

Effects of economic liberalization on regional social mobility in Brazil*

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Abstract: Social mobility is essential to reducing inequalities, promoting equity, and fostering economic development. This study analyzes the effect of economic liberalization on social mobility in micro-regions of Brazil. To measure regional exposure to openness, the methodology of Dix-Carneiro is applied. Social mobility is approximated from a variable constructed from census data from 1980, 1991, 2000, and 2010, which relates the educational attainment of parents and children. Results indicate that between 1991 and 2000, liberalization reduced social mobility in more exposed regions, and this effect worsened twenty years later. The impact was greater for children of parents with low education, black parents, and single mothers. In addition, liberalization reduced formal employment and wages and increased informal employment.

Keywords: Social Mobility, Education, Economic Liberalization, Trade, Regional Economics

Efectos de la liberalización económica en la movilidad social regional en Brasil

Resumen: La movilidad social es clave para reducir desigualdades, promover la equidad y fomentar el desarrollo económico. Este estudio analiza el efecto de la liberalización económica sobre la movilidad social en las microrregiones de Brasil. Para medir la exposición regional a la apertura, se aplica la metodología de Dix-Carneiro. La movilidad social se aproxima desde una variable construida con datos censales de 1980, 1991, 2000 y 2010, que relaciona el nivel educativo de padres e hijos. Los resultados indican que entre 1991 y 2000 la apertura económica redujo la movilidad social en regiones más expuestas, efecto que se agravó veinte años

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después. El impacto fue mayor para hijos de padres con baja educación, de raza negra y madres cabeza de hogar. Además, la liberalización redujo el empleo formal y los salarios, y aumentó el empleo informal.

Palabras clave: movilidad social, educación, liberalización económica, comercio, economía regional

Introduction

In the late 1980s and early 1990s, many less developed countries saw their international trade policies change dramatically. A notable example is the case of Brazil. Prior to 1990, the country had been characterized by an extremely protectionist policy with high tariffs on trade. Over the next five years, all tariff and non-tariff barriers were rapidly and almost completely eliminated, and the dependence of the local economy on imported goods increased significantly (Lisboa; Filho; Schor, 2010; Pavcnik; Blom; Goldberg; Schady, 2004).

According to economic theory, international trade can provide many benefits for countries, including increased efficiency, market expansion, access to better quality and lower cost goods and services, increased competition, and economic diversification. For instance, Dass and Lahiri (2025) show that tariff reductions in Indonesia boosted absolute economic mobility by fostering regional growth, reducing inequality, and enhancing relative mobility. However, extensive research in Brazil and other countries like Colombia, Mexico, and South Africa has consistently shown that these episodes of trade liberalization have significantly affected local labor markets (Goldberg; Pavcnik, 2007). The consensus in literature is that these events of trade liberalization lead to higher unemployment and lower wages for less educated workers (Dix-Carneiro; Kovak, 2015; 2017).

Research on whether the effects of economic liberalization have substantial intergenerational consequences remains limited. Analyzing the impact of economic opening on regional social mobility in Brazil is important because it allows individuals to overcome inherited socioeconomic barriers and achieve higher social and economic status. This process promotes a more equitable distribution of resources and opportunities. By enabling access to new opportunities and fostering meritocracy, social mobility supports economic development and reduces inequalities (Dodin; Findeisen; Henkel; Sachs; Schüle, 2024).

To estimate social mobility, this study used Brazilian population censuses from 1980 to 2010 and measured the average number of children aged 10 to 18, who surpassed their parents' educational attainment in each microregion.

Two mobility metrics were calculated based on household heads with 5 and 10 years of education. The shock variable was represented by Regional Economic Liberalization Tariffs (RELT), constructed following the methodology proposed by Dix-Carneiro and Kovak (2017). This measure is a weighted average of price changes in regional industries, non-labor factor costs, regional labor shares, and changes in tariff rates, and serves as an indicator of the degree of regional economic openness in Brazil.

Results of the estimation between social mobility and changes in regional economic liberalization rates showed that in the 1991-2000 period, the increase in economic liberalization produced a decrease in social mobility in the most exposed regions. This is understood as the immediate effect of liberalization, since the entry of imported products and the uncertainty of national companies led to a cost reduction policy that affected the demand for labor and wage income.

In turn, 20 years after liberalization (1991-2010), estimates show that the negative effects of increased economic liberalization on social mobility worsened. This is because, in the regions most affected by tariff reductions, companies slowly reallocated their capital to other regions, so they became smaller in size and others closed. As a result, demand for formal labor continued to shrink and so did wage income. Thus, with rising unemployment and falling wages, families were affected and children's difficulties in surpassing their parents' standard of living increased.

The negative impact on social mobility is not the same for all the educational attainments. That is, children whose parents had a lower educational attainment were much more affected in terms of social mobility than those whose parents had a higher educational attainment. This shows how the labor market penalizes the less educated workers and rewards the more educated. The latter, being better qualified, tend to find it easier to compete in the market and gain access to other jobs. In addition, the adverse effects were worse for black fathers and for female-headed households.

The study also examined potential mechanisms influencing social mobility, such as the average employment rate and wage income, and their response to economic liberalization. It was found that formal employment and wage income declined following liberalization, both in the short and long term, while informal employment increased. It was also observed that the average number of years of education for children residing in the areas most exposed to economic liberalization decreased in both the short and long term. Robustness tests used alternative specifications: excluding the largest micro-region, adding controls (household head's race, gender), restricting mobility estimates to women, and applying an alternative RELT calculation method. Results indicated that the

coefficients remained significant, and the negative correlation between social mobility and economic openness persisted.

The document is organized as follows: First, it examines the background and context of the Brazilian economy before and after economic liberalization. Then, a literature review is conducted focusing on studies that have analyzed social mobility and the effects of economic liberalization in Brazil. The document continues with an explanation of the methodology employed. This is followed by an analysis of the results, both short-term and long-term, including robustness checks. Finally, the conclusions drawn from this research are presented.

Brazil before and after liberalization

During the 1980s, Brazil experienced one of its most severe economic crises, characterized by stagnant GDP growth and record inflation rates. The economy's growth trajectory shifted, leading to a profound downturn. For instance, per capita GDP, which had grown at an average annual rate of 6.1% from 1970 to 1980, declined by 13% between 1980 and 1983. Unemployment rates for both men (4.9%) and women (4.8%) were high, and the formal labor market contracted, thus increasing the number of workers without formal employment. Despite a slight recovery, the 1980s became known as Brazil's "lost decade" (Ometto; Furtuoso; Silva, 1995).

The crisis initially stemmed from excessive external debt but evolved into broader economic imbalances. The first oil crisis and import substitution policies led to a financing pattern based on external debt, exacerbated by the second oil crisis in 1979 and rising international interest rates. This situation worsened public finances and accelerated inflation, averaging 272% annually from 1980 to 1989, deepening Brazil's external crisis (Ometto et al., 1995). Despite poor economic performance, social indicators improved, with increased literacy and education rates, decreased infant mortality, expanded sanitation, and better health coverage.

In the 1990s, Brazil faced the legacy of the previous decade, prompting structural reforms that emphasized economic liberalization and a shift from a state-led development model to a regulatory role. Between 1990 and 1999, economic performance improved, particularly after 1994, with moderate GDP growth, lower inflation, and increased exports. Economic liberalization and privatizations spurred domestic and foreign investment, leading to industrial restructuring, although unevenly, across sectors (Castro, 2001; Pinheiro; Giambiagi; Gostkorszewicz, 1999).

Liberalization significantly reduced average tariff levels from around 60% in 1987 to 15% in 1998, increasing uncertainty for firms and leading to higher import penetration in most sectors (Pavcnik et al., 2004). Firms responded defensively, focusing on cost reduction, while foreign capital played a significant role in modernizing the industrial sector. However, low confidence and uncertainty led to a negative investment propensity, with stronger firms pre-liberalization faring better than weaker ones (Ferraz; Kupfer; Ito, 2004).

The employment landscape deteriorated as new technologies, de-verticalization, outsourcing, and weak demand growth reduced employment levels to unprecedented lows. Trade liberalization further decreased participation and employment rates, particularly for lower-skilled workers (Gaddis; Pieters, 2017; Gonzaga; Menezes-Filho; Terra, 2006). Despite these challenges, trade reform did not exacerbate wage inequality between skilled and unskilled workers.

In terms of productivity, Ferreira and Rossi (2003) found that tariff reductions led to a 6% increase in total factor productivity growth, with similar impacts on labor productivity. Lisboa et al. (2010) highlighted that input tariff reductions were a key driver of productivity growth during the liberalization period. Foreign trade expanded significantly, from USD 50 billion in 1990 to USD 100 billion in 2001, though trade deficits worsened until a currency devaluation in 2000. Brazil's share of global trade declined from 1.4% in the mid-1980s to 0.75% in 2001 (Pinheiro et al., 1999).

Social mobility and economic openness in Brazil

The impact of economic liberalization on social mobility in Brazil has not been extensively studied, though various papers have explored factors influencing intergenerational social mobility, particularly concerning race, gender, education, income, and social class. For instance, Bourguignon, Ferreira and Menéndez (2001) analyzed the relationship between inequality of outcomes, inequality of opportunities, and intergenerational educational mobility using Brazil's 1996 household survey (PNAD). Their findings highlight that parental education is a primary source of inequality, significantly impacting both children's education and individual income.

Similarly, Dunn (2007) estimates that intergenerational earnings transmission in Brazil is notably high. The study underscores education as a critical pathway for the transmission of intergenerational earnings. Andrade, Veloso, Madalozzo and Ferreira (2003) emphasized the role of credit constraints in limiting intergenerational mobility in Brazil, contrasting this with findings from developed countries. Meanwhile, Ferreira and Veloso (2006) found that

intergenerational wage mobility in Brazil varies by region and race, with higher mobility in wealthier regions and among Black populations. Antonio and Ribeiro (2010) focused on racial inequality, finding that mobility differences primarily affect individuals from higher social classes.

Further studies, such as Torche and Ribeiro (2010), show that Brazil's social mobility has improved over the last quarter-century, albeit unevenly, while Marchon (2014) used the Becker-Tomes model to link family background with income variation. Oviedo-Tejada et al. (2015) identified higher social mobility in Brazil's middle strata, contrasting with De Figueiredo and Ziegelmann (2010), who found low-income mobility. Jones (2022) explored the effects of the Bolsa Familia program on intergenerational poverty, highlighting increased aspirations but limited educational and labor market opportunities for poor youth. Salata and Cheung (2022) challenged the notion that educational expansion increases social mobility, arguing that education, as a positional good, has not reduced the link between origin and destination. Britto, Fonseca, Pinotti, Sampaio and Warwar (2022) revealed that income persistence in Brazil is higher than previously estimated, with significant heterogeneity based on gender, race, and assortative mating.

In addition to these studies on social mobility, research on the impact of economic liberalization in Brazil has shown varied effects. Moreira and Najberg (2000) noted short-term negative impacts on employment following trade liberalization, while Ferreira, Leite and Wai-Poi (2007) found that liberalization reduced wage inequality in Brazil, unlike in other Latin American countries. Gaddis and Pieters (2017) highlighted gender convergence in employment due to trade liberalization, particularly affecting low-skilled workers in the tradable goods sector. Dix-Carneiro and Kovak (2017) observed long-term declines in formal employment and earnings in regions with larger tariff reductions, a trend exacerbated over 20 years. Finally, Dix-carneiro, Soares and Ulyssea (2018) linked trade liberalization to a temporary rise in crime, driven by adverse effects on labor markets and income inequality.

Methodology

The methodology employed in this study follows Dix-Carneiro and Kovak (2017). The analysis was made using data from the Brazilian Demographic Census, covering the period 1980-2010, which includes pre-1986 information to enhance the study. While census data offer smaller sample sizes and do not track individuals over time, they encompass the entire population, which is advantageous.

This enables the collection of detailed demographics and social characteristics, living standards, informal employment, unemployment, and non-labor force participation, among others. Census data is integrated with information on tariff reductions in Brazil during the analyzed periods.

To analyze the results of local social mobility, boundaries are defined for each region. The Brazilian Statistics Institute (IBGE) definition of ‘micro-region’ is considered. It groups together contiguous economically integrated municipalities (counties) with similar geographical and productive characteristics (IBGE, 2000). Where necessary, micro-regions whose boundaries changed during the sampling period were merged to ensure that geographical areas of social mobility were defined consistently over time.

Empirical approach

This empirical analysis adheres to the shift-share literature, which enables identifying sources of regional economic change. The study compares the evolution of social mobility outcomes between regions that experienced substantial tariff reductions and those with smaller reductions. The variable of interest -regional social mobility- is calculated as a dichotomous variable. It takes a value of 1 if at least one child within a specified age range surpasses the head of household (father or mother) educational attainment. The percentage of children surpassing their parents’ educational attainment is then averaged across each geographical area (state, mesoregion, microregion) to derive the measure of social mobility.

The proxy variable for social mobility was constructed using two different educational attainments to capture a greater or lesser number of children with mobility and assess whether the model estimates vary. The first measurement focused on children aged 10 to 18, who had over 5 years of education more than the head of household. The second measurement considered adolescents aged 14 to 18, who had surpassed the head of household by 10 years of education. The education of the head of household was used regardless gender to include mothers and ensure greater representativeness. This approach is important because, as Facelli and Lopez-Roldan (2012) explain, sociological literature has traditionally relied on the occupation of male workers as a key indicator of social class and an individual’s position within the social structure.

Equation 1 shows how the proxy variable for social mobility was constructed:

$$\begin{aligned}
 Sm_{hrt} &= 1 && \text{If the child exceeds the head of the household} \\
 &&& \text{by years of education.} && (1) \\
 Sm_{hrt} &= 0 && \text{Otherwise}
 \end{aligned}$$

Where h indexes households; r , microregion; and t , year. Subsequently, the weighted average of the binary variable Sm_{hrt} is calculated within each group defined by microregion and year. The values of Sm_{hrt} are multiplied by the population weight and added up, the total is divided by the sum of the weights in that group. The resulting average represents the proportion of households with social mobility in each microregion and year. In this way, an aggregated measure is obtained by geographic area and period.

To estimate the shock variable, which was named as regional economic liberalization tariffs - RELT, a process analogous to the one carried out by Dix-Carneiro and Kovak (2017) and Dix-carneiro et al. (2018), who use the specific factors model of regional economics proposed by Kovak (2013). The tariff reduction suffered by the regions uses liberalization-induced price change, which is replaced by the change in the logarithm of 1 plus the tariff rate. Thus, RELT is defined in Equation 2:

$$RELT_r = - \sum_i \beta_{ri} * d * \ln(1 + \tau) \approx - \sum_i \beta_{ri} * \hat{P}_i \quad (2)$$

Where:

$$\beta_{ri} \equiv \frac{\gamma_{ri} \frac{1}{\varphi_i}}{\sum_j \gamma_{rj} \frac{1}{\varphi_j}} \text{ and } \hat{P}_i \equiv d * \ln(1 + \tau_i) \quad (3)$$

$\hat{P}_i$ is the liberalization-induced price change faced by industry, and $\sum_i \beta_{ri} * \hat{P}_i$ is a weighted average of these price changes across all tradable industries. Thus, although all regions face the same vector of liberalization-induced price changes, differences in the regional industry mix generate regional variation. Likewise, r indexes regions, i indexes industries, φ_i is the non-labor factor cost shares, and γ_{ri} is the regional labor share initially assigned to tradable industry i . Meanwhile, τ_i is the tariff rate in industry i , and d represents the difference from 1990-1995, the period of Brazilian trade liberalization.

Tariff changes were calculated using data from Corseuil and Kume (2003), γ_{ri} was derived from the 1991 Census and, φ_i was obtained from the 1990 IBGE National Accounts. These elements were combined to calculate the weights that constitute β_{ri} . A negative sign was used to simplify interpretation, indicating that a more positive RELTr corresponds to regions that experienced greater tariff reductions.

The regression uses the following specification to compare the evolution of social mobility outcomes in regions that experienced large and/or small tariff reductions:

$$\ln((Sm_{r,t}) - \ln(Sm_{r,1991})) = \delta_t RELT_r + \omega_{st} + \rho_t [\ln(Sm_{r,1991}) - \ln(Sm_{r,1980})] + \varepsilon_{rt} \quad (4)$$

The above equation was estimated separately for the periods (2000-1991) and (2010-1991). The variable $Sm_{r,t}$ is the value of the regional outcome of social mobility for period t . Therefore, the dependent variable of this estimation is the difference between the natural logarithm of the average social mobility of each region for the periods 2000 and 2010 relative to the year of economic liberalization in Brazil. δ_t is the cumulative effect of liberalization on outcomes in year t , ω_{st} are the state-fixed effects that may vary between periods, and ρ_t is the coefficient of the previous trend of pre-liberalization social mobility. To estimate δ_t consistently, ε_{rt} should be uncorrelated with $RELT_r$, conditional on state-fixed effects and the prior trend in the outcome.

As the proposed specification, it uses a prior trend of past social mobility for the 1991 and 1980 periods. The presence of the logarithm of mobility in 1991 on both sides of the equation may generate biases and contaminate the estimates. To try to solve that problem, we implemented the pre-existing trends $\rho_t [\ln(Sm_{r,1991}) - \ln(Sm_{r,1980})]$ with the variable $(Sm_{r,1991} / Sm_{r,1980})$. In this new estimation, changes in the coefficients are negligible. This suggests that the estimated relationship between changes in regional average social mobility rates and regional tariff changes is not driven by past trends. The estimations were performed using ordinary least squares (OLS) and two-stage least squares (2SLS) for the instrumental variable estimation.

Basic statistics on social mobility and *RELT*

Table 1 presents the basic statistics of the social mobility variable calculated in this study. In 1980, for the group of children aged 10 to 18 with 5 years of education more than the head of household, the average mobility in Brazil was approximately 14.5%. By 1990, this figure had increased by 9.8%, reaching 15.9%. In 2000, there was a 20.5 percentage point increase, raising mobility to 36.4%, and in 2010, the increase was 37.3%, reaching an average of 50%. Regarding the 10th percentile, a 33-percentage point increase was observed, rising from 5.4% in 1980 to 38.1% in 2010. It indicates that 90% of young Brazilians in that year had mobility above 38%. The overall average social mobility for this group during the period was 29.2%, which is 7.2 percentage points higher than the average for the group with 7 years of education or more.

Furthermore, when analyzing the social mobility of adolescents aged 14 to 18, who surpassed their parents by 10 years of education, less pronounced growth is observed. In 2010, the average mobility for this group remained around 8%. In 1991, there was a 31% decrease compared to 1980, followed by a 3.6 percentage point increase in 2000, thus reaching 4.9%, and a 56% increase in 2010. These results highlight an interesting pattern: the higher the education level of the head of household, the lower the social mobility of the young people. This may be due to reasons like limitations in the age range used or the influence of income levels because children from wealthier families may match or surpass their parents in education, while in lower-income families, educational mobility is more difficult to achieve.

Table • 1

Descriptive statistics of social mobility in Brazil.

Average social mobility by microregions (5 years more than HH's education)				
Sm5	1980	1991	2000	2010
Mean	14.5%	15.9%	36.4%	50.0%
Std. dev.	8.5%	8.4%	14.0%	8.5%
Percentile 10%	5.4%	6.3%	18.3%	38.1%
Percentile 25%	7.2%	8.5%	23.7%	44.1%
Percentile 50%	11.9%	14.6%	37.7%	51.9%
Percentile 75%	20.9%	22.8%	48.9%	57.1%
Percentile 90%	27.8%	28.9%	54.3%	59.5%
Obs	479	486	486	486
Average social mobility by microregions (10 years more than HH's education)				
Sm10	1980	1991	2000	2010
Mean	1.9%	1.3%	4.9%	7.5%
Std. dev.	0.9%	1.0%	2.6%	3.1%
Percentile 10%	0.9%	0.3%	1.9%	3.6%
Percentile 25%	1.2%	0.5%	2.6%	5.2%
Percentile 50%	1.8%	1.1%	4.6%	7.4%

Percentile 75%	2.5%	2.0%	6.8%	9.8%
Percentile 90%	3.1%	2.8%	8.5%	11.8%
Obs	479	486	486	486

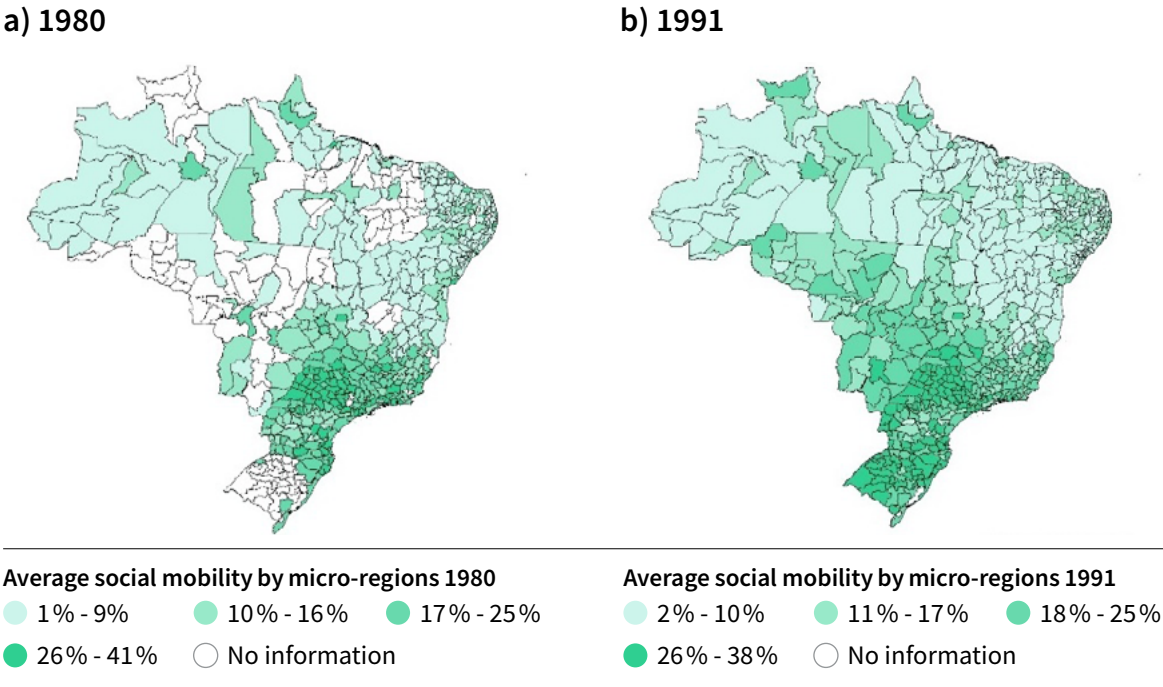
Source: Prepared by the author using the 1980, 1991, 2000 and 2010 censuses.

Figure 1 and Figure 2 present the geographical distribution of social mobility in Brazil considering 5 years of education. Figure 1 shows that, in 1980, the micro-regions with the highest mobility were Florianópolis and São Paulo. In 1991, Não-Me-Toque, Floraí, and Auriflama, with an average mobility of 37.6%, 37.4% and 35.6% respectively, in the states of Rio Grande do Sul, Paraná and São Paulo, were the micro-regions with the highest social mobility. On the contrary, the micro-regions with the lowest educational mobility were Japurá, Portel, and Purus (1.5%, 1.9%, 2.4%), belonging to the states of Amazonas and Pará.

Figure 2 shows that, in 2000, the micro-regions with the highest levels of mobility were Nhandeara, Araçatuba, and Auriflama, all located in the state of São Paulo, with mobility rates of 62.7%, 62.0%, and 61.1%, respectively. Conversely, the micro-regions with the lowest levels of mobility were Portel, Japurá, and Traipu, with rates of 6.9%, 8.5%, and 9.3%, located in the states of Pará, Amazonas, and Alagoas. By 2010, the micro-regions with the highest mobility levels were Fernandópolis, Auriflama, and Floraí, with rates of 64.6%, 64.4%, and 64.3%, respectively, in the states of São Paulo and Paraná. In contrast, the Portel, Japurá, and Furos de Breves in the northern part of the country, specifically in the states of Pará and Amazonas, exhibited the lowest mobility levels, with rates of 17.3%, 20%, and 22.9%, respectively.

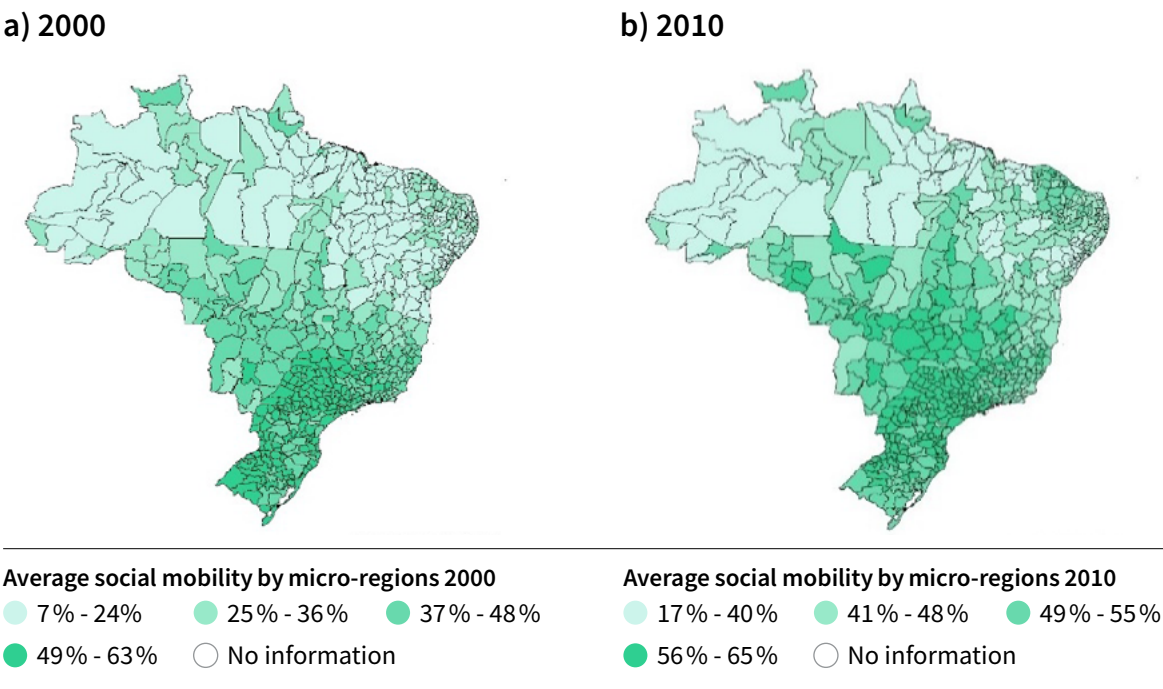
In 2010, the Nhandeara, Auriflama, and Fernandópolis micro-regions (65.6%, 63.9%, 63.5%), all in the state of São Paulo, had the highest level of social mobility. In contrast, Portel, Furos de Breves, and Japurá (12.4%, 14.5%, 16.4%), located in the states of Pará and Amazonas, had the lowest social mobility indicator. Portel and Japurá are again among the lowest but showed relative increases of 210% and 343%, respectively, compared to 2000.

Figure • 1
Average social mobility by micro-regions considering 5 years of education 1980-1991.



Source: Prepared by the author using the 1980 and 1991 censuses.

Figure • 2
Average social mobility by micro-regions considering 5 years of education 2000-2010.



Source: Prepared by the author using the 2000 and 2010 censuses.

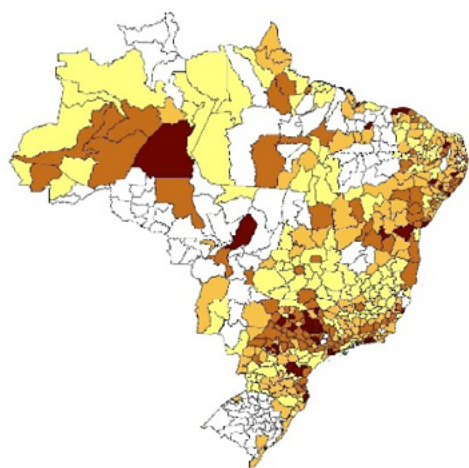
The results in Figure 3 for the years 1980 and 1991 are similar to those in Figure 1. Figure 4 shows that, in 2000, the micro-regions with the highest mobility rates were Lapa and Florai, with values of 15.9% and 12.0%, respectively, in the states of Paraná and Pernambuco. Conversely, the micro-regions with the lowest social mobility were Furos de Breves (0.63%), Alagoana do Sertão do São Francisco (0.84%), and Alto Parnaíba Piauiense (0.85%), in the states of Paraná, Alagoas, and Piauí. By 2010, the micro-regions with the highest mobility rates were Concórdia, Auriflama, and Jales, with values of 17.2%, 16.3%, and 15.5%, respectively, in the states of Santa Catarina and São Paulo. The micro-regions with the lowest average mobility rates were Fernando de Noronha, Furos de Breves, and Portel.

Geographically, there is a very clear pattern in southern regions of Brazil. They have higher rates of social mobility, partly because they are more affluent and have higher income levels. However, regions in the Northeast of Brazil have also gradually increased their rates of social mobility. This type of trend can also be explained by spatial agglomeration: rich regions surrounded by rich regions prosper, and poor regions surrounded by poor neighbors tend to stay in that circle.

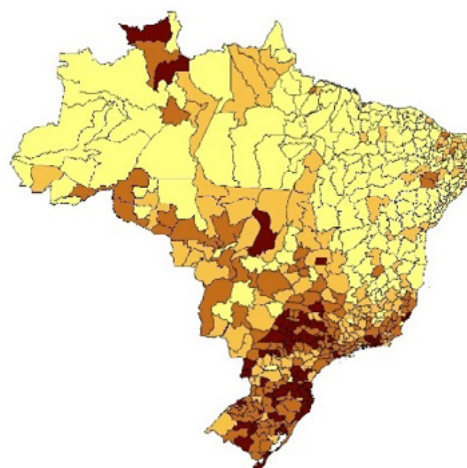
Figure • 3

Average social mobility by micro-regions considering 10 years of education 1980-1991.

a) 1980



b) 1991



Average social mobility by micro-regions 1980

- 0,25 % - 1,42 % ● 1,43 % - 2,26 %
- 2,27 % - 3,32 % ● 3,33 % - 5,44 %
- No information

Average social mobility by micro-regions 1991

- 0 % - 0,77 % ● 0,78 % - 1,61 %
- 1,62 % - 2,63 % ● 2,64 % - 4,89 %
- No information

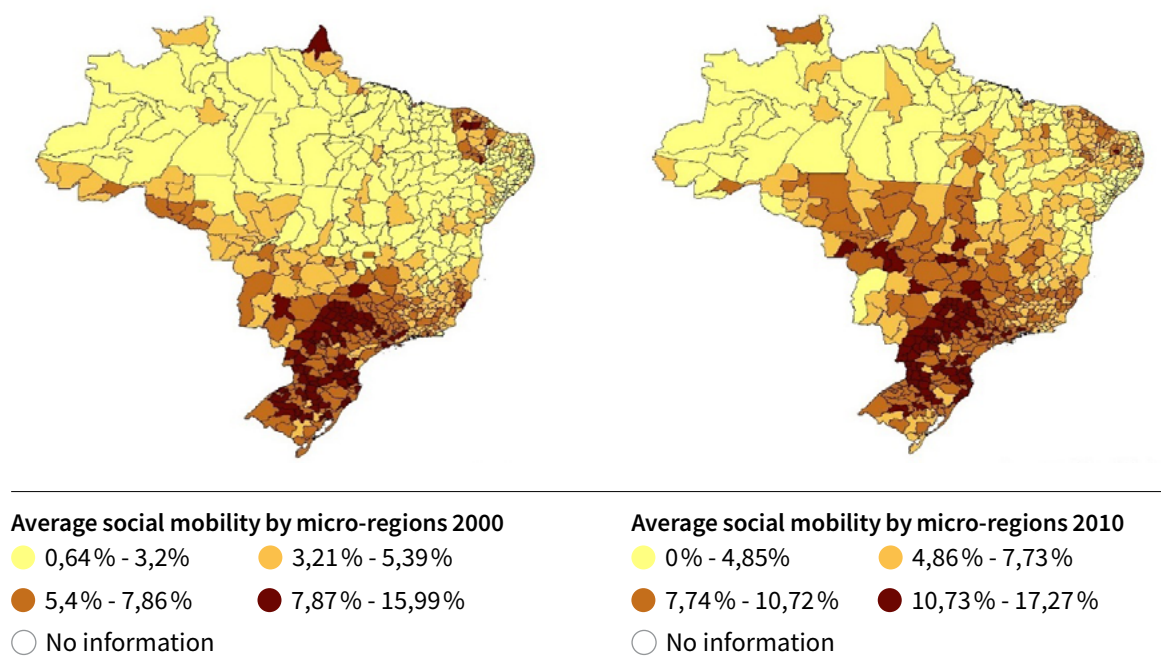
Source: Prepared by the author using the 1980 and 1991 censuses.

Figure • 4

Average social mobility by micro-regions considering 10 years of education 2000-2010.

a) 2000

b) 2010



Source: Prepared by the author using the 2000 and 2010 censuses.

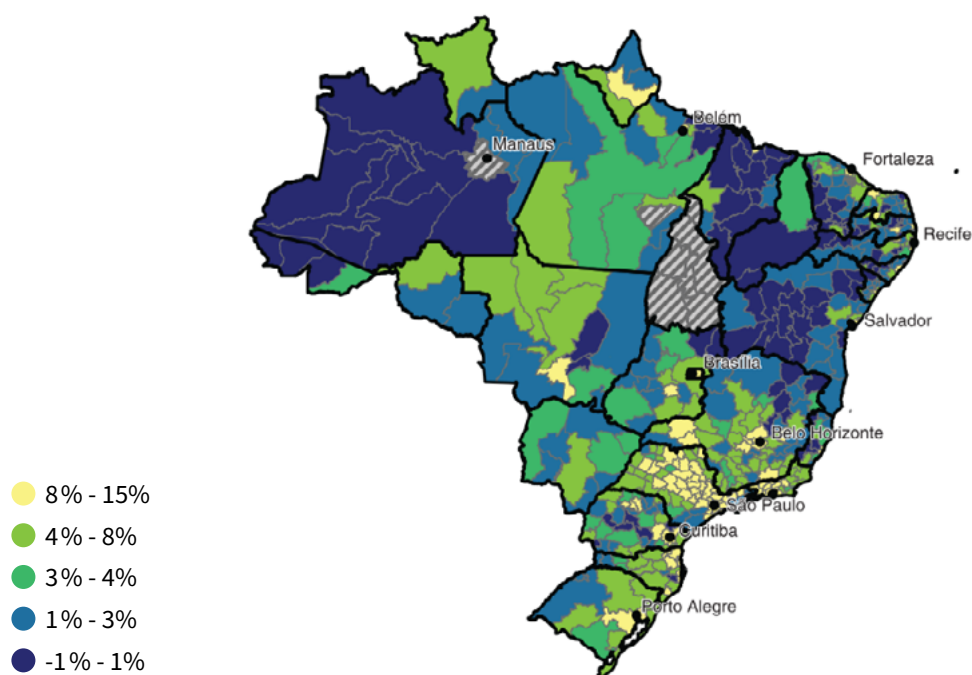
Table 2 shows that the average tariff reduction per microregion in Brazil was 4.3%, the largest reduction was 15.3%, and 75% of the microregions studied had reductions of more than 3% at the 25th percentile. It is also observed that regions in the 10th percentile experienced a tariff reduction of 0.2 percentage points, and those in the 90th percentile presented a reduction of 10.7 p.p. The difference between the two groups of regions is 10.5 p.p. Therefore, when interpreting the estimates of the regressions, we compare the regions whose *RELT* values differ by 10 percentage points. This allows us to compare regions that suffered the greatest tariff reduction with those that suffered the least.

Figure 5 shows the geographical distribution of the *RELT*. The micro-regions of Rio de Janeiro, Fortaleza, São Paulo, Natal, São José dos Campos, Osasco, Recife, Belo Horizonte, and Serrana (15.36%, 15.11%, 14.74%, 14.54%, 14.50%, 14.42%, 14.36%, 14.31%, 14.24%) have shown the greatest reductions in tariff rates with economic liberalization. These micro-regions belong to the states of Rio de Janeiro, Ceará, São Paulo, Rio Grande do Norte, Pernambuco, and Minas Gerais. On the contrary, the smallest decrease (or increase) occurred in the micro-regions

Table • 2Descriptive statistics of the $RELT_r$ variable.

$RELT_r$, 1991	
Mean	4.314%
Std. dev.	3.912%
Variance	0.153%
Percentile 10%	0.203%
Percentile 25%	1.215%
Percentile 50%	3.024%
Percentile 75%	6.533%
Percentile 90%	10.67%
Largest	15.36%
Smallest	0.871%
Obs	486

Source: Prepared by the author based on (Dix-Carneiro and Kovak, 2017).

Figure • 5Geographical distribution of $RELT_r$ 

Source: taken from Dix-Carneiro and Kovak (2017, p. 2917).

of Serrana do Sertão Alagoano, Traipu, Japurá, Jalapão, Lençóis Maranhenses, and Tarauacá (-0.85%, -0.84%, -0.66%, -0.57%, -0.45%, -0.45%, -0.45%), belonging to the states of Alagoas, Amazonas, Tocantins, Maranhão, and Acre.

Short-term analysis

In this section, the results of estimations examining changes in social mobility considering 5 and 10 years of education (measured in logarithms) between 1991 and 2000 are analyzed in relation to changes in regional economic liberalization rates. Table 3 presents the results of various estimations using regional social mobility data from individuals with more than 5 years of education than the head of household.

In column 1 of Table 3, an estimation is conducted without applying population weights. The analysis reveals that a 10-percentage point reduction in regional tariff rates (corresponding to an increase in *RELT*) is associated with a 35.47 percentage point decline in social mobility. In column 2, where population weights are incorporated into the estimation, results demonstrate that tariff reductions lead to a 30.48 percentage point decrease in social mobility.

Table • 3

Log changes in social mobility (5 years) and regional economic liberalization tariffs 1991-2000.

	OLS	OLS	OLS	OLS	2SLS
$Ln(Sm_{r2000-1991})$	(1)	(2)	(3)	(4)	(5)
$RELT_r$	-3.547*** (0.319)	-3.048*** (0.293)	-2.540*** (0.173)	-3.239*** (0.218)	-3.239*** (0.210)
$Ln(Sm_{r1991-1980})$				-0.272*** (0.0611)	-0.272*** (0.0591)
State fixed effects	No	No	Yes	Yes	Yes
Observations	486	486	486	472	472
R-squared	0.269	0.469	0.754	0.780	0.780

Notes: Robust standard errors in parentheses are adjusted for 112 meso-region clusters. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. In column 1, observations are not weighted; in column 2, observations are weighted by population; column 3 adds state fixed effects to column 2; column 4 adds pre-trends to column 3; column 5 shows two-stage least squares, with an instrument for $Ln(Smr1991-1980)$.

Source: Prepared by the author using the 1980, 1991, 2000 and 2010 censuses.

From columns 3 to 5, estimations incorporate population weights and state fixed effects. Additionally, columns 4 and 5 include prior trends, thus making these results particularly noteworthy. The result in column 3 indicates that a 10-percentage point reduction in tariff rates leads to an average decrease of 25.40 percentage points in social mobility across micro-regions in Brazil. In column 4, the reduction in tariff rates results in a 32.39 percentage point decline in social mobility, which is consistent with the finding in column 5, where prior trends are accounted for. This consistency suggests that the prior trend does not significantly impact either social mobility or regional tariff changes.

Table 4 presents the calculations of social mobility for household heads with 10 years of education, whose children surpassed them, alongside the corresponding changes in regional economic liberalization tariffs. In column 3, analysis reveals that a reduction in tariff rates (indicating an increase in economic liberalization) leads to an average decrease of 36.15 percentage points in social mobility. Results in columns 4 and 5 further demonstrate that greater economic liberalization is associated with a 25.2 percentage point decline in social mobility across Brazilian regions. When this coefficient is compared with the estimates in Table 3, a reduction of 22.04% is observed.

Table • 4

Log changes in social mobility (10 years) and regional economic liberalization tariffs 1991-2000.

	OLS	OLS	OLS	OLS	2SLS
$Ln(Sm_{r2000-1991})$	(1)	(2)	(3)	(4)	(5)
$REL T_r$	-5.428*** (0.734)	-4.180*** (0.653)	-3.615*** (0.501)	-2.525*** (0.410)	-2.525*** (0.396)
$Ln(Sm_{r1991-1980})$				-0.466*** (0.0317)	-0.466*** (0.0306)
State fixed effects	No	No	Yes	Yes	Yes
Observations	475	475	475	463	463
R-squared	0.106	0.215	0.552	0.741	0.741

Notes: Robust standard errors in parentheses are adjusted for 112 meso-region clusters. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. In column 1, observations are not weighted; in column 2, observations are weighted by population; column 3 adds state fixed effects to column 2; column 4 adds pre-trends to column 3; column 5 shows two-stage least squares, with an instrument for $Ln(Smr1991-1980)$.

Source: Prepared by the author using the 1980, 1991, 2000 and 2010 censuses.

An interesting pattern emerges from the coefficients in columns 4 and 5 of tables 3 and 4. The effects of economic liberalization in Brazilian regions appear to be more detrimental to social mobility for young people whose parents had lower educational attainment. Less educated parents often hold low-wage jobs and are more vulnerable to the negative impacts of economic liberalization, e.g., job loss. It directly affects household income and consequently reduces their children's opportunities for upward social mobility. In contrast, heads of households with higher educational attainment are better equipped to re-enter and compete in the labor market, which allows them to secure better jobs and, subsequently, higher salaries.

These results are consistent with what has been explained in the economic literature regarding the short-term effects that regions experience in the face of drastic economic openings. Empirically, there is an inverse relationship between tariff reductions and social mobility in Brazilian micro-regions. That is, the regions that experienced a greater propensity to liberalize also experienced declines in social mobility. The reasons for this behavior include those related to local labor markets and domestic firms.

As detailed by Pavcnik et al. (2004), the economic liberalization in Brazil led to considerable uncertainty, marked by an influx of imports and new competitors. In response, domestic firms adopted defensive strategies focused on cost reduction. This shift contributed to a decline in employment and a subsequent decrease in workers' incomes, further exacerbated by advancements in technology and machinery. As a result, families faced diminished earnings and increased unemployment, which negatively impacted their children's social mobility. The transmission of economic disadvantages from parents to children became more pronounced. In that sense, Wu, Li and Miao (2024) argue that investment in early childhood education enhances social mobility by addressing disparities in educational and cognitive development among various socioeconomic groups. Consequently, during this period, opportunities for education, advancement, and improved living conditions for children were significantly reduced, adversely affecting social mobility.

Long-term analysis

In this section, the analysis focuses on the effects of changes in regional tariff rates and their impact on social mobility, specifically for individuals who surpass their parents' educational attainments (5 and 10 years of education) from 1991 to 2010. The objective is to determine whether these effects remain negative or if they stabilize in long-term equilibrium. In Table 5, it is evident that

all estimations have a negative correlation between the logarithmic changes in social mobility and the *RELTr*. Column 3 shows that an increase in the *RELTr* (a decrease in tariff rates) leads to an average reduction of 52.4 percentage points in regional social mobility. This figure represents a 106% increase compared to the same coefficient for the 1991-2000 period. The estimates in columns 4 and 5 indicate that liberalization resulted in an average decline of 60.3 percentage points, which is 86.3% higher than in the previous period. These estimates reflect a nearly twofold increase in the magnitude of the negative impact of economic liberalization on young people's social mobility.

Table • 5

Log changes in social mobility (5 years) and regional economic liberalization tariffs 1991-2010.

	OLS	OLS	OLS	OLS	2SLS
<i>Ln(Sm_{r2010-1991})</i>	(1)	(2)	(3)	(4)	(5)
<i>RELTr</i>	-8.037*** (0.457)	-6.883*** (0.437)	-5.241*** (0.334)	-6.035*** (0.404)	-6.035*** (0.390)
<i>Ln(Sm_{r1991-1980})</i>				-0.308*** (0.0816)	-0.308*** (0.0789)
State fixed effects	No	No	Yes	Yes	Yes
Observations	486	486	486	472	472
R-squared	0.468	0.635	0.864	0.875	0.875

Notes: Robust standard errors in parentheses are adjusted for 112 meso-region clusters. *** p<0.01, ** p<0.05, * p<0.1. In column 1, observations are not weighted; in column 2, observations are weighted by population; column 3 adds state fixed effects to column 2; column 4 adds pre-trends to column 3; column 5 shows two-stage least squares, with an instrument for *Ln(Smr1991-1980)*.

Source: Prepared by the author using the 1980, 1991, 2000 and 2010 censuses.

Table 6 presents the results of regressions between social mobility, calculated considering that the head of the household received 10 years of education, and changes in regional tariff rates. Looking at the estimate in column 3, we see that a 10-p.p. decrease in regional trade taxes leads to a 52.2 p.p. decrease in the social mobility of young people. This estimate suffered an increase of 44.5%

compared to the same period of the previous year. Similarly, columns 4 and 5 show that, on average, there is a 41.3 p.p. decrease in regional mobility in the face of increased liberalization, and the coefficient also shows an increase of about 64% compared to the 1991-2000 period.

Table • 6

Log changes in social mobility (10 years) and regional economic liberalization tariffs 1991-2010.

	OLS	OLS	OLS	OLS	2SLS
<i>Ln(Sm_{r2010-1991})</i>	(1)	(2)	(3)	(4)	(5)
<i>RELT_r</i>	-7.433*** (0.685)	-6.839*** (0.820)	-5.222*** (0.454)	-4.137*** (0.374)	-4.137*** (0.361)
<i>Ln(Sm_{r1991-1980})</i>				-0.442*** (0.0366)	-0.442*** (0.0353)
State fixed effects	No	No	Yes	Yes	Yes
Observations	475	475	475	463	463
R-squared	0.194	0.406	0.663	0.789	0.789

Notes: Robust standard errors in parentheses are adjusted for 112 meso-region clusters. *** p<0.01, ** p<0.05, * p<0.1. In column 1, observations are not weighted; in column 2, observations are weighted by population; column 3 adds state fixed effects to column 2; column 4 adds pre-trends to column 3; column 5 shows two-stage least squares, with an instrument for *Ln(Smr1991-1980)*.

Source: Prepared by the author using the 1980, 1991, 2000 and 2010 censuses.

The results demonstrate that the short-term effects of economic liberalization persist in the long run, particularly impacting the social mobility of children whose parents had lower educational attainment. In Columns 4 and 5 of Table 5, it is evident that the negative effects of liberalization on social mobility, calculated considering that the head of household received 5 years of education, are 31% greater than those for parents with 10 years of education. Markets tend to reward higher educational attainment, offering better wages, while penalizing lower levels with reduced earnings. Consequently, more educated workers were less affected by liberalization, as they had better opportunities to compete in the labor market, resulting in smaller income losses and less impact on their children's social mobility.

In the long term, regional social mobility for young people deteriorated significantly. Twenty years after liberalization, the decline in social mobility was twice as severe for those whose parents received 5 years of education compared to those with 10 years. This outcome contradicts expectations that regional markets would stabilize within two decades post-liberalization. Factors such as business insecurity, cost-cutting, and reduced employment and wages contributed to this persistent decline.

Dix-Carneiro and Kovak (2017) provide insight into this phenomenon, finding that the impact on regional earnings 20 years after liberalization was more than three times greater than after 10 years. This is due to imperfect labor mobility, slow capital adjustment, and the effects of agglomeration economies. Regions facing larger tariff reductions experienced steady declines in the number of formal firms and average firm size, as capital gradually shifted away from the most affected areas. This led to a slow decline in employment levels as businesses delayed downsizing or closure.

The growing impact on employment and incomes significantly influenced the decline in social mobility. Children from lower-income families faced greater difficulties accessing education and meeting basic needs, further hindering their social mobility. In regions with greater economic openness, social mobility declined more sharply.

Mechanisms explaining social mobility

This section analyzes mechanisms identified in the literature as important for social mobility, such as employment and labor income. Specifically, the effects of liberalization on these variables are estimated to determine if they are impacted and whether the results align with the previously stated hypotheses.

Table 7 shows the results of estimating log differences among the average employment rate, the formal employment rate, the informal employment rate, and the *RELT* between 1991 and 2000. Concerning the employment rate, column 3 shows that a 10-percentage point increase in the *RELT* (increase in economic openness) leads to a 4.19 percentage point decrease in the average regional employment rate. Similarly, with an increase in liberalization, formal employment falls by 17.7 p.p., while informal employment rises by 10.4 p.p. after liberalization.

Previous results allow us to conclude that during the period of economic liberalization, the most affected regions in Brazil experienced a decline in employment levels, mainly due to the decline in formal employment. Because domestic companies faced foreign competition, the arrival of numerous imported

Table • 7

Log changes in total, formal and informal employment, and regional economic liberalization tariffs 1991-2000.

$Ln(Emp_{r2000-1991})$	OLS (1)	OLS (2)	OLS (3)
$RELT_r$	-0.739*** (0.0874)	-0.637*** (0.0622)	-0.419*** (0.0577)
State fixed effects	No	No	Yes
Observations	486	486	486
R-squared	0.136	0.304	0.470
$Ln(ForEm_{r2000-1991})$	OLS (1)	OLS (2)	OLS (3)
$RELT_r$	-1.860*** (0.273)	-1.858*** (0.207)	-1.770*** (0.175)
State fixed effects	No	No	Yes
Observations	486	486	486
R-squared	0.110	0.322	0.543
$Ln(InforEm_{r2000-1991})$	OLS (1)	OLS (2)	OLS (3)
$RELT_r$	0.633*** (0.158)	0.917*** (0.186)	1.042*** (0.115)
State fixed effects	No	No	Yes
Observations	486	486	486
R-squared	0.055	0.288	0.500

Notes: Robust standard errors in parentheses are adjusted for 114 meso-region clusters. *** p<0.01, ** p<0.05, * p<0.1. In column 1, observations are not weighted; in column 2, observations are weighted by population; column 3 adds state fixed effects to column 2. The variable $Ln(Emp_{r2000-1991})$ refers to the average employment rate, $Ln(ForEm_{r2000-1991})$ means the average formal employment rate and $Ln(InforEm_{r2000-1991})$ refers to the average informal employment rate by microregions.

Source: Prepared by the author using the 1991 and 2000 censuses.

products, the uncertainty created, and the desire to reduce costs had a direct impact on formal workers. As a result, many workers had to move into informality, thus, it increased due to liberalization and compensated for the decline in the overall level of employment.

On the one hand, Table 8 shows the same estimates as in Table 7, but for the period 1991-2010. Regarding the employment rate, column 3 shows that 20 years after liberalization, there was an average increase of 1.9 percentage points; on the other hand, the formal employment rate decreased by 36.8 p.p., that is, 108% concerning the 1991-2000 period, a little more than double. The informal employment rate increased by 8.8 p.p. on average with an increase in the *RELT*, which is 15% lower than the estimate obtained in the previous period.

Table • 8

Log changes in total, formal and informal employment, and regional economic liberalization tariff 1991-2010.

	OLS	OLS	OLS	OLS	2SLS
<i>Ln(Sm_{r 2010-1991})</i>	(1)	(2)	(3)	(4)	(5)
<i>RELT_r</i>	-8.037*** (0.457)	-6.883*** (0.437)	-5.241*** (0.334)	-6.035*** (0.404)	-6.035*** (0.390)
<i>Ln(Sm_{r 1991-1980})</i>				-0.308*** (0.0816)	-0.308*** (0.0789)
State fixed effects	No	No	Yes	Yes	Yes
Observations	486	486	486	472	472
R-squared	0.468	0.635	0.864	0.875	0.875

Notes: Robust standard errors in parentheses are adjusted for 112 meso-region clusters. *** p<0.01, ** p<0.05, * p<0.1. In column 1, observations are not weighted; in column 2, observations are weighted by population; column 3 adds state fixed effects to column 2; column 4 adds pre-trends to column 3; column 5 shows two-stage least squares, with an instrument for *Ln(Sm_{r 1991-1980})*.

Source: Prepared by the author using the 1980, 1991, 2000 and 2010 censuses.

With economic liberalization, the most affected regions began to see a decline in the number of formal enterprises and a reduction in their size. As a result, the capital of these enterprises is gradually being transferred to other

regions. Thus, there is a decline in the demand for formal labor and in the creation of establishments, which is also reflected in a decline in investment in affected regions. Therefore, entrepreneurs expect the depreciation of their installed capital, and the decline in formal employment to be sustained over time. Faced with this situation, workers take refuge in informality and manage to compensate for the decline in formal employment, and the effect of liberalization on total employment ends up being positive after 20 years, but only in terms of quantity and not in terms of quality.

Meanwhile, Table 9 shows the average wage income of workers and how it correlates with economic liberalization. Considering the estimation in column 3, we find that a 10-percentage point decrease in tariff rates (increase in liberalization) leads to a 15.5 percentage point decrease in the average income of workers. This result is consistent with the contraction in formal employment, the increase in informal employment, and the cost-cutting processes of firms that occurred in the early years of economic liberalization. In other words, both employment and wages were affected by liberalization in the short run.

Table 10 shows the same estimates as Table 9, but for the period from 1991 to 2010. Column 3 shows that the negative correlation remains, i.e., an increase in openness in a region is associated with a 21.15 percentage point decrease in workers' wage income. Twenty years after liberalization, the negative impact of liberalization on workers' incomes has intensified by 36%.

Table • 9

Log changes in wages and regional economic liberalization tariff 1991-2000.

<i>Ln(Wage_{r,2000-1991})</i>	OLS (1)	OLS (2)	OLS (3)
<i>RELT_r</i>	-1.564*** (0.189)	-1.416*** (0.215)	-1.555*** (0.0987)
State fixed effects	No	No	Yes
Observations	486	486	486
R-squared	0.148	0.330	0.660

Notes: Robust standard errors in parentheses are adjusted for 114 meso-region clusters. *** p<0.01, ** p<0.05, * p<0.1. In column 1, observations are not weighted; in column 2, observations are weighted by population; column 3 adds state fixed effects to column 2. The variable *Ln(Wage_{r,2000-1991})* refers to the average wages rate by microregions.

Source: Prepared by the author using the 1991 and 2000 censuses.

Table • 10

Log changes in wages and regional economic liberalization tariff 1991-2010.

<i>Ln(Wage_{r, 2010-1991})</i>	OLS (1)	OLS (2)	OLS (3)
<i>RELT_r</i>	-2.587*** (0.290)	-2.539*** (0.421)	-2.115*** (0.121)
State fixed effects	No	No	Yes
Observations	486	486	486
R-squared	0.261	0.485	0.829

Notes: Robust standard errors in parentheses are adjusted for 114 meso-region clusters. *** p<0.01, ** p<0.05, * p<0.1. In column 1, observations are not weighted; in column 2, observations are weighted by population; column 3 adds state fixed effects to column 2. The variable *Ln(Wage_{r, 2010-1991})* refers to the average wages rate by microregions.

Source: Prepared by the author using the 1991 and 2010 censuses.

Table 11 presents the impact of economic liberalization on children's educational attainment between 1991 and 2000. The estimate in column 3 indicates that increased economic liberalization is linked to a 6.35 pp decrease in the average years of education among children living in the micro-regions most affected by the liberalization process. Similarly, Table 12 shows the same estimates as above but for the period 1991 to 2010. Results suggest that 20 years after liberalization there is a worsening in the average years of education of children living in the micro-regions most exposed to economic liberalization in Brazil. Column 3 shows that a decrease of 10 pp in RELT produces a decrease of 11.7 percentage points.

Results presented in Tables 11 and 12 reinforce previous findings of this research. It states that the micro-regions most exposed to trade liberalization suffered a decrease in social mobility because the increase in economic liberalization generated a decrease in the average years of education received by children residing in the most affected regions.

With the drop in demand for labor, the gradual closure of businesses, and the decline in investment, workers moved to the informal market, where wages are unregulated and often lower than what they can earn in formal employment. These negative effects on income and formal employment have had both short and long-term effects on social mobility, as the decline in household income

Table • 11

Log changes in children's years of education and regional economic liberalization tariff 1991-2000.

$Ln(SonEduc_{r2000-1991})$	OLS (1)	OLS (2)	OLS (3)
$RELT_r$	-0.924*** (0.0815)	-0.758*** (0.0756)	-0.635*** (0.0513)
State fixed effects	No	No	Yes
Observations	486	486	486
R-squared	0.342	0.533	0.813

Notes: Robust standard errors in parentheses are adjusted for 114 meso-region clusters. *** p<0.01, ** p<0.05, * p<0.1. In column 1, observations are not weighted; in column 2, observations are weighted by population; column 3 adds state fixed effects to column 2. The variable $Ln(SonEduc_{r2000-1991})$ refers to the average years of education of the children by microregions.

Source: Prepared by the author using the 1991 and 2000 censuses.

Table • 12

Log changes in children's years of education and regional economic liberalization tariff 1991-2010.

$Ln(SonEduc_{r2010-1991})$	OLS (1)	OLS (2)	OLS (3)
$RELT_r$	-1.788*** (0.135)	-1.464*** (0.103)	-1.175*** (0.0969)
State fixed effects	No	No	Yes
Observations	486	486	486
R-squared	0.397	0.601	0.850

Notes: Robust standard errors in parentheses are adjusted for 114 meso-region clusters. *** p<0.01, ** p<0.05, * p<0.1. In column 1, observations are not weighted; in column 2, observations are weighted by population; column 3 adds state fixed effects to column 2. The variable $Ln(SonEduc_{r2010-1991})$ refers to the average years of education of the children by microregions.

Source: Prepared by the author using the 1991 and 2010 censuses.

creates many more difficulties in terms of access to better education, living conditions, basic services, health, and other important aspects for the educational mobility of children.

It should be noted that, as other studies have shown, various mechanisms affect social mobility and may affect estimates; for instance, the economic situation of a country, public policies aimed at social development and poverty reduction, the macroeconomic environment of the country, health systems, urbanization, the education system, among other determinants not studied in this section.

Robustness tests

In this part of the document, the social mobility models computed considering that 5 and 10 years of education received by the head of household are estimated using the *RELT*, while excluding the most populous microregion (São Paulo). Additionally, the original estimates of social mobility are included, incorporating other controls to observe variations in the coefficient of interest.

The estimates made without including the micro-region with the largest population in Tables 13, 14, 16, and 17 show that the coefficients vary only slightly in magnitude. Likewise, in terms of correlation, the negative relationship between increased economic openness and social mobility continues to be observed. Estimates also show that they are still statistically significant.

Tables 15 and 18 show that when the original estimates are run including racial control variables, coefficients vary only slightly, and their sign and statistical significance remain the same. The greatest variation in the magnitude of the coefficient is observed when including the control for the average number of female heads of household per microregion, but the causal relationship is the same and remains significant.

Table • 13

Log changes in social mobility (5 years) and regional economic liberalization tariffs 1991-2000, excluding Sao Paulo.

$Ln(Sm_{r, 2000-1991})$	OLS (1)	OLS (2)	OLS (3)	OLS (4)	2SLS (5)
$REL T_r$	-3.543*** (0.323)	-2.919*** (0.310)	-2.486*** (0.180)	-3.184*** (0.236)	-3.184*** (0.228)
$Ln(Sm_{r, 1991-1980})$				-0.271*** (0.0611)	-0.271*** (0.0590)
State fixed effects	No	No	Yes	Yes	Yes
Observations	485	485	485	471	471
R-squared	0.265	0.420	0.731	0.760	0.760

Notes: Robust standard errors in parentheses are adjusted for 112 meso-region clusters. *** p<0.01, ** p<0.05, * p<0.1. The microregion of Sao Paulo was excluded. In column 1, observations are not weighted; in column 2, observations are weighted by population; column 3 adds state fixed effects to column 2; column 4 adds pre-trends to column 3; column 5 shows two-stage least squares, with an instrument for $Ln(Smr1991-1980)$.

Source: Prepared by the author using the 1980, 1991, 2000 and 2010 censuses.

Table • 14

Log changes in social mobility (5 years) and regional economic liberalization tariffs 1991-2010, excluding Sao Paulo.

$Ln(Sm_{r, 2010-1991})$	OLS (1)	OLS (2)	OLS (3)	OLS (4)	2SLS (5)
$REL T_r$	-8.045*** (0.460)	-6.729*** (0.461)	-5.224*** (0.349)	-6.019*** (0.426)	-6.019*** (0.412)
$Ln(Sm_{r, 1991-1980})$				-0.308*** (0.0818)	-0.308*** (0.0791)
State fixed effects	No	No	Yes	Yes	Yes
Observations	485	485	485	471	471
R-squared	0.465	0.598	0.850	0.861	0.861

Notes: Robust standard errors in parentheses are adjusted for 112 meso-region clusters. *** p<0.01, ** p<0.05, * p<0.1. The microregion of Sao Paulo was excluded. In column 1, observations are not weighted; in column 2, observations are weighted by population; column 3 adds state fixed effects to column 2; column 4 adds pre-trends to column 3; column 5 shows two-stage least squares, with an instrument for $Ln(Smr1991-1980)$.

Source: Prepared by the author using the 1980, 1991, 2000 and 2010 censuses.

Table • 15

Log changes in social mobility (5 years), regional economic liberalization tariffs, and other controls for 1991-2000 and 1991-2010.

SOCIAL MOBILITY 1991-2000			
$Ln(Sm_{r2000-1991})$	OLS (1)	OLS (2)	OLS (3)
$RELT_r$	-2.489*** (0.177)	-2.440*** (0.171)	-1.718*** (0.233)
$Black-hh_{r1991}$	-2.737* (1.456)		
$White-hh_{r1991}$		-0.989** (0.389)	
$Woman-hh_{r1991}$			-5.432*** (1.030)
State fixed effects	Yes	Yes	Yes
Observations	486	486	486
R-squared	0.756	0.762	0.769
SOCIAL MOBILITY 1991-2010			
$Ln(Sm_{r2010-1991})$	OLS (1)	OLS (2)	OLS (3)
$RELT_r$	-5.131*** (0.316)	-5.068*** (0.332)	-3.898*** (0.365)
$Black-hh_{r1991}$	-6.217** (2.827)		
$White-hh_{r1991}$		-1.682*** (0.539)	
$Woman-hh_{r1991}$			-8.836*** (1.751)
State fixed effects	Yes	Yes	Yes
Observations	486	486	486
R-squared	0.868	0.871	0.875

Notes: Robust standard errors in parentheses are adjusted for 114 meso-region clusters. *** p<0.01, ** p<0.05, * p<0.1. All columns' observations are weighted, and state fixed effects were used. The variable $Black-hh_{r1991}$ refers to the average of heads of household who are black, $White-hh_{r1991}$ refers to the average of heads of household who are white and $Woman-hh_{r1991}$ refers to the average of heads of household who are woman in a micro regions for 1991.

Source: Prepared by the author using the 1980, 1991, 2000 and 2010 censuses.

Table • 16

Log changes in social mobility (10 years) and regional economic liberalization tariffs 1991-2000, excluding Sao Paulo.

$\ln(Sm_{r, 2000-1991})$	OLS (1)	OLS (2)	OLS (3)	OLS (4)	2SLS (5)
$RELT_r$	-5.438*** (0.740)	-4.117*** (0.758)	-3.517*** (0.521)	-2.346*** (0.412)	-2.346*** (0.398)
$\ln(Sm_{r, 1991-1980})$				-0.472*** (0.0316)	-0.472*** (0.0305)
State fixed effects	No	No	Yes	Yes	Yes
Observations	474	474	474	462	462
R-squared	0.105	0.190	0.539	0.739	0.739

Notes: Robust standard errors in parentheses are adjusted for 112 meso-region clusters. *** p<0.01, ** p<0.05, * p<0.1. The microregion of Sao Paulo was excluded. In column 1, observations are not weighted; in column 2, observations are weighted by population; column 3 adds state fixed effects to column 2; column 4 adds pre-trends to column 3; column 5 shows two-stage least squares, with an instrument for $\ln(Smr1991-1980)$.

Source: Prepared by the author using the 1980, 1991, 2000 and 2010 censuses.

Table • 17

Log changes in social mobility (10 years) and regional economic liberalization tariffs 1991-2010, excluding Sao Paulo.

$\ln(Sm_{r, 2010-1991})$	OLS (1)	OLS (2)	OLS (3)	OLS (4)	2SLS (5)
$RELT_r$	-7.418*** (0.698)	-6.572*** (0.986)	-5.000*** (0.467)	-3.828*** (0.349)	-3.828*** (0.337)
$\ln(Sm_{r, 1991-1980})$				-0.452*** (0.0364)	-0.452*** (0.0352)
State fixed effects	No	No	Yes	Yes	Yes
Observations	474	474	474	462	462
R-squared	0.191	0.362	0.643	0.785	0.785

Notes: Robust standard errors in parentheses are adjusted for 112 meso-region clusters. *** p<0.01, ** p<0.05, * p<0.1. The microregion of Sao Paulo was excluded. In column 1, observations are not weighted; in column 2, observations are weighted by population; column 3 adds state fixed effects to column 2; column 4 adds pre-trends to column 3; column 5 shows two-stage least squares, with an instrument for $\ln(Smr1991-1980)$.

Source: Prepared by the author using the 1980, 1991, 2000 and 2010 censuses.

Table • 18

Log changes in social mobility (10 years), regional economic liberalization tariffs, and other controls for 1991-2000 and 1991-2010.

MOVILIDAD SOCIAL 1991-2000			
$\ln(Sm_{r2000-1991})$	OLS (1)	OLS (2)	OLS (3)
$RELT_r$	-3.509*** (0.543)	-3.371*** (0.499)	-2.531*** (0.692)
$Black-hh_{r1991}$	-5.424 (4.444)		
$White-hh_{r1991}$		-2.522*** (0.644)	
$Woman-hh_{r1991}$			-7.122** (2.963)
State fixed effects	Yes	Yes	Yes
Observations	475	475	475
R-squared	0.554	0.565	0.558
MOVILIDAD SOCIAL 1991-2010			
$\ln(Sm_{r2010-1991})$	OLS (1)	OLS (2)	OLS (3)
$RELT_r$	-5.042*** (0.493)	-4.853*** (0.439)	-2.733*** (0.666)
$Black-hh_{r1991}$	-10.03** (4.531)		
$White-hh_{r1991}$		-3.708*** (0.666)	
$Woman-hh_{r1991}$			-16.33*** (3.321)
State fixed effects	Yes	Yes	Yes
Observations	475	475	475
R-squared	0.669	0.684	0.687

Notes: Robust standard errors in parentheses are adjusted for 114 meso-region clusters. *** p<0.01, ** p<0.05, * p<0.1. All columns' observations are weighted, and state fixed effects were used. The variable $Black-hh_{r1991}$ refers to the average of heads of household who are black, $White-hh_{r1991}$ refers to the average of heads of household who are white and $Woman-hh_{r1991}$ refers to the average of heads of household who are woman in a microregions for 1991.

Source: Prepared by the author using the 1980, 1991, 2000 and 2010 censuses.

Focusing on the newly included controls, it is observed that when the head of household is white, the effects of economic liberalization on social mobility are also negative, though significantly less severe compared to households headed by black individuals. A similar pattern is seen among female heads of household; the impact on their children's social mobility is also negative in both the short and long term, but to a greater extent in magnitude. In summary, the trends remain consistent.

In addition, Annex 1 presents additional estimates used as robustness tests. In Tables 1A and 2A, the dependent variable of social mobility is redefined to consider only the comparison between the years of education received by mothers and their children, without distinction of gender. In Tables 3A and 4A, mobility is calculated by comparing only the education of mothers with that of their daughters. In both cases, the short- and long-term results indicate that regions with greater exposure to economic openness experienced a decline in social mobility.

Tables 5A and 6A modify the *RELT* estimation methodology, applying the approach proposed by Topalova (2010). Estimates remain negative and statistically significant, with an increase in the magnitude of the coefficients. Taken together, these results reinforce the evidence that economic openness had an adverse impact on social mobility in the most exposed regions.

Conclusions

Economic literature broadly highlights the benefits of free international trade, proposing that reduced trade taxes lower consumer prices, stimulate market entry, and enhance overall living standards. However, empirical studies reveal that the short-term effects of trade liberalization can be detrimental, particularly for developing countries experiencing initial job losses due to trade shocks and market competition. Over time, these economies generally adjust, leading to increased competitiveness, improved wages, and higher productivity.

In the Brazilian context, this investigation was conducted to estimate the impact of economic openness on social mobility. This analysis used data on heads of household educational attainment—5 and 10 years—as well as *RELT*, a variable indicating reductions in tariff rates. This proxy reflects the degree of economic openness in different Brazilian regions. In general, findings indicate a consistent increase in social mobility from 1980 to 2010, people with 5 years of education had mobility averaging around 50% by 2010, while those with 10 years of education stood at 7.5%.

Regression analyses were employed to assess the effects of economic openness on social mobility for different educational attainments of the parents, both in the short and long run. Short-term results reveal a negative correlation between trade liberalization and social mobility. Specifically, mobility measures for 5 years of education showed an average decrease of 32.3 percentage points, while for 10 years of education, it decreased by 25.2 percentage points. This decline is attributed to trade-induced shocks that heightened competition, increased imports, and led to cost-cutting measures by firms, negatively impacting employment and wages. Consequently, this economic strain diminished families' opportunities to improve their children's future standard of living.

Long-term analysis further illustrates that the negative impact on social mobility persisted, and in some cases worsened. Twenty years post-liberalization, social mobility calculated for 5 years of education had decreased by approximately 60.3 percentage points compared to the 1991-2000 period. For 10 years of education, the reduction was about 41.3 percentage points. Notably, children from more educated families experienced less severe impacts, indicating that higher parental education somewhat buffered the adverse effects of economic liberalization.

The observed long-term deterioration in social mobility can be attributed to several factors. Regions most affected by tariff reductions experienced a decline in firm presence and size, while less impacted regions saw a slow redeployment of capital, leading to reduced investment and formal job demand. This resulted in a cascading effect that decreased local economic activity and productivity.

Additional regressions analyzing general, formal, and informal employment rates and wage income in relation to regional tariff changes corroborated these findings. In the short term, reductions in formal employment and wages, along with an increase in informal employment, were observed. The negative effects on formal employment and wages were pronounced in the short run, aligning with the broader decline in social mobility from an income perspective. Other regressions were also estimated showing that the increase in economic openness had an adverse effect on the average years of education received by children residing in the regions most affected by economic liberalization.

The robustness tests included various specifications: exclusion of the most populated micro-region, incorporation of control variables such as race and gender of the head of household, modification of the methodology for estimating the social mobility variable by restricting it to women only, and application of an alternative method for calculating the RELT variable. Results show that the negative impact of economic liberalization on social mobility varies according to demographic factors. Households headed by white people experienced less

pronounced effects compared to those headed by black people. Likewise, female-headed households experienced greater negative impacts, both in the short and long term.

It is important to acknowledge that other influential factors, such as public policies, healthcare systems, education, urbanization, macroeconomic conditions, and inequality, were not considered in this study. Future research could explore additional variables and alternative measures of social mobility to gain a more comprehensive understanding of its dynamics in response to economic liberalization.

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Annex 1

In Tables 1A and 2A, the variable Sm_{hrt} takes a value of 1 when children, regardless of gender, exceed their mother's number of years of education, and 0 otherwise. Meanwhile, in Tables 3A and 4A, Sm_{hrt} takes the value of 1 only when daughters exceed the years of education attained by their mother, and 0 in all other cases.

Table • 1A

Log changes in social mobility (5 years) and regional economic liberalization tariffs 1991-2000 and 2000-2010.

Variables	(1) $Ln(Sm_{r2000-1991})$	(2) $Ln(Sm_{r2000-1991})$	(3) $Ln(Sm_{r2010-1991})$	(4) $Ln(Sm_{r2010-1991})$
$RELT_r$	-1.994*** (0.206)	-3.649*** (0.225)	-4.569*** (0.322)	-6.147*** (0.367)
$Ln(Smr1991-1980)$		-0.514*** (0.0464)		-0.490*** (0.0555)
State fixed effects	Yes	Yes	Yes	Yes
Observations	485	469	485	469
R-squared	0.523	0.694	0.774	0.826

Notes: Robust standard errors in parentheses are adjusted for 114 meso-region clusters. *** p<0.01, ** p<0.05, * p<0.1. All columns' observations are weighted, and state fixed effects were used. The variable $Ln(Smr2000-1991)$ measures the change in average regional social mobility associated with five years of education for female heads of household, compared to the education attained by their children, between 1991 and 2000. Similarly, the variable $Ln(Smr2010-1991)$ reflects the same calculation, but considering the period between 1991 and 2010. Columns 2 and 4 add pre-trends to column 1 and 3.

Source: Prepared by the author using the 1980, 1991, 2000 and 2010 censuses.

Table • 2A

Log changes in social mobility (10 years) and regional economic liberalization tariffs 1991-2000 and 2000-2010.

Variables	(1) $Ln(Sm_{r2000-1991})$	(2) $Ln(Sm_{r2000-1991})$	(3) $Ln(Sm_{r2010-1991})$	(4) $Ln(Sm_{r2010-1991})$
$RELT_r$	-3.169*** (0.647)	-2.177*** (0.499)	-4.812*** (0.635)	-3.755*** (0.540)

$Ln(Smr1991-1980)$		-0.717*** (0.0433)		-0.744*** (0.0501)
State fixed effects	Yes	Yes	Yes	Yes
Observations	369	362	369	362
R-squared	0.279	0.720	0.410	0.762

Notes: Robust standard errors in parentheses are adjusted for 114 meso-region clusters. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. All columns' observations are weighted, and state fixed effects were used. The variable $Ln(Smr2000-1991)$ measures the change in average regional social mobility associated with ten years of education for female heads of household, compared to the education attained by their children, between 1991 and 2000. Similarly, the variable $Ln(Smr2010-1991)$ reflects the same calculation, but considering the period between 1991 and 2010. Columns 2 and 4 add pre-trends to column 1 and 3.

Source: Prepared by the author using the 1980, 1991, 2000 and 2010 censuses.

Table • 3A

Log changes in social mobility (5 years, mother and daughters) and regional economic liberalization tariffs 1991-2000 and 2000-2010.

Variables	(1) $Ln(Sm_{r2000-1991})$	(2) $Ln(Sm_{r2000-1991})$	(3) $Ln(Sm_{r2010-1991})$	(4) $Ln(Sm_{r2010-1991})$
$RELT_r$	-1.800*** (0.221)	-3.833*** (0.222)	-4.463*** (0.316)	-6.439*** (0.340)
$Ln(Smr1991-1980)$		-0.608*** (0.0439)		-0.582*** (0.0482)
State fixed effects	Yes	Yes	Yes	Yes
Observations	485	469	485	469
R-squared	0.428	0.693	0.721	0.816

Notes: Robust standard errors in parentheses are adjusted for 114 meso-region clusters. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. All columns' observations are weighted, and state fixed effects were used. The variable $Ln(Smr2000-1991)$ measures the change in average regional social mobility associated with five years of education for female heads of household, compared to the education attained by their daughters, between 1991 and 2000. Similarly, the variable $Ln(Smr2010-1991)$ reflects the same calculation, but considering the period between 1991 and 2010. Columns 2 and 4 adds pre-trends to column 1 and 3.

Source: Prepared by the author using the 1980, 1991, 2000 and 2010 censuses.

Table • 4A

Log changes in social mobility (10 years, mother and daughters)
and regional economic liberalization tariffs 1991-2000 and 2000-2010.

Variables	(1) $Ln(Sm_{r2000-1991})$	(2) $Ln(Sm_{r2000-1991})$	(3) $Ln(Sm_{r2010-1991})$	(4) $Ln(Sm_{r2010-1991})$
$RELT_r$	-2.151*** (0.702)	-1.760*** (0.518)	-3.932*** (0.741)	-3.584*** (0.552)
$Ln(Smr1991-1980)$		-0.748*** (0.0440)		-0.793*** (0.0452)
State fixed effects	Yes	Yes	Yes	Yes
Observations	336	331	336	331
R-squared	0.231	0.702	0.324	0.740

Notes: Robust standard errors in parentheses are adjusted for 114 meso-region clusters. *** p<0.01, ** p<0.05, * p<0.1. All columns' observations are weighted, and state fixed effects were used. The variable $Ln(Smr2000-1991)$ measures the change in average regional social mobility associated with ten years of education for female heads of household, compared to the education attained by their daughters, between 1991 and 2000. Similarly, the variable $Ln(Smr2010-1991)$ reflects the same calculation, but considering the period between 1991 and 2010. Columns 2 and 4 adds pre-trends to column 1 and 3.

Source: Prepared by the author using the 1980, 1991, 2000 and 2010 censuses.

Tables 5A and 6A replicate the initial estimates presented in this study (Tables 3, 4, 5, and 6), which analyze the effects of economic liberalization on social mobility in Brazil's micro-regions, both in the short and long term. However, on this occasion, the methodology used to calculate the independent variable $RELT$ has been modified. The approach proposed by Topalova (2010) was followed, which incorporates the productive structure existing prior to the economic liberalization process. Equation 1A presents the formula used for this calculation.

$$Tariff_{rt} = \frac{\sum_i L_{r,i,1991} * Tariff_{it}}{L_{r,1991}} \quad (1A)$$

Where is the $Tariff_{rt}$ exposure of micro-region r in year t. $L_{r,i,1991}$ is the number of workers in micro-region r in industry i in the base year 1991. $L_{r,1991}$ is the total number of workers in micro-region r in the base year. Finally, $Tariff_{it}$ is the average tariff applied to industry i in year t.

Table • 5A

Log changes in social mobility (5 years) and regional economic liberalization tariffs 1991-2000 and 2000-2010 using Topalova's (2010) methodology.

Variables	(1) $Ln(Sm_{r2000-1991})$	(2) $Ln(Sm_{r2000-1991})$	(3) $Ln(Sm_{r2010-1991})$	(4) $Ln(Sm_{r2010-1991})$
$Tariff_{rt}$	-14.75*** (3.304)	-13.59*** (3.236)	-28.36*** (6.114)	-24.86*** (5.546)
$Ln(Smr1991-1980)$		0.147** (0.0672)		0.465*** (0.112)
State fixed effects	Yes	Yes	Yes	Yes
Observations	486	472	486	472
R-squared	0.609	0.619	0.694	0.725

Notes: Robust standard errors in parentheses are adjusted for 114 meso-region clusters. *** p<0.01, ** p<0.05, * p<0.1. All columns' observations are weighted, and state fixed effects were used. The variable $Ln(Smr2000-1991)$ measures the change in average regional social mobility associated with ten years of education for heads of household, compared to the education attained by their children, between 1991 and 2000. Similarly, the variable $Ln(Smr2010-1991)$ reflects the same calculation. Columns 2 and 4 add pre-trends to column 1 and 3.

Source: Prepared by the author using the 1980, 1991, 2000 and 2010 censuses.

Table • 6A

Log changes in social mobility (10 years) and regional economic liberalization tariffs 1991-2000 and 2000-2010 using Topalova's (2010) methodology.

Variables	(1) $Ln(Sm_{r2000-1991})$	(2) $Ln(Sm_{r2000-1991})$	(3) $Ln(Sm_{r2010-1991})$	(4) $Ln(Sm_{r2010-1991})$
$Tariff_{rt}$	-15.53** (6.141)	-4.641 (4.386)	-19.49*** (7.341)	-8.435 (5.165)
$Ln(Smr1991-1980)$		-0.510*** (0.0370)		-0.512*** (0.0467)
State fixed effects	Yes	Yes	Yes	Yes

Observations	475	463	475	463
R-squared	0.467	0.696	0.534	0.703

Notes: Robust standard errors in parentheses are adjusted for 114 meso-region clusters. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. All columns' observations are weighted, and state fixed effects were used. The variable $\text{Ln}(\text{Smr2000-1991})$ measures the change in average regional social mobility associated with ten years of education for heads of household, compared to the education attained by their children, between 1991 and 2000. Similarly, the variable $\text{Ln}(\text{Smr2010-1991})$ reflects the same calculation. Columns 2 and 4 add pre-trends to column 1 and 3.

Source: Prepared by the author using the 1980, 1991, 2000 and 2010 censuses.