The effects of intergovernmental transfers on inter and intra regional inequalities

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Área 1 - Economia Regional

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Resumo

Este trabalho analisa o impacto das transferências intergovernamentais sobre as desigualdades inter e intra-regionais no Brasil. Utilizando as descontinuidades existentes no repasse do Fundo de Participação dos Municípios (FPM), este trabalho usa o design de regressão descontínua para identificar o impacto causal do FPM sobre as taxas de crescimento econômico regionais. Denter os principais resultados, foram encontrados impactos positivos das transferências intergovernamentais sobre a taxa de crescimento da região Nordeste e nenhum efeito sobre as demais regiões, o que é um indício de uma redução nas desigualdades interregionais no Brasil. No entanto, foi encontrado que o aumento na taxa de crescimento do Nordeste foi guiada por um maior dinamismo dos municípios mais ricos. Esses resultados sugerem que, embora essas transferências estejam ajudando regiões mais pobres a alcançarem o crescimento econômico, as desigualdades intraregionais devem aumentar.

Palavras-chave: Avaliação de Política, Crescimento, Desigualdades Regionais, Federalismo Fiscal

Abstract

This paper analyzes the impact of intergovernmental transfers on inter and intra-regional inequalities in Brazil. Taking advantage of the discontinuities of the Municipalities Participation Fund (FPM) – an important intergovernmental transfer – this paper uses a regression discontinuity design to identify the causal impact of FPM transfers on regional economic growth rates. We find that an increase in the FPM transfer impacts positively on economic growth rate of the poorest region of the country (Northeast) and has no significant impact on the richest region (Southeast), which indicates a decrease in the inter-regional inequality. Nonetheless, we find that the improvements on growth rates achieved by the Brazilian Northeast are driven by the richest municipalities. This results suggest that, even though intergovernmental transfers help poor regions catching up, intra regional inequalities may increase.

Keywords: Fiscal Federalism, Policy Evaluation, Regional Inequality

JEL: H72, H77, O15

1 Introduction

In the last decades, cash transfer programs have being used as an important instrument to reduce income concentration in Brazil (Barros et al., 2006; Carneiro et al., 2012; Soares et al., 2010, 2006, 2009). There is a solid literature on the influence of conditional cash transfers (CCT), such as *Bolsa Família* Program, on income inequality. Hoffmann (2006), for instance, finds that CCT decrease income inequality in 28% in Brazil and in 66% in the Northeast region between 1998 and 2004. Barros et al. (2006) estimate that 36% of the decrease in the income inequality between 2001 and 2004 in Brazil had happened because of the increase in the "income from other sources", which includes government transfers (*Bolsa Família*).

However, there are other transfers which are transferred from Federal to Local Government (state and municipalities) aiming to contribute to local development, since states and municipalities have a better knowledge about their necessities than the Central Government, and they could allocate more efficiently the received resources. Established by the tax reform of 1967, the State Participation Fund (FPE) and Municipalities Participation Fund (FPM) have the main objective of reducing regional inequalities. Differently from Conditional Cash Transfers, where money is directly transferred to population, FPM and FPE are transferred to local governments. Many researchers had studied in the last years the impacts of FPM on many different outcomes and they found positive impacts on education and negative impacts on poverty (Litschig, 2012; Litschig and Morrison, 2013), positive affect on corruption and a negative effect on the average education of candidates for mayor (Brollo et al., 2013) and positive effects on local public spending (Litschig, 2012).

The municipality funds are financed by 22.5% of the revenue of Income Tax and Industrialized Products Tax of previous year. Besides, from the amount transferred for each municipality, 20% is automatically insvested in the educational system,and at least 15% must be spent in the health system (Mattos and Ribeiro, 2015). The remaining can be spent in anything considered priority for each municipality, which is decided by the city council.

According to Paes and Siqueira (2008), the main contribution of this fund is decreasing regional inequality in Brazil, characterized as one of the highest in the world (Cossio and Carvalho, 2001). In fact, FPM, by construction, must reduce regional inequalities since it transfers income from more to less developed areas[1]. However, Gomes et al. (2000) and Politi et al. (2014) argue that FPM transfers are bigger, using per capita terms, for smaller municipalities (less than 10.000

[1]Based on FPM calculation, the amount is directly transferred to the municipality's inhabitant and indirectly to the state's GDP. In other words, the GDP's coefficients are bigger for municipalities in poorer states, particularly located in the Northeast region of the country.

inhabitants), which not necessarially means these are the poorest municipalities of the country.

Although the northeastern states of Brazil have the highest income coefficients of the country (determined by the wealth of the state), the number of inhabitants is crucial to determine the transfer value. The Brazilian semi arid area is considered the the poorest sub-region of the country, whose transfers flow is higher comparative to municipalities' revenue colected with taxes. Baião (2013) shows that, on average, a municipality budget in Brazil is composed by 64% of intergovernmental transfers, 20% of tax collection and 16% from other sources, such as economic activities at the industrial, agricultural or service sectors. In some parts of the Northeast region, for instance in the Semi arid area, the share of the intergovernmental transfers on the total revenue is even bigger, reaching sometimes more than 90% of total revenue.

Although the share of FPM on municipalities revenue in Brazilian municipalities is very high, the literature on their impacts on income and welfare is still lacking. It is very important to study more deeply how these funds are transferred to population because they are responsables por financing the biggest share of public services in developing countries (Litschig, 2012), such as in Brazil. According to Litschig (2012), big amounts of transfers do not guarantee neither the efficiency nor quality of public services. Therefore, the first objective of this paper is to analyze the impacts of FPM on regional inequality in Brazil and, secondly, identify the impact of these transfers on intra-regional inequalities, measured in both cases by the municipality economic growth rate. Similar analysis were developed for the EU Regional Policy and they find a positive impact of the structural funds on economic growth (Becker et al., 2010; Pellegrini et al., 2013).

Data set was collected by the Brazilian Finance (FINBRA) website, provided by National Treasure, and by the Demographic Census of 2010, provided by the Brazilian Institute of Geography and Statistics (*Instituto Brasileiro de Geografia e Estatística* - IBGE). Therefore, to analyze the causal effect of transfers on regional inequalities, this paper uses the same methodology as firstly used by Brollo et al. (2013) to analyse FPM impacts, which is the fuzzy regression discontinuity approach, whose instrument is the discontinuity among each population threshold. It is possible to measure the impact of an increase of a municipality revenue on economic growth rate, considering that municipalities very close to the threshold have very similar characteristics.

The results show an overall positive impact of FPM transfers on economic growth rate in Brazil driven by a positive impact on the Northeast and South regions. North, Southeast and Midwest regions do not present significant impact on their growth rates. Considering that the Northeast is the poorest region of the county and that the Southeast is the richest one, we conclude FPM is contributing

to reduce inter-regional inequalities. When analyzed the impacts on intra-regional inequalities, we observed a positive and significant impact on the economic growth rate of the 50% richest municipalities in the Northeast, whereas there is no impact for the 50% poorest municipalities in this region, which indicates an increase in the intra-regional inequality in the Northeast.

Besides this introduction, the paper is divided in four more sections. Second section reviews FPM and the fiscal federalism in Brazil. The following section describes the dataset and methodology, followed by the results and main conclusions.

2 FPM and Fiscal Federalism in Brazil

In Brazil, the biggest share of the municipalities revenue comes from intergovernmental transfers (Shah, 2006), which are constitutionals and without counterpart funds. According to Cossio and Carvalho (2001), intergovernmental transfers are very popular in developing countries, such as Brazil, and the main objective is to equalize the tax collection inequalities, which is the main source of differences of public services offered by local governments. The poorest regions, which is the Northeast in the Brazilian case, are more in need of public services and infrastructure, when compared to other richer and more developed regions, such as the Southeast.

According to STN (2008), the Constitutional Amendment n. 18, from January the 12^{th} of 1965, determined that 20% of Income Tax (IR) and Industrialized Product Taxes (IPI) must be transferred to states (10%), via FPE, and for municipalities (10%), via FPM. These percentages changed along the years and, in 1992, the value transferred to FPM increased to 22.5% of IR and IPI's collection from previous years and this percentage is the same nowadays.

From the total amount transferred to municipalities, 20% is automatically transferred to educational system. The Constitutional Amendment of September, the 12^{th} of 1996 created the Fund for Maintenance and Development of Elementary Education (FUNDEF), whose financial support comes from the FPM quota transferred automatically to the educational system. However, in December, the 19^{th} of 2006, another amendment was created to susbstitute FUNDEF by FUNDEB, which is still in place nowadays.

FPM allocation criteria are directly related to the size of municipality's population and inversely related to the state's GDP. From the whole amount of transfer, 10% must be distributed among states' capitals and 90% for the remaining municipalities, which is segmented between "interior" municipalities, (which receive 86.4% of the total amount) and "reserve" municipalities (which receive 3.6% of the total amount transferred as a complementary quota besides the "interior" quota). The "reserve" municipalities receive this extra transfer because they are

highly populated (population above 156,216 inhabitants). These rules were established in the Brazilian Constitution, where municipalities more (less) populated and which belong to poorer (richer) states receive a bigger (smaller) share of the transfer.

As highlighted by Gasparini and Ramos (2004), the population criterion is the main determinant of the 86.4% dos recursos do FPM. Thus, Table 6 presents population thresholds and their respectives coefficients, which is useful to calculate the theoretical transfers. According to Gasparini and Ramos (2004), smaller municipalities (those which less than 5,000 habitantes) are the ones which receive more per capita transfers in all macro-regions, except Southeast. This encouraged the creation of new and small municipalities along the last decades. Gomes et al. (2000) show that, 52% out of 1,405 municipalities created between 1984 and 1997 in Brazil had less than 5,000 inhabitants.

Information on population for each municipality and on per capita income of each state is informed by IBGE to Federal Court of Audit (Tribunal de Contas da União – TCU) before October the 31^{st} of the previous year. Tables 5 to 8 in the Appendix present coeffients used to calculate the theoretical transfers. To have more details about the metodology to calculate the transfers to capitals, interior and reserve municipalities, see STN (2008).

3 Empirical Strategy

3.1 Data

Data of FPM transfers are available at Brazilian Finance database (*Finançcas do Brasil* – FINBRA), provided by the National Treasure for 2010 and data for population and other variables were collected at Ipeadata website and Demographic Census data of 2010.

According to FPM mechanisms, municipalities are divided in populational brackets which determine transfers coefficients, as one can see in Table 6. This coefficient is an increasing function of the municipality population size, where a municipality above certain cut-off receives higher transfer comparing to the ones bellow it, keeping the level of their state's income constant. Figure 1 shows how transfers are distributed along the municipalities, with clear "jumps" in each thresholds of inhabitants. Besides, because each state receives a different percentage of the transfer (related to their wealth), two cities in the same populational threshold should receive the same amount of transfer only if they are in the same state. Let the populational coefficient of municipality m called λ_m and FPM_s the volume of transfer to state s, so the FPM volume transferred to municipality m in the state

s is given by:

$$FPM_m^s = \frac{FPM_s \lambda_m}{\sum_{m \in s} \lambda_m}.$$

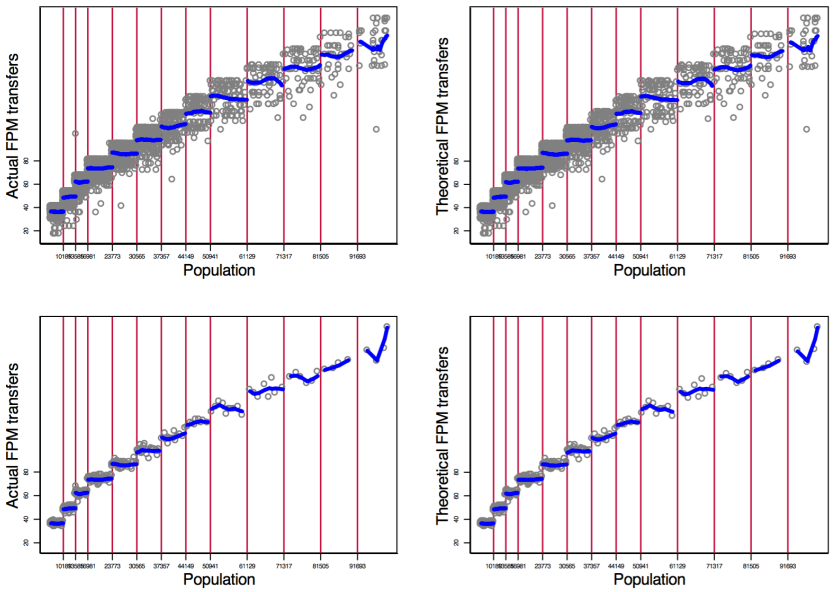

Figure 1: FPM distribution along the population, Brazil

Source: Author's elaboration. Data from FINBRA, 2010.

As one can see in Table 6, the difference between first and second thresholds is 3,396 inhabitants, and the difference between the sixth and seventh is 6,791. Therefore, to keep the simetry of the analysis, we included in the sample municipalities with 3,396 inhabitants bellow the first cut-off and 6,791 above the seventh cut-off, which is the last cut-off used in the estimations. We used only cities bellow the seventh threshold because the other brackets with higher population size were not many and the analysis for those cut-offs would not be accurate.

However, regression discontinuity analysis requires that only municipalities close to the cut-offs may be considered in the estimations, because the method assumes that observations right before and right after the discontinuities may have similar characteristics, difering only by the fact that a municipality with bigger population size receives more transfers than another one less populated. Therefore, we have considered only municipalities in the mid point of each interval before and after each threshold. For example, for the analysis in the first cut-off, we have considered municipalities whose population size is in between 8,490 and 11,886 inhabitants, while in the last threshold analyzed the population size is in

Table 1: Number of observation in each threshold

Threshold	Brazil	North	Northeast	Southeast	South	Midwest
Threshold 1	644	46	220	194	129	55
Threshold 2	510	42	228	121	82	37
Threshold 3	361	31	157	97	54	22
Threshold 4	444	39	197	121	62	29
Threshold 5	262	34	106	65	38	19
Threshold 6	161	16	67	45	22	11
Threshold 7	118	13	39	42	16	8

Source: Author's elaboration.

between 40,753 and 47,544. Thus, the final sample size is composed by Brazilian municipalities whose number of inhabitants is in between 8,490 and 47,544, which is represented by 2,673 municipalities. The same analysis is made for each one of the macro-regions such that the number of cities used in the analysis is not the actual number of cities in the whole region. Table 1 shows exatcly the number of observation in each threshold by macro-region for the seven brackets used in the estimations, considering only the municipalities in the mid point of the threshold before and the mid point of the threshold after. As one can see, when estimated each threshold individually, only regions Northeast and Southeast present enough number of observation. The Northeast is the region with higher number of municipalities, although the Southeast the most populated.

The outcome variable used in the analysis is the economic growth rate, calculated based on municipalities' per capita GDP for the years 2011 to 2013. The ideia is to identify if transfers received in 2010 had effect on economic growth of the following years. The first analysis observes whether an increase in FPM has effect on inter-regional inequality by macro-region and by threshold. The second analysis, when considering the intra-regional impacts, we have considered only municipalities in the poorest and richest regions of the country: the Northeast and Southeast, respectively. For this later analysis, the FPM impacts were observed for the 50% poorest municipalities and the 50% richest ones.

3.2 Identification Strategy

According to Khandker et al. (2010), participation rules in a public policy are considered exogenous identification instruments for participant and non-participant groups. In this paper, the upper bound of each population cut-off is the exogenous variation which we are interested. The choice of these cut-offs was defined exoge-

nously by the Brazilian Constitution. Therefore, it is possible to identify the effect of this policy on inter and intra-regional inequalities, measured by the economic growth rate of those municipalities around the cut-offs.

The idea of comparing municipalities above and below a certain cut-off came up from the fact of municipalities close to the threshold have similar characteristics, which make them comparable and useful to calculate the average treatment effect (ATE). Formaly, the population variable, p_m, determines the program eligibility[2]. Population is divided by cut-offs p^*, such that if a municipality m is in $p_m \leq p^*$, so it will receive a smaller share of transfers, otherwise ($p_m > p^*$) it will be in a higher threshold and will receive a higher amount of transfer.

We use a fuzzy regression discontinuity design (RDD), in which the probability of receiving the treatment is smaller than 1, unlike sharp RDD (Imbens and Lemieux, 2008). This happen, in FPM case, because population is not the only criterion that defines in which interval the municipality is and, therefore, how much it should receive.

Therefore, we calculate the theoretical transfers[3] ($\hat{\tau}$) and compare them to the actual transfers. While the theoretical transfers follow the pattern defined by the policy, actual transfers do not necessarily do, because some municipalities tend to overestimate their population estimatives to receive more transfers. **?**, for example, argues that there was a distortion of the population size of the small Brazilian municipalities and this may happen due to the distribution of FPM.

The effect of transfers on economic growth can be estimated by:

$$y_m = g(p_m) + \beta\tau_m + \gamma_s + \epsilon_m,$$

where β is the coefficient we are interested in, $g(.)$ is a high-order polynomial in p_m, γ_s is the state fixed effect, and ϵ_m is the clustered error term. We use $\hat{\tau}_m$ as an instrument for τ_m, where the first stage is given by:

$$\tau_m = g(p_m) + \alpha_\tau \hat{\tau_m} + \gamma_s + u_m,$$

where u_m is the clustered error term. In the next section we present the results for the impacts of FPM on inter and intra-regional inequalities in Brazil.

4 Results

The main hypothesis of the paper is that FPM transfers generate a higher economic growth rate for poorer regions, such as North and Northeast, and a negative or no

[2]To be precise, all of municipalities is treated by the policy. The eligibility, in this specific case, is to be alocated in a higher threshold, where it receives more transfers than in the case it was not allocated for this higher threshold.

[3]Theoretical transfers are those that should be received by municipalities considering the rule of the transfers, based on population estimations provided by IBGE in a previous year.

impact in the economic growth of the richer regions, such as the Southeast region. This hypothesis is based on the structure of the transfer by itself, where a bigger share of the amount is transferred to municipalities located in poorer states.

Table 2 presents the first stage estimations, where theoretical transfers explain actual transfers for Brazil and macro-regions. Besides the overall impact, we also have segregated the analysis of the effect of theoretical transfers on actual trasfers in two different groups: the three first thresholds (municipalities between 8,490 and 18,678 inhabitants) and the last four thresholds (municipalities between 20,377 and 47,544 inhabitants); and for each threshold individually. In all of the models we have included state fixed effects and a third-order polynomial based on the municipalities' population. The number of observations shown in the table represent the sample size of each region described in the column, considering the mid point below the first cut-off and the mid point above the seventh cut-off. To see the number of observation of each threshold for each region, see Table 1.

As expected, first stage estimations present coefficients positive and statistically significant at 99% confidence interval for all regions in the overall analysis and for most of the estimations by groups of thresholds. The exception is the North region, which does not present significant coefficents in the individual analysis of the first threshold. The number of observation for North and Midwest regions are very small comparing to the remaining regions, which need more caution in the interpretation of their results.

In Table 3 are exposed the estimations for the inter-regional analysis. As expected, the Northeast region presents a positive and statistically significant coefficient, indicating that an increase in the amount transferred to a municipality increase its economic growth rate. The other four macro-regions present non significant coefficients, which means that an increase of transfers in municipalities in those regions does not increase economic growth. This result, in general, suggests that FPM decreases regional inequality. This findings are in line with the findings of Becker et al. (2010) and Pellegrini et al. (2013) who studied the impacts of the regional funds in Europe on economic growth. Results by groups of thresholds also indicate a positive and significant effect of economic growth of northeastern municipalities, while the analysis for each threshold only present significant impact for the first, fourth and sixth intervals.

Considering that Northeast and Southeast regions have the highest number of municipalities, and that, in general, the Southeast region transfers income for the Northeast region[4], the intra-regional analysis in this paper considers only these two

[4]The Southeast is the richest macro-region of the country and, therefore, it is responsible for the biggest share of the income taxes and industrialized product taxes collected by the Federal Gorvernment. The Northeast, however, although very populated, is the poorest region of the country. Therefore, in general, one can say that Southeast transfers income to the Northeast region.

Table 2: First Stage

	Brazil	North	Northeast	Southeast	South	Midwest
Overall	0.995***	1.008***	0.994***	1.000***	0.988***	1.000***
	(0.005)	(0.009)	(0.013)	(0.000)	(0.012)	(0.000)
Threshhold 1-3	0.821***	0.603**	0.889***	1.016***	0.880***	0.685***
	(0.033)	(0.188)	(0.034)	(0.017)	(0.034)	(0.072)
Threshold 4-7	0.866***	0.812***	0.898***	0.991***	0.915***	0.768***
	(0.019)	(0.099)	(0.022)	(0.021)	(0.025)	(0.054)
Threshold 1	0.689***	0.378	0.765***	0.950***	0.749***	0.560***
	(0.042)	(0.259)	(0.042)	(0.015)	(0.049)	(0.097)
Threshold 2	0.730***	0.454*	0.853***	0.952***	0.784***	0.567***
	(0.049)	(0.221)	(0.064)	(0.021)	(0.042)	(0.095)
Threshold 3	0.761***	0.635***	0.797***	0.943***	0.807***	0.659***
	(0.026)	(0.123)	(0.033)	(0.025)	(0.038)	(0.073)
Threshold 4	0.788***	0.694***	0.823***	0.946***	0.835***	0.680***
	(0.027)	(0.151)	(0.029)	(0.025)	(0.031)	(0.070)
Threshold 5	0.806***	0.771***	0.856***	0.953***	0.853***	0.725***
	(0.021)	(0.084)	(0.023)	(0.021)	(0.028)	(0.059)
Threshold 6	0.830***	0.736***	0.851***	0.952***	0.837***	0.720***
	(0.021)	(0.096)	(0.027)	(0.023)	(0.032)	(0.058)
Threshold 7	0.836***	0.730***	0.864***	0.960***	0.855***	0.774***
	(0.017)	(0.085)	(0.027)	(0.019)	(0.027)	(0.047)
State Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
Cubic Polynom	Yes	Yes	Yes	Yes	Yes	Yes
N	2673	238	1086	721	428	200

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 3: Inter Regional Inequality

	Brazil	North	Northeast	Southeast	South	Midwest
Overall	0.042	-0.009	0.094*	-0.122	0.078	
	(0.035)	(0.138)	(0.050)	(0.112)	(0.050)	
Threshhold 1-3	-0.012	0.015	0.089*	-0.168	0.017	
	(0.050)	(0.156)	(0.051)	(0.200)	(0.064)	
Threshold 4-7	0.049	-0.058	0.109*	-0.115	0.035	0.087
	(0.031)	(0.112)	(0.060)	(0.083)	(0.044)	(0.068)
Threshold 1	-0.104	-0.027	0.184**	-0.702	0.042	-0.022
	(0.119)	(0.187)	(0.082)	(0.627)	(0.109)	(0.158)
Threshold 2	-0.058	-0.035	-0.138	-0.080	0.014	
	(0.066)	(0.180)	(0.182)	(0.166)	(0.103)	
Threshold 3	-0.039	-0.102	0.062	0.034	0.032	0.014
	(0.058)	(0.210)	(0.081)	(0.137)	(0.086)	(0.129)
Threshold 4	0.007	-0.168	0.171**	-0.253**	0.039	0.129
	(0.046)	(0.122)	(0.083)	(0.121)	(0.059)	(0.117)
Threshold 5	0.043	0.061	0.055	0.047	-0.029	0.092
	(0.047)	(0.172)	(0.084)	(0.140)	(0.066)	(0.104)
Threshold 6	0.010	-0.030	0.099*	-0.266	0.077	0.091
	(0.043)	(0.127)	(0.058)	(0.196)	(0.082)	(0.104)
Threshold 7	0.079	-0.506	0.068	-0.140	0.215**	0.108*
	(0.057)	(0.388)	(0.089)	(0.110)	(0.100)	(0.064)
State Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
Cubic Polynom	Yes	Yes	Yes	Yes	Yes	Yes
N	2673	238	1086	721	428	200

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 4: Intra Regional Inequality

	NE	50-	50+	SE	50-	50+
Overall	0.094*	-0.017	0.192**	-0.122	0.087	-0.369*
	(0.050)	(0.039)	(0.097)	(0.112)	(0.074)	(0.221)
Threshold 1-3	0.089*	-0.071	0.308***	-0.168	-0.002	-0.475
	(0.051)	(0.048)	(0.094)	(0.200)	(0.097)	(0.454)
Threshold 4-7	0.109*	0.029	0.109	-0.115	0.044	-0.262*
	(0.060)	(0.049)	(0.108)	(0.083)	(0.076)	(0.144)
State Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
Cubic Polynom	Yes	Yes	Yes	Yes	Yes	Yes

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Brazilian macro-regions, and its results are presented in Table 4. In this table, the first three columns present estimations for the Northeast region and the last three for the Southeast. Besides the overall effect for each region, presented in columns 1 and 4, the table also shows the effects on the 50% poorest municipalities (50−), and the 50% richiest ones (50+), considering the per capita GDP in 2007. We had considered 2007 GDP because it was the year used by the Government to calculate the states' income coefficient for the FPM tranfers in 2010.

The coefficients shown in the table indicate that FPM transfers have a positive and statistically significant impact on economic growth rate in the Northeast but not in the Southeast, which is an evidence of decreasing in the regional inequality. Columns NE and SE are the same as showed in the previous table. When considering the distribution of income of the municipalities, one can see FPM transfers do not affect economic growth rate in the poorest municipalities of the Northeast region, but do so for the 50% richiest ones, represented by a positive and 5% statistically significant coeffient of 0.192. In the Southeast, the overall impact on the region is not significant, but when considering rich and poor municipalities separately, one can observe a negative and significant impact of FPM on the 50% richer. Probably those municipalities are the ones which pay more taxes and proportionally receives less transfer. Therefore, for a richer region, FPM decrease intra-regional inequality, but for a poor region, the intra-regional inequality increases. We have not considered in this table the analysis for each threshold individually because of the decrease in the number of observations, which makes the estimations less truthful.

Therefore, using a regression discontinuity strategy, we found an evidence that

intergovernmental transfers in fact decrease regional inequality but increase intra-regional inequality of the poor region. This result may suggest the transfers are meeting their goals of reducing inter-regional disparities because poorer municipalities are growing faster than the richier ones.

5 Conclusions

This paper analyzes the impact of an intergovernmental transfers on inter and intra-regional inequalities in Brazil, measured by the economic growth rate of municipalities in differente macro-regions. Using data of transfers in 2010, provided by the Brazilian Finance, we used a regression discontinuity design to caputure the causal effect.

Results presented in this paper suggest that an increase in the FPM transfer impacts positively on economic growth rate of the poorest region of the country (Northeast) and has no significant impact on the richest region (Southeast), which indicates a decrease in the overall inter-regional inequality. Nonetheless, we find that the improvements on growth rates achieved by the Brazilian Northeast is driven by the richest municipalities. This results suggest that even though intergovernmental transfers help poor regions catching up, intra regional inequalities may increase.

This findings are in line with others papers which concentrated in the regional funds in Europe, such as Becker et al. (2010) and Pellegrini et al. (2013), which used the similar identification strategy of this paper. Although there is no consensus in the literature, these results are one more piece of evidence that regional funds reduce regional inequalities. However, the positive impact on economic growth rate of richest municipalities in the Northeast reveals a government expenditure more efficiently in those municipalities, possibly investing in more dynamic sectors. The 50% poorest municipalities – the ones for which we did not find any effect of the transfers – may be stuck in a poverty trap.

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Appendix

Table 5: Share of each state in the total of transfers – "Interior" municipalities, 2014

Region	State	% Participation
North	Acre	0,263
North	Amapá	0,1392
North	Amazonas	1,2452
North	Pará	3,2948
North	Rondônia	0,7464
North	Roraima	0,0851
North	Tocantins	1,2955
Northeast	Alagoas	2,0883
Northeast	Bahia	9,2695
Northeast	Ceará	4,5864
Northeast	Maranhão	3,9715
Northeast	Paraíba	3,1942
Northeast	Pernambuco	4,7952
Northeast	Piauí	2,4015
Northeast	Rio Grande do Norte	2,4324
Northeast	Sergipe	1,3342
Midwest	Goiás	3,7318
Midwest	Mato Grosso	1,8949
Midwest	Mato Grosso do Sul	1,5004
Southeast	Espírito Santo	1,7595
Southeast	Minas Gerais	14,1846
Southeast	Rio de Janeiro	2,7379
Southeast	São Paulo	14,262
South	Paraná	7,2857
South	Rio Grande do Sul	7,3011
South	Santa Catarina	4,1997

Source: Lei Complementar 62, de 28/12/1989 c/c Resolução-TCU 242/1990.

Table 6: FPM coefficients by population threshold – "Interior" municipalities

Population	Coefficient	Population	Coefficient
Up to 10,188	0.6	From 61,129 to 71,316	2.4
From 10,189 to 13,584	0.8	From 71,317 to 81,504	2.6
From 13,585 to 16,980	1.0	From 81,505 to 91,692	2.8
From 16,981 to 23,772	1.2	From 91,693 to 101,880	3.0
From 23,773 to 30,564	1.4	From 101,881 to 115,464	3.2
From 30,565 to 37,356	1.6	From 115,465 to 129,048	3.4
From 37,357 to 44,148	1.8	From 129,049 to 142,632	3.6
From 44,149 to 50,940	2.0	From 142,633 to 156,216	3.8
From 50,941 to 61,128	2.2	Above 156,216	4.0

Source: Decreto-Lei 1.881, de 27 de agosto de 1981.

Table 7: FPM – Per capita income factor

Inverso do índice relativo à renda per capita da entidade participante	Fator
Até 0,0045	0,4
Acima de 0,0045 até 0,0055	0,5
Acima de 0,0055 até 0,0065	0,6
Acima de 0,0065 até 0,0075	0,7
Acima de 0,0075 até 0,0085	0,8
Acima de 0,0085 até 0,0095	0,9
Acima de 0,0095 até 0,0110	1,0
Acima de 0,0110 até 0,0130	1,2
Acima de 0,0130 até 0,0150	1,4
Acima de 0,0150 até 0,0170	1,6
Acima de 0,0170 até 0,0190	1,8
Acima de 0,0190 até 0,0220	2,0
Acima de 0,0220	2,5

Source: Lei nº 5.172, de 25/10/66 (Accessed in `http://www.planalto.gov.br/ccivil_03/Leis/L5172.htm`).

Table 8: FPM – Population factor

Categoria do Município, segundo seu número de habitantes	Coeficiente
Até 10.188	0,6
De 10.189 até 13.584	0,8
De 13.585 até 16.980	1,0
De 16.981 até 23.772	1,2
De 23.773 até 30.564	1,4
De 30.565 até 37.356	1,6
De 37.357 até 44.148	1,8
De 44.149 até 50.940	2,0
De 50.941 até 61.128	2,2
De 61.129 até 71.316	2,4
De 71.317 até 81.504	2,6
De 81.505 até 91.692	2,8
De 91.693 até 101.880	3,0
De 101.881 até 115.464	3,2
De 115.465 até 129.048	3,4
De 129.049 até 142.632	3,6
De 142.633 até 156.216	3,8
Acima de 156.216	4,0

Source: Lei nº 5.172, de 25/10/66 (Accessed in `http://www.planalto.gov.br/ccivil_03/Leis/L5172.htm`).