \*Significant at 1%.

gender found in the regression are assumed to fall from 40 to 20 per cent in the same period.<sup>6</sup>

The fifth and last step involves calculating the distribution of social security benefits in 2025 and 2050. This task is addressed making several assumptions. First, coverage is assumed to be determined by age, gender

<sup>6</sup>It seems reasonable to assume that the higher the level of development, the lower the gender wage gap, other things being equal. This view is supported by the empirical evidence presented by, among others, Blau (1998), Blau and Kahn (2000, 2006) and Goldin (2006) for the United States and other high-income countries. Also worthy of mention is the work of Contreras and Puentes (2000) on Chile, which shows that the gender wage differentials in this country decreased from the 1970s to the 2000s.

and education of the population. The composition by gender and age is straightforwardly obtained from Conapo projections. Second, the education of the retired population is computed assuming that the relationship between the levels of schooling of the employed population and the retired population—modelled using a transition matrix—remains constant over time. Once the distribution of this set of variables has been simulated, the predicted earnings over time are computed using the results of the Mincerian regression, as explained above. Third, the amount of pension benefits in 2025 and 2050 is calculated by applying the rules of the fully-funded scheme that has been in operation since 1997.<sup>7</sup> A complex issue here is the computation of workers' careers, which are the main determinant of pensions. In this respect, a quite eclectic view is adopted: since recent findings for Chile (Arenas de Mesa, Behrman and Bravo, 2004) and Mexico (Levy, 2008) suggest that the distribution of pension contributions to fully-funded systems in Latin America is bimodal, with a pole of workers who nearly never contribute and another group that regularly makes contributions to social security, it is assumed that covered workers had a full record of contributions, and uncovered workers receive no benefits at all.<sup>8</sup> The adoption of this quite extreme assumption helps to make the model more tractable, and captures reasonably well the distribution of the data. However, one should keep in mind that they do not exactly replicate the data on pension contributions, and thus interpret the results with caution. In fact, a natural extension of this paper would be to benefit from the eventual availability of administrative registers of contributors in the future, in order to construct a more complex model able to capture a higher heterogeneity of patterns of pension contribution.

In order to compute the pension benefits, the model also takes into account the different rules of transition from the old pay-as-you-go system to the new fully funded scheme. Such a framework establishes that, at the moment of retirement, those workers who started to contribute to social security before the pension reform in 1997 can choose between the pension they would have obtained under the old system and the benefit re-

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<sup>7</sup>The main features of this social security reform are detailed by, among many others, Mesa-Lago (2004).

<sup>8</sup>For example, according to Levy's data, almost 45 per cent of people affiliated to the new system showed a contribution density below 30 per cent between 1997 and 2007, and nearly 30 per cent contributed 70 per cent or more months since affiliation. To the author's knowledge, these kinds of data are not available for academic researchers on a general basis, neither through the INEGI nor the Comisión Nacional del Sistema de Ahorro para el Retiro (Consar).

sulting from contributions to the new one. This mechanism is fully incorporated in the model, which also considers the minimum and maximum pensions and the so-called *Cuota Social*, a state-funded contribution to all individual accounts fixed at 5.5 per cent of the minimum wage.<sup>9</sup> Private pensions in the new system are computed using a 4 per cent yearly rate of return. The model is tested using alternative assumptions on the rate of return (3 and 6% respectively), obtaining similar results. This result is explained by the very long time that the system will take to mature (that is, to have the bulk of pensions calculated according to the new system). Finally, in order to compute the annuities received by workers in the new system, retirement is assumed to be at 65 years old and total funds accumulated by each individual are transformed into pensions, using the projected life expectancies according to the Conapo (2003a).

## *II.2. Alternative scenarios*

As in any type of projection, some of the assumptions of the baseline scenario described above, though reasonable, are, to some extent, discretionary. Therefore, the simulation has been carried out assuming no educational improvement and no change in returns to schooling or gender pay differentials. The results obtained in such alternative scenarios closely resemble the baseline. The reason is that the main driving force of earnings distribution in the future will be the educational level of young people. Even in the absence of additional improvement of educational levels, since human capital levels have grown in Mexico during the last few years, such a trend is likely to have an equalizing effect in the future, when other cohorts with lower and more poorly distributed schooling levels will be replaced by them. Therefore, the results obtained are essentially invariant to these assumptions, as is shown in the next section.

Nevertheless, it is interesting to guess what the effect might be, on the one hand, of a larger coverage of the contributory pension system, consistent with an optimistic view of the future in which **labor market informality** decreases, and, on the other hand, of an active role of the Mexican federal government in providing non-contributory benefits to retirees. In this respect, first, the coverage of the contributory system is assumed to rise by

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<sup>9</sup>The inclusion of the *Cuota Social* and minimum pensions in the analysis thus requires making assumptions about the evolution of the minimum wage in Mexico. Because of the turbulent evolution of this magnitude in the last few years, it is assumed that it remains constant in real terms.

5 and 10 percentage points respectively for men and women aged between 65 and 74 in 2025; it is assumed that in 2050 this same age group benefits from an additional increase of 5 percentage points for both sexes. In the second place, the distributional and fiscal implications of a non-contributory pension established at the extreme and moderate poverty line in 2004, that targeted individuals without contributory pensions, are simulated.

### *II.3. Measuring inequality*

In order to measure the degree of inequality across the different scenarios described above and considering the presence of a large share of observations with zero-income in the micro-simulation (which makes many dispersion measures unsuitable), the calculations presented here are limited to the classical Gini index, which can be defined as follows:

$$G(Y) = 1 - 2 \int_0^1 L(p) dp \quad (1)$$

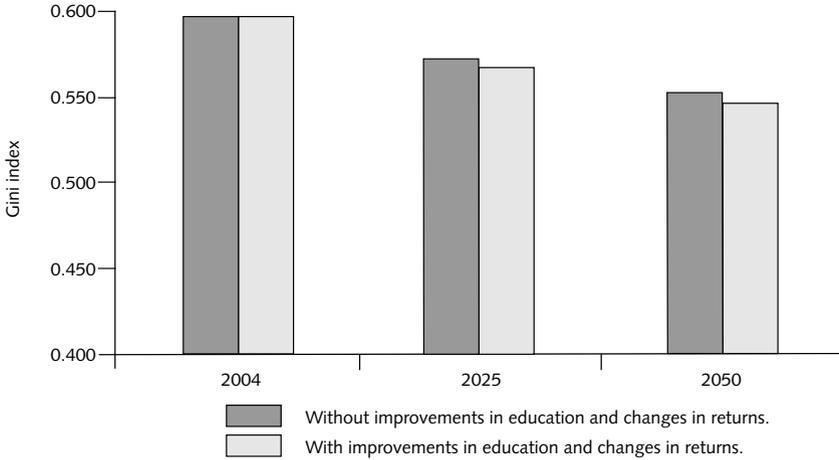
where  $Y$  denotes income,  $p$  represents the  $p$  poorest fraction of the population, and  $L(\cdot)$  is the concentration curve for income. As is well-known, the Gini index is delimited between zero (which corresponds to a population where income is equally distributed) and one (which is associated with a completely unequal society, where one person receives the whole income). The higher the Gini index, the higher the income dispersion.

### **III. Empirical results**

The first finding to be highlighted is that, according to the micro-simulations (figure 4), labor income distribution in Mexico is not likely to worsen in the coming decades. This result is not dependent on the assumptions about the evolution of wage premia and the educational attainment of the Mexican labor force, as the sensitivity of these figures to a no-change scenario is minimal. As mentioned above, the main driving force of this trend is the evolution of the distribution of schooling levels among the working-age population, since the younger and more educated cohorts in 2004 will represent an increasing share of workers in 2025.

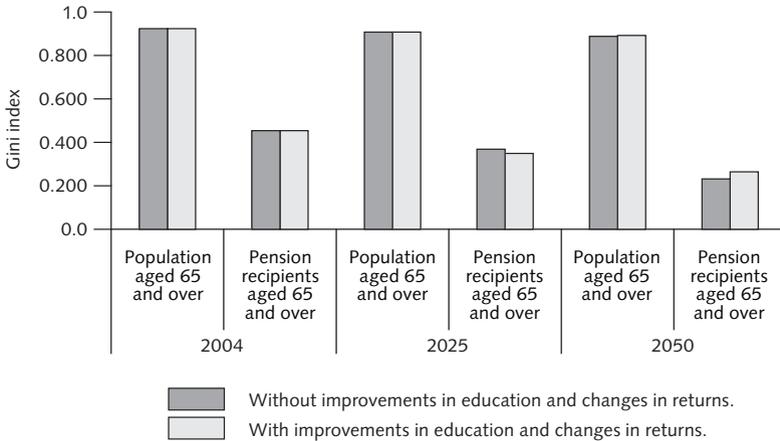
Regarding the distribution of pension income among the elderly (figure 5), one can see that very high levels of inequality will persist in 2025 and 2050. These results do not change at all with the assumptions described above, as long as they basically affect the working-age population.

**Figure 4.** Distribution of labor income (Gini index) among population aged 18 and over in Mexico, according to simulations (2004, 2025 and 2050)



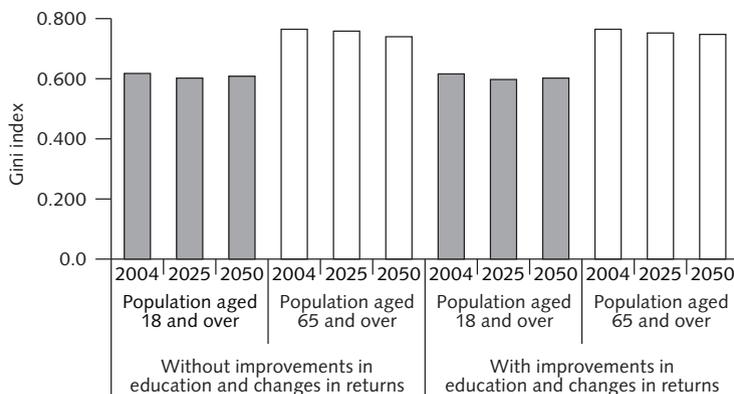
*Source:* Author's analysis. *Note:* The Gini index is a measure of inequality between 0 and 1. The higher the index, the higher the inequality. Changes in returns refer to a reduction in the wage penalty for females and the narrowing of the returns to education.

**Figure 5.** Distribution of pension income among population aged 65 and over in Mexico, according to simulations (2004, 2025 and 2050)



*Source:* Author's analysis. *Note:* The Gini index is a measure of inequality between 0 and 1. The higher the index, the higher the inequality. Changes in returns refer to a reduction in the wage penalty for females and the narrowing of the returns to education.

**Figure 6.** Distribution of total income (labor income plus pension income) among the population in Mexico, according to simulations (2004, 2025 and 2050)

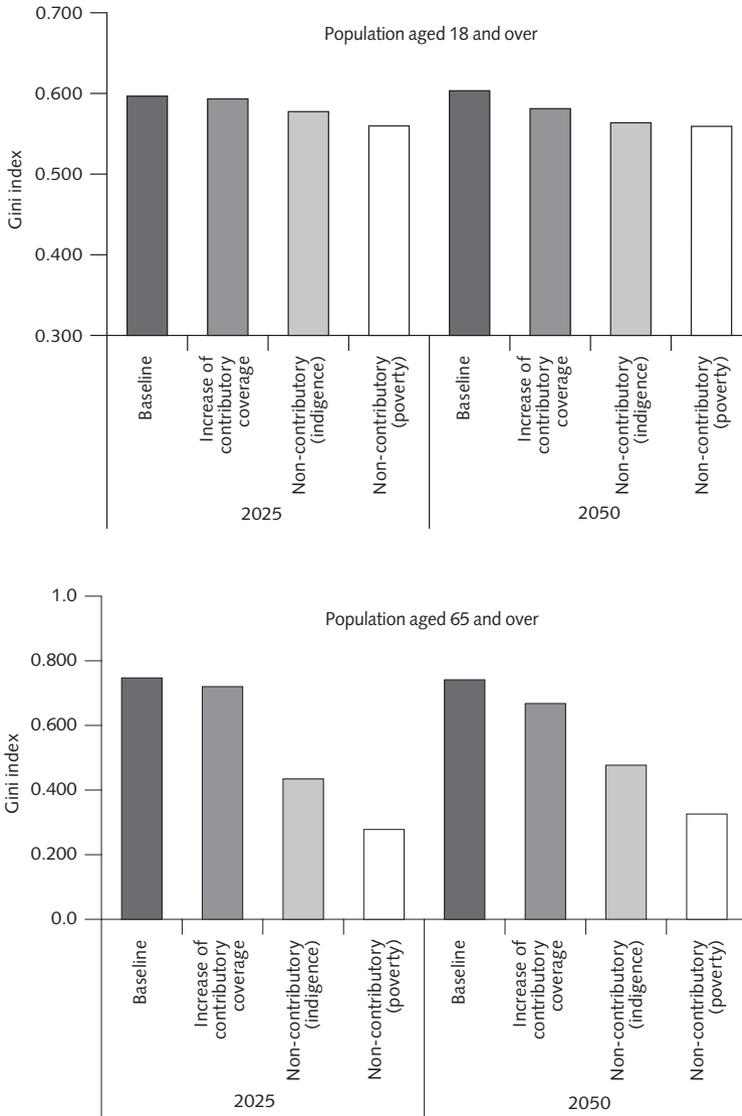


*Source:* Author's analysis. *Note:* The Gini index is a measure of inequality between 0 and 1. The higher the index, the higher the inequality. Changes in returns refer to a reduction in the wage penalty for females and the narrowing of the returns to education.

Third, the pessimistic view of the negative impact of aging on income distribution in Mexico is not confirmed when adding labor income and pension income (figure 6), as long as one does not observe a wider degree of inequality; if anything, one could talk about a slight decrease in the Gini index in 2025, and a very similar figure for 2050.

The rejection of the hypothesis of a more unequal income distribution in the next decade leads to the exploration of what the effect of either an increase in the coverage of the contributory system or the establishment of a generous scheme of non-contributory old-age benefits would be on future inequality. According to the results of micro-simulations (figure 7), a moderate increase in contributory coverage —resulting from, for instance, an improvement in labor market functioning— in the terms described in the previous section would mean a substantial decrease in income inequality. However, its impact is limited by the fact that changes that happen in the labor market right now require several decades to reach a retired population. In turn, a more radical pension policy, namely a non-contributory scheme at the level of 2004 indigence and poverty lines would result in a larger reduction of inequality levels.

**Figure 7.** Distribution of total income (labor income plus pension income) under different coverage scenarios according to simulations (2004, 2025 and 2050)



*Source:* Author's analysis. *Note:* The Gini index is a measure of inequality between 0 and 1. The higher the index, the higher the inequality.

**Table 2.** Fiscal cost of non-contributory pension benefits in Mexico under different GDP growth scenarios, according to simulations (2004, 2025 and 2050)

<i>Benefit level</i>	<i>Year</i>						
	<i>2004</i>	<i>2025</i>			<i>2050</i>		
		<i>3%</i>	<i>4%</i>	<i>5%</i>	<i>3%</i>	<i>4%</i>	<i>5%</i>
Indigence line	0.44	0.57	0.46	0.38	0.61	0.39	0.25
Poverty line	0.87	1.14	0.93	0.76	1.22	0.78	0.50

*Source:* Author's analysis.

However, such non-contributory benefits would by no means represent a free lunch. Table 2 reproduces the fiscal cost of different pension benefits targeted at people aged 65 and over without any other pension. These pensions have been set at two different levels: the official indigence (or extreme poverty) and poverty lines in 2004 (roughly US\$70 and US\$140/month respectively). It is assumed that the level of these pensions in 2025 and 2050 remains constant in real terms (hence, their value with respect to per capita income decreases over time) and we compute the cost of such old-age benefits in 2025 and 2050 under different assumptions on GDP growth. The volume of resources needed for financing these pensions is not at all negligible: even though the cost of these pensions would be, at most, around 1.2 per cent of GDP, this figure is certainly high if one bears in mind that the *Oportunidades* program, the flagship anti-poverty tool of the Mexican government since the mid-90s, amounts to roughly 0.4 per cent of GDP (Cohen, Franco and Villatoro, 2006).

#### IV. Conclusions

The aim of this work has been to explore the potential consequences of ageing on income distribution in the coming decades in Mexico, a country characterized by low social security and which will experience a very important increase in their share of elderly population. In order to carry out this task, using micro-simulation techniques as is common in this type of exercises, the paper has focused only on individuals and labor and pension income. Two important conclusions can be drawn. First, in spite of the in-

creasing proportion of elderly in Mexico and even under the assumption of constant (and low) pension coverage, the results suggest that income distribution is not likely to worsen in the future (all things being equal) as long as the current younger cohorts present much higher and better distributed levels of schooling than the oldest ones, with education acting as a compensating device for the increasing proportion of people without any income from labor. The second finding, linked to the previous one, has to do with the potential improvements in income distribution through enlarging the coverage of the pension system. Two alternatives have been analyzed: an increase in contributory coverage associated with a better functioning of the labor market, and the establishment of a non-contributory system targeted at people aged 65 and over who receive no contributory pension. The latter alternative has been found to be more powerful in terms of inequality reduction than the former, whose effects are more likely to be observed in the very long run. However, the fiscal cost of non-contributory pensions has been shown to be very high in terms of GDP, exceeding the cost of the most important anti-poverty program in Mexico today.

Although the article illustrates a potential role of micro-simulations for evaluating social policy and the implications of aging, it presents some limitations as well. In the first place, it would be desirable to increase the degree of heterogeneity captured by the model, for example, using more detailed information on contribution patterns. Second, the work does not take into account the relevance of family formation and capital income in determining income distribution. Lastly, the model is not truly dynamic and does not include **behavioral responses of individuals to policy changes**. It is expected that such issues will be addressed in future extensions of this work, providing with a further knowledge of the implications of aging and pension policy.

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