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Re-examining the Brazilian South–Northeast labour income gap

A decomposition approach

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Abstract: The purpose of this article is to provide new evidence about the sources of regional income inequalities in Brazil along the wage distribution, taking into account the regional differentials in purchasing power. We use a unique and recent regional purchasing power index to adjust nominal values of the Brazilian metropolitan regions and consider recentred influence function (RIF) regressions to measure the contributions of different determinants of wages to the inequality between the São Paulo metropolitan region in the Southeast (the richest one, apart from Brasília) and each of the most important metropolitan regions of the Northeast (Fortaleza, Recife, and Salvador).

Key words: Brazil, regional inequality, decomposition, wage distribution

JEL classification: C21, J31, J38

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1 Introduction

Despite some progress toward regional income convergence in the past decade (Silveira Neto and Azzoni 2011; Oliveira and Silveira Neto 2016), regional income inequality in Brazil is still very large, involving a substantial enduring well-being imbalance, mainly between southeastern and northeastern regions. The per capita GDP of Maranhão (a state in the Northeast region), for example, corresponds to only about 27 per cent of the GDP of São Paulo (the most industrialized state, in the Southeast). These regional income gaps persist even considering metropolitan regions; the average labour income in the Fortaleza metropolitan region (in the Northeast) is about 39.2 per cent lower than the average labour income of all Brazilian metropolitan regions (IBGE 2018), for example. Such a high level of regional income inequality in a country that, unlike other large developing countries such as China, India and Russia, has a common language, culture, and institutional characteristics, along with no barriers to internal migration and a strong tradition of regional policies, continues to challenge regional researchers and policymakers.

Traditionally, researchers and policymakers involved in understanding the resistant Brazilian regional income inequality emphasize two different kinds of factors as the main reasons for this situation. Inspired by the Brazilian historical economic development pattern based on exploitation of spatially concentrated activities (Leff 1972; Furtado 2003), Cano (1985) and Baer (2001) highlighted the importance of the spatial concentration of the manufacturing sector to understand the Brazilian regional income imbalance, i.e., the authors scrutinized the role of local productive structures. On the other hand, Pessôa (2001) and Ferreira (2004) argued that Brazil's regional income disparity is fundamentally explained by regional difference in workers' personal characteristics and highlighted the role of schooling. In spite of their potential importance, given the Brazilian historical context, both explanations are solely linked to two aspects of regional labour market composition differentials (individual and industrial structure differences). However, as mentioned by Combes et al. (2008), spatial wage differentials can also arise from spatial differences associated with local amenities and agglomeration gains. In addition, as recently shown by Huertas et al. (2020), regional purchasing power differentials can also contribute to regional nominal wage differentials.

Recent empirical works about the relative roles of factors associated with regional income inequality basically use decomposition strategies applied to individual data or consider the two-step strategy proposed by Combes et al. (2008) to obtain evidence about the relevance of agglomeration economies for individual productivity. The decomposition strategies usually follow the Oaxaca-Blinder approach (Blinder 1973; Oaxaca 1973) and try to estimate both the contributions of individual and labour market characteristics (the so-called composition effect) and the contributions of the returns of these characteristics (the so-called unexplained or wage structure effect) to the regional difference of average income between regions (Garcia and Molina 2002; Motellon et al. 2011; Duranton and Monastiriotis 2002; Vieira et al. 2006; Pereira and Galego 2011). Thus, the approach explores the relevance of the spatial distribution of both workers (with different characteristics) and returns to their characteristics. On the other hand, the empirical works based on the approach of Combes et al. (2008) assume spatial equilibrium and free mobility of homogeneous workers to obtain evidence about the role of agglomeration economies in determining individual productivity (Barufi et al. 2016; Groot et al. 2014; Matano and Naticchioni 2012, 2016). Since this approach first estimated fixed-spatial effects using individual data, it necessarily considers a larger number of usually smaller spatial units and does not fully explore the different contributions of individual and labour market characteristics and of the returns of these characteristics.

In light of the strong assumptions behind the traditional Oaxaca-Blinder decomposition (e.g. linearity) and the belief that spatial arbitrage capacity and agglomeration gains can differently affect individuals according to their positions in the wage distribution, more recent investigations consider the regional inequality using reweighting of samples and decompositions throughout the wage distribution. For example, Motellon et al. (2011) applied the reweighting strategy of DiNardo et al. (1996) to create counterfactual distributions that allow decomposing and studying regional inequality in Spain though the wage distribution. Pereira and Galego (2014) applied the quantile-based decomposition method proposed by Machado and Mata (2005) and Melly (2005, 2006) to decompose regional wage differentials across the entire wage distribution of Portugal. Following the innovative strategy proposed by Firpo et al. (2009, 2011), involving reweighting and recentered influence function (RIF) regressions, to provide a detailed decomposition of both composition and structure effects along wage distributions, something not possible using previous techniques, Perreira and Galego (2014), Herrera-Idárraga et al. (2016), and Huertas et al. (2020) considered, respectively, the cases of Portugal, Colombia, and Spain. The evidence provided by these studies confirms the existence of important variations in the level of regional inequality along the wage distribution. Interestingly, Huertas et al. (2020) is the only work that used regional incomes adjusted by purchasing power for the decompositions, and thus obtained more reliable results. After purchasing power adjustment, they particularly showed that the regional income differences are higher in the lower quantiles of wage distributions and that both composition and wage structure matter for understanding regional inequalities in Spain.

In the current investigation, we use a decomposition approach to obtain new evidence about the relative relevance of factors associated with wage gaps between Brazilian metropolitan regions. This choice seems more suitable, given the small number of Brazilian metropolitan regions, the continental size of the country and the big distances between regions, as well as the country's traditional debate about the factors behind its regional disparities. More specifically, the objective of this investigation is to provide new evidence about the sources of regional income inequalities in Brazil along the wage distribution, taking into account the regional differentials in purchasing power. We use a unique and recent regional purchasing power index provided by Almeida and Azzoni (2016) to adjust nominal values of the Brazilian metropolitan regions and consider RIF regressions (Firpo et al. 2009) to measure the contributions of different determinants of wages to the inequality between the São Paulo metropolitan region (SPMR), the richest one apart from Brasília (Brazilian capital and federal district), and each of the metropolitan regions of the Brazilian Northeast macro regions, Fortaleza, Recife and Salvador (the poorest metropolitan regions), across regional PPP adjusted wage distributions. The focus on these areas stems from the fact that regardless of the wage quantile distribution, PPP adjusted wage gaps between the SPMR and other metropolitan areas disappear or narrow significantly.

To the best of our knowledge, there is no previous evidence about the patterns of regional wage disparities in a large developing country using regional purchasing power parity (PPP) adjusted values. Indeed, as far as we know, the previous evidence about regional wage disparities provided by Huertas et al. (2020) is the only evidence considering regional PPP adjusted values, so this specific literature is far from abundant. Moreover, the evidence generated by Huertas et al. (2020) can hardly be immediately assumed valid for continental developing countries, as it is the case of Brazil. First, regional income disparities in Brazil are much higher than in Spain, even considering Brazilian metropolitan regions and Spain NUTS 2 regions as spatial units of analysis. Using night-time light information from satellites for a sample of 180 countries, Lessman and Seidel (2017), for example, showed that unlike Spain, Brazil belongs to the group of 25 per cent most regionally unequal countries, with regional disparity levels above those registered for other big developing countries, such as China, India and Russia. The levels and factors associated with regional income inequality across PPP adjusted wage distribution in such developing and regionally unequal

countries remain unexplored. Second, because of Brazil's continental size, distances between its regions are much greater than in Spain[1], a condition certainly reinforced by its poorer transport infrastructure, making the spatial arbitrage of workers harder. Actually, as shown in this study, although PPP wage adjustment is also very important for the Brazilian regional context, it accounts for a smaller share of initial regional nominal wage differences compared to the Spanish situation, suggesting greater persistence of spatial heterogeneity in Brazil.

In addition to the unique possibility of using regional PPP adjusted wages in a large important developing country, note that the Brazilian metropolitan context is particularly well suited to apply the method. First, Brazilian regional differences in both individual characteristics (for example, race composition and schooling) and productive structure (for example, the presence of manufacturing activity and science and engineering related occupations) are substantial across these regions. Obviously, these differences are a primary potential source of regional income inequality. Second, since the metropolitan region of São Paulo is much bigger than any northeastern metropolitan region, the investigation also allows exploring suggestive evidence about the importance of agglomeration gains for understanding regional income disparities in Brazil. Third, the fact that we consider only metropolitan regions also allows better controls for observable and unobservable covariates that can differently affect, for example, metropolitan and small urban or rural environments.

Oaxaca-Blinder decomposition techniques have been previously applied, but no consensual results have emerged about the factors associated with Brazil's regional income inequality. The evidence includes application of the more traditional Oaxaca-Blinder approach (Silveira Neto and de Menezes 2008), DiNardo et al. (1996)'s reweighting of samples strategy (Duarte et al. 2003), Mata and Machado (2005)'s strategy (Guimarães et al. 2006), and the RIF regression approach of Firpo et al. (2009) (Oliveira and Silveira Neto 2016). While Silveira Neto and de Menezes (2008) and Duarte et al. (2003) found that workers' characteristics, mainly schooling, play the most important role for understanding Brazilian regional inequality, Guimarães et al. (2006) and Oliveira and Silveira Neto (2016) found that both workers' characteristics and the returns to these characteristics matter for understanding Brazil's regional inequality, with bigger regional income differences found in the lower income quantiles.

The empirical investigations about Brazilian regional income inequality are hence far from conclusive. Importantly, all these applications share two important limitations. First, they consider only nominal wages instead of adjusting values for regional purchasing power differentials. Note that in the Brazilian case, this limitation is far from irrelevant even when comparing, for example, metropolitan regions (a practice that attenuates regional price differentials). Actually, Almeida and Azzoni (2016) showed that after taking into account regional purchasing power differentials, there was a reduction of 28 per cent in the value of the Gini index for the per capita income distribution among Brazilian metropolitan regions. The second limitation refers to the regular absence of any role for the different kinds of occupations in explaining regional income disparities in Brazil in empirical works. Since innovations can be present in different activities and usually are associated with specific occupations, considering specific regional differentials associated with kinds of occupations might be very revealing. Actually, as argued by both Kambourov and Manovskii (2009) and Acemoglu (2011) based on US experience, mobility across occupation may be essential for understanding labour market income inequality. Once more, Brazilian labour market's recent dynamics suggest that this omission matters greatly for understanding regional wages disparities in

[1] A quick example illustrates the differences: while the distance from Basque Country to Andalusia is not bigger than 850 km, the distance between the São Paulo and Fortaleza metropolitan regions is about 3,000 km (using centroids of the respective core cities).

the country. Recently, Rodrigues et al. (2016) documented that changes in the kind of occupations were more important than those in industries to understand wage levels of highly skilled Brazilian workers during the period 1995-2008. Andrade et al. (2014), in turn, highlighted that while natural resource-related occupations (such as, for example, tannery supervision) are more concentrated in the North and Northeast regions, while the South and Southeast regions concentrate most of knowledge-intensive occupations.

The evidence obtained in the current investigation indicates that, for all quantiles of the wage distribution, an important part of regional wage gaps between São Paulo and northeastern metropolitan regions (around half of the nominal initial differences) disappears after adjusting for regional purchasing power differentials. As for the remaining non-negligible part of the regional wage differentials, they vary both across quantiles and metropolitan regions. Unlike the evidence obtained by Huertas et al. (2020), we found that the higher the quantiles of the wage distributions, the greater the regional wage gap will be: regional wage gaps are almost inexistent for lower quantiles and very significant for the higher ones. This evidence is also different from that found by Oliveira and Silveira Neto (2016). While individual and labour market characteristics (mainly a university degree and kind of occupation) are the main factors associated with the regional wage inequalities for the intermediate and highest quantiles, we found no role of the spatial concentration of manufacturing or other economic activity in understanding regional wage differentials. The relevant role of the regional structure of occupations also suggests greater agglomeration gains arising from the SPMR's much bigger labour market.

The paper is structured in four more sections. In the next section, we present the adopted empirical strategy. In Section 3, we present the data and preliminary evidence about wage disparities between São Paulo and the Brazilian northeastern metropolitan regions. The main results of the study are presented in Section 4, and our final remarks and conclusions are contained in Section 5.

2 Empirical strategy

In a standard Oaxaca-Blinder decomposition, the overall inequality is split between the composition effect, which explains the share of inequality by the difference in characteristics of individuals between the two groups, and the wage structure effect, which explains the portion of inequality by the differences in returns on the characteristics of similar individuals, but in different groups. In this study, we evaluate the difference in labour incomes between three northeastern metropolitan regions (Salvador, Recife, and Fortaleza) in relation to the metropolitan region of São Paulo. We use the composition effect to evaluate, for example, the mean wage inequality between regions explained by differences in observed characteristics, such as age and education. The wage structure effect captures the differences of returns, such as return on education, for the wage inequality. Although the results of the detailed decomposition of the composition and wage structure effects are based on correlations and cannot be interpreted as causal parameters, they document the relative quantitative importance of each factor in explaining regional income inequality. In this sense, our results contribute to future analyses aiming to identify the causes of inequality and generate insights for designing policies that seek to reduce these disparities (Kilic, et al. 2015).

Several authors have performed Oaxaca-Blinder related decomposition in the entire distribution of income (Machado and Mata 2005; Melly 2005, 2006; DiNardo et al. 1996; Juhn et al. 1993). But, although they decomposed the inequality between the overall composition and wage structure effect, they did not provide a way to compute the contribution of each covariate to both effects (Fortin et al. 2011). Firpo et al. (2007) proposed an unconditional quantile regression that enables

generalization of the Oaxaca Blinder decomposition for any distribution measure, such as the mean, median, quantile, variance, and Gini index.

Let F be a distributional statistic $\vartheta(F)$, where F_y is the cumulative distribution function of variable Y, so $IF(y;\ \vartheta)$ is the influence of an individual observation on this distributional statistic. Subsequently, adding $\upsilon(F)$ back into the influence function produces what the authors call the 'Recentered Influence Function' (RIF), which is their greatest contribution and what differentiates their work from previous ones. The RIF decomposition has the property of being path independent, because the order in which the different elements of the detailed decomposition are calculated does not affect the decomposition results. (Firpo et al. 2010). It is calculated as:

$$RIF(y;\ \vartheta) = \ \vartheta(F) + IF(y;\ \vartheta) \tag{1}$$

The RIF for the τth quantile is given by:

$$RIF(y, q_\tau) = q_\tau + \frac{\tau - I(y \leq q_\tau)}{f_y(q_\tau)} \tag{2}$$

where q_τ is the sample quantile, $f_y(q_\tau)$ is the marginal density at the point q_τ and $\tau - I\ (y\ \leq\ q_\tau)$ is an indicator function denoting whether the value of the outcome variable is less than q_τ.

A very important property of this is the fact that the conditional expectation of the RIF is equal to the value of the statistic $\vartheta(F)$, a property that does not hold in a conditional quantile regression (Koenker and Basset 1978). Chi and Li (2008) pointed out that the unconditional quantiles provided by the RIF method have the advantage of estimating the marginal effect of the covariates on the unconditional quantiles of interest using a linear regression model of the RIF on the covariates. So, we estimate the effects of the covariates on the $RIF(y; q_\tau)$ using a linear regression:

$$\begin{aligned} RIF(y; q_\tau) = \ & \beta_0 + \beta_1\, education + \beta_2 experience + \beta_3 experience^2 + \\ & \textstyle\sum_{k=1}^{7} \gamma_k\, sector_k + \sum_{k=1}^{11} \gamma_k\, occupations_k + \beta_4 black + \beta_5 men + \beta_6\, formal + \\ & \beta_7\, married + \beta_8\, family\ size + \beta_9\, migration + \varepsilon \end{aligned} \tag{3}$$

Here, the coefficients β and γ give the approximate marginal effects of the explanatory variables on the wage quantile for workers. After estimating the RIF for each metropolitan region (MR) and for São Paulo (SP), we decompose the overall inequality (Δ^τ) between the composition effect (Δ_c^τ) and wage structure effect (Δ_w^τ). Another important feature, as pointed out by Barsky et al. (2011), is that when the conditional wage expectation is nonlinear, a correction using some reweighting approach is necessary. However, this reweighting approach generates a specification error and a reweighting error. We decompose the wage inequality as:

$$\Delta^\tau = \ \Delta_c^\tau + \ \Delta_w^\tau \tag{4}$$

Where:

$$\Delta_c^\tau = \ \Delta_{c,pure}^\tau + S_{error} \ = \left(\bar{X}_{MR}^C - \ \bar{X}_{MR} \right) \hat{\beta}_{\tau,MR} + \ \bar{X}_{MR}^C \left(\hat{\beta}_{\tau,MR}^C - \ \hat{\beta}_{\tau,MR} \right) \tag{5}$$

and

$$\Delta_w^\tau = \ \Delta_{w,pure}^\tau + R_{error} = \ \bar{X}_{SP} (\hat{\beta}_{\tau,SP} - \hat{\beta}_{\tau,MR}^C) + (\bar{X}_{SP} - \bar{X}_{MR}^C)\ \hat{\beta}_{\tau,MR}^C \tag{6}$$

The index *C* means the counterfactual distribution of São Paulo. Fortin, et al. (2011) explained that when the specification error is equal to zero, the conditional expectation of wages is linear. The errors are shown in the Appendix (Table A2), and as can be seen, the specification errors are not statistically significant, so they are not different from zero. Therefore, in our analysis we estimate the decomposition without the reweighting procedure:

$$\Delta^{\tau} = \Delta_c^{\tau} + \Delta_w^{\tau} \tag{7}$$

Where:

$$\Delta_c^{\tau} = \Delta_{c,pure}^{\tau} = (\bar{X}_{SP} - \bar{X}_{MR})\hat{\beta}_{\tau,MR} \quad \text{and} \tag{8}$$

$$\Delta_w^{\tau} = \Delta_{w,pure}^{\tau} = \bar{X}_{SP}(\hat{\beta}_{\tau,SP} - \hat{\beta}_{\tau,MR}) \tag{9}$$

A common problem of these decomposition methods is the invariance of the base group when calculating the wage structure effect (Oaxaca and Ransom 1999). That is, when using categorical explanatory variables, the result of the estimation of the detailed decomposition varies depending on the base group chosen. In this case, to overcome this problem, we implement the correction proposed by Yun (2005) for the dummies of economic activities and occupations.

Several studies have already used RIF to investigate gender inequality (Chi and Li 2008; Kilic et al. 2015), racial inequality (Heywood and Parent 2012), urban-rural inequality (Ndoye 2013), the evolution of inequality through time (Firpo et al. 2011) and regional inequality (Perreira and Galego 2014; Herrera-Idárraga et al. 2016; Huertas et al. 2020). In Brazil, applications have focused on the factors that explain the evolution of inequality through time, such as education and experience (Ferreira, et al. 2017) and minimum wage (Brito et al. 2013).

Using a cross-sectional database on Brazilian metropolitan regions obviously brings worries about endogeneity, since unobserved individual heterogeneity influence is difficult to deal with (Card 1999; Hout 2012). Particularly, selection bias associated with differences between employees and non-participants in the labour market and between migrants and non-migrants may be present. Fortunately, our dataset (with information both on employees and non-participants) allows controlling for the first kind of selection bias by using the two-step strategy of Heckman (1979) before decomposing wage gaps. As for migrant and non-migrant differences associated with wages, note that in our sample, only 7.5 per cent of the individuals were inter-state migrants (meaning during any time of their lives having resided in another state), most of them (55 per cent) have been living in the MRs for at least five years. Actually, as observed by Kone et al. (2018), in comparison with the US, Brazil's recent internal migration rates (both across municipalities and across states) are very low and equivalent to those in China. Such a situation decreases the chance of the results being influenced by migration. Even so, we are able to attenuate the potential effects of this source of bias by directly including in the regressions a dummy variable for the individual inter-state migrant status (considering as migrant an individual who had resided for any period in another state)[2]. Consistent with the above observations, the inclusion of this variable does not change quantitatively or qualitatively our set of evidence about factors associated with regional wage gaps.

In addition, to attenuate the potential influence of spatial sorting based on local characteristics correlated with wages, similarly to Combes et al. (2020), we use a significant number of explanatory

[2] The results without this specific variable are available upon request.

variables, including particularly a large number of occupational indicators. This makes the influence of spatial sorting less important since these indicators can be correlated with unobservable individual heterogeneity (Duranton and Monatiriotis 2002). In this regard, we observe that, in the case of the US, Baun-Snow and Pavan (2012) showed that most spatial sorting is explained by observed characteristics, and that Ramalho and Silveira Neto (2012) indicated that in the case of Brazilian rural-urban migrants, labour market insertion is strongly associated with schooling and occupation. Given these caveats, it appears plausible to assume that our results are not substantively affect by these different kinds of selection bias.

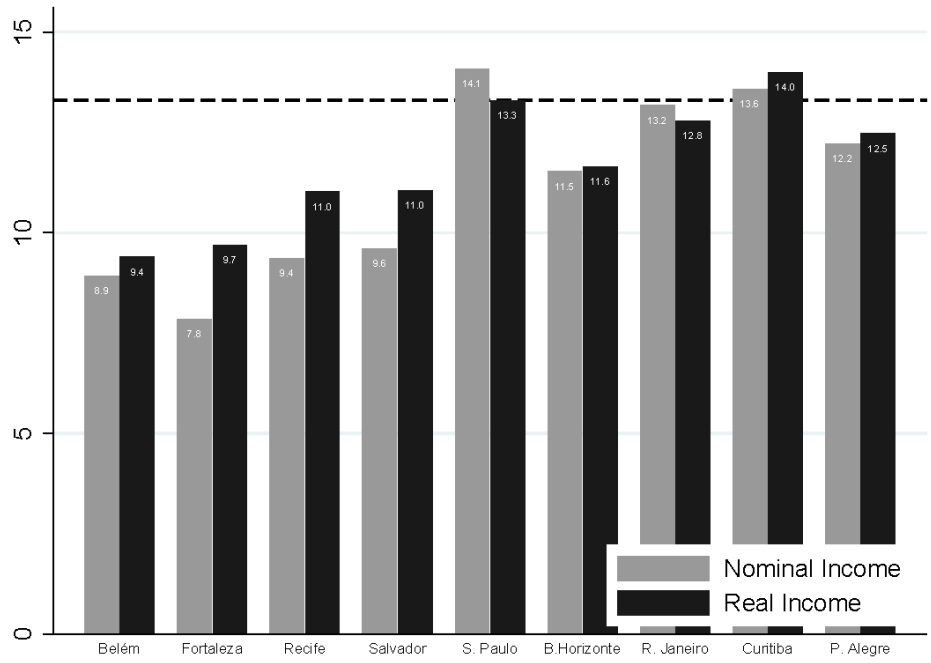
3 Data description and introductory analysis

We use data from the National Household Survey (*Pesquisa Nacional por Amosta de Domicílio*, PNAD), a yearly nationwide household survey, for 2014, provided by the Brazilian Institute of Geography and Statistics (IBGE). Although all the information is also available for more recent years (up to 2018), nominal values can only be adjusted for local purchasing power using the indexes generated by Almeida and Azzoni (2016) until 2014. The PNAD is a traditional and very rich database and includes both household and labour market information of individuals in all 27 Brazilian states (counting the Federal District as a state) and the most important metropolitan regions in country. As the local price indexes provided by Almeida and Azzoni (2016) are available only for metropolitan regions, we consider information only for these regions available in the PNAD: Belém in the North; Fortaleza, Recife, and Salvador in the Northeast; Belo Horizonte, Rio de Janeiro, and São Paulo in the Southeast; and Curitiba and Porto Alegre in the South. Our main results using PPP adjusted values consider specifically wage gaps between São Paulo, the richest metropolitan region (apart from the Federal District), located in the Southeast region, and Salvador, Recife, and Fortaleza, the three poorest metropolitan regions, located in the northeastern regions. In addition to representing the most important and traditional income differences in the country (Northeast and Southeast), these specific comparisons, as shown below, stem from the fact that wage gaps between SP and other metropolitan regions in the country become very small or negligible after adjustment by regional price differentials.

The information about nominal wage values for each Brazilian metropolitan region from the PNAD were adjusted using local PPP indexes provided by Almeida and Azzoni (2016). These authors considered the CPD (Country Product Dummy) method, developed by Kravis et al. (1982), in order to obtain regional PPPs for Brazilian metropolitan regions for the period 1996-2014, a strategy that assured reversibility and transitivity when comparing them. The implementation uses implicit prices of goods and services, both obtained from official Family Budget Surveys (the so called *POF*, *Pesquisa de Orçamento Familiar*), also provided by the IBGE for the periods 1995-96, 2002-03 and 2008-09, and weighted least squares to estimate regional prices of goods and services for each metropolitan region. Annual regional values are obtained using specific monthly price research for the metropolitan regions (Comprehensive Consumer Price Index - IPCA – *Índice de Preço ao Consumidor Amplo)*, also conducted by the IBGE. As the authors show, there were no important changes in the relative weight of goods across metropolitan regions in the period. The comparable regional price indexes for the set of metropolitan regions considered by Almeida and Azzoni (2016) are presented in Table A1 in the Appendix, showing significant regional price differentials. For example, the price levels in the SPMR are about 31 per cent higher than those in the Fortaleza metropolitan region. We note that northeastern metropolitan regions (Fortaleza, Recife, and Salvador) have the lowest price levels, while metropolitan regions of São Paulo and Brasília (Federal District) have the highest price levels, both in 2009 and 2014.

Figure 1 presents the mean hourly labour income for the set of 9 Brazilian metropolitan regions available in the PNAD for 2014[3]. The numbers refer to hourly labour income, measured in *reais* (BRL, the Brazilian currency) before and after adjustment by the regional purchasing power parity (PPP) indexes of Almeida and Azzoni (2016) (Nominal Income and Real Income, respectively). The hourly wage is built using the information about monthly salaries and weekly working hours, both available in the PNAD. In general, the values illustrate the traditional North/Northeast and South/Southeast economic division of the country and the leadership of the SPMR, the richest metropolitan region of the country. For example, the mean nominal hourly wage in the SPMR was 80.8 per cent and 58.4 per cent higher than those of Fortaleza and Belém metropolitan regions, respectively, but it was only 6.8 per cent and 22.6 per cent higher than in Rio de Janeiro and Belo Horizonte, respectively. Furthermore, and importantly, after adjusting for regional price differentials (Real Income), wage gaps between SPMR and northeastern regions remain very significant: for example, real hourly wage in SPMR varies from 20.1 per cent to 41.5 per cent higher than in Recife and Belém, respectively. On the other hand, PPP adjusted wage gaps between the SPMR and southern or southeastern regions are negligible or much lower. Thus, although an important part of the wage gaps between the SPMR and northeastern regions can be attributed to regional price differentials, and unlike wage gaps between the SPMR and southern or southeastern regions, substantial parts of theses gaps remain[4].

Figure 1: Nominal and real wages for each Brazilian metropolitan region



Source: authors' elaboration based on PNAD.

[3] Because of its very specific pattern of occupation associated with the condition of being the nation's capital, we do not include the values for Brasília. Politically, the Federal District is state/municipal hybrid.

[4] Given the much lower PPP adjusted wage gaps between the SPMR and other metropolitan regions of the Southeast and South, an interesting investigation would be to study differences in the patterns of occupational specialization between them. This line investigation, however, is beyond the objectives of the current paper, although we may address it in future studies.

In the regressions, the sample is composed of 27,757 individuals from 10 to 65 years old with positive labour income and engaged in non-agricultural activities, living in one of the five metropolitan regions studied. This sample represents 55.48 per cent of the population of the respective states and 20 per cent of the Brazilian population. Using the sample weights, this set of observations corresponds to 12,758,324 individuals living and working in one of the five metropolitan regions.

For the set of five metropolitan regions considered, we use information about variables commonly used in Mincer type equations. Our dependent variable is the logarithm of real hourly labour income, measured in *reais* (BRL), as described above. The set of explanatory variables includes individual ones (experience, schooling, race, family size, civil status, and migrant status) and labour market characteristics (formal/informal occupation, economic activities, and kinds of occupation). Experience is the number of years of experience reported by the individual in the survey; for schooling, we use High School and University degrees; race by a dummy variable equal to one if black (zero otherwise); family size is the number of individuals in the household; civil status by a dummy variable equal to one for a married individual (zero otherwise); and migrant status is denoted by a dummy variable equal to one for individuals born in another state (zero otherwise). For the economic activity and kind of occupation, we use dummies for seven activities and eleven occupations, respectively. The condition of formal worker is captured by a dummy variable equal to one if the individual is a formally registered employee, small business owner or self-employed person with any formal registration (zero for employees or self-employed people with no formal registration).

Table 1 presents descriptive statistics of the variables used. Three important facts about wage differentials should initially be highlighted. First, as we have previously indicated, an important part of mean wage differentials between the SPMR and northeastern metropolitan regions is explained by regional cost of living differentials. For men, this part accounts for 56.2 per cent (Recife)[5], and for women regional differentials of living costs explain even bigger portions of nominal wage gaps. However, because nominal differentials are so high, as can be noted from the second line of Table 1, regional real wage gaps relative to São Paulo remain generally large after the adjustment for regional living cost differentials. For example, after taking into account the costs of living differentials, the mean wage in the SPMR is about 42.8 per cent (=100*14.38/10.07) and 30.9 per cent (=100*12.02/9.18) higher than in Fortaleza for men and women, respectively. This example illustrates the third point about regional wage differentials: they are higher for men than women.

This last point is perfectly consistent with the lower regional schooling differentials across the metropolitan regions for women, as can be noted in Table 1 through the percentages of workers with high school and college degrees. Nevertheless, in spite of smaller regional differentials for other levels of schooling, there are still significant regional schooling differentials associated with university degrees. For example, while around 21.7 per cent of male workers living the São Paulo metropolitan region had a college degree, this percentage was just 9.3 per cent in Fortaleza. Notice also that, although there are no substantial regional differentials associated with other personal characteristics, regional differentials by race are very large; the percentage of black workers in the Salvador metropolitan region (above 80 per cent), for example, is more than twice that found for the SPMR.

[5] These percentages are obtained from values of columns 9 (Belém) and 5 (Recife) of Table 1, respectively: 27 per cent = 100*((15.2/9.4)-(14.4/9.91))/(15.2/9.4) and 56.2 per cent = 100*((15.2/9.8)-(14.4/10.3))/(15.2/9.8).

There are also substantial regional differences between São Paulo and the northeastern metropolitan regions related to labour market structure. This is a legacy of Brazil's historical pattern of concentration of manufacturing activities in the Southeast. The numbers of Table 1 indicate much higher percentages of men and women working in the manufacturing sector in the SPMR compared to northeastern metropolitan regions. On the other hand, public sector employment is much more frequent in these metropolitan regions. For example, while only 4.5 per cent the male workers are in the public sector in São Paulo, the rate is 9.5 per cent in Recife. The numbers in Table 1 also indicate a larger formal labour market in São Paulo than in northeastern metropolitan regions. Finally, but not least important, while the shares of occupations associated with science and engineering and law are much higher in the SPMR than in the northeastern metropolitan regions, the share of occupations associated with general services is higher in these regions than in the SPMR. The stronger presence of scientists and engineers in the SPMR is in line with high spatial concentration of innovation activities in Brazil, as mentioned by Albuquerque et al. (2002). Note that both statistics are also consistent with SPMR's bigger labour market, which tends to facilitate stronger specialization of jobs.

Remarkably, although we consider only metropolitan regions (ignoring regional urban non-metropolitan and rural differentials), the numbers of Table 1 still indicate considerable variation between São Paulo and the northeastern metropolitan regions related both to individual and labour market characteristics. Since traditional explanations for Brazilian regional disparities rely on the contribution of factors associated with these characteristics, the current focus on metropolitan regions allows verifying which of these explanations the empirical evidence supports.

Table 1: Descriptive statistics—Brazilian metropolitan regions – 2014

Variables	São Paulo		Salvador		Recife		Fortaleza	
	Men	Women	Men	Women	Men	Women	Men	Women
Nominal wage	15.24	12.74	10.33	8.79	9.85	8.73	8.16	7.43
Real wage	14.38	12.02	11.87	10.11	11.60	10.27	10.07	9.18
Age (years)	35.82	34.94	36.23	35.37	36.63	35.84	34.52	33.97
Experience	19.24	17.34	20.39	18.91	20.71	18.20	19.27	16.97
Family size	3.41	3.33	3.19	3.00	3.35	3.24	3.55	3.41
Black	41.58	37.46	87.25	82.08	68.17	61.09	70.84	64.40
High school	48.55	48.81	53.44	58.89	50.70	52.97	51.84	55.39
University	21.66	31.49	13.04	24.05	14.48	29.42	9.26	22.43
Married	3.74	3.91	3.49	3.85	3.69	3.45	4.83	5.12
Manufacturing	24.37	11.58	12.52	3.78	14.77	6.43	19.68	19.52
Construction	7.12	1.04	15.01	1.07	10.61	1.04	11.58	1.06
Extractive and public utility	1.04	0.24	1.90	0.92	1.35	0.64	0.75	0.35
Commerce	20.96	17.12	21.95	19.62	22.86	20.34	28.34	18.46
Services	22.07	39.96	24.02	47.82	24.38	46.62	22.07	42.05
Public sector	4.53	4.68	7.59	8.28	9.55	8.92	7.15	7.51
Other activities	19.92	25.35	17.02	18.41	16.41	15.99	10.28	11.04
Military and civilian security	1.22	0.20	1.84	0.57	2.29	0.24	2.25	0.00
Business managers	1.04	0.85	0.77	0.86	0.53	0.48	0.20	0.53
Science and engineering	4.45	1.82	2.73	0.79	1.41	1.13	1.43	0.53

Health services	0.70	2.54	0.71	3.64	0.41	2.97	0.48	1.77
Education	2.30	9.04	1.96	7.78	3.28	12.14	3.34	11.48
Law related	1.04	1.53	0.77	1.43	0.88	0.96	0.41	0.97
Social science	3.56	6.46	2.25	5.42	1.88	4.98	1.43	3.45
Technic tasks	10.13	10.86	9.13	11.35	11.37	10.37	7.77	9.45
Office and administrative	13.61	30.24	14.12	29.12	14.36	31.27	13.28	25.62
General services	22.00	25.39	26.45	32.05	27.20	28.22	27.18	28.09
Factory work	32.83	5.97	35.23	3.28	32.59	3.86	37.87	14.49
Other jobs	7.12	5.09	4.03	3.71	3.81	3.38	4.36	3.62
Formal job	85.94	84.9	85.11	80.08	85.64	80.06	78.13	77.38
Observations	2,795,120	2,574,728	541,634	451,112	459,831	335,519	496,607	383,460

Note: wages are in logarithm of the average wage, measured in BRL of 2014; 'Nominal wage' refers to the wage not deflated with purchasing parity power; 'Real wage' refers to the wage deflated with purchasing parity power; 'Age' is measured in years; 'Experience' is the time in the current job and it is measured in years; 'Family size' is the average number of individuals per household.

Source: authors' calculations using micro data from PNAD.

4 Results

4.1 Regional inequality across the wage distribution

In Table 2, we present the set of estimated coefficients of the variables for the metropolitan regions of São Paulo, Salvador, Recife, and Fortaleza for quantiles 0.1, 0.5, and 0.9 and for men using RIF regressions. Due to space restrictions, the corresponding results for women are presented in Table A3 in the Appendix[6]. We performed Wald tests for the hypothesis of equality of coefficients between OLS and each of these quantiles and between different pairs of quantiles. In all cases, the differences were statically significant at 5 per cent. In spite of being statistically different across quantiles and presenting variations across metropolitan regions, in general the coefficients have the expected signs.

More specifically, considering the traditional individual characteristics, higher schooling levels, more experience, and non-black race are characteristics that in general are associated with higher wages in all metropolitan regions. However, important differences exist both across regions and wage distribution quantiles. First, note that while the returns to schooling do not vary much across the metropolitan regions in quantile 0.5, schooling levels are relatively more important in quantile 0.9 for northeastern regions than for the SPMR. Exactly the opposite happens for quantile 0.1 of the wage distribution. This suggests that the more productive jobs in the SPMR are relatively less dependent on individual schooling, possibly due to the general (not necessarily linked to a university degree) better matching or sharing associated with a bigger labour market (Barufi et al. 2016; Chauvin et al. 2017). As for the less productive jobs, a higher schooling level appears important for taking advantage of the bigger labour market. Interestingly, we also observe that in general, the negative differential associated with being black generally increases with the quantiles of wage distributions (the exception is Fortaleza for quantiles 0.1 and 0.5), with the highest

[6] Due to space restrictions, we do not present the first stage of the Heckman (1979) procedure for correction for participation bias. However, this is available upon request.

differences occurring for quantile 0.9 of Salvador and Recife. This suggests that race discrimination tends to be stronger for higher quantiles.

As for labour market characteristics, the numbers in Table 2 indicate that the wage differentials of economic activities relative to manufacturing (the reference) are generally negative for commerce and service activities and positive for extractive and public utility industries. Note also that the positive differential favouring public sector activities is bigger in the northeastern metropolitan regions than in São Paulo and they tend to increase with higher wage distribution quantile. This evidence is consistent with the stronger importance of governmental activities in the northeastern regions and the bigger labour market of the SPMR.

Consistent with previous evidence for Brazilian labour market (Bargain and Kweuda 2014; Maciel and Oliveira 2018), we also note that a formal job is generally more important the lower the quantile of the wage distribution, indicating the importance of the formal labour market mainly for low-income workers in Brazilian metropolitan regions. Finally, three important factors related to the economic returns to different kinds of occupations (the reference category is general services) deserve attention. First, wage differentials are generally positive and can be highly significant for all quantiles and metropolitan regions. This evidence is in line with the less specialized tasks involved in the general services category. Second, independently of the region, we note that only for the categories of 'scientists and engineers' and 'business managers' do the returns increase with the wage distributions quantiles. This evidence suggests that these two categories of occupations matter mainly for higher productivity jobs, which is also consistent with the usually more specialized duties of these professionals. Third, regional differences are observed mainly for the returns in the categories of occupations at the 0.1 quantile of the wage distributions: the returns to the categories of occupation tend to be higher in the SPMR than in northeastern regions.[7] Once more, this is consonant with higher shares of general service workers in these last regions (Table 1) and suggests these professionals are involved mainly in lower productivity tasks.

Overall, this set of estimates suggests that, in addition to regional differences in the labour market composition (as shown in Table 1), the regional differentials of returns to individual and labour market characteristics may play a role in understanding the wage gaps between São Paulo and the northeastern metropolitan regions across the wage distribution.

[7] Exceptions are 'military and civil security' and 'office and administrative professionals.'

Table 2: Coefficients estimated of unconditional quantile regression for men—dependent variable is the log of hourly wage

Variables	São Paulo			Salvador			Recife			Fortaleza		
	Q10	Q50	Q90	Q10	Q50	Q90	Q10	Q50	Q90	Q10	Q50	Q90
High school	0.174*	0.248*	0.039*	0.099*	0.297*	0.167*	0.072*	0.217*	0.313*	0.059*	0.173*	0.223*
	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.006)	(0.002)	(0.002)	(0.005)	(0.001)	(0.002)	(0.005)
University	0.211*	0.588*	1.578*	0.123*	0.660*	2.046*	0.061*	0.503*	2.689*	0.044*	0.376*	3.098*
	(0.001)	(0.002)	(0.005)	(0.002)	(0.003)	(0.018)	(0.002)	(0.004)	(0.017)	(0.001)	(0.003)	(0.019)
Experience	0.015*	0.035*	0.026*	0.009*	0.025*	0.043*	0.010*	0.015*	0.048*	0.006*	0.014*	0.035*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.001)
Experience2	-0.000*	-0.001*	-0.000*	-0.000*	-0.000*	-0.000*	-0.000*	-0.000*	-0.001*	-0.000*	-0.000*	-0.000*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Married	0.051*	0.040*	0.119*	-0.073*	0.020*	0.453*	-0.029*	0.058*	-0.204*	0.034*	-0.079*	-0.205*
	(0.002)	(0.002)	(0.006)	(0.003)	(0.005)	(0.015)	(0.004)	(0.005)	(0.012)	(0.002)	(0.003)	(0.009)
Black	-0.011*	-0.142*	-0.205*	-0.068*	-0.083*	-0.310*	-0.028*	-0.095*	-0.321*	-0.010*	-0.003**	-0.196*
	(0.001)	(0.001)	(0.002)	(0.001)	(0.003)	(0.010)	(0.001)	(0.002)	(0.006)	(0.001)	(0.001)	(0.006)
Family size	-0.017*	-0.016*	-0.005*	-0.004*	-0.004*	0.026*	-0.006*	-0.042*	-0.022*	0.004*	-0.020*	-0.010*
	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)	(0.002)	(0.000)	(0.001)	(0.002)	(0.000)	(0.000)	(0.002)
Construction	0.012*	-0.018*	0.312*	0.002	-0.164*	-0.334*	0.095*	0.013*	-0.017*	0.023*	0.094*	0.351*
	(0.001)	(0.002)	(0.005)	(0.002)	(0.004)	(0.011)	(0.002)	(0.004)	(0.009)	(0.001)	(0.003)	(0.010)
Ext. and p. utility	0.112*	0.241*	0.377*	0.039*	0.108*	1.424*	-0.001	0.276*	-0.104*	-0.067*	0.186*	0.570*
	(0.001)	(0.004)	(0.012)	(0.002)	(0.006)	(0.035)	(0.004)	(0.008)	(0.024)	(0.005)	(0.008)	(0.028)
Commerce	-0.058*	-0.116*	-0.159*	-0.137*	-0.098*	-0.534*	-0.004	-0.053*	-0.301*	-0.040*	0.008*	0.007
	(0.001)	(0.001)	(0.003)	(0.002)	(0.003)	(0.010)	(0.002)	(0.003)	(0.008)	(0.001)	(0.002)	(0.007)
Services	-0.041*	-0.054*	-0.137*	-0.013*	-0.004	-0.587*	0.006**	0.168*	-0.253*	0.013*	0.081*	-0.070*
	(0.001)	(0.001)	(0.003)	(0.002)	(0.003)	(0.011)	(0.002)	(0.003)	(0.008)	(0.001)	(0.002)	(0.008)
Public sector	-0.022*	0.095*	-0.154*	0.063*	0.254*	0.726*	0.122*	0.401*	0.403*	0.044*	0.160*	1.195*
	(0.002)	(0.002)	(0.008)	(0.002)	(0.005)	(0.021)	(0.002)	(0.004)	(0.017)	(0.002)	(0.004)	(0.018)
Other activities	0.039*	-0.005*	0.007*	0.031*	-0.008**	-0.630*	0.042*	-0.006*	-0.440*	0.049*	0.073*	-0.065*
	(0.001)	(0.001)	(0.004)	(0.002)	(0.004)	(0.012)	(0.002)	(0.004)	(0.010)	(0.001)	(0.003)	(0.010)
M. and civil security	0.151*	0.787*	0.884*	0.158*	0.667*	-0.302*	0.189*	0.508*	0.834*	0.097*	0.413*	2.420*
	(0.004)	(0.003)	(0.015)	(0.002)	(0.005)	(0.035)	(0.003)	(0.005)	(0.034)	(0.002)	(0.004)	(0.037)

Table 2: continued

M. and civil security	0.151*	0.787*	0.884*	0.158*	0.667*	-0.302*	0.189*	0.508*	0.834*	0.097*	0.413*	2.420*
	(0.004)	(0.003)	(0.015)	(0.002)	(0.005)	(0.035)	(0.003)	(0.005)	(0.034)	(0.002)	(0.004)	(0.037)
Business manager	0.268*	0.675*	3.746*	0.191*	0.755*	1.322*	0.221*	0.279*	2.463*	0.045*	0.438*	3.422*
	(0.001)	(0.003)	(0.017)	(0.003)	(0.006)	(0.052)	(0.002)	(0.011)	(0.061)	(0.002)	(0.006)	(0.078)
Sc. and engineers	0.314*	0.793*	1.090*	0.160*	0.756*	3.266*	0.237*	0.750*	3.217*	0.121*	0.410*	1.036*
	(0.001)	(0.002)	(0.009)	(0.002)	(0.004)	(0.031)	(0.002)	(0.004)	(0.034)	(0.002)	(0.004)	(0.038)
Health services	0.406*	0.742*	2.359*	0.171*	0.679*	1.937*	0.338*	0.685*	-0.417*	0.123*	0.436*	4.683*
	(0.002)	(0.004)	(0.024)	(0.003)	(0.005)	(0.064)	(0.003)	(0.005)	(0.075)	(0.003)	(0.004)	(0.048)
Education	0.306*	0.676*	-0.480*	0.167*	0.564*	2.313*	0.266*	0.408*	0.856*	0.139*	0.390*	2.346*
	(0.001)	(0.002)	(0.010)	(0.002)	(0.005)	(0.040)	(0.004)	(0.005)	(0.031)	(0.002)	(0.004)	(0.029)
Law related	0.317*	0.668*	0.667*	0.117*	0.513*	2.896*	0.288*	0.508*	2.369*	0.166*	0.495*	0.302*
	(0.002)	(0.003)	(0.018)	(0.003)	(0.006)	(0.054)	(0.003)	(0.008)	(0.048)	(0.003)	(0.005)	(0.061)
Social science	0.313*	0.688*	0.536*	0.101*	0.542*	2.045*	0.252*	0.555*	1.735*	0.104*	0.292*	1.008*
	(0.002)	(0.002)	(0.009)	(0.003)	(0.006)	(0.033)	(0.003)	(0.006)	(0.034)	(0.004)	(0.006)	(0.033)
Technic tasks	0.289*	0.618*	-0.055*	0.130*	0.655*	0.666*	0.253*	0.534*	0.336*	0.087*	0.308*	0.562*
	(0.001)	(0.002)	(0.004)	(0.002)	(0.004)	(0.014)	(0.002)	(0.003)	(0.011)	(0.002)	(0.003)	(0.013)
Office and adm.	0.164*	0.314*	0.078*	0.182*	0.284*	0.118*	0.217*	0.263*	-0.091*	0.093*	0.135*	0.066*
	(0.002)	(0.002)	(0.003)	(0.002)	(0.003)	(0.007)	(0.002)	(0.003)	(0.008)	(0.001)	(0.002)	(0.008)
Factory work	0.222*	0.239*	0.009*	0.115*	0.395*	-0.073*	0.189*	0.270*	-0.247*	0.056*	0.125*	0.046*
	(0.001)	(0.001)	(0.002)	(0.002)	(0.003)	(0.005)	(0.002)	(0.003)	(0.006)	(0.001)	(0.002)	(0.006)
Other jobs	0.264*	0.686*	1.673*	0.140*	0.547*	2.561*	0.228*	0.573*	0.519*	0.049*	0.392*	1.786*
	(0.001)	(0.002)	(0.008)	(0.002)	(0.005)	(0.026)	(0.003)	(0.005)	(0.023)	(0.002)	(0.003)	(0.023)
Formal Job	0.305*	0.150*	0.005	0.275*	0.256*	0.182*	0.201*	0.147*	-0.054*	0.245*	0.045*	0.050*
	(0.001)	(0.001)	(0.003)	(0.002)	(0.003)	(0.007)	(0.002)	(0.003)	(0.009)	(0.002)	(0.002)	(0.006)
Constant	2.253*	2.563*	4.074*	2.496*	2.398*	3.691*	2.466*	2.798*	3.726*	2.591*	2.780*	3.112*
	(0.003)	(0.002)	(0.005)	(0.004)	(0.006)	(0.016)	(0.004)	(0.005)	(0.014)	(0.003)	(0.004)	(0.014)
Observations	2,802,397	2,802,397	2,802,397	543,245	543,245	543,245	460,100	460,100	460,100	497,284	497,284	497,284
R-squared	0.128	0.328	0.288	0.156	0.313	0.373	0.118	0.272	0.367	0.165	0.198	0.396

Note: robust standard errors in parentheses. * P-value < 0.01. For schooling variables, the reference is less than high school degree; for sector of activities, the reference is the manufacture sector; and for occupations, the reference is general services.

Source: authors' elaboration based on PNAD

Before presenting the decompositions of wage differences between the SPMR and each region across purchasing power adjusted distributions, Table 3 presents estimated regional wage differences for the mean and quantiles for both nominal (PPP non-adjusted) and real (PPP adjusted) wages. The values were obtained using estimated coefficients. The two first lines of each panel indicate estimated log.hourly wage differences, while the third line corresponds to the percentage of wage difference that persists after the regional PPP adjustment. For men in Recife (Panel B), for example, the wage gaps favourable to the SPMR measured in the mean wages amount to 38.9 per cent and 16.8 per cent, respectively, for nominal and PPP adjusted values[8]. Thus, 43.2 per cent of the nominal wage gap (16.8/38.9) persists after PPP adjustment. We confirm that, while a significant share of the regional wage gap disappears after adjusting values for regional PPP, wage gaps are still quite relevant after this adjustment. For the mean wages for men, the PPP adjusted wage gap favourable to the SPMR varies from 16.8 per cent in Recife to 29.4 per cent in Fortaleza, values that correspond, respectively, to 43.2 per cent (0.168/0.389) and 52.2 per cent (0.294/0.563) of the nominal wag gap.

The numbers in Table 3 also indicate that the wage gap between the SPMR and northeastern regions and the PPP adjustment have very different relevance across wage quantiles and between genders. Actually, the general pattern for the three northeastern regions indicates that while the wage gap is significantly lower, or even reversed (see the case of Fortaleza) for lower quantiles after regional PPP adjustment, their values continue to be large for higher quantiles. For instance, from the numbers of Table 3, the wage gaps favourable to the SPMR relative to Recife at the 0.1 quantile corresponded to 21.9 per cent and 0.1 per cent, respectively for nominal and regional PPP adjusted values; but the corresponding differences at the 0.9 quantile are 56.5 per cent and 34.4 per cent. Thus, in this last case, in spite of the relevance of PPP adjustment, the adjusted wage gap still accounts to 60.9 per cent of its nominal measure at quantile 0.9. Note also that independently of the wage distribution quantile, wage gaps for men tend to be bigger than for women, except in Salvador at the median and higher quantiles.

Table 3: Estimated regional wage differences between São Paulo and northeastern metropolitan regions for the mean and quantiles (Q) – Nominal (N) and regional purchasing power parity adjusted (PPP) values.

	Mean	**Q 0.1**	**Q 0.3**	**Q 0.5**	**Q 0.7**	**Q 0.9**
Panel A – Salvador						
			Men			
Nominal (N)	0.369	0.219	0.336	0.323	0.399	0.421
PPP (P)	0.172	0.017	0.138	0.114	0.202	0.223
PPP share (%)	46.61	7.76	41.07	38.70	50.63	52.97
			Women			
Nominal (N)	0.357	0.189	0.244	0.341	0.431	0.449
PPP (P)	0.159	-0.008	0.0468	0.143	0.234	0.251
PPP share (%)	44.54	-4.23	19.18	41.94	54.29	55.90
Panel B – Recife						
			Men			
Nominal (N)	0.389	0.219	0.31	0.316	0.445	0.565

[8] We are measuring here percentage change by log. differences.

PPP (P)	0.168	0.001	0.089	0.095	0.225	0.344
PPP share (%)	43.19	0.46	28.71	30.06	50.56	60.88
		Women				
Nominal (N)	0.312	0.184	0.281	0.322	0.407	0.409
PPP (P)	0.091	-0.036	0.059	0.101	0.185	0.188
PPP share (%)	29.17	-19.57	21.00	31.37	45.45	45.97
Panel C – Fortaleza						
		Men				
Nominal (N)	0.563	0.258	0.399	0.571	0.65	0.758
PPP (P)	0.294	-0.011	0.131	0.302	0.381	0.489
PPP share (%)	52.22	-4.26	32.83	52.89	58.62	64.51
		Women				
Nominal (N)	0.454	0.207	0.274	0.449	0.562	0.641
PPP (P)	0.185	-0.062	0.0052	0.181	0.293	0.372
PPP share (%)	40.75	-29.95	1.90	40.31	52.14	58.03

Note: 'Nominal' refers to the estimated difference between wages of São Paulo metropolitan region and correspondent northeastern region; 'PPP' refers to the same difference after adjusting for regional purchasing power parity. Both are measured using difference of log. of hourly wage and obtained using estimated coefficients for regional PPP non-adjusted (Nominal) and PPP adjusted (PPP) values, respectively. 'PPP share' refers to the share of nominal regional disparities (measured in per cent) still present when using regional PPP adjusted values.

Source: authors' elaboration based on PNAD.

Figure 3 presents estimated regional wage differentials between the SPMR and each northeastern region across PPP adjusted wage distribution quantiles, together and their two components (composition and wage structure effects, see equations (8) and (9)). To identify the relative differentials obtained through traditional OLS regression for each northeastern region, the figure also presents wage differentials at the mean of the wage distribution (horizontal dotted line).

Note, first, that both for men and women, the figure clearly indicates the aforesaid pattern of regional inequalities between São Paulo and northeastern metropolitan regions: in general, the regional wage gap favourable to São Paulo tends to increase with quantiles of the wages distribution. Notice particularly that while for quantile 0.1 of the differentials is small or even negative, for men the highest regional wage differentials are found for the highest quantile (0.9). Figure 3 clearly indicates that traditional Oaxaca-Blinder decompositions (difference in means) significantly underestimate wage differentials between the SPMR and northeastern region at higher quantiles and overestimate these differentials for lower quantiles of the wage distribution. More specifically, for example, while the estimate for the mean in Fortaleza indicates a 29.4 per cent wage gap favourable to males in the SPMR, the same wage differentials are about 49 per cent and -1.1 per cent, respectively, for quantiles 0.9 and 0.1 of the wage distributions.

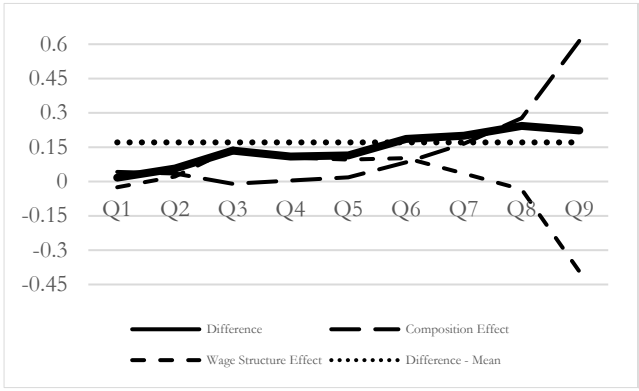
This pattern of regional inequality is similar to that obtained by Perreira and Galego (2014), when comparing Lisbon with other Portuguese regions, but it is different from the evidence obtained by Oliveira and Silveira Neto (2016) when comparing southeastern and northeastern Brazilian macro regions, and by Huertas et al. (2020) for Spanish regions. The differences between our results and those of Oliveira and Silveira Neto (2016) and Huertas et al. (2020) are consistent with the fact that we consider only more developed and urbanized places, so we disregard the lowest

paid jobs in non-urban activities of the Brazilian Northeast. Furthermore, the tendency of more significant regional wage gaps registered here for higher quantiles of wage distributions suggest greater benefits for more skilled individuals living in Brazil's largest metropolitan region. Still, this evidence also suggests that the bigger regional wage gaps between São Paulo and the northeastern metropolitan regions are hardly explained by some lack of regional mobility of workers across regions (which tends to be more serious for low-skilled individuals) and favours interpretations based on spatial equilibrium models (Gleaser and Maré 2001; Gleaser 2008).

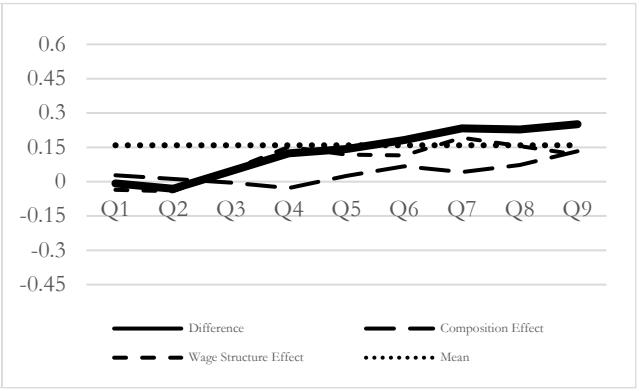
Figure 2: Estimated regional wage differentials for men—São Paulo and northeastern metropolitan regions

a) Salvador

Men

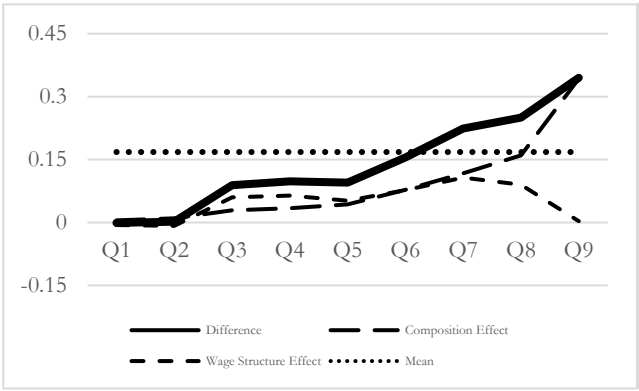


Women

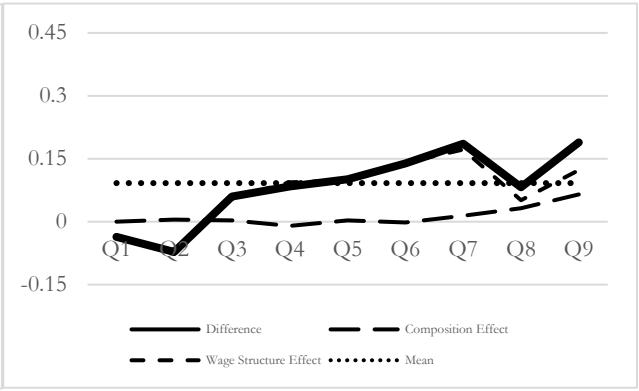


b) Recife

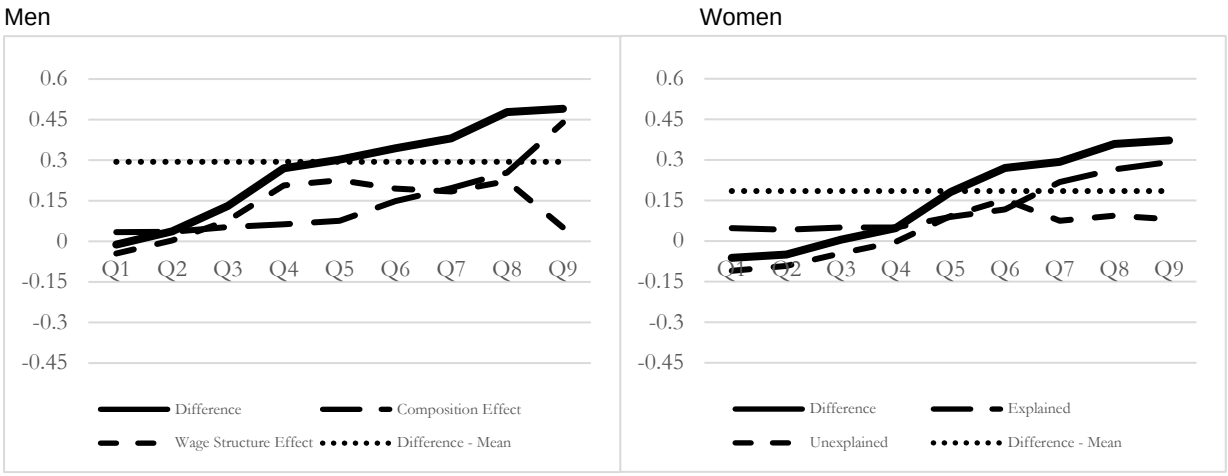
Men



Women



c) Fortaleza



Note: the horizontal dotted line is the average estimate differential.

Source: authors' elaborations based on PNAD.

Figure 3 also indicates that in general, for the lowest quantiles (both for men and women), the aforementioned smaller regional gaps derive from positive composition effect and negative wage structure effect (see dashed lines). Thus, for these quantiles, while individual and labour market characteristics (endowments) favour the SPMR, the returns to them favour northeastern regions. This result, which is similar to those obtained for male income distribution by Pereira and Galego (2014) in comparing Lisbon to other Portuguese regions, indicates that low-wage workers are favoured in the northeastern regions. For the quantiles around the median, however, both effects generally contribute positively to the wage gaps. Finally, except for the wage distribution of women in Recife, the composition effect is generally responsible for most of the wage gap at the highest quantiles of the wage distribution, where the biggest regional wage gaps are found.

4.2 Detailed decompositions: factors associated with regional differentials across the wage distribution

Tables 4 and 5 present the results of the detailed decomposition of the wage gaps between the SPMR and each of the northeastern metropolitan regions according to the traditional OLS estimation (mean) and quantiles 0.1, 0.5, and 0.9. Due to space restrictions, we focus here only on the results for men, while the results for women and other quantiles are presented in Tables A4–A11 of the Appendix. In Appendix Table A2, we present an estimated specification and reweighting errors (equation (5) and (6)). Notice that the estimative for the contributions of economic activities and for different occupations are presented in aggregate form for all their respective categories (respectively, as 'Sectors' and 'Occupations').

The results in the first four columns of Table 4 are obtained by applying the traditional Oaxaca-Blinder decomposition. As seen, the numbers of Table 3 indicated that PPP adjusted wage gaps relative to the SPMR for men were 17.2 per cent, 16.8 per cent, 29.4 per cent, and 30.4 per cent, respectively, for Salvador, Recife, and Fortaleza. Initially, note that the numbers in Table 4 indicate that for the means of wage distributions together, individual and labour market characteristics (composition effect) favour the SPMR over northeastern regions and are more important than regional differences associated with returns to them. Actually, the relative importance of this effect varies from 51 per cent (0.150/0.294) to 74.4 per cent (0.128/0.172) of the total wage gap on average, respectively, for Fortaleza and Salvador. Note, however, that the composition effect is relatively less important for understanding the wage gap between the SPMR and Belém.

In spite of the significant wage gap variation across the wage distribution seen, there are general results for the mean wages that are mostly also common to the different quantiles of the wage distribution. First, note that the regional labour market composition differentials associated with university degree, kinds of occupations, and individual race (black) account for most of the magnitude of the composition effect favouring the SPMR in all the four northeastern regions. Actually, in the cases of Salvador and Recife, factors associated with these regional labour market composition differentials account for more than 90 per cent of their respective total wage gaps relative to the SPMR. More specifically, regional labour market composition differentials associated with a university degree, kinds of occupations, and race account, respectively, for about 35.7 per cent, 31.4 per cent, and 24.4 per cent of the total wage gap between the SPMR and Recife[9]. Secondly, consistent with the numbers in Table 1, the influence of regional differences related to the different compositions of kinds of occupations are more important for men and the regional racial differences are more important for the metropolitan region of Salvador (the region with the highest share of black individuals).

There are also, however, important differences across quantiles related to the contributions of the variables. The last four columns of Table 4 present results of the detailed decomposition for the wage gaps between SP and each of the Brazilian northeastern metropolitan regions at quantile 0.1 of the wage distribution, where there are negligible wage gaps between the SPMR and northeastern regions. However, particularly for Salvador, factors associated with individual race account for most of this composition influence favouring the SPMR. Actually, together with their wage structure effect, such factors account for the entire positive wage gap favouring the SPMR. On the other hand, for females (see Appendix Tables A7 and A9), factors associated with the condition of having a formal job are the most important ones in accounting for the wage differential that favours the SPMR over all the northeastern metropolitan regions of Recife and Fortaleza.

Table 5 presents the results of the detailed decomposition for the wage gaps between SP and each of the Brazilian northeastern metropolitan regions at the median and 0.9 quantiles. As discussed, regional wage gaps relative to the SPMR are much more significant at these quantiles, ranging, for example for men, from 22.3 per cent (Salvador) to 48.9 per cent (Fortaleza) at the 0.9 quantile (Table 3). Note also that while regional differences associated with the returns to individual and labour market characteristics are relatively more important for understanding wage gaps relative to the SPMR at the 0.5 quantile, regional differences associated with the characteristics themselves (composition effect) are relatively more important at the 0.9 quantile for northeastern regions. And, once more, we perceive that regional labour market composition differentials associated with university degree and kind of occupation account for all or most of the magnitude of the composition effects favouring the SPMR. At the 0.9 quantile, 54 per cent (0.187/0.346) and 37.6 per cent (0.13/0.346) of the total wage gap between SPMR and Recife, for example, are associated with factors related to a university degree and different kinds of occupations, respectively.

Similar evidence about the role of schooling in accounting for regional income differences in median and higher quantiles was also obtained by Pereira and Galego (2014) and Oliveira and Silveira Neto (2017), but, in our current analysis, regional differences in occupations and race compositions are also quite relevant for understanding the composition effects in these quantiles. Interestingly, for the occupations, most of effect is associated with the two categories of scientists and engineers and/or general services (these specific results can be observed in Tables A4-A11), generally favourable to the SPMR, but due to different reasons. For the first one, it happens because of SPMR's higher share of workers in these occupations, together with higher returns. For

[9] The numbers are obtained from the ratios 0.06/0.168, 0.053/0.168, and 0.041/0.168, respectively.

general service occupations, this occurs because of the northeastern regions' higher shares of workers in these occupations, together with lower returns. In the case of Salvador metropolitan region, for example, 44.6 per cent of the total wage gap for men is associated with these two combined effects.[10]

From Table 5, we highlight two other interesting results for the wage structure effect at quantile 0.9. First, note that since we obtained a lower return than to a university degree for the SPMR than for northeastern regions (see Table 2), the contributions of a university degree to the regional wage gaps between the SPMR and each of these regions are all negative, something that does not happen for other quantiles. We do not have enough information to entirely understand this result, however, agglomeration effects associated with a bigger labour market acting through better matching and sharing (for example) might be more important for more productive job, making a university degree relatively less important in the SPMR. Second, and contrary to this result for a university degree at quantile 0.9, our results indicate in general positive contributions of regional differentials of returns to the occupational categories at this quantile. The evidence is also consistent with bigger agglomeration gains associated with SPMR's larger labour market, which may make more specialized occupations more productive.

Table 4: Detailed decomposition of mean regional differential for men—São Paulo and Brazilian northeastern metropolitan regions – mean and quantile 0.1

	Median			Quantile 0.1		
	Salvador	Recife	Fortaleza	Salvador	Recife	Fortaleza
Comp. effect	0.128***	0.105***	0.150***	0.042***	0.005***	0.034***
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
High school	-0.010***	-0.005***	-0.006***	-0.005***	-0.002***	-0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
University	0.066***	0.060***	0.101***	0.010***	0.006***	0.005***
	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)
Sectors	0.007***	-0.021***	-0.014***	-0.001	-0.007***	-0.000***
	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Occupations	0.055***	0.053***	0.044***	0.007***	0.013***	-0.000**
	(0.000)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)
Experience	-0.018***	-0.020***	-0.001***	-0.008***	-0.007***	0.004***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Black	0.049***	0.041***	0.015***	0.029***	0.009***	0.006***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)
Formal	0.002***	0.000***	0.011***	0.002***	0.001***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Others	-0.022***	-0.004***	0.000	0.007***	-0.009***	0.001***
	(0.002)	(0.001)	(0.000)	(0.001)	(0.001)	(0.000)
W.S. effect	0.043***	0.064***	0.143***	-0.025***	-0.006***	-0.045***

[10] More specifically, according to the numbers of Table A4 for men in Salvador, 12.6 per cent (100x0.028/0.222) and 32.0 per cent (100x0.071/0.222) of the of the total wage gap in relation to the SPMR are associated with the composition effects for the scientists and engineers and general services, respectively.

	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
High school	0.005***	-0.010***	0.001	0.043***	0.048***	0.059***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
University	0.007***	-0.009***	-0.003***	0.023***	0.031***	0.040***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)
Sectors	0.048***	0.006***	0.008***	0.002***	-0.002***	-0.021***
	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)
Occupations	-0.022***	-0.050***	-0.059***	-0.041***	-0.013***	-0.040***
	(0.002)	(0.003)	(0.002)	(0.001)	(0.001)	(0.001)
Experience	0.024***	0.045***	0.012***	0.039***	0.065***	0.079***
	(0.003)	(0.003)	(0.004)	(0.003)	(0.003)	(0.002)
Black	-0.007***	0.013***	-0.029***	0.019***	0.007***	-0.005***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Formal	-0.128***	-0.047***	-0.035***	-0.002	0.074***	0.006**
	(0.004)	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)
Others	3.107***	4.441***	10.656***	4.205***	0.955***	4.832***
	(0.264)	(0.311)	(0.360)	(0.243)	(0.280)	(0.246)
Constant	-2.991***	-4.325***	-10.408***	-4.314***	9.750***	-4.994***
	(0.261)	(0.307)	(0.355)	(0.240)	(0.286)	(0.243)

Note: detailed decomposition using recentered influence functions. Robust standard errors in parentheses. *** and ** indicate, respectively, p-value<0.01 and p-value < 0.05. 'Others' includes 'married' and 'family size' variables.

Source: authors' elaboration based on PNAD.

Table 5: Detailed decomposition of regional differential for men—São Paulo and Brazilian northeastern metropolitan regions – quantile 0.5 and quantile 0.9

	Quantile 0.5			Quantile 0.9		
	Salvador	Recife	Fortaleza	Salvador	Recife	Fortaleza
Comp. effect	0.018***	0.043***	0.076***	0.615***	0.343***	0.439***
	(0.002)	(0.001)	(0.001)	(0.006)	(0.003)	(0.005)
High school	-0.018***	-0.005***	-0.005***	0.001**	-0.006***	-0.004***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
University	0.067***	0.040***	0.046***	0.150***	0.187***	0.368***
	(0.001)	(0.000)	(0.000)	(0.002)	(0.002)	(0.003)
Sectors	0.035***	-0.017***	-0.002***	-0.055***	-0.028***	-0.079***
	(0.001)	(0.000)	(0.000)	(0.002)	(0.001)	(0.001)
Occupations	0.038***	0.040***	0.031***	0.192***	0.130***	0.096***
	(0.000)	(0.000)	(0.000)	(0.002)	(0.002)	(0.002)
Experience	-0.010***	-0.008***	-0.001***	-0.054***	-0.049***	-0.003***
	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)
Black	0.061***	0.031***	-0.001	0.075***	0.078***	0.037***
	(0.001)	(0.001)	(0.000)	(0.005)	(0.002)	(0.002)
Formal	0.000***	0.000***	0.004***	0.005***	0.000	0.025***

	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Others	-0.156***	-0.038***	0.004***	0.301***	0.031***	-0.000
	(0.002)	(0.001)	(0.000)	(0.006)	(0.003)	(0.001)
W.S. effect	0.096***	0.052***	0.226***	-0.393***	0.003	0.051***
	(0.002)	(0.001)	(0.001)	(0.007)	(0.004)	(0.005)
High school	-0.039***	0.022***	0.057***	-0.018***	-0.161***	-0.096***
	(0.001)	(0.001)	(0.001)	(0.003)	(0.003)	(0.003)
University	-0.029***	0.021***	0.060***	-0.071***	-0.254***	-0.335***
	(0.001)	(0.001)	(0.001)	(0.004)	(0.004)	(0.005)
Sectors	-0.021***	0.013***	-0.011***	0.265***	0.002	0.157***
	(0.001)	(0.001)	(0.001)	(0.005)	(0.004)	(0.005)
Occupations	-0.068***	-0.100***	-0.105***	0.186***	0.061***	0.405***
	(0.002)	(0.002)	(0.001)	(0.010)	(0.010)	(0.010)
Experience	0.158***	0.204***	0.132***	-0.338***	-0.116***	-0.219***
	(0.004)	(0.004)	(0.003)	(0.010)	(0.010)	(0.011)
Black	-0.017***	-0.024***	-0.074***	0.008*	0.063***	-0.007**
	(0.001)	(0.001)	(0.001)	(0.005)	(0.003)	(0.003)
Formal	0.005	-0.012***	-0.024***	-0.313***	0.207***	-0.059***
	(0.004)	(0.004)	(0.003)	(0.011)	(0.011)	(0.009)
Others	-4.795***	3.814***	15.296***	4.790***	-23.441***	1.442
	(0.324)	(0.375)	(0.302)	(0.860)	(0.881)	(1.161)
Constant	4.902***	-3.887***	-15.106***	-4.902***	10.864***	-1.237
	(0.319)	(0.370)	(0.298)	(0.848)	(1.319)	(1.145)

Note: detailed decomposition using recentered influence functions. Robust standard errors in parentheses. *** and ** indicate, respectively, p - value < 0.01 and p - value < 0.05. 'Others' includes 'married' and 'family size' variables.

Source: authors' elaboration based on PNAD.

5 Concluding remarks

Since regional nominal income disparities can merely reflect regional differentials of local prices, measuring effective regional disparities of income among localities requires using incomes adjusted for local purchasing power differences. In this study, we used unique and recent local price indices for Brazilian metropolitan regions in order to measure and decompose factors associated with the regional wage disparities between the SPMR, Brazil's most economically developed metropolis, and Brazil's northeastern metropolitan regions, the poorest ones. The strategy, based on RIF regression and Oaxaca-Blinder decomposition, enables measuring and decomposing regional inequalities across wage distributions using values adjusted by regional purchasing power indices, something still unexplored in regional studies applied to the Brazilian context, characterized by extreme and longstanding regional income imbalances.

Our set of evidence helps sheds light on the patterns of Brazilian regional wage disparities between the São Paulo and northeastern metropolitan regions and suggests different situations and reasons behind the observed wage gaps. First, we showed that a large part (no less than 50 per cent) of wage gaps merely reflects regional price differentials, indicating the relevance of considering wages

adjusted by local PPP in such a big country. However, an important part of regional wage gaps remains after adjusting for regional purchasing power differences. For example, around 52 per cent of nominal wage gap between SPMR and Fortaleza at the mean values for men remains after adjusting for regional PPP. Furthermore, for the four northeastern regions, we also showed that these PPP adjusted regional wage gaps generally increase with the rise of the wage distribution quantile but are only significant for intermediate and mainly higher quantiles of the wage distribution. In the case of Fortaleza, for example, wage gaps relative to the SPMR amount to 30.2 per cent and 48.9 per cent, respectively, at the 0.5 and 0.9 quantiles of the wage distribution. This evidence indicates the relevance of considering regional disparities across the wage distribution and indicates both greater regional similarity of economic opportunities for low-skilled individuals across Brazilian metropolitan regions and that the higher regional wage gaps among these regions are insufficiently explained by barriers to labour mobility.

Second, our results also indicate that while both regional differentials associated with labour market compositions and returns to individual and labour market characteristics matter for understanding regional wage gaps relative to the SPMR at intermediate quantiles, regional labour market differentials account for effectively all the wage gaps between the SPMR and northeastern regions at higher wage distribution quantiles. Consistent with their weaker spatial mobility in Brazil (Justo and Silveira Neto 2009), we also showed that the influence of the returns to individual and labour market characteristics is more important for women than for men. More specifically, we showed that factors associated with a university degree, kind of occupations and race regularly account for the entire composition effect favouring the SPMR. Thus, both regional differences in human capital and in productive structure of firms contribute to the observed regional wage gaps and we obtained support for explanations based on individual characteristics (mainly schooling) for Brazilian regional income disparities and a minor role of regional differences associated with economic activities. However, unlike most previous studies of the Brazilian regional context, we did find that differences in regional occupational structures are almost as important as schooling to understand regional wage gaps between the SPMR and the northeastern regions. This last evidence highlights the fact that the spatial distributions of occupations do not immediately follow the spatial distribution of industries (Vignandi et al. 2016). It also appears to be consistent with greater agglomeration gains arising from the SPMR's much bigger labour market, which allows greater specialization of occupations.

The set of results brings regional policy implications. First, it is important to emphasize that we did not find any relevant role for regional differentials of industrial structure in explaining wage gaps between the regions, and this evidence cannot be attributed to the fact of dealing only with metropolitan regions. Our set of evidence, thus, does not support any role for traditional territorial policies based on, for example, attracting manufacturing firms to the northeastern regions (as still occurs in Brazil). On the other hand, given the important role played by university degrees in accounting for the Brazilian regional wage gap, the recent expansion of the federal system of universities and technical schools appears to be a sensible policy and may contribute to reduce regional wage imbalances (Carazza 2016). In addition, our results also indicate that policies favouring racial equality of opportunities in the northeastern metropolitan regions can also help to reduce regional gaps. Last but not least, given the relevance of the composition of occupations in accounting for the wage gaps between the SPMR and northeastern metropolitan regions, and the important role associated with the presence of more specialized occupations (such as scientists and engineers), the suitability of territorial policies appears associated with developing innovative activities and expanding regional markets. The presence of important public universities in the northeastern metropolitan regions, thus, is saluted.

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Appendix

Table A1: Regional price indexes (general average = 100)—Brazilian metropolitan regions

	2009	2014
Distrito Federal (DF)	118	114
São Paulo	106	106
Goiânia	104	103
Rio de Janeiro	102	103
Belo Horizonte	98	99
Porto Alegre	99	98
Curitiba	94	97
Belém	97	95
Salvador	90	87
Recife	85	85
Fortaleza	80	81
Maximum/minimum (%)	47.5%	40.7%
São Paulo/minimum (%)	32.5%	30.9%

Source: authors' calculations from the numbers provided by Almeida and Azzoni (2016).

Table A2: Specification (SE) and reweighing (RE) error – Men

	Salvador		Recife		Fortaleza	
	SE. Error	RE. Error	SE. Error	RE. Error	SE. Error	RE. Error
Quantile 10	0.0238	-0.0048	0.0122	-0.0011	-0.0063	0.0024
Quantile 20	0.0200	-0.0065	0.0037	-0.0057	-0.0689	0.0021
Quantile 30	0.0130	-0.0035	0.0033	-0.0057	0.0121	0.0065
Quantile 40	0.0430	0.0013	-0.0139	-0.0085	0.0620***	0.0057
Quantile 50	0.0260	-0.0180	-0.0027	-0.0110	0.0853***	0.8280
Quantile 60	0.0060	-0.0030	-0.0058	-0.0146	0.0364	0.0025
Quantile 70	0.0059	-0.0009	0.0007	-0.0143	0.0452	0.0100
Quantile 80	0.0449	-0.0690	-0.0539	-0.0109	0.1313	0.0054
Quantile 90	-0.1090	-0.1109	-0.0032	0.0047	-0.0534	-0.0008

Note: Specification and reweighting errors of rif decomposition with reweighting procedure for men. *** indicates p - value < 0.01.

Source: authors' calculations based on PNAD.

Table A3: Coefficients estimated of unconditional quantile regression for women

Variables	São Paulo			Salvador			Recife			Fortaleza		
	Q10	Q50	Q90	Q10	Q50	Q90	Q10	Q50	Q90	Q10	Q50	Q90
High school	0.193*	0.249*	0.133*	0.124*	0.196*	0.166*	0.186*	0.093*	0.082*	0.020*	0.109*	0.093*
	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.006)	(0.003)	(0.003)	(0.005)	(0.002)	(0.002)	(0.005)
University	0.210*	0.801*	1.431*	0.109*	0.603*	1.436*	0.218*	0.540*	1.125*	0.024*	0.329*	1.289*
	(0.001)	(0.002)	(0.005)	(0.002)	(0.003)	(0.012)	(0.003)	(0.004)	(0.012)	(0.002)	(0.003)	(0.011)
Experience	-0.171*	0.139*	1.174*	-0.037*	0.137*	0.038	-0.104*	0.101*	0.801*	0.034*	0.261*	0.757*
	(0.003)	(0.004)	(0.016)	(0.005)	(0.007)	(0.030)	(0.009)	(0.007)	(0.045)	(0.002)	(0.008)	(0.038)
Experience2	0.105*	0.397*	0.970*	-0.077*	0.129*	1.335*	0.129*	0.251*	1.387*	0.021*	-0.081*	-0.726*
	(0.002)	(0.011)	(0.022)	(0.004)	(0.009)	(0.053)	(0.006)	(0.010)	(0.052)	(0.004)	(0.016)	(0.046)
Married	-0.023*	-0.118*	0.084*	-0.115*	-0.003	-0.363*	0.017*	-0.168*	-0.123*	-0.033*	0.016*	0.140*
	(0.001)	(0.002)	(0.005)	(0.004)	(0.005)	(0.018)	(0.004)	(0.005)	(0.012)	(0.002)	(0.003)	(0.009)
Black	-0.032*	-0.010*	-0.040*	-0.102*	0.076*	-0.281*	0.059*	-0.058*	-0.183*	-0.063*	0.049*	0.097*
	(0.001)	(0.002)	(0.005)	(0.004)	(0.005)	(0.018)	(0.004)	(0.005)	(0.013)	(0.002)	(0.003)	(0.008)
Family size	-0.011*	0.069*	0.874*	0.001	0.325*	0.748*	0.088*	0.109*	0.827*	0.012*	0.121*	1.319*
	(0.001)	(0.002)	(0.010)	(0.004)	(0.006)	(0.024)	(0.004)	(0.005)	(0.020)	(0.002)	(0.004)	(0.016)
Construction	-0.030*	0.020*	0.242*	-0.058*	0.117*	-0.340*	0.082*	0.016*	-0.188*	0.005*	0.116*	0.225*
	(0.001)	(0.002)	(0.005)	(0.004)	(0.005)	(0.019)	(0.004)	(0.005)	(0.013)	(0.002)	(0.003)	(0.011)
Ext. and p. utility	0.227*	1.002*	1.557*	0.037*	0.491*	-0.274*	0.288*	0.575*	0.578*	-	-	-
	(0.002)	(0.005)	(0.045)	(0.003)	(0.005)	(0.055)	(0.006)	(0.009)	(0.093)			
Commerce	0.176*	0.647*	2.912*	0.049*	0.522*	1.449*	0.106*	0.581*	1.615*	0.137*	0.453*	2.364*
	(0.001)	(0.002)	(0.025)	(0.002)	(0.004)	(0.056)	(0.003)	(0.008)	(0.069)	(0.004)	(0.005)	(0.048)
Services	0.293*	0.662*	1.767*	0.102*	0.490*	1.966*	0.218*	0.336*	2.024*	0.160*	0.295*	0.567*

	(0.001)	(0.003)	(0.015)	(0.003)	(0.006)	(0.047)	(0.004)	(0.007)	(0.050)	(0.004)	(0.006)	(0.044)
Public sector	0.244*	0.591*	1.077*	0.182*	0.554*	2.075*	0.178*	0.538*	1.666*	0.168*	0.388*	2.219*
	(0.001)	(0.002)	(0.014)	(0.002)	(0.004)	(0.026)	(0.003)	(0.004)	(0.032)	(0.003)	(0.003)	(0.035)
Other activities	0.196*	0.554*	-0.101*	0.134*	0.484*	0.409*	0.167*	0.398*	0.462*	0.152*	0.322*	0.241*
	(0.001)	(0.002)	(0.007)	(0.002)	(0.004)	(0.015)	(0.003)	(0.004)	(0.015)	(0.002)	(0.003)	(0.014)
M. and civil security	0.274*	0.661*	1.918*	0.177*	0.487*	1.322*	0.152*	0.507*	1.023*	0.098*	0.401*	1.728*
	(0.001)	(0.003)	(0.017)	(0.003)	(0.006)	(0.035)	(0.003)	(0.006)	(0.045)	(0.003)	(0.003)	(0.045)
Business manager	0.202*	0.675*	0.372*	0.116*	0.454*	0.050*	0.154*	0.430*	0.292*	0.172*	0.340*	-0.192*
	(0.001)	(0.002)	(0.008)	(0.002)	(0.004)	(0.017)	(0.003)	(0.005)	(0.020)	(0.002)	(0.004)	(0.017)
Sc. and engineers	0.181*	0.437*	0.267*	0.032*	0.526*	0.082*	0.179*	0.407*	0.294*	0.066*	0.249*	0.231*
	(0.001)	(0.002)	(0.004)	(0.002)	(0.003)	(0.007)	(0.002)	(0.004)	(0.010)	(0.002)	(0.003)	(0.010)
Health services	0.160*	0.177*	-0.175*	0.065*	0.228*	-0.024*	0.087*	0.218*	-0.083*	0.098*	0.209*	-0.153*
	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.005)	(0.002)	(0.003)	(0.005)	(0.001)	(0.002)	(0.006)
Education	0.046*	-0.032*	-0.115*	-0.085*	-0.045*	0.020	0.102*	-0.112*	-0.246*	-0.070*	-0.051*	0.002
	(0.002)	(0.002)	(0.005)	(0.005)	(0.005)	(0.018)	(0.005)	(0.005)	(0.009)	(0.003)	(0.003)	(0.008)
Law related	0.220*	0.640*	1.366*	0.113*	0.598*	0.309*	0.153*	0.509*	0.185*	0.078*	0.381*	0.899*
	(0.001)	(0.002)	(0.009)	(0.002)	(0.004)	(0.019)	(0.003)	(0.005)	(0.023)	(0.002)	(0.003)	(0.022)
Social science	0.011*	0.015*	0.046*	0.009*	0.007*	0.023*	-0.000	0.007*	0.017*	0.005*	0.003*	0.023*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.001)
Technic tasks	-0.000*	-0.000*	-0.001*	-0.000*	-0.000*	-0.000*	0.000*	-0.000*	-0.000	-0.000*	0.000*	-0.000*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Office and adm.	0.013*	-0.104*	-0.304*	0.016*	-0.127*	-0.236*	-0.093*	-0.026*	0.160*	-0.049*	-0.114*	-0.187*
	(0.002)	(0.002)	(0.005)	(0.003)	(0.004)	(0.012)	(0.005)	(0.005)	(0.014)	(0.003)	(0.003)	(0.009)
Factory work	-0.005*	-0.066*	-0.187*	-0.037*	-0.048*	-0.381*	-0.015*	-0.018*	-0.266*	-0.025*	-0.007*	-0.063*
	(0.001)	(0.001)	(0.002)	(0.001)	(0.002)	(0.008)	(0.001)	(0.002)	(0.006)	(0.001)	(0.001)	(0.005)

Other jobs	0.210*	0.052*	0.053*	0.323*	0.107*	0.165*	0.260*	0.009*	0.286*	0.258*	0.046*	0.300*
	(0.001)	(0.001)	(0.003)	(0.002)	(0.002)	(0.006)	(0.002)	(0.003)	(0.006)	(0.002)	(0.002)	(0.005)
Formal Job	-0.000	-0.050*	-0.089*	-0.011*	-0.014*	0.031*	0.007*	-0.011*	0.059*	-0.011*	-0.003*	0.009*
	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.002)	(0.000)	(0.000)	(0.002)
Constant	2.341*	2.759*	3.825*	2.522*	2.572*	3.827*	2.377*	2.853*	3.532*	2.693*	2.793*	3.273*
	(0.002)	(0.003)	(0.007)	(0.005)	(0.007)	(0.022)	(0.006)	(0.006)	(0.018)	(0.004)	(0.004)	(0.013)
Observations	2,574,728	2,574,728	2,574,728	451,434	451,434	451,434	335,519	335,519	335,519	383,460	383,460	383,460
R-squared	0.116	0.402	0.245	0.204	0.359	0.287	0.165	0.361	0.263	0.193	0.293	0.288

Note: dependent variable is the log of hourly wage. Robust standard errors in parentheses. * P-value < 0.01. For schooling variables, the reference is less than high school degree; for sector of activities, the reference is the manufacture sector; and for occupations, the reference is general services.

Source: authors' calculations based on PNAD.

Table A4: Detailed decomposition of wage differential between São Paulo and Salvador metropolitan regions—Men

	Mean	q.10	q.30	q.50	q.70	q.90
Composition effect	0.128***	0.042***	-0.010***	0.018***	0.165***	0.615***
	(0.002)	(0.001)	(0.001)	(0.002)	(0.002)	(0.006)
High school	-0.010***	-0.005***	-0.013***	-0.018***	-0.014***	0.001**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
University	0.066***	0.010***	0.042***	0.067***	0.084***	0.150***
	(0.001)	(0.000)	(0.000)	(0.001)	(0.001)	(0.002)
Inv. Mills	-0.025***	0.008***	-0.104***	-0.160***	-0.074***	0.297***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.006)
Migrated	0.002***	0.000***	0.001***	0.001***	0.002***	0.007***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Sectors	0.007***	-0.001	0.021***	0.035***	0.049***	-0.055***
	(0.001)	(0.000)	(0.000)	(0.001)	(0.001)	(0.002)
Military and civilian security (%)	0.002***	-0.000***	-0.000***	-0.001***	0.001***	0.011***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Business managers (%)	0.001***	0.000***	0.000***	0.001***	0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Science and engineering (%)	0.007***	0.000***	0.003***	0.006***	0.008***	0.028***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Health services (%)	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Education (%)	0.001***	0.000***	-0.001***	-0.001***	0.001***	0.004***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Law related (%)	0.001***	-0.000**	-0.001***	-0.001***	-0.000***	0.005***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Social science (%)	-0.000	-0.001***	0.002***	0.003***	0.002***	0.003***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Technic tasks (%)	-0.001***	-0.000***	0.001***	0.001***	-0.000	-0.008***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Office and administrative (%)	0.002***	-0.000***	0.001***	0.002***	0.003***	0.006***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
General services (%)	0.026***	0.006***	0.009***	0.019***	0.034***	0.071***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)
Factory work (%)	0.011***	0.000***	0.003***	0.006***	0.014***	0.031***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Other jobs (%)	0.006***	0.001***	0.002***	0.002***	0.009***	0.041***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Experience	-0.018***	-0.008***	-0.008***	-0.010***	-0.018***	-0.054***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Black	0.049***	0.029***	0.032***	0.061***	0.061***	0.075***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.005)

Formal	0.002***	0.002***	0.001***	0.000***	0.000***	0.005***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Others	0.000***	-0.001***	0.001***	0.004***	0.001***	-0.003***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Wage structure effect	0.043***	-0.025***	0.144***	0.096***	0.035***	-0.393***
	(0.002)	(0.001)	(0.002)	(0.002)	(0.002)	(0.007)
High school	0.005***	0.043***	0.008***	-0.039***	-0.018***	-0.018***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.003)
University	0.007***	0.023***	-0.003***	-0.029***	0.029***	-0.071***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.004)
Inv. Mills	3.141***	4.248***	3.957***	-4.727***	-10.423***	4.854***
	(0.264)	(0.242)	(0.257)	(0.322)	(0.373)	(0.857)
Migrated	-0.008***	-0.006***	-0.006***	-0.001***	-0.007***	-0.015***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Sectors	0.048***	0.002***	0.005***	-0.021***	-0.061***	0.265***
	(0.001)	(0.000)	(0.001)	(0.001)	(0.002)	(0.005)
Military and civilian security (%)	0.004***	-0.001***	-0.000***	0.001***	0.007***	0.022***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Business managers (%)	0.005***	-0.000***	-0.001***	-0.002***	-0.002***	0.031***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Science and engineering (%)	-0.008***	0.003***	0.003***	-0.002***	-0.007***	-0.071***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Health services (%)	0.001***	0.001***	0.000***	-0.000***	0.001***	0.008***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Education (%)	-0.009***	-0.000***	0.003***	0.004***	-0.001***	-0.056***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Law related (%)	-0.004***	0.001***	0.002***	0.003***	0.004***	-0.020***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Social science (%)	0.001***	0.005***	0.002***	-0.001***	-0.009***	-0.027***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Technic tasks (%)	-0.002***	0.004***	0.001**	-0.009***	-0.019***	-0.018***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.002)
Office and administrative (%)	-0.001***	-0.020***	-0.015***	0.004***	-0.013***	0.056***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.002)
General services (%)	-0.003***	-0.022***	-0.033***	-0.020***	-0.020***	0.124***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.003)
Factory work (%)	-0.010***	-0.010***	-0.030***	-0.050***	-0.060***	0.172***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.005)
Other jobs (%)	0.004***	-0.000***	-0.002***	0.005***	0.006***	-0.034***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)
Experience	0.024***	0.039***	0.098***	0.158***	0.245***	-0.338***
	(0.003)	(0.003)	(0.003)	(0.004)	(0.004)	(0.010)
Black	-0.007***	0.019***	-0.015***	-0.017***	0.004**	0.008*

	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.005)
Formal	-0.128***	-0.002	-0.025***	0.005	0.004	-0.313***
	(0.004)	(0.003)	(0.003)	(0.004)	(0.005)	(0.011)
Others	-0.026***	-0.037***	0.002	-0.066***	-0.076***	-0.049***
	(0.002)	(0.002)	(0.002)	(0.003)	(0.004)	(0.008)
Constant	-2.991***	-4.314***	-3.806***	4.902***	10.450***	-4.902***
	(0.261)	(0.240)	(0.255)	(0.319)	(0.369)	(0.848)

Source: authors' elaboration based on PNAD.

Table A5: Detailed decomposition of wage differential between São Paulo and Salvador metropolitan regions—Women

	Mean	q.10	q.30	q.50	q.70	q.90
Composition effect	0.067***	0.028***	-0.004***	0.025***	0.042***	0.133***
	(0.002)	(0.002)	(0.001)	(0.002)	(0.004)	(0.008)
High school	-0.017***	-0.013***	-0.014***	-0.021***	-0.011***	-0.027***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
University	0.058***	0.008***	0.020***	0.046***	0.096***	0.120***
	(0.001)	(0.000)	(0.000)	(0.001)	(0.001)	(0.002)
Inv. Mills	-0.037***	-0.001	-0.048***	-0.025***	-0.090***	-0.149***
	(0.002)	(0.002)	(0.001)	(0.002)	(0.004)	(0.008)
Migrated	0.003***	0.001***	-0.000	-0.003***	0.001***	0.019***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Sectors	-0.012***	0.007***	0.007***	-0.010***	-0.006***	-0.028***
	(0.001)	(0.000)	(0.000)	(0.000)	(0.001)	(0.002)
Military and civilian security (%)	0.000***	0.000***	-0.000	-0.000***	-0.002***	0.004***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Business managers (%)	-0.000	0.000	-0.000	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Science and engineering (%)	0.004***	0.000***	0.001***	0.002***	0.004***	0.015***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Health services (%)	-0.006***	-0.001***	-0.002***	-0.002***	-0.006***	-0.018***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Education (%)	-0.001***	0.001***	-0.000***	0.000***	0.001***	-0.006***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Law related (%)	0.000***	0.000***	-0.000***	0.000***	-0.000***	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Social science (%)	-0.001***	0.000***	0.001***	0.001***	0.001***	-0.003***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Technic tasks (%)	0.000***	0.000***	-0.000	-0.001***	0.000	0.003***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Office and administrative (%)	-0.004***	-0.000***	-0.001***	-0.002***	-0.006***	-0.008***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)

General services (%)	0.027***	0.005***	0.013***	0.025***	0.039***	0.031***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)
Factory work (%)	-0.014***	-0.004***	-0.008***	-0.013***	-0.024***	-0.020***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Other jobs (%)	0.000***	0.000***	0.002***	0.003***	0.000	-0.005***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Experience	-0.007***	-0.005***	-0.003***	-0.002***	-0.005***	-0.006***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Black	0.064***	0.017***	0.027***	0.028***	0.054***	0.195***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.004)
Formal	0.007***	0.016***	0.002***	0.003***	-0.005***	-0.006***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Others	0.000	-0.003***	-0.002***	-0.003***	0.002***	0.021***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)
Wage structure effect	0.093***	-0.036***	0.051***	0.118***	0.192***	0.118***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.004)	(0.009)
High school	0.012***	0.033***	0.050***	0.027***	0.036***	-0.082***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.004)
University	0.004***	0.031***	0.069***	0.064***	-0.031***	-0.080***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.003)	(0.005)
Inv. Mills	-1.909***	0.133	2.924***	0.444	-17.654***	-28.783***
	(0.330)	(0.261)	(0.230)	(0.304)	(0.555)	(1.161)
Migrated	-0.002***	-0.005***	-0.003***	0.005***	-0.002***	-0.015***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Sectors	0.015***	0.017***	-0.004**	-0.052***	-0.016***	-0.031***
	(0.002)	(0.001)	(0.002)	(0.002)	(0.004)	(0.009)
Military and civilian security (%)	0.000***	0.000***	0.000***	0.001***	0.001***	0.003***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Business managers (%)	0.003***	0.000***	-0.000***	0.000***	-0.001***	0.008***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Science and engineering (%)	-0.003***	0.002***	0.002***	0.001***	-0.005***	-0.011***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Health services (%)	-0.009***	-0.001***	-0.001***	-0.002***	-0.009***	-0.039***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Education (%)	-0.010***	-0.005***	-0.003***	-0.002***	0.003***	-0.037***
	(0.001)	(0.000)	(0.000)	(0.000)	(0.001)	(0.002)
Law related (%)	0.000**	-0.000***	0.001***	0.001***	0.010***	0.010***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Social science (%)	0.008***	-0.002***	0.004***	0.008***	-0.001**	-0.024***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.002)
Technic tasks (%)	-0.005***	0.004***	0.001***	-0.020***	-0.025***	-0.010***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)
Office and administrative (%)	-0.032***	-0.005***	-0.030***	-0.045***	-0.040***	-0.082***

	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.004)
General services (%)	-0.022***	-0.027***	-0.034***	-0.026***	-0.054***	-0.121***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.003)
Factory work (%)	-0.003***	0.001***	-0.007***	-0.005***	-0.002***	-0.012***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)
Other jobs (%)	0.007***	-0.000	-0.001***	-0.003***	0.009***	0.043***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Experience	0.057***	-0.004	0.025***	0.077***	0.234***	0.415***
	(0.004)	(0.003)	(0.003)	(0.004)	(0.007)	(0.014)
Black	0.015***	0.012***	-0.002***	-0.005***	-0.009***	0.101***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.003)
Formal	-0.039***	-0.103***	-0.062***	-0.042***	0.232***	0.244***
	(0.004)	(0.004)	(0.003)	(0.004)	(0.007)	(0.015)
Others	-0.104***	0.033***	-0.005**	-0.123***	-0.232***	-0.492***
	(0.003)	(0.002)	(0.002)	(0.003)	(0.005)	(0.009)
Constant	2.108***	-0.151	-2.873***	-0.184	17.746***	29.111***
	(0.327)	(0.259)	(0.229)	(0.302)	(0.550)	(1.151)

Source: authors' elaboration based on PNAD.

Table A6: Detailed decomposition of wage differential between São Paulo and Recife metropolitan regions—Men

	Mean	q.10	q.30	q.50	q.70	q.90
Composition effect	0.105***	0.005***	0.029***	0.043***	0.117***	0.343***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.003)
High school	-0.005***	-0.002***	-0.004***	-0.005***	-0.005***	-0.006***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
University	0.060***	0.006***	0.023***	0.040***	0.065***	0.187***
	(0.001)	(0.000)	(0.000)	(0.000)	(0.001)	(0.002)
Inv. Mills	-0.006***	-0.008***	-0.032***	-0.038***	0.000	0.024***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.003)
Migrated	0.003***	0.000	0.001***	0.002***	0.005***	0.008***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Sectors	-0.021***	-0.007***	-0.010***	-0.017***	-0.031***	-0.028***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)
Military and civilian security (%)	0.001***	0.000***	0.000***	-0.001***	-0.000**	0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Business managers (%)	0.002***	0.000***	-0.001***	-0.001***	0.001***	0.007***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Science and engineering (%)	0.021***	0.001***	0.007***	0.011***	0.011***	0.062***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Health services (%)	0.000***	0.000***	0.001***	0.001***	0.002***	-0.003***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

Education (%)	0.000**	-0.000***	0.001***	0.001***	-0.002***	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Law related (%)	0.001***	0.000***	-0.000***	-0.000***	0.000***	0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Social science (%)	0.002***	0.001***	0.002***	0.003***	0.001***	0.012***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Technic tasks (%)	0.001***	-0.000***	-0.001***	-0.001***	0.000***	0.008***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Office and administrative (%)	0.003***	0.000***	0.001***	0.002***	0.003***	0.007***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
General services (%)	0.027***	0.011***	0.015***	0.021***	0.034***	0.050***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)
Factory work (%)	-0.001***	-0.000***	-0.000***	-0.001***	-0.001***	-0.003***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Other jobs (%)	-0.004***	-0.000	0.004***	0.004***	-0.000	-0.014***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Experience	-0.020***	-0.007***	-0.007***	-0.008***	-0.020***	-0.049***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Black	0.041***	0.009***	0.030***	0.031***	0.055***	0.078***
	(0.001)	(0.000)	(0.000)	(0.001)	(0.001)	(0.002)
Formal	0.000***	0.001***	0.000*	0.000***	0.000***	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Others	-0.001***	-0.000***	-0.001***	-0.002***	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Wage structure effect	0.064***	-0.006***	0.060***	0.052***	0.107***	0.003
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.004)
High school	-0.010***	0.048***	0.047***	0.022***	0.003*	-0.161***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.003)
University	-0.009***	0.031***	0.034***	0.021***	0.043***	-0.254***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.004)
Inv. Mills	4.400***	0.997***	7.532***	3.721***	-1.700***	-23.426***
	(0.310)	(0.279)	(0.312)	(0.374)	(0.467)	(0.879)
Migrated	-0.006***	-0.005***	-0.005***	-0.003***	-0.010***	-0.010***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Sectors	0.006***	-0.002***	0.019***	0.013***	-0.029***	0.002
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.004)
Military and civilian security (%)	0.002***	-0.001***	0.001***	0.002***	0.005***	0.001**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Business managers (%)	0.004***	0.000***	0.002***	0.003***	0.002***	0.013***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Science and engineering (%)	-0.021***	0.002***	-0.000	-0.002***	-0.003***	-0.089***
	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Health services (%)	0.003***	0.000***	-0.000***	-0.000***	0.001***	0.020***

	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Education (%)	-0.005***	0.000	0.001***	0.003***	0.000	-0.026***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Law related (%)	-0.004***	0.000	0.001***	0.000**	-0.000	-0.015***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Social science (%)	-0.002***	0.001***	0.002***	0.000	-0.004***	-0.044***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Technic tasks (%)	-0.008***	0.000**	-0.003***	-0.005***	-0.015***	-0.033***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.002)
Office and administrative (%)	-0.009***	-0.012***	-0.017***	-0.012***	-0.032***	0.036***
	(0.001)	(0.000)	(0.000)	(0.000)	(0.001)	(0.002)
General services (%)	-0.017***	-0.005***	-0.017***	-0.027***	-0.044***	-0.013***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.003)
Factory work (%)	-0.018***	-0.001	-0.037***	-0.060***	-0.084***	0.123***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.005)
Other jobs (%)	0.026***	0.001***	-0.006***	-0.001*	0.025***	0.088***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.002)
Experience	0.045***	0.065***	0.130***	0.204***	0.271***	-0.116***
	(0.003)	(0.003)	(0.003)	(0.004)	(0.005)	(0.010)
Black	0.013***	0.007***	0.003***	-0.024***	0.035***	0.063***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.003)
Formal	-0.047***	0.074***	0.048***	-0.012***	0.007	0.207***
	(0.004)	(0.003)	(0.003)	(0.004)	(0.005)	(0.011)
Others	0.048***	-0.037***	0.083***	0.097***	-0.002	-0.004
	(0.002)	(0.002)	(0.002)	(0.003)	(0.004)	(0.007)
Constant	-4.325***	-1.171***	-7.757***	-3.887***	1.637***	23.642***
	(0.307)	(0.276)	(0.309)	(0.370)	(0.462)	(0.867)

Source: authors' elaboration based on PNAD.

Table A7: Detailed decomposition of wage differential between São Paulo and Recife metropolitan regions—Women

	Mean	q.10	q.30	q.50	q.70	q.90
Composition effect	0.026***	-0.000	0.003***	0.003***	0.014***	0.065***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.003)
High school	-0.004***	-0.009***	-0.008***	-0.005***	-0.002***	-0.003***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
University	0.014***	0.006***	0.008***	0.012***	0.026***	0.023***
	(0.001)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)
Inv. Mills	-0.005***	-0.026***	-0.011***	-0.024***	-0.023***	-0.003
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.003)
Migrated	0.007***	0.000	0.000***	0.001***	0.006***	0.015***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)

Sectors	-0.014***	-0.000	0.003***	0.006***	-0.005***	-0.043***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)
Military and civilian security (%)	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Business managers (%)	0.000***	0.000***	0.000***	0.001***	0.002***	0.004***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Science and engineering (%)	0.002***	0.001***	-0.000	0.000***	0.003***	0.009***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Health services (%)	-0.002***	-0.000***	-0.001***	-0.001***	-0.003***	-0.004***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Education (%)	0.002***	0.004***	0.000	0.003***	0.004***	0.006***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Law related (%)	0.001***	-0.001***	0.000	0.000	-0.001***	0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Social science (%)	0.001***	0.002***	0.002***	0.003***	0.004***	-0.005***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Technic tasks (%)	-0.001***	0.000***	0.000***	0.000***	-0.001***	-0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Office and administrative (%)	0.003***	0.001***	0.001***	0.002***	0.006***	0.008***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)
General services (%)	0.012***	0.003***	0.006***	0.009***	0.019***	0.019***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)
Factory work (%)	-0.011***	-0.003***	-0.006***	-0.012***	-0.024***	-0.019***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Other jobs (%)	0.000***	-0.000**	0.001***	0.002***	0.003***	-0.008***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Experience	-0.004***	0.004***	0.001***	-0.000*	-0.004***	-0.015***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Black	0.012***	0.012***	0.005***	0.012***	0.002*	0.061***
	(0.001)	(0.000)	(0.000)	(0.001)	(0.001)	(0.002)
Formal	0.011***	0.006***	0.002***	-0.006***	0.001***	0.014***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Others	0.000***	0.001***	-0.002***	-0.001***	0.000	0.006***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Wage structure effect	0.066***	-0.036***	0.057***	0.098***	0.172***	0.123***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.004)
High school	0.045***	-0.016***	0.029***	0.066***	0.066***	0.013***
	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)	(0.004)
University	0.030***	-0.025***	0.034***	0.070***	-0.024***	0.082***
	(0.002)	(0.001)	(0.001)	(0.002)	(0.003)	(0.005)
Inv. Mills	1.020***	-9.923***	4.864***	-5.617***	-14.933***	-10.397***
	(0.378)	(0.289)	(0.296)	(0.342)	(0.628)	(1.336)
Migrated	-0.012***	-0.002***	-0.004***	-0.004***	-0.015***	-0.005***

	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Sectors	0.070***	-0.029***	-0.002	-0.016***	0.093***	0.074***
	(0.003)	(0.001)	(0.002)	(0.002)	(0.004)	(0.010)
Military and civilian security (%)	-0.000***	-0.000***	0.000***	0.001***	0.000***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Business managers (%)	0.005***	-0.000***	-0.000***	-0.001***	0.002***	0.008***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Science and engineering (%)	-0.001***	-0.001***	0.004***	0.003***	-0.006***	-0.010***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Health services (%)	-0.006***	-0.001***	0.000**	-0.003***	-0.011***	-0.024***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Education (%)	-0.010***	0.011***	-0.005***	0.009***	0.023***	-0.061***
	(0.001)	(0.000)	(0.000)	(0.001)	(0.001)	(0.002)
Law related (%)	0.001***	0.003***	0.000	0.002***	0.007***	0.011***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Social science (%)	0.001*	-0.008***	0.005***	0.001***	-0.011***	-0.018***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.002)
Technic tasks (%)	-0.001***	-0.003***	-0.010***	-0.011***	-0.005***	-0.026***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.002)
Office and administrative (%)	-0.032***	0.027***	-0.023***	-0.044***	-0.039***	-0.077***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.005)
General services (%)	-0.018***	-0.023***	-0.030***	-0.043***	-0.032***	-0.074***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.004)
Factory work (%)	-0.002***	-0.000	-0.005***	-0.000	0.012***	-0.002*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)
Other jobs (%)	0.008***	0.002***	0.001***	0.000	0.001*	0.050***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)
Experience	0.116***	0.183***	0.085***	0.122***	0.245***	0.291***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.008)	(0.014)
Black	-0.019***	0.017***	-0.017***	-0.010***	-0.051***	0.035***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.003)
Formal	-0.109***	0.067***	-0.055***	0.105***	0.119***	-0.102***
	(0.005)	(0.004)	(0.004)	(0.004)	(0.008)	(0.017)
Others	-0.143***	-0.064***	0.005*	-0.161***	-0.272***	-0.511***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.005)	(0.009)
Constant	-0.875**	9.750***	-4.820***	5.630***	15.004***	10.864***
	(0.372)	(0.286)	(0.292)	(0.338)	(0.620)	(1.319)

Source: authors' elaboration based on PNAD.

Table A8: Detailed decomposition of wage differential between São Paulo and Fortaleza metropolitan regions—Men

	Mean	q.10	q.30	q.50	q.70	q.90
Composition effect	0.150***	0.034***	0.053***	0.076***	0.197***	0.439***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.005)
High school	-0.006***	-0.002***	-0.004***	-0.005***	-0.008***	-0.004***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
University	0.101***	0.005***	0.025***	0.046***	0.115***	0.368***
	(0.001)	(0.000)	(0.000)	(0.000)	(0.001)	(0.003)
Inv. Mills	-0.001***	-0.000***	-0.000***	-0.000***	0.001***	-0.007***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Migrated	0.000***	-0.000**	0.001***	-0.000	0.000***	0.003***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Sectors	-0.014***	0.004***	0.001*	-0.002***	-0.004***	-0.079***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)
Military and civilian security (%)	-0.002***	-0.000***	0.000***	-0.001***	-0.002***	-0.010***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Business managers (%)	0.003***	-0.000***	-0.000**	0.001***	0.005***	0.015***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Science and engineering (%)	0.001***	0.001***	0.001***	0.003***	0.008***	-0.019***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Health services (%)	0.001***	0.000***	0.000***	0.000***	0.001***	0.006***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Education (%)	-0.002***	-0.001***	-0.001***	-0.001***	-0.002***	-0.012***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Law related (%)	0.001***	0.001***	0.001***	0.001***	-0.002***	-0.006***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Social science (%)	-0.003***	0.000	-0.001***	-0.001***	0.002***	-0.013***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Technic tasks (%)	-0.003***	-0.000***	0.001***	-0.000***	-0.005***	-0.022***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Office and administrative (%)	-0.001***	0.000***	-0.000***	-0.001***	-0.002***	-0.005***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
General services (%)	0.027***	0.005***	0.008***	0.017***	0.030***	0.083***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Factory work (%)	0.020***	0.002***	0.003***	0.010***	0.025***	0.067***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Other jobs (%)	0.003***	-0.001***	0.004***	0.003***	0.010***	0.010***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Experience	-0.001***	-0.000***	-0.001***	-0.001***	-0.001***	-0.003***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Black	0.015***	0.001***	0.008***	-0.001	0.026***	0.037***
	(0.001)	(0.000)	(0.000)	(0.000)	(0.001)	(0.002)

Formal	0.011***	0.021***	0.008***	0.004***	-0.006***	0.025***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Others	0.001***	-0.001***	0.001***	0.004***	0.005***	0.004***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Wage structure effect	0.143***	-0.045***	0.077***	0.226***	0.184***	0.051***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.005)
High school	0.001	0.059***	0.075***	0.057***	-0.011***	-0.096***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.003)
University	-0.003***	0.040***	0.059***	0.060***	0.039***	-0.335***
	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)	(0.005)
Inv. Mills	10.658***	4.898***	16.981***	15.222***	-5.814***	1.393
	(0.360)	(0.246)	(0.255)	(0.301)	(0.491)	(1.159)
Migrated	0.002***	-0.004***	-0.004***	0.002***	0.005***	0.010***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Sectors	0.008***	-0.021***	0.016***	-0.011***	0.012***	0.157***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.005)
Military and civilian security (%)	-0.002***	-0.001***	0.001***	0.001***	0.003***	-0.012***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Business managers (%)	0.005***	0.001***	0.001***	0.000***	-0.003***	0.009***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Science and engineering (%)	0.007***	0.003***	0.009***	0.010***	0.000	0.028***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)
Health services (%)	0.001***	0.001***	0.001***	0.001***	0.003***	-0.010***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Education (%)	-0.011***	-0.001***	-0.002***	-0.002***	-0.001***	-0.052***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Law related (%)	-0.001***	-0.000***	-0.001***	-0.002***	0.006***	0.010***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Social science (%)	0.006***	0.003***	0.009***	0.008***	-0.006***	0.003**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Technic tasks (%)	-0.005***	0.004***	0.002***	0.005***	0.001	-0.001
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.002)
Office and administrative (%)	-0.013***	-0.015***	-0.021***	-0.016***	-0.019***	0.086***
	(0.001)	(0.000)	(0.000)	(0.000)	(0.001)	(0.002)
General services (%)	-0.019***	-0.031***	-0.044***	-0.043***	-0.061***	0.127***
	(0.001)	(0.000)	(0.000)	(0.001)	(0.001)	(0.003)
Factory work (%)	-0.036***	-0.006***	-0.048***	-0.072***	-0.098***	0.185***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.005)
Other jobs (%)	0.009***	0.003***	-0.006***	0.002***	0.001**	0.032***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.002)
Experience	0.012***	0.079***	0.094***	0.132***	0.295***	-0.219***
	(0.004)	(0.002)	(0.002)	(0.003)	(0.005)	(0.011)
Black	-0.029***	-0.005***	-0.033***	-0.074***	-0.014***	-0.007**

	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.003)
Formal	-0.035***	0.006**	-0.034***	-0.024***	0.115***	-0.059***
	(0.003)	(0.003)	(0.002)	(0.003)	(0.004)	(0.009)
Others	-0.004	-0.062***	0.019***	0.071***	0.029***	0.040***
	(0.003)	(0.002)	(0.002)	(0.002)	(0.004)	(0.007)
Constant	-10.408***	-4.994***	-16.998***	-15.106***	5.704***	-1.237
	(0.355)	(0.243)	(0.253)	(0.298)	(0.486)	(1.145)

Source: authors' elaboration based on PNAD.

Table A9: Detailed decomposition of wage differential between São Paulo and Fortaleza metropolitan regions—Women

Mean	Mean	q.10	q.30	q.50	q.70	q.90
Composition effect	0.152***	0.047***	0.049***	0.087***	0.216***	0.284***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.004)
High school	-0.009***	-0.001***	-0.006***	-0.008***	-0.018***	-0.015***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
University	0.063***	0.001***	0.016***	0.032***	0.127***	0.140***
	(0.001)	(0.000)	(0.000)	(0.000)	(0.001)	(0.002)
Inv. Mills	0.007***	-0.002***	-0.005***	0.000	0.021***	0.043***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)
Migrated	0.003***	0.000***	0.001***	0.003***	0.001***	0.012***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Sectors	0.006***	0.002***	0.008***	0.012***	-0.011***	-0.009***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.002)
Business managers (%)	0.001***	0.000***	0.000***	0.001***	0.003***	0.006***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Science and engineering (%)	0.005***	0.001***	-0.001***	0.000***	0.001***	0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Health services (%)	0.006***	0.000***	0.000***	0.001***	0.004***	0.014***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Education (%)	0.005***	-0.002***	-0.003***	-0.001***	0.005***	0.020***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Law related (%)	0.002***	0.000***	0.000***	0.001***	0.002***	0.003***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Social science (%)	-0.001***	0.002***	-0.000**	0.002***	0.011***	-0.018***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Technic tasks (%)	-0.003***	-0.000***	0.000***	-0.000***	-0.005***	-0.007***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Office and administrative (%)	-0.016***	0.000***	0.001***	-0.003***	-0.019***	-0.047***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
General services (%)	0.011***	0.003***	0.005***	0.007***	0.015***	0.014***

	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Factory work (%)	0.047***	0.013***	0.010***	0.029***	0.071***	0.083***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)
Other jobs (%)	-0.000***	-0.000***	0.001***	0.002***	0.004***	0.003***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Experience	0.003***	0.002***	0.003***	0.002***	0.004***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Black	0.011***	0.005***	0.005***	0.002***	0.012***	0.044***
	(0.001)	(0.000)	(0.000)	(0.000)	(0.001)	(0.002)
Formal	0.008***	0.021***	0.012***	0.003***	-0.015***	-0.007***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)
Others	0.004***	0.001***	0.001***	0.002***	0.004***	0.004***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Wage structure effect	0.031***	-0.110***	-0.045***	0.093***	0.073***	0.084***
	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)	(0.005)
High school	0.029***	0.087***	0.075***	0.069***	-0.041***	-0.062***
	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)	(0.004)
University	0.029***	0.062***	0.099***	0.148***	-0.064***	-0.059***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.003)	(0.005)
Inv. Mills	-3.069***	2.139***	13.404***	3.281***	-23.267***	-44.602***
	(0.359)	(0.266)	(0.269)	(0.299)	(0.579)	(1.108)
Migrated	-0.002***	-0.003***	-0.007***	-0.009***	-0.003***	-0.002**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Sectors	-0.069***	0.027***	0.037***	-0.070***	-0.126***	-0.372***
	(0.004)	(0.001)	(0.002)	(0.003)	(0.006)	(0.009)
Business managers (%)	0.003***	-0.000***	0.001***	0.000***	-0.001***	0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Science and engineering (%)	-0.003***	0.001***	0.006***	0.004***	0.002***	0.013***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Health services (%)	-0.014***	0.000**	0.002***	0.001***	-0.005***	-0.042***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Education (%)	0.006***	-0.006***	-0.015***	0.000	0.035***	0.002
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.002)
Law related (%)	-0.001***	0.001***	-0.001***	0.001***	0.001***	0.010***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Social science (%)	0.009***	-0.002***	0.014***	0.012***	-0.009***	0.001
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)
Technic tasks (%)	0.011***	0.003***	0.001***	-0.000	0.023***	-0.007***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)
Office and administrative (%)	-0.021***	-0.010***	-0.051***	-0.070***	-0.069***	0.011***
	(0.001)	(0.000)	(0.001)	(0.001)	(0.002)	(0.003)
General services (%)	-0.015***	-0.018***	-0.031***	-0.039***	-0.034***	-0.100***

	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.003)
Factory work (%)	-0.000	0.001***	-0.015***	-0.010***	0.000	0.004***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Other jobs (%)	0.011***	0.003***	0.002***	0.003***	0.001***	0.018***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Experience	0.055***	0.012***	-0.039***	0.044***	0.146***	0.594***
	(0.004)	(0.003)	(0.003)	(0.003)	(0.006)	(0.011)
Black	-0.023***	0.005***	-0.018***	-0.026***	-0.038***	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
Formal	-0.007*	-0.068***	-0.153***	-0.027***	0.316***	0.222***
	(0.004)	(0.003)	(0.003)	(0.003)	(0.007)	(0.012)
Others	-0.087***	0.042***	-0.012***	-0.147***	-0.240***	-0.467***
	(0.003)	(0.002)	(0.002)	(0.002)	(0.005)	(0.008)
Constant	3.189***	-2.385***	-13.343***	-3.072***	23.446***	44.920***
	(0.354)	(0.263)	(0.266)	(0.296)	(0.572)	(1.094)

Source: authors' elaboration based on PNAD.