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Convergence in income inequality: revisiting the case of Brazilian municipalities

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Abstract

This paper investigates the hypothesis of income inequality convergence for the Brazilian municipalities using data from the 1991, 2000 and 2010 census. As we are restricted to a single country, and we take into account regional differences, we interpret our approach as a conditional convergence analysis. The findings suggest that from 1991 to 2000 most macro regions (or states) were converging, but to a higher long-run Gini index. From 2000 to 2010 this upward trend was reverted, and we find convergence toward a lower inequality level.

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1 Introduction

Convergence of per capita income was proposed by Solow (1956) and Swan (1956) as part of neoclassical growth models. Due to diminishing returns to factors of production, the neoclassical growth models predict that economies converge to their own steady-state level of income and the speed of convergence is inversely related to the gap between effective income and its steady-state value. This proposition is known as conditional convergence, and it gave rise to a vast empirical literature testing convergence in average incomes both within and across countries (see Barro and Sala-i Martin, 1992; Mankiw et al., 1992; Temple, 1999). However, Bénabou (1996) notes that most versions of the neoclassical growth model imply convergence in the entire distribution of income, not just for its first moment. As a result, for regions with the same fundamentals, the moments (statistics) of the income distribution will eventually converge toward the same value.

Bénabou (1996) himself investigates the income inequality convergence hypothesis, asking if inequality falls in high inequality countries, and rises in low inequality countries. To accomplish such investigation, Bénabou (1996) regress the average rate of change of the Gini index on its initial level for 69 countries. Although the neoclassical growth model predicts conditional convergence, such an approach is better viewed as an unconditional convergence test (Ravallion, 2003). Despite that, Bénabou (1996) finds evidence of inequality convergence. Ravallion (2003) investigates the inequality convergence hypothesis for different samples of countries. In all cases, the inequality convergence hypothesis is not rejected, even when measurement error in the initial inequality measure is controlled for. Bleaney and Nishiyama (2003) analyze the income inequality convergence hypothesis for 79 countries. The findings suggest that convergence of income inequality is significantly faster amongst the OECD countries.

As discussed by Gomes (2007), a common drawback of using international data is the lack of homogeneity. Indeed, Ravallion (2001) points out that the surveys that estimate the Gini index are less standardized than National Accounts and, consequently, data comparability becomes a more significant problem when analyzing income inequality instead of income level. To overcome this problem, Ezcurra and Pascual (2005) use data supplied by the European Community Household Panel (ECHP), which is based on homogeneous surveys and covers regions of the European Union. Their findings reveal the existence of a process of convergence in regional income inequality level. Using data from ECPH, Tselios (2009) investigates the convergence of both income level and income inequality among regions of Europe by means of growth models with spatial interaction effects. Regarding the analysis of income inequality, the findings support the convergence hypothesis.

The interest in the analysis of regional convergence, as well as the concern with the use of reliable data sets, has led a branch of the literature to examine the hypothesis of income inequality convergence among states or municipalities of a country. Furthermore, the neoclassical growth model predicts conditional convergence and fundamentals are more similar within than across countries (Gomes, 2007). In this vein, Panizza (2001) tests the hypothesis of income inequality convergence for U.S. states and does not reject it. Lin and Huang (2011) revisit the U.S. states case, and after using alternative inequality indicators, different regional divisions, and alternative sub-sample periods, they find overwhelming evidence in support of convergence in income inequality. Marina (2000) uses the Gini index of 25 provinces in Argentina and finds evidence of inequality convergence. Goerlich and Mas (2004) investigate the Spanish provinces using the Gini index, and the results support the hypothesis of income inequality convergence. Gomes (2007) uses the Gini index to study the 5507 Brazilian municipalities. At first, the results suggest that municipalities are converging toward a higher inequality level. However, controlling for the five Brazilian macro regions differences, the result is reverted for the South region, whose municipalities converge to a lower level of inequality.

Gomes (2007) uses the reliable data set prepared by the Brazilian Human Development Report (BHDR), which is based on the Brazilian census. At that time, the data covered the years 1991 and 2000; however, the most recent census was incorporated by the BHDR, and its new version covers the year 2010. Consequently, Gomes' (2007) predictions can be evaluated, and his analysis can be extended to the year 2010. The motivation for both is straightforward: the National Household Survey (PNAD) indicates that the Gini index drops from 0.60 in the year 2001 to 0.54 in the year 2009.[1] It is worth mentioning that the Brazilian economy experienced an increase in the average annual GDP per capita growth, turning from 0.97% in the period 1991-2000 to about 2.51% in the period 2001-2010, according to the data from World Development Indicators. Not surprisingly, Barros et al. (2006) finds evidence that the improvement in the labor market conditions accounts for about 47% of the reduction in inequality in Brazil between 2001 and 2004. Furthermore, throughout the 2000s, the Brazilian government sharply increased the spending on conditional cash transfer programs such as the Bolsa Escola and the Bolsa Familia (Hall, 2006; Soares, 2011).[2] Notably, such programs have been associated with reductions in inequality and poverty indicators, essentially because of improvements in education outcomes and increasing health conditions (Glewwe and Kassouf, 2012; Soares et al., 2010).[3]

This paper revises the hypothesis of income inequality convergence for Brazilian municipalities, considering the Gini index for the year 2010. In this sense, we take into account the recent changes in the Brazilian per capita income and the increase in the spending on social programs by the Brazilian government. Consistent with our goal of comparing our results with those from Gomes (2007), we follow his empirical strategy closely. Thus, we apply growth regressions in which the growth rate of the Gini index depends on its initial value. Initially, we do not include others covariates and we refer to such an approach as an unconditional test of income inequality. As done by Gomes (2007), to move toward conditional convergence tests, we employ dummies for the Brazilian macro regions. Finally, we go further by using dummies for the Brazilian states. After all, we find evidence of income inequality convergence. However, differently from Gomes (2007), the findings suggest that most municipalities are now converging toward a lower level of income inequality.

[1] The PNAD is a survey conducted by the Brazilian Institute of Geography and Statistics (IBGE) that investigates, on a yearly basis, general characteristics of the population based on samples of households of the whole country.

[2] The Bolsa Escola was incorporated into the Bolsa Familia Program (BFP) in 2004. Eligible families are of two types, according to their levels of income: those subject to extreme poverty, which receives a fixed transfer, and low-income families with children (0 to 17 years old), which has access to a variable transfer that depends on the number of children and their age. An essential feature of the BFP is the requirement for the poor households of keeping their children (ages 6 to 17) enrolled in school. For details on the design and conditionalities of such a program, see Glewwe and Kassouf (2012); Soares (2012).

[3] One can arguably defend that such conditional transfer programs have both short and long-run effects on the poor households' income. First, the transfer immediate raises their income. Second, because such income transfer is conditional on keeping children (ages 6 to 17) enrolled in school, there is a long-run effect through a human capital improvement. Besides these channels, another potential effect of the program is related to better health conditions (as discussed, for example, in Aghion et al. (2011)).

2 Econometric Methodology

This section presents the econometric methodology employed to test the income inequality convergence hypothesis. Section 2.1 describes the data set while Section 2.2 presents the testing equations.

2.1 Data Set

The BHDR dataset covers the years 1991, 2000 and 2010, being irregularly spaced. For this reason, we employ cross-section models instead of panel ones. It is worth mentioning that, throughout the 2000s the number of municipalities in Brazil increased from 5507 to 5565, and the BHDR takes into account the establishment of new municipalities. Hence, our number of observations is different from that in Gomes (2007), but the inequality measure remains the same, the Gini index based on household income per capita.

Table 1 reports the descriptive statistics of the Gini index. For the country as a whole, in 1991 the average Gini index was 0.525, and it increased to 0.547 in 2000. However, this upward trend was reverted throughout the 2000s, and the average Gini index decreased to 0.494 in 2010. From 1991 to 2000 the average growth rate of the Gini index is positive, on average, 0.4% per year, while from 2000 to 2010, it is negative, on average, -1.0% per year. This new pattern may revert Gomes's (2007) prediction that most Brazilian municipalities would converge to a higher level of inequality. After testing for convergence, we estimate the implied long-run Gini index to investigate such issue. Finally, notice in Table 1 that the variance and the amplitude of the Gini index decreased over time. In particular, the Gini index ranged from 0.27 to 0.92 in 1991, and these numbers have become 0.28 and 0.80, in 2010.

Table 1 also presents the descriptive statistics for each Brazilian macro region. In the South region, the average Gini index decreased from 1991 to 2000 and from 2000 to 2010. In the other regions the average Gini index increased from 1991 to 2000, but it decreased throughout the 2000s. Regarding the Gini dispersion, its variance and amplitude decreased from 1991 to 2000 in the five Brazilian macro regions.

Last, Figure 1 presents the estimated kernel densities for the Gini index for the Brazil and its macro regions in 1991, 2000 and 2010. The figure help us to visualize how the Gini distribution evolves over these years. It is worth mentioning that the densities move to the right from 1991 to 2000 in most regions, which results in a movement in the whole country distribution at that period. However, in all cases, the densities moved to the left from 1991 to 2010 which reinforces the doubts on Gomes's (2007) prediction that most Brazilian municipalities would converge to a higher level of inequality.

2.2 Econometric Model

As usual in the literature, to test the hypothesis of income inequality, we regress the average growth rate of the Gini index on its initial value, as follows:

$$\frac{1}{\tau}\ln\left(\frac{G_{i,t+\tau}}{G_{i,t}}\right) = \delta_0 + \delta_1 \ln G_{i,t} + \varepsilon_{i,t+\tau} \tag{1}$$

where $G_{i,t}$ is the Gini index of municipality i in period t, $\varepsilon_{i,t+\tau}$ is the residual term of municipality i in period $t+\tau$, δ_0 and δ_1 are the parameters of interest. The convergence hypothesis is not rejected if $\delta_1 < 0$, and the long-run equilibrium value of the Gini index

Table 1: Descriptive Statistics for Gini index

Variable	Obs.	Mean	S.D.	Variance	Minimum	Maximum
Whole Country						
$G_{i,1991}$	5,565	0.525	0.072	0.0051	0.27	0.92
$G_{i,2000}$	5,565	0.547	0.068	0.0047	0.30	0.87
$G_{i,2010}$	5,565	0.494	0.066	0.0043	0.28	0.80
$\frac{1}{9}\ln\left(\frac{G_{i,2000}}{G_{i,1991}}\right)$	5,565	0.004	0.017	0.0030	-0.072	0.119
$\frac{1}{10}\ln\left(\frac{G_{i,2010}}{G_{i,2000}}\right)$	5,565	-0.010	0.012	0.0001	-0.069	0.041
Region North						
$G_{i,1991}$	449	0.542	0.085	0.0072	0.27	0.86
$G_{i,2000}$	449	0.599	0.064	0.0041	0.42	0.81
$G_{i,2010}$	449	0.567	0.063	0.0040	0.42	0.80
$\frac{1}{9}\ln\left(\frac{G_{i,2000}}{G_{i,1991}}\right)$	449	0.011	0.019	0.0001	-0.040	0.119
$\frac{1}{10}\ln\left(\frac{G_{i,2010}}{G_{i,2000}}\right)$	449	-0.005	0.012	0.0001	-0.059	0.041
Region Northeast						
$G_{i,1991}$	1,794	0.516	0.072	0.0052	0.31	0.92
$G_{i,2000}$	1,794	0.561	0.061	0.0037	0.35	0.82
$G_{i,2010}$	1,794	0.525	0.049	0.0024	0.36	0.79
$\frac{1}{9}\ln\left(\frac{G_{i,2000}}{G_{i,1991}}\right)$	1,794	0.009	0.016	0.0002	-0.063	0.070
$\frac{1}{10}\ln\left(\frac{G_{i,2010}}{G_{i,2000}}\right)$	1,794	-0.006	0.011	0.0001	-0.052	0.038
Region Southeast						
$G_{i,1991}$	1,668	0.521	0.067	0.0045	0.31	0.85
$G_{i,2000}$	1,668	0.529	0.061	0.0037	0.33	0.76
$G_{i,2010}$	1,668	0.465	0.054	0.0030	0.32	0.78
$\frac{1}{9}\ln\left(\frac{G_{i,2000}}{G_{i,1991}}\right)$	1,668	0.001	0.015	0.0002	-0.072	0.063
$\frac{1}{10}\ln\left(\frac{G_{i,2010}}{G_{i,2000}}\right)$	1,668	-0.012	0.011	0.0001	-0.069	0.037
Region South						
$G_{i,1991}$	1,188	0.530	0.071	0.0051	0.33	0.87
$G_{i,2000}$	1,188	0.523	0.070	0.0049	0.30	0.80
$G_{i,2010}$	1,188	0.459	0.061	0.0038	0.28	0.72
$\frac{1}{9}\ln\left(\frac{G_{i,2000}}{G_{i,1991}}\right)$	1,188	-0.001	0.016	0.0002	-0.066	0.066
$\frac{1}{10}\ln\left(\frac{G_{i,2010}}{G_{i,2000}}\right)$	1,188	-0.012	0.013	0.0001	-0.064	0.034
Region Center-West						
$G_{i,1991}$	466	0.540	0.069	0.0047	0.30	0.75
$G_{i,2000}$	466	0.561	0.073	0.0053	0.36	0.87
$G_{i,2010}$	466	0.495	0.059	0.0035	0.37	0.77
$\frac{1}{9}\ln\left(\frac{G_{i,2000}}{G_{i,1991}}\right)$	466	0.004	0.018	0.0003	-0.063	0.078
$\frac{1}{10}\ln\left(\frac{G_{i,2010}}{G_{i,2000}}\right)$	466	-0.012	0.014	0.0002	-0.063	0.024

Notes: Obs.: Number of observations by region. S.D.: Standard Deviation.

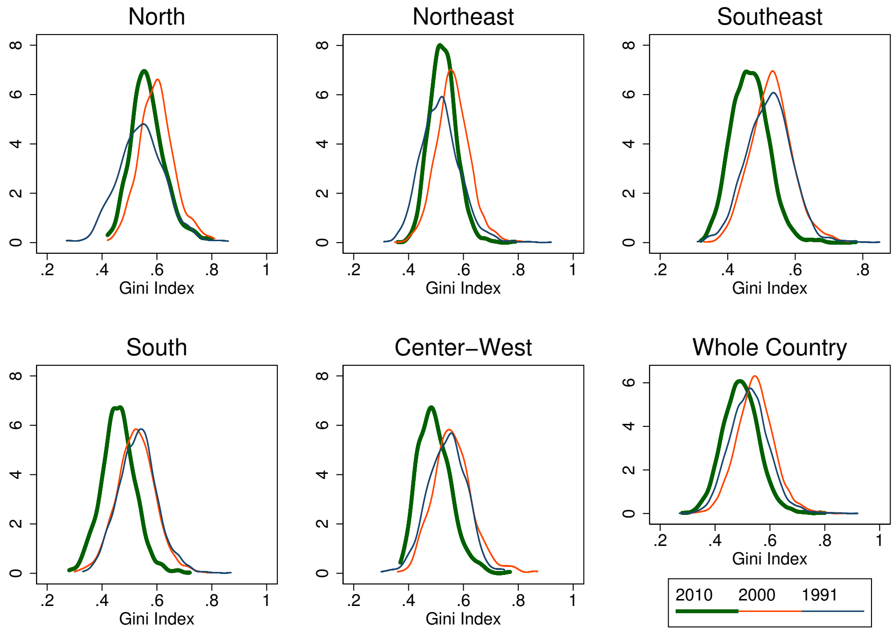

Figure 1: Kernel Densities for Gini Index

is estimated by $\exp\left(-\hat{\delta}_0/\hat{\delta}_1\right)$. We estimate the equation (1) for sample periods 1991-2000 ($t = 1991$ and $\tau = 9$) and 2000-2010 ($t = 2000$ and $\tau = 10$).

To move from an unconditional test to a conditional one, we add regional dummies in equation (1). First, to take into account any heterogeneity among the five macro regions of Brazil (North, Northeast, South, Southeast, and Center-West), we use dummy variables to allow a specific intercept and slope for each region, as in Gomes (2007). Second, we replace the dummies for regions by dummies for states.[4] Thus, we estimate the following specification:

$$\frac{1}{\tau}\ln\left(\frac{G_{i,t+\tau}}{G_{i,t}}\right) = \delta_0 + \sum_{j=1}^{J}\delta_{0,j}D_{i,t}^{(j)} + \delta_1 \ln G_{i,t} + \sum_{j=1}^{J}\delta_{1,j}D_{i,t}^{(j)}\ln G_{i,t} + \varepsilon_{i,t+\tau} \tag{2}$$

Note that four dummies are used for macro regions case, $J = 4$, and twenty five dummies are used for states case, $J = 25$.[5] For a specific region (or state), the convergence hypothesis is not rejected if its slope is negative. Consequently, for $j = 1$, there is support for convergence if $\delta_1 < 0$, and for $j > 1$ this condition becomes $\delta_1 + \delta_{1,j} < 0$. The long-run Gini index is estimated by $\exp\left(-\hat{\delta}_0/\hat{\delta}_1\right)$ for region (or state) $j = 1$ and $\exp\left(-(\hat{\delta}_0 + \hat{\delta}_{0,j})/(\hat{\delta}_1 + \hat{\delta}_{1,j})\right)$ for region (or state) $j > 1$. Finally, we estimate the coefficients of the models (1) and (2) by Ordinary Least Squares (OLS), but their variance-covariance matrices are corrected by the White robust estimator.

[4]Brazil has 27 states: Acre (AC), Alagoas (AL), Amapá (AP), Amazonas (AM), Bahia (BA), Ceará (CE), Distrito Federal (DF), Espírito Santo (ES), Goiás (GO), Maranhão (MA), Mato Grosso (MT), Mato Grosso do Sul (MS), Minas Gerais (MG), Pará (PA), Paraíba (PB), Paraná (PR), Pernambuco (PE), Piauí (PI), Rio de Janeiro (RJ), Rio Grande do Norte (RN), Rio Grande do Sul (RS), Rondônia (RO), Roraima (RR), Santa Catarina (SC), São Paulo (SP), Sergipe (SE), Tocantins (TO).

[5]Although Brazil has 27 states, one of them is the Federal District where the capital Brasilia is located and there is no others municipalities. For this reason, we drop this municipality and employ only 25 state dummies.

3 Results

Table 2 presents the results for the model (1). The slope coefficient is significant, at 1% significance level, and negative for both samples 1991-2000 and 2000-2010. Therefore, even before controlling for regional differences, the hypothesis of income inequality convergence is not rejected. Table 2 also reports the results for the model (2) with macro regions dummies. For sample 1991-2000, the dummy variables for regions Southeast and South are relevant, at 10% of significance level, which is an evidence that it is important to take regional factors into account. In any case, the slope coefficients are negative for all regions, supporting the hypothesis of income inequality convergence. For sample 2000-2010 the results are qualitatively similar. However, it is worth mentioning that in such case at least one dummy (intercept or slope) is relevant, at 1% significance level, for each region.

Table 2: Analysis of income inequality convergence based on model (1) and model (2) with macro regions dummies

Regression Analysis												
Dependent variable: average growth rate of the Gini index												
Sample	1991-2000						2000-2010					
	Model (1)			Model (2)			Model (1)			Model (2)		
Covariate	Coef.	Rob. SE		Coef.	Rob. SE		Coef.	Rob. SE		Coef.	Rob. SE	
Constant	-0.0480	0.0010	***	-0.0531	0.0036	***	-0.0367	0.0009	***	-0.0540	0.0027	***
$\ln G_{i,t}$	-0.0805	0.0016	***	-0.0920	0.0058	***	-0.0432	0.0014	***	-0.0709	0.0044	***
$D^{(1)}_{i,t}$				0.0031	0.0046					0.0123	0.0039	***
$D^{(2)}_{i,t}$				0.0037	0.0039					0.0092	0.0029	***
$D^{(3)}_{i,t}$				0.0070	0.0040	*				0.0089	0.0031	***
$D^{(4)}_{i,t}$				0.0099	0.0042	***				0.0103	0.0033	***
$D^{(1)}_{i,t}\ln G_{i,t}$				-0.0069	0.0074					0.0008	0.0068	
$D^{(2)}_{i,t}\ln G_{i,t}$				0.0037	0.0062					0.0053	0.0048	
$D^{(3)}_{i,t}\ln G_{i,t}$				0.0192	0.0064	***				0.0207	0.0050	***
$D^{(4)}_{i,t}\ln G_{i,t}$				0.0272	0.0068	***				0.0241	0.0053	***

Notes: $\ln G_{i,t}$ is the log Gini observed in year 1991 or 2000, depending on the sample. $D^{(j)}_{i,t}$, $j \in \{1, \ldots, 4\}$ stands for macro regions North, Northeast, Southeast, and South, respectively. Rob. SE: robust standard deviation. ***: statistical significance at 1%. **: statistical significance at 5%. *: statistical significance at 10%.

The results in Table 2 are used to estimate the long-run Gini index. Table 3 presents the average Gini index for each year and the long-run Gini index for each sample period. Note that, the average Gini for Brazilian municipalities is 0.547 in the year 2000, but the implied long-run Gini based on sample 1991-2000 is 0.5512, indicating that, on average, the municipalities would be converging toward a higher inequality level. Hence, we reproduce the main result from Gomes (2007). However, there is a clear evidence that such an upward trend in income inequality was reverted throughout the 2000s because the implied long-run Gini for sample 2000-2010 decrease to 0.429.

From 1991 to 2000, the average Gini index increased in all regions, except the South one (see Table 3). Not by chance, when regional differences are controlled for, the South region converges to a lower inequality level while the other four regions remain converging to a higher inequality level. Hence, our results are in line with Gomes (2007). However, from 2000 to 2010, the average Gini index declines in all regions and, consequently, for sample 2000-2010 the implied long-run Gini indexes suggest convergence toward a lower level of inequality for all regions. Once again, the findings suggest that the upward trend estimated by Gomes (2007) has been reverted throughout the decade of 2000.

Table 3: Analysis of the implied Long-Run Gini for the Brazilian macro regions

Region	Number of Municipalities	Average Gini index 1991	Average Gini index 2000	Average Gini index 2010	Implied long-run Gini index Sample 1991-2000	Implied long-run Gini index Sample 2000-2010
North	449	0.542	0.599	0.567	0.604	0.551
Northeast	1794	0.516	0.561	0.525	0.571	0.505
Southeast	1668	0.521	0.529	0.465	0.530	0.407
South	1188	0.530	0.523	0.459	0.514	0.393
Center-West	465	0.540	0.561	0.494	0.562	0.467
Whole Country	5,565	0.525	0.547	0.494	0.551	0.429

Notes: Long-run Gini index for whole country is based on model (1) while the values for each region is based on model (2) with macro regions dummies.

Previous results indicate that differences among the Brazilian macro regions are important (see Table 2). However, there may be heterogeneity among the states of the same region. Table 4 presents the results of the model (2) with state dummies and, in fact, for sample 1991-2000 fifteen states present intercept and/or slope shifts significant, at 10% of significance level. For sample 2000-2010 this number becomes sixteen. Despite this regional heterogeneity, the hypothesis of income inequality convergence is not rejected for any state in both samples. Comparing the implied long-run Gini index for each state in samples 1991-2000 and 2000-2010, only AC and RR presents an increasing value. Hence, all other states experienced a reduction in the implied long-run Gini index.

4 Conclusions

This paper investigates the hypothesis of income inequality convergence for Brazilian municipalities. We employ a reliable dataset that covers the years of 1991, 2000 and 2010. As we are restricted to a single country, and we take into account regional differences, we interpret our approach as a conditional convergence test.

The findings suggest that from 1991 to 2000 most regions (or states) was converging to a higher long-run Gini index. However, the results based on the sample 2000-2010 suggest convergence toward a lower long-run Gini index. Thus, the upward trend was reverted throughout the decade of 2000. As mentioned, the potential factors for explaining this change include the increase in both the Brazilian GDP growth rate and the spending on government income transfer programs in the 2000s.

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Table 4: Analysis of income inequality convergence based on model (2) with states dummies

State	1991-2000						2000-2010						Differ. in
	Slope		Heterogeneity		Conv.	LR Gini	Slope		Heterogeneity		Conv.	LR Gini	LR Gini (%)
			Intercept	Slope					Intercept	Slope			
AC	-0.115	***	0.47	**0.03**	Yes	0.602	-0.073	***	0.65	0.18	Yes	0.605	00.61
AL	-0.076	***	**0.07**	0.75	Yes	0.623	-0.064	***	0.84	**0.02**	Yes	0.507	-18.61
AM	-0.082	***	**0.04**	0.43	Yes	0.656	-0.075	***	0.40	**0.01**	Yes	0.614	-06.39
AP	-0.098	***	0.87	0.25	Yes	0.619	-0.087	***	0.97	0.19	Yes	0.613	-00.97
BA	-0.085	***	0.80	**0.05**	Yes	0.567	-0.063	***	0.78	**0.00**	Yes	0.504	-11.18
CE	-0.091	***	0.64	**0.03**	Yes	0.603	-0.052	***	0.53	0.30	Yes	0.475	-21.17
ES	-0.082	***	0.96	0.53	Yes	0.549	-0.071	***	0.14	**0.02**	Yes	0.472	-14.08
GO	-0.083	***	0.93	0.15	Yes	0.554	-0.043	***	**0.00**	**0.00**	Yes	0.455	-17.89
MA	-0.086	***	0.38	**0.08**	Yes	0.596	-0.082	***	0.11	**0.00**	Yes	0.553	-07.23
MG	-0.080	***	1.00	0.21	Yes	0.540	-0.061	***	**0.00**	**0.00**	Yes	0.433	-19.95
MS	-0.086	***	0.92	0.42	Yes	0.572	-0.075	***	**0.09**	**0.00**	Yes	0.497	-13.05
MT	-0.114	***	**0.00**	**0.00**	Yes	0.569	-0.074	***	**0.00**	**0.00**	Yes	0.485	-14.85
PA	-0.089	***	0.53	**0.08**	Yes	0.600	-0.077	***	0.55	**0.00**	Yes	0.557	-07.24
PB	-0.085	***	0.32	**0.07**	Yes	0.534	-0.067	***	0.17	**0.00**	Yes	0.485	-09.13
PE	-0.079	***	0.24	0.51	Yes	0.588	-0.056	***	0.84	0.11	Yes	0.480	-18.30
PI	-0.095	***	0.20	**0.00**	Yes	0.561	-0.082	***	**0.02**	**0.00**	Yes	0.535	-04.66
PR	-0.078	***	0.83	0.47	Yes	0.540	-0.065	***	0.62	0.70	Yes	0.371	-31.28
RJ	-0.060	***	0.18	0.29	Yes	0.530	-0.032	***	0.13	0.43	Yes	0.404	-23.80
RN	-0.105	***	**0.02**	**0.00**	Yes	0.553	-0.074	***	**0.01**	**0.00**	Yes	0.481	-13.05
RO	-0.122	***	**0.02**	**0.00**	Yes	0.582	-0.080	***	0.16	**0.01**	Yes	0.514	-11.71
RR	-0.055	***	**0.06**	0.42	Yes	0.582	-0.078	***	0.35	0.06	Yes	0.652	11.97
RS	-0.053	***	**0.01**	**0.00**	Yes	0.478	-0.075	***	**0.02**	0.23	Yes	0.395	-17.49
SC	-0.069	***	0.35	0.47	Yes	0.522	-0.037	***	**0.00**	**0.00**	Yes	0.402	-22.97
SE	-0.090	***	0.64	0.25	Yes	0.549	-0.051	***	0.59	0.48	Yes	0.475	-13.50
SP	-0.073	***	-	-	Yes	0.514	-0.041	***	-	-	Yes	0.374	-27.21
TO	-0.108	***	0.13	**0.00**	Yes	0.595	-0.083	***	**0.02**	**0.00**	Yes	0.528	-11.29

Notes: States list is available in footnote 4. In equation (2), slope equals δ_1 for state $j = 1$, which is São Paulo, and it becomes $\delta_1 + \delta_{1,j}$ for $j > 1$, that is, other states. Intercept (slope) column shows the p-value for significance statistic test over the coefficient of the intercept (interaction) dummy $\delta_{0,j}$ ($\delta_{1,j}$) for $j > 1$, where bold numbers express statistical significance at 10%. Conv. means that slope is negative for state j, and the convergence hypothesis is not rejected. LR Gini stands for the implied long-run Gini index, which are based on model (2) with state dummies. Differ. in LR Gini is the difference between the implied LR Gini for samples 2000-2010 and 1991-2000, for each state. *** means statistical significance at 1%.

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