Economics Bulletin

Volume 39, Issue 2

DETERMINANTS OF WAGE INEQUALITY IN BRAZILIAN MUNICIPALITIES

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Abstract

This study analyzes the determinants of wage inequality in Brazilian municipalities from 2007 to 2016, based on panel data regressions of municipal variables calculated from microdata contained in the Annual Social Information Reports (RAIS) submitted by companies to the Ministry of Labor (MTE). In general, the main hypothesis was confirmed, namely a positive relationship between wage inequality and the number of formal jobs (a proxy for municipal size), i.e., municipalities with larger populations tend to have higher inequality levels. The same relationship was observed for the average monthly salary of the municipality. Besides this, the results indicate a positive effect on wage inequality of the proportion of workers in the financial sector, in the public sector, with college education and men in the workforce. In summary, a large part of the wage inequality in Brazil at the local level is generated by wage differences between sectors (e.g., percentage participation in the public and financial sectors), level of schooling (stock of human capital) and worker gender.

Citation: Matheus O. de Alencar and Jair A. Araujo and Wellington R. Justo and Celina Santos de Oliveira, (2019) "DETERMINANTS OF WAGE INEQUALITY IN BRAZILIAN MUNICIPALITIES", *Economics Bulletin*, Volume 39, Issue 2, pages 845-853
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Submitted: November 06, 2018. **Published:** April 25, 2019.

1. Introduction

Questions involving wage inequality are very important in academic discussions, both in Brazil and internationally. Analyzing the disparity of labor income is essential to understand the dynamics of income inequality in general.

Various studies of Brazil have addressed this theme, but the majority focus has been at the macrogeographic level. Investigation of inequality at the municipal[1] level, however, is also fundamental, because according to Lee *et al.* (2016), its effects can be felt more intensely in cities. Glaeser *et al*. (2009) also stresses the need to study inequality in the local context, noting that greater inequality is associated with higher crime rates, lower welfare, higher mobility and less growth of income.

In general for Brazil, several studies have found a significant decline in wage inequality since the start of the 2000s. Substantial reductions I income inequality, including labor income[2] have been notes since the second administration of President Fernando Henrique Cardoso, with a decline of the Gini index. During the administrations of President Lula (2003-2010), against a favorable backdrop of the global economy, mainly the rise of international commodity prices and the consequent expansion of economic activity and generation of jobs in Brazil, the reduction of wage inequality was even stronger (also see Barros *et al.* 2007 and Justo *et al.* 2017).

With maintenance of the economic policies of the Lula administration to combat the crisis of 2008, the administration of Dilma Rousseff began with positive results, leading to a sharp decrease in the unemployment rate, which lasted until 2014. However, in that year the international economic scenario started to change, marked by deceleration of the Chinese economy, crisis in the euro zone and slow recovery in the United States, among other factors. These elements, combined with aggravation of the Brazilian fiscal situation, led to a strong recession. Between 2014 and 2016, the unemployment rate doubled and the process of reduction of inequality in general stalled (see also Justo *et al.* 2017).

The sum total of these occurrences is that despite the advances achieved in reducing wage inequality in recent years, Brazil is still among the most unequal countries in the world. Various studies in the international literature have tried to explain the factors that influence wage inequality. In particular the association between wage inequality and city size is a pertinent topic that has been studied in recent years in various countries. Baum-Snow and Pavan (2013) demonstrated the existence of a positive relationship between wage inequality and city size in the United States in the period from 1979 to 2007, when faster growth of inequality was observed, mainly in groups of more skilled workers in larger cities. Also analyzing the United States, Behrens and Robert-Nicoud (2014) used quantile regressions and found that larger cities (hence with more workers) tend to be more unequal and polarized[3] with respect to wage distribution, and that trade between cities is associated with higher inequality levels.

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[1] The municipality is the local administrative unit in Brazil. It is akin to a county, except there is a single mayor and municipal council. Municipalities range from lightly populated rural ones with one or two small towns to heavily populated urban ones that are part of greater metropolitan regions. There are no unincorporated areas in Brazil.

[2] About 76% of household income in Brazil comes from labor. Estimates are that a large part of the household income disparity is a result of the inequalities of remuneration in the job market (also see Lavinas and Nicoll 2006).

[3] Polarization in this case, as the name indicates, is a measure of income inequality based on the concentrations of the population receiving higher and lower wages, i.e., the polarization of this population in the wage distribution. The theory of polarization measures was developed for the case where the income distribution can be described using density functions (see also Duclos *et al.*, 2004).

Analyzing the determinants of wage inequality in local Swedish labor markets, Korpi (2007) observed a positive relationship between wage inequality and population size. Lee *et al.* (2016), using the number of employed people as a proxy for population, observed the same relationship in UK cities. These authors also found that cities with higher average wages tend to have greater wage inequality.

These findings lead to the following questions: What factors influence the level of wage inequality in Brazilian municipalities? In Brazil, do more populous municipalities tend to be more unequal in general? What is the relationship between the average wage and the degree of wage inequality of Brazilian municipalities?

To address these questions, this study investigates the determinants of wage inequality in Brazilian municipalities in the interval from 2007 to 2016, and compares Brazil with other countries regarding the behavior of wage inequality in light of international studies already conducted.

Although this study covers a subject that has been widely discussed by economists, it contributes to the literature by shedding more light on the causes of wage inequality in Brazil and fills some gaps, such as by examining wage inequality in Brazil at the municipal level; adding important variables to control for inequality of labor earnings; and working with more recent data.

The article is composed of four sections including this introduction. The next section describes the methodological procedures, the third reports and discusses the results, and the last section concludes.

2. Methodology

This section presents information about the database, method of analysis and specification of the estimated models.

2.1 Database

The data used in this study consisted of microdata obtained from the Annual Social Information Reports (RAIS)[4] submitted by companies to the Ministry of Labor, tabulated at the municipal level, covering the period from 2007 to 2016. This cross section coincides with the start of the second term of President Lula until the first months of President Temer's term (after the impeachment of Lula's successor, Dilma Rousseff, during her second term in office.).

To assure the quality of the analysis, we excluded from the sample municipalities for which there were fewer than 10 observations and also those without information covering all the years analyzed, to obtain a balanced panel. Therefore, of the country's 5,570 municipalities, we considered 5,306.

The dependent variables used in the analysis were the Gini and Theil indexes, calculated by means of the average annual labor income of all workers in the municipality. The Gini index, based on the Lorenz curve, is an efficient tool to calculate the relative degree of inequality and as such is one of the most widely used measures of disparity in studies of income or wage inequality. In turn, the Thiel index is the natural logarithm of the ratio between the arithmetic

[4] Despite the limitation of this data source, since it only captures information about workers in the formal sector (which accounts for roughly half of occupied workers in the country), it is still very satisfactory due to the amplitude of information, including workers' characteristics.

and geometric means of per capita household income. Both indexes vary from zero to one, where values nearer to zero indicate less inequality, and vice versa (see also Hoffmann, 2006).

To explain the behavior of wage inequality in Brazilian municipalities, we applied control variables in the model based on the socioeconomic characteristics of the workers in each municipality. The explanatory variables were: number of jobs (formal sector) in each year, as a proxy for municipal size, as utilized by Lee *et al.* (2016); average wage; percentage of workers in the financial sector; percentage of workers in the public sector; percentage of workers with college degrees; percentage of foreign workers; percentage of workers in their peak earning years (peak earners); and percentage of male workers.

2.2 Specification of the Model

To analyze the behavior of wage inequality in Brazilian municipalities, we used municipal variables constructed from socioeconomic information on the workers in the respective municipalities. We estimated four models with panel data, as specified in Table 1.

According to Lee *et al.* (2016), there is a correlation between the size of a city (represented by the number of jobs) and the percentage of workers with college degrees on the one hand, and the average wage on the other, since large cities and/or those with more highly qualified residents tend to have higher wages. Besides this, consideration should also go to the contingent of "peak earners" (workers aged 35-50, when earnings are highest on average) in relation to the average wage. As a result of these relations, some explanatory variables were not included in some models.

Table I: Models of the relation between the Gini index and the explanatory variables

Model	Proposed Relation
	Models including the number of formal jobs variable
1	$lnineq = \propto_i + \beta_1 lnnjobs_{it} + \rho_t + u_{it}$
2	$lnineq = \propto_i + \beta_1 lnnjobs_{it} + \beta_2 percfinsect_{it} + \beta_3 percpubsect_{it} + \beta_4 perccollege_{it} + \beta_5 percforeign_{it} + \beta_6 percpeak_{it} + \beta_7 percmasc_{it} + \rho_t + u_{it}$
	Models including the average wage variable
3	$lnineq = \propto_i + \beta_1 lnavewage_{it} + \rho_t + u_{it}$
4	$lnineq = \propto_i + \beta_1 lnavewage_{it} + \beta_2 percfinsect_{it} + \beta_3 percpubsect_{it} + \beta_4 percforeign_{it} + \beta_5 percmasc_{it} + \rho_t + u_{it}$

Source: Prepared by the authors.

In these models, *lnineq* is the dependent variable and is represented by the natural logarithm of the Gini and Theil[5] indexes for wages of the municipality. In turn, the explanatory variables are: *lnnjobs,* given by the natural logarithm of the number of formal jobs in the municipality; *lnavewage,* the natural logarithm of the average wage of the municipality; *percfinsect*, the percentage of workers in the financial sector in the municipality; *percpubsect*, the percentage of workers in the public sector in the municipality; *perccollege,* the percentage of workers with college degrees in the municipality; *percforeign*, the percentage of foreign workers in the municipality; *percpeak,* percentage of peak earners in the municipality; *percmasc*, the percentage of male workers in the municipality; $\propto_i$, the municipality specific

[5] To test the robustness of the results, all the models specified in Table 1 were tested considering two wage inequality measures. Therefore, these models were estimated with the Gini index and Theil index as the dependent variable.

effect; and ρ_t, the time fixed effects. The subscripts *i* and *t* denote, respectively, the *i* = 1, 2, ..., 5,306 observable units (municipalities) and the *t* = 1, 2, ..., 10 periods (years).

All the regressions were estimated by fixed effects. There is no justification for estimating a model with random effects, for two reasons. First, we observe the universe of municipalities, so there is no stochastic bias that could come from having only a random sample. Second, the assumption that the stochastic terms are orthogonal to the regressors is untenable in this context.

3. Results

In this section we present the estimated results for the equations of the Gini and Thiel indexes for wages in function of the municipal size, average wage and percentage of workers in the public sector, financial sector, those with college degrees, foreign workers, peak earners and male workers, for Brazilian municipalities in the period from 2007 to 2016.

Models 1, 2, 3 and 4, presented in this part, are those specified in Table 1. The estimated results of the parameters of models 1 and 2, as well as the respective standard errors, are reported in Table 2, and the same results for models 3 and 4 are in Table 3.

Models 1 and 2, shown in Table 2, express regressions that consider the variable *lnnjobs*, referring to the natural logarithm of the number of formal workers in each municipality, used as a proxy for municipal population. In the first model, the regressions are estimated only with this variable, while in the second the other explanatory variables are included, according to the specification of the models in Table 1. In both models shown in Table 2, all the estimated coefficients are statistically significant at 1% and have the expected signs, except for the variables *percforeign* and *percpeak* in model 2, referring to the percentages of foreign workers and peak earners, neither of which is statistically significant.

Regarding the number of formal workers in the municipality, the variable *lnnjobs* has a positive sign in both regressions of models 1 and 2, meaning that in Brazil there is a positive relation between wage inequality and municipal size, so that larger municipalities tend to have a higher level of wage inequality. This finding is in accordance with the results of Korpi (2007), Glaeser *et al.* (2009) and Lee *et al.* (2016), obtained respectively for Sweden, United States and United Kingdom.

With respect to the elasticity of this variable in relation to wage inequality, according to model 1 an increase of 1% in the number of formal workers would result in an increase of approximately 0.059% in the Gini index and 0.117% in the Theil index. In model 2, with inclusion of the other explanatory variables, an increase of 1% in the number of workers produces the same increase in the Gini wage index (0.059%), while the Thiel index is slightly lower, at 0.126%. In other words, the inclusion of the other explanatory variables in the regression leads to little variation in the results regarding the effect of the number of jobs on inequality, indicating the effects are robust.

In model 2, which also considers the percentage of workers with college degrees (*perccollege*) to explain wage inequality, as was observed by Korpi (2007) and Lee *et al.* (2016), the percentage of these more educated workers had a positive relationship with the natural logarithm of the Gini index. In this case, each 1% increase in the percentage of workers with college degrees would raise the Gini index by 0.34% and the Thiel index by 0.38%.

Table II: Results of the estimates of wage inequality according to the number of jobs variable with panel data covering the period 2007-2016

Explanatory variables	Model 1		Model 2	
	Gini	Theil	Gini	Theil
lnnjobs	0.059* (0.009)	0.117* (0.015)	0.059* (0.86e^{-2})	0.126* (0.016)
percfinsect	-	-	1.75e^{-2}* (0.38e^{-2})	3.89e^{-2}* (0.85e^{-2})
percpubsect	-	-	0.18e^{-2}* (0.02e^{-2})	0.24e^{-2}* (0.04e^{-2})
perccollege	-	-	0.34e^{-2}* (0.04e^{-2})	0.38e^{-2}* (0.06e^{-2})
percforeign	-	-	-0.62e^{-2} (0.46e^{-2})	-0.13e^{-2} (0.29e^{-2})
percpeak	-	-	0.21e^{-2} (0.11e^{-2})	0.01e^{-2} (0.18e^{-2})
percmasc	-	-	0.63e^{-2}* (0.05e^{-2})	0.79e^{-2}* (0.07e^{-2})
Constant	-1.691* (0.061)	-2.544* (0.113)	-2.20* (0.077)	-3.23* (0.139)
Time fixed effects	Yes	Yes	Yes	Yes
N	53,060	53,060	53,060	53,060
Municipalities	5,306	5,306	5,306	5,306
F	100.95*	108.95*	73.23*	87.95*

Notes: Robust standard errors are given in parentheses. * significante a 1%.
Source: Prepared by the authors with data from the RAIS.

This result might appear contradictory, since previous studies in Brazil, such as Miro *et al.* (2014) and Miro *et al.* (2016), concluded that the increase in educational attainment was one of the factors for the drop in wage inequality since the start of the 21st century. However, for higher schooling level quantiles, the effect can be the opposite, i.e., among the contingent of more educated workers, increased schooling can have a positive effect on wage inequality, which is corroborated by our results.

Further regarding the positive impact of the proportion of workers with college degrees on wage inequality, mention should be made of the "paradox of progress", which according to Bourguignon *et al.* (2005) happens when educational progress causes an increase in inequality.

The estimated coefficient of the variable *percpeak*, referring to the percentage of workers classified as peak earners, is not statistically significant according to model 2 in any of the estimations. In the study by Lee *et al.* (2016), although this variable was significant with positive sign for some measures of inequality utilized by them, its coefficient also was not statistically significant to explain the Gini index.

Table 3 presents the estimates of equations 3 and 4, specified in Table 1, which consider the effect of the *lnavewage*, indicating the effect of the average wage in the municipality on wage inequality. As already shown in Table 1 in the model specification section, these regressions do not include the variables referring to the number of formal jobs in the municipality (proxy for municipal size), or those denoting the percentage of workers with college degrees and percentage of peak earners, because of the correlation these can have with the average wage value. The regressions of model 3 are estimated only considering the variable average wage, while model 4 includes all the other explanatory variables. In both models, all

the estimated coefficients are statistically significant at 1% and have the expected signs, except for the percentage of foreign workers, which is not significant.

The results of the estimations indicate that in Brazil, in the period analyzed, the average wage in the municipality was positively related with wage inequality, meaning that the higher the average pay, the greater the level of wage inequality observed. This result coincides with the findings reported by Korpi (2007), Glaeser *et al.* (2009) and Lee *et al.* (2016).

With respect to the elasticity of the average wage vis-à-vis wage inequality, according to the estimates of model 3, an increase of 1% in the average wage would result in increases of 1.14% in the Gini index and 1.72% in the Theil index. In model 4, in turn, with inclusion of the other explanatory variables, a 1% increase in the average wave would result in increases of 1.15% in the Gini index and 1.75% in the Thiel index. The positive effect of this variable can be associated with the fact that the rise in average pay can be associated with the presence of some workers in the municipality with very high salaries.

Table III: Results of the estimates of wage inequality according to the average wage variable with panel data covering the period 2007-2016

Explanatory variables	Model 3		Model 4	
	Gini	Theil	Gini	Theil
lnavewage	1.14* (0.038)	1.72* (0.056)	1.15* (0.038)	1.75* (0.056)
percfinsect	-	-	$0.87e^{-2}$* ($0.21e^{-2}$)	$2.29e^{-2}$* ($0.55e^{-2}$)
percpubsect	-	-	$0.05e^{-2}$* ($0.02e^{-2}$)	$0.01e^{-2}$ ($0.04e^{-2}$)
percforeign	-	-	$0.88e^{-2}$ ($0.45e^{-2}$)	$-0.39e^{-2}$ ($0.24e^{-2}$)
percmasc	-	-	$-0.05e^{-2}$ ($0.03e^{-2}$)	$-0.22e^{-2}$* ($0.05e^{-2}$)
Constant	-9.451* (0.269)	-14.01* (0.404)	-9.519* (0.269)	-14.11* (0.403)
Time fixed effects	Yes	Yes	Yes	Yes
N	53,060	53,060	53,060	53,060
Municipalities	5,306	5,306	5,306	5,306
F	257.39*	293.13*	197.92*	220.10*

Notes: Robust standard errors are given in parentheses. * significante a 1%.
Source: Prepared by the authors with data from the RAIS.

It is interesting to note that when including the other explanatory variables in model 4, the impact of the average wage on wage inequality practically did not change in comparison with model 3. This adds further evidence of the robustness of the results.

Besides this, the average wage value had a strong effect on wage inequality, indicating the importance of this variable. Therefore, public policies aiming to decrease wage inequality by increasing pay for contingents with lower income can produce better results, by reducing this dispersion without reducing the average wage.

With respect to the variables related to the work sectors included in models 2 and 4 (Tables 3 and 4), as expected the percentages of workers in the financial sector (*percfinsect*) and of workers in the public sector (*percpubsect*) had a positive relation with the two wage inequality measures, meaning the greater the proportion of workers in these sectors in the municipality, the more unequal the wages tended to be.

According to model 2, a 1% increase in the percentage of workers in the financial sector would result in rises of 1.75% in the Gini index and 3.89% in the Theil index, while according to model 4 these elevations would be 0.87% in the Gini index and 2.29% in the Thiel index. Lee *et al.* (2016) observed a similar result for cities in the United Kingdom.

Regarding the percentage of workers employed in the public sector, according to mode 2, a 1% increase in this variable would result in increases of 0.18% in the Gini index and 0.24% in the Theil index. In turn, for model 4 there would be an increase of 0.05% in the Gini index, while the change in the Thiel index was not statistically significant. One of the explanations for this result is the difference in pay between the public and private sectors. According to Vaz and Roffmann (2006) and Souza and Medeiros (2013), civil servants in Brazil receive higher average pay than workers in the private sector with similar attributes and engaged in the same activities.

As can be seen in Tables 3 and 4, the percentage of foreign workers (*percforeign*) was not statistically significant in either model in which it was included (models 2 and 4). This result to a certain extent was expected, given the small number of foreign workers in the majority of Brazilian municipalities.

Finally, as can be seen in models 2 and 4 (Tables 3 and 4), the percentage of male workers (*percmasc*) also generally presented a positive relation with wage inequality, coinciding with the result reported by Korpi (2007), that the higher the male participation in the workforce of a determined place, the greater the wage wage inequality tends to be. According to model 2, each 1% rise in the percentage of male workers would lead to an increase of 0.63% in the Gini index and 0.79% in the Theil index, while for model 4 there would be an increase of 0.22% in the Thiel index and 0.05% in the Gini index.

We also estimated models 3 and 4 with the Thiel wage inequality index as the dependent variable, to test the robustness of the results. All the coefficients had the same sign and significance, indicating the robustness of the estimations.

4. Conclusions

The objective of this study was to analyze the relationship between the level of municipal wage inequality and the municipal population (proxied by number of workers in the formal sector), along with other determinants, based on annual data covering the period from 2007 to 2016 from a sample of 5,306 Brazilian municipalities.

In general, our main hypotheses were confirmed, since we found a positive relation between wage inequality and the population size of the municipality, as well as with the average wage in the municipality, in line with findings for other countries.

We also found a favorable influence on wage inequality of the factors percentage of workers in the financial sector, percentage of workers in the public sector, percentage of workers with college degrees and percentage of male workers.

In summary, it was possible to observe that a good part of wage inequality in Brazil is generated by the existence of wage differences between economic sectors (in this study the percentages of workers in the public and financial sectors), schooling level (stock of human capital) and worker gender.

References

Baltagi, B. H. (2005) *Econometric Analysis of Panel Data*, New York: Wiley & Sons Ltd.

Barros, R. P., Franco, S. e Mendonça, R. (2007) "A recente queda da desigualdade de renda e o acelerado progresso educacional brasileiro da última década." IPEA discussion paper number 1304.

Baum-Snow, N. and Pavan, R. (2013) "Inequality and city size" *Review of Economics and Statistics* **95**, 1535-1548.

Behrens, K. and Robert-Nicoud, F. (2014), Survival of the Fittest in Cities: Urbanisation and Inequality. The Economic Journal, 124: 1371-1400.

Bourguignon, F., Ferreira, F. H. and Lustig, N. (2005). *The Microeconomics of Income Distribution Dynamics in East Asia and Latin America*, The World Bank.

Duclos, J. Y., Esteban, J. and Ray, D. (2004) "Polarization: concepts, measurement, estimation" *Econometrica* **72**, 1737-1772.

Glaeser, E. L., Resseger, M. and Tobio, K. (2009) "Inequality in cities" *Journal of Regional Science* **49**, 617-646.

Greene, W. H. (2000) *Econometric Analysis*, New Jersey: Prentice Hall.

Hoffmann, R. (2006) "Transferências de renda e a redução da desigualdade no Brasil e cinco regiões entre 1997 e 2004" *Revista Econômica* **8**, 55-81.

Hsiao, C. (2003) *Analysis of Panel Data*, Econometric Society Monographs.

Justo, W. R.; Alencar, M. O.; Alencar, N. S. (2017) "Retorno à Educação no Brasil com uso de Regressão Quantílica: 2003-2014" *Informe GEPEC* **21**, 9-23.

Korpi, M. (2007) "Does size of local labour markets affect wage inequality? A rank-size rule of income distribution" *Journal of Economic Geography* **8**, 211-237.

Lavinas, L. and Nicoll, M. (2006) "Pobreza, transferências de renda e desigualdades de gênero: conexões diversas" *Parcerias Estratégicas* **11**, 39-76.

Lee, N., Sissons, P. and Jones, K. (2016) "The geography of wage inequality in British cities" *Regional Studies* **50**, 1714-1727.

Machado, J. B. B., Sachsida, A. and Mendonça, M. J. C. (2005) "Abertura comercial e inflação: uma análise para dados em painel" *Estudos Econômicos (São Paulo)* **35**, 547-567.

Miro, V. H., França, J. M. S. and Pinho Neto, V. R. (2016) "Capital humano e desigualdade salarial no Brasil: uma análise de decomposição para o período 1995-2014" *Estudos Econômicos (São Paulo)* **46**, 579-608.

Miro, V. H., França, J. M. S. and Pinho Neto, V. R. (2014) "Capital humano e desigualdade salarial no Brasil: uma análise de decomposição para o período 2001-2012" In: *42° Encontro Nacional de Economia*. ANPEC.

Sonaglio, C. M., Zamberlan, C. O., Lima, J. E. D. and Campos, A. C. (2010) "Evidências de desindustrialização no Brasil: uma análise com dados em painel" *Economia Aplicada* **14**, 347-372.

Souza, P. H. and Medeiros, M. (2013) "Diferencial salarial público-privado e desigualdade de renda per capita no Brasil" *Estudos Econômicos (São Paulo)* **43**, 05-28.

Vaz, D. V. and Hoffmann, R. (2007) "Remuneração nos serviços no Brasil: o contraste entre funcionários públicos e privados" *Economia e Sociedade* **16**, 199-232.

Wooldridge, J. M. (2002) *Econometric Analysis of Cross Section and Panel Data*, MIT Press.