Intergovernmental Transfers and Fiscal Equalization across Regions: A Standardized Analysis for Brazilian Municipalities

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Abstract: This research aims to apply a method to investigate redistributive and equalization aspects of unconditional transfers received by municipalities. This method allows investigating how the ranges of per capita transfers are associated with fiscal capacity and fiscal need, controlling for social-demographic and human development index variables. Using 2010 data, we find that the largest recipients of FPM owns around 35% of fiscal gap distribution, meanwhile the smallest recipients owns only 15% of fiscal gap cumulative proportion. The concentration factors are different by region and the distribution is more unequal in states from Southern region and more equal in states of the Northeast region. This analysis suggests that for transfer's redistribution, regional distributive rules could be more appropriate to provide equalization than the national rules.

Keywords: Fiscal Equalization, intergovernmental transfers, regional imbalances

JEL Codes: R10, R50, H72, H77.

1. INTRODUCTION

Fiscal imbalance between different levels of government is quite common in a Federal system, mostly between central and subnational government jurisdictions. As in most federations, in Brazil, although tax incidence occurs largely at low local levels, the central government collects the tax revenue. This fiscal imbalance asks for vertical resources redistribution. However, the distribution of tax revenues from the central government to local and regional spheres is a source of severe conflict. In Brazil, most municipalities and states consider that they receive less federal support that they should.

In fact, fiscal transfers affect the fiscal behavior of local governments from the local number of public employees to the amount of provision of public services, which should influence horizontal efficiency and inequality between municipalities (SHAH, 2007). In Brazil, the Municipal Participation Fund (MPF, Fundo de Participação de Municípios in Portuguese) constitutes in the main fiscal instrument to provide vertical transfers from central to subnational governments.

Regarding fiscal imbalance, it is a methodological challenge to comprehend if intergovernmental transfers promote equalization, in which a horizontal fiscal target is set for different jurisdictions; or redistribution, in which tax revenues flow from rich municipalities to the poor ones, independent from fiscal need. There is some academic research considering MPF in Brazil, but most of the research includes raw descriptive analysis (GASPARINI e MIRANDA, 2006; MENDES, MIRANDA e BLANCO, 2008) or data envelopment analysis (GASPARINI e MELO, 2004; GASPARINI e MIRANDA, 2011).

In this paper, we propose a standardized analysis in which it is possible to tackle simultaneously equalization and redistributive aspects of MPF transfers. In this horizontal analysis, we consider both fiscal revenue capacity and fiscal needs among municipalities, through a fiscal gap indicator. This methodology allows evaluating the fiscal gap conditioned to the Human Development Index (HDI), socioeconomic characteristics, and gross domestic product in MPF ranges (Quintiles). Moreover, it is possible to identify which MPF characteristics increase or reduce the fiscal gap by regions.

This analysis is relevant for Brazil, since transfers from MPF tend to be the main source of revenue for municipalities with small numbers of inhabitants. In contrast, in larger municipalities, with important production sites, state devolutive transfers (from sales tax[1]) constitutes the major source of local tax revenue. On average, transfers revenue represents around 65% of municipalities' fiscal revenue, meanwhile local tax revenues accounts for less than 20% of the resources (MENDES, MIRANDA e BLANCO, 2008).

The conflicting objectives between devolutive (from state sales tax) and redistributive transfers (from MPF), from different levels of government (central versus state) and the low fiscal capacity of most municipalities leads to a huge discussion about the fiscal allocation among municipalities. In Brazil, due MPF distributional criteria, cities with small populations tend to receive a much larger MPF per capita than the largest cities in the country. Large municipalities with important production sites tend to receive more state devolutive per capita

[1] Sales tax in Brazil is similar to a value added tax (VAT) and is collected at the state level. It is called ICMS in Portuguese, it is simultaneously a source, and destination based tax.

transfers. Because of this scenario, commuter towns close to large cities but with low production and low public provision of services tend to be the largest unassisted jurisdictions from intergovernmental transfers (MENDES, MIRANDA e BLANCO, 2008).

Based on the standardized method, we identify fiscal inequality in municipalities in Brazil by MPF quintiles and Brazilian regions. While municipalities in the highest MFP quintile per capita responds for around 35% of the total fiscal gap share, municipalities in the lowest quintile respond for around 15% of the accumulated fiscal gap. This horizontal inequality among municipalities is stronger in towns located in the South region and weaker in the towns of the Northeast region. Moreover, municipalities with higher percentage of rural inhabitants receive more MPF per capita.

More interesting, we identify that the factors that contribute most for fiscal inequality among municipalities varies according to the national region. As long as in the South region MPF per capita transfers are positively associated with devolutive state transfers (largest recipients of state transfers are also larger recipients of devolutive transfers), in Northeast region there is a positive relation between MPF per capita transfers and matching grant to support education from central government (FUNDEB in Portuguese, see discussion in section 2.1 next). Regarding equalization, these results shed light on the discussion of fiscal inequality between municipalities and results suggest that a uniform national rule to attribute intergovernmental transfers could be less appropriate than some criteria which incorporates different regional characteristics.

The methodology used to standardize fiscal capacity and fiscal need is described in section 3. First, we describe intergovernmental transfers in more detail in section 2. Later, on section 4 we detail the dataset and in section 5 we discuss our main results. Finally, on section 5 we conclude.

2. Transfers and Local Budget

2.1 Intergovernmental transfers in Brazil

In 1967, Federal Constitution in Brazil attributed local fiscal base and tax revenues to the central government. Consequently, it provoked a huge fiscal imbalance. In order to minimize this effect, around the same time the central government created two intergovernmental funds: the MPF to redistribute tax revenues to municipalities and the State Participation Fund (SPF, in Portuguese FPE), to redistribute resources to states (GASPARINI e MIRANDA, 2006). In 1988, a new Federal Constitution increased the total of resources available to both funds (SPF and MPF). This set of rules is still valid, and MPF resources are composed of 21,5% and 22,5% of tax revenues from federal income tax and federal sales tax, respectively.

Brazil is composed of 5,565 municipalities. The criteria for MPF distribution´s resources presents different rules for municipalities with more than 142 thousand inhabitants or jurisdictions that are states´ capital. For both states ‘capital and municipalities with populations above the 142 thousand population cutoff, the share of transfers depends on inverse income factors and population

factors.[2] We also should note that most populated cities in Brazil are states' capital. Only three Brazilian cities present more than 1 million inhabitants and are not states 'capital: Campinas and Guarulhos, in São Paulo state and São Gonçalo (in Rio de Janeiro, State). Besides, 26 states´ capital, there are around only 160 municipalities with more than 142 thousand inhabitants, and both group accounts for around 95 million habitants (approximately half of the country's population). Contrastingly, the share of municipalities with less than 142 thousand inhabitants (more than 95% of municipalities) depends only on population factors varying by population ranges (see Table B on appendix).

Due this arrangement, MPF per capita transfers varies largely by municipalities´ population size. MPF rules tend to privilege less inhabited cities and tend to affect negatively non-states 'capital cities with more than 150 habitants (Mendes, Miranda e Blanco, 2008).

TABLE 1 - Per capita revenues across municipalities ranges (in 2010 R$)

Populational Range	FPM	Tax Revenue	Transfers			GDP
			State	SUS	FUNDEB	
up to 5 k	1,493.1	110.5	583.2	107.3	253.5	13,020
> 5 to 10 k	678.3	98.9	396.2	100.9	252.6	11,378
> 10 to 25 k	507.8	95.0	303.7	104.1	250.8	10,238
> 25 to 50 k	371.0	141.3	316.5	102.9	246.0	12,388
> 50 to 250 k	262.2	213.2	365.7	130.9	217.7	16,121
> 250 k	145.1	386.4	435.3	159.6	165.7	22,313

As depicted in Table 1, MPF per capita transfers are a decreasing function of population ranges. Whereas municipalities up to 5 thousand inhabitants get on average R$ 1,500 MPF transfers per capita, municipalities with more than 10 thousand inhabitants get R$ 600 or less per capita. When someone considers matching grants from the Health System Fund (SUS, in Portuguese) and Fund for Development of Basic Education (FUNDEB, In Portuguese), total transfers inequality among municipalities drops a little, but it is still quite high (see column other transfers). Nevertheless, it is possible to note that for most municipalities' intergovernmental transfers represents more than 90% of total budget resources.

This descriptive analysis confirms that medium size municipalities close to state capital tend to present less budget resources per capita. These municipalities are negatively affected by two factors: they tend to receive less MPF per capita because of population ranges, and tend to get less devolutive state transfers, since they own small number of industries. In this framework, we should raise the discussion of how much transfers share should depend on population ranges (RESCHOVSKY, 2007).

To avoid large fiscal imbalance, we should expect that municipalities with a large fiscal need (higher demand for public services) get more fiscal revenues. For this reason, municipalities with a large tax base (high number of inhabitants) are

2 Due this rules, states' capitals with large population and small per capita income get high absolute MFP transfers, as e.g. Fortaleza and Salvador. However, in per capita terms, states´ capital with smaller population and low income per capita, get more MPF transfers, as e.g. Palmas and Boa Vista. See (Gasparini e Miranda, 2006), pp. 20-26.

expected to collect more tax revenue from property tax and corporate tax (SLACK, 2007). However, in Brazil, municipalities present low autonomy over tax base, and the tax revenues from property tax (IPTU in Brazil) and local services (ISS in Brazil) are low as a percentage of total budget, even in wealthier cities. Thus, large cities tend to present higher fiscal gap than small cities.

2.2 Fiscal equalization across municipalities

The difference between fiscal revenues (or fiscal capacity) and fiscal need is known in public finance literature as fiscal gap (BOADWAY e SHAH, 2007). This fiscal imbalance is a typical vertical problem in federative systems: as long as central governments cumulate tax revenues, local jurisdictions present low fiscal capacity (WILSON, 2007). In many countries, as also true for Brazil, although the federation concentrates much of tax revenues, local and states should provide some important public service as education, health and public security.

Standard approach defines the fiscal gap as the difference between fiscal need and fiscal capacity (RESCHOVSKY, 2007). Regarding fiscal gap, a main concern is to find an appropriate and feasible measure of fiscal need addressing both political and economic aspects of local jurisdictions (DAFFLON, 2007). In a broad sense, we could define a fiscal need as the total amount that the local jurisdiction would use to public provision of services locally assigned. (DAFFLON, 2007). In public finance literature, there is some consensus about the idea that public provision costs varies according to municipalities geographical characteristics, scale economies, congestion problems, labor force, and socioeconomic composition (RESCHOVSKY, 2007).

Although there is a huge theoretical discussion about how intergovernmental transfers should equalize the fiscal gap, considering both fiscal capacity and fiscal need, few governments are able to consider fiscal need to approach fiscal gap. This is particularly true for developing countries, where most jurisdictions present large fiscal capacity inequalities and face lack of information regarding public provision costs (DAFFLON, 2007).

For these reasons, it is not usual in several countries to include the fiscal need or local expenses as criteria for transfer's distribution among municipalities. Usually, countries consider fiscal capacity as a main indicator to try to promote equalization (DAFFLON, 2007). Based on equalization, central government should provide a uniform treatment for similar jurisdictions. The main assumption of horizontal equalization is that individuals should get the same level of public provision whatever they live (WILSON, 2007). This aspect of equalization should guarantee that allocation is efficient in contrast to distorcive allocations which incentive individuals to migrate to municipalities with higher net fiscal benefits (ALBOUY, 2012).

However, it is quite difficult to set transfer distribution criteria that accomplish both vertical fiscal imbalance and horizontal equalization between municipalities. Additionally, there is little consensus in the theoretical literature about transfers equalization versus transfer redistribution. There is more consensus about the inefficiency associated with an increase in transfers to isolate and low populated regions, with high cost of public provision (SLACK, 2007). Contrastingly, when congestion costs are superior to equalization efforts, it could be more efficient for local governments to incentive migration, (DAFFLON, 2007). In this scenario, a huge amount of transfers to metropolitan areas can increase migration to these

areas and can uphold congestion costs (FENGE e MEIER, 2002). Regarding matching grants, it is broadly accepted that larger cities present more resources to attain central governments' investments in health and education. However, matching grant tends to diminish local autonomy over budget decisions. For this reason, small cities should receive more unconditional block grants, in order to attain fiscal equalization 2007).

On theoretical ground, fiscal transfers are compatible to both fiscal gap equalization and efficient allocation, when resource distribution is based on individual characteristics instead of municipalities socioeconomic characteristics (ALBOUY, 2012). Thus, efficient distribution reaches the poor share of population wherever they live. The main implication of this theoretical background that is quite hard to reach both equalization and efficiency through intergovernmental transfers. Actually, intergovernmental transfers can reach poor regions but still not benefit poor individuals.

In most countries, intergovernmental transfers are set to pursue fiscal capacity equalization, leaving fiscal need equalization as a minor issue (BOADWAY, 2004). Thus, in most cases, transfers promote redistribution instead of equalization; actually, public provision equalization is replaced by redistribution of fiscal capacity (DAFFLON, 2007). In this context, municipalities with higher tax revenues should transfer resources to jurisdictions with a smaller tax base, and this fiscal redistribution should reflect local per capita income. Regarding our methodological approach, the transfer policy analysis should evaluate both fiscal gap equalization and redistribution based on municipalities' socioeconomic characteristics. Regarding efficiency and equity, a transfer policy analysis should consider both effects (ALBOUY, 2012).

3. METHODOLOGICAL FRAMEWORK

3.1 Standardized Analysis and Fiscal Need

As previously discussed in Section 2, several factors including fiscal capacity and fiscal need should be considered to evaluate transfer allocation. One of the most relevant need factors is the local provision of public services. Thus, the fiscal need could be obtained using information about direct costs of public provision or estimating local demand for these services. Additionally, it is important to consider some information regarding fiscal capacity. For these reasons, we consider in our analysis the standardized fiscal gap of municipalities measured as the difference between local current expenses (fiscal need) and local tax revenues (fiscal capacity).[3]

Since standardization is a measure of horizontal equity, our analytical focus is the municipalities across ranges of MPF per capita. Ranges are usually grouped by quartiles, quintiles or deciles. Based on the standardized approach, once we control for factors which affect fiscal need, municipalities should present similar distribution of fiscal gap by MPF ranges. In a situation in which there is no

3 The standardized methodology is discussed in O'Donnell et. Al. (2008). It is used originally to measure the inequality of access to health services by socioeconomic groups. Still, Dafflon (pp. 373; 2007) develop a similar approach to address fiscal capacity equalization. Methodological discussion in this section follows O'Donnell et. Al. (2008).

difference of fiscal gap by MPF quintiles, per capita distribution of MPF among municipalities would promote perfect equalization. Contrastingly, after the fiscal need standardization, any difference (inequality) in the fiscal gap average between municipalities by FPM ranges could be interpreted as redistributive (this could even cause more inequality) policy, instead of equalizing.

Beyond the actual distribution of FPM per capita by quintiles, the standardized method aims to estimate the expected or predicted fiscal gap based on need factors as also condicional to additional variables that affect both fiscal capacity and fiscal need. Those covariates, which could be correlated to both fiscal gap factors and MPF are included in the regression to avoid the omitted variable problem. For these reasons, the predicted estimate considers the relationship between need factors and covariates, as described in function (1):

$$y_i = \alpha + \sum_j \beta_j \, x_{ji} + \sum_k \gamma_k z_{ki} + \varepsilon_i \quad (1)$$

Where: y is a fiscal gap variable (difference between fiscal capacity and fiscal need, we use tax revenue and current expenses respectively) in each locality *me*; β and γ are the parameters of interest, x_j is the set of variables that define fiscal need (need factors) and generate standardization;z_k are the covariates that do not define need directly, but we wish want to control for the partial correlation with the need factors.

The literature usually defines as need factors (SHAH, pp. 38, 2007): the share of young in the jurisdiction (proxy for educational demand) , the share of elderly (proxy for health demand) and some socioeconomic indicators of inequity as Gini index, or Human Development Index (HDI) as suggested by Mendes, Miranda e Blanco, 2008. Additional explanatory variables (covariates) should reflect scale gains on the provision of public services, as population density, the share of rural área and average years of education (it reflects productivity).

Using fiscal need variables and controlling for covariates, the predicted fiscal need could be estimated by a linear regression. Thus, the predicted (or expected) fiscal gap, y^E is estimated using individual values of need variables and controlling for sample mean of covariates (non need factors), as detailed in function (2):

$$\hat{y}_i^E = \hat{\alpha} + \sum_j \hat{\beta}_j x_{ji} + \sum_k \hat{\gamma}_k \bar{z}_k \quad (2)$$

The standardized need, y^P, is obtained from the difference between the actual need (y) and the predicted need, plus the overall sample mean of the municipalities fiscal gap, as described in function (3):

$$\hat{y}_i^P = y_i - \hat{y}_i^E + \bar{y} \quad (3)$$

The standardized inequality could be more or less than the actual (observed) distribution, since the distribution corrects for the need factors of each municipality. Standardized need brings the fiscal gap distribution conditioned to need factors. Thus, we expect that the standardized distribution brings a more accurate measure of the need for fiscal resources (transfers), since it controls for socioeconomic and demographic composition of each jurisdiction and allow to

identify inequality around FPM ranges. We should note that the analysis is kept descriptive, and it does not allow to establish causal relationships.

The main idea is that after standardization, if any difference of fiscal gap is found by MPF ranges it means that there fiscal inequalities across FPM ranges. The main methodological issue is to investigate if after standardization, in the high FPM quintiles the average per capita fiscal gap is different from the average fiscal gap found in the lowest quintile (inequality).

3.2 Data set

To evaluate fiscal need and the redistributive aspects of FPM transfers we collect data from Ipeadata source (public finance data) and National Treasure data available at FINBRA data. All monetary values are brought to the year 2010 present values. Moreover, monetary variables should be representative and stable around them (DAFLON, 2007). For these reasons, we use the average of a three year sample, from year 2009 to 2011. Moreover, we calculate the per capita values of monetary variables for all municipalities.

Additional demographic information as share of rural population, share of women, population density is available at the National Bureau of Economics and Statistics (IBGE) for the year 2010. The complete set of independent e variables, and their respective mean by FPM controls are in Table 2. The total sample is composed of 5,240 jurisdictions out of total 5,565 municipalities in which these variables are available.

We note in Table 2 that with exception of the lowest MPF per capita quintile (in our sample, this quintile concentrates the state capitals), the municipalities present on average approximately the same per capita tax revenue, around R$ 100 per inhabitant, which reflect the low fiscal capacity of most jurisdictions. Different from it, the average per capita expenses are very different across MPF Quintiles. In the highest quintile, for example, the average current expenses are approximately twice the average expenses of the lower group. It is noteworthy that the fiscal gap reflects mostly jurisdictions expenses, once local tax revenues are fairly similar across quintiles (with exception of the highest range) and quite low. This discussion reinforces the importance to comprehend per capita MPF distribution across quintiles, since MPF constitutes in the main municipalities revenue source.

Interestingly, descriptive analysis of Table 2 reveals that municipalities in the intermediate FPM quintiles (second to fourth quintile) presents the lowest sócio economic indicators, for example, per capita GDP, income HDI, access to treated water, infant mortality and share of illiterates. MPF distribution across quintiles is obviously associated with MFP rules, and there is a negative relationship between MPF and municipalities' population. We note that there is a positive relationship between MPF transfers and local expenses. In the next section, we discuss further these indicators using the standardized approach.

TABLE 2 Per capita average across MPF quintiles (year 2010 - monetary values in 2010 R$)

MPF quintiles	Poorest	2º	3º	4º	Richest	Total
FPM	283.25	449.16	555.87	773.96	1,597.46	731.82
Tax Revenues	203.84	117.32	84.94	93.36	113.13	122.53
Expenses	1,021.9	1,092.6	1,100.7	1,320.4	2,124.9	1,332.0
State devolutive transfers	361.97	345.96	308.82	379.36	624.41	404.08
SUS (health) matching grants	123.03	105.37	100.65	101.43	107.10	107.51
Fundeb (education) matching grant	224.31	248.70	253.00	252.25	252.83	246.23
GNP	15,576	12,183	9,476	10,914	13,669	12,364
Density	420.85	52.70	40.07	30.30	20.10	112.85
Population	129,976	20,914	12,559	7,085	3,148	34,284
% aged	10.1%	11.2%	12.3%	12.9%	14.4%	12.2%
% young	27.8%	28.4%	27.6%	27.0%	24.7%	27.1%
% Infant mortality	1.2%	0.6%	0.5%	0.4%	0.2%	0.6%
% Illiteracy	16.8%	22.9%	24.6%	23.5%	18.0%	21.2%
% Acess to treated water	69.0%	60.3%	59.7%	61.3%	68.0%	63.6%
% Urban population	72.2%	56.1%	51.9%	49.5%	45.3%	55.0%
IDH income	0.611	0.545	0.543	0.551	0.551	0.560
IDH education	0.769	0.699	0.707	0.720	0.719	0.723
Income Gini Index	0.547	0.533	0.536	0.523	0.486	0.525
IDH - FGV	4.71	4.32	4.27	4.37	4.75	4.49

4. RESULTS

Table 3 brings the main results. Column I (on the left) brings the observed fiscal gap per capita across MPF quintiles. Column II brings the standardized fiscal gap and column III brings the predicted (or expected) fiscal gap. In this analysis we use need factors and covariates as discussed in section 3 and described in Table 2. The main difference is that in “controls 2” model we include the devolutive state transfers as covariate, which is not used as a control variable in “controls 1”.

Similarly to the tax revenues and current expenses described in Table 2, we found large differences in the mean values of actual fiscal gap indicators (column I) across quintiles of MPF transfers. The highest quintile of MPF transfers presents approximately 2.5 times more fiscal gap than the municipalities at the lowest MPF quintile. Additionally, need standardized distribution (column II, controls 1) suggests that socioeconomic and demographic factors helps to comprehend some of the difference found in the MPF transfers distribution. Once we control for the need factors and covariates, the fiscal gap inequality between the highest and the lowest quintiles drops to two times.

Moreover, the predicted fiscal gap (column II, controls 1) reveals that we should expect a small difference regarding fiscal need across FPM transfers quintiles. Actually, predicted fiscal gap results are quite intuitive: fiscal need shoulçd not be so different between municipalities. This last result suggest that most municipalities present similar (or uniform) demand for public service provision. According to the predicted fiscal gap, municipalities in the highest quintile really need more transfers than other groups. However, our analysis suggests that these groups should get on average only 24% more resources (transfers) than the lowest control group. Thus, the predicted fiscal gap is much

lower than the actual fiscal and the standardized fiscal gap, and it suggests that MPF transfers are heavily concentrated on the last group and not promoting equalization.

TABLE 3 -Fiscal Gap across MPF transfers quintiles (in 2010 R$ - per capita)

	I	II		III		IV		
Quintiles	***Actual***	Standardized		Need-predicted		Difference (net)		
		Controls1	Controls2	Controls1	Controls2	Actual-Need1	Standard1-Need1	Standard2-Need2
Quintis FPM								
Poorest	(818.1)	(909.2)	(914.8)	(1,112.8)	(1,107.2)	(294.7)	(203.6)	(192.4)
2º	(975.3)	(1,051.4)	(1,021.6)	(1,127.8)	(1,157.7)	(152.5)	(76.3)	(136.1)
3º	(1,015.8)	(1,036.5)	(1,011.0)	(1,183.2)	(1,208.7)	(167.4)	(146.7)	(197.8)
4º	(1,227.0)	(1,191.7)	(1,188.0)	(1,239.2)	(1,242.9)	(12.2)	(47.5)	(54.8)
Richest	(2,011.8)	(1,841.9)	(1,902.7)	(1,373.8)	(1,313.0)	638.0	468.1	589.7

It is also interesting to analyze the net result between the standardized and the predicted fiscal gap. We observe in column IV that once we control for the need factors, the difference between predicted and actual fiscal gap is larger than the difference between predicted and standardized fiscal gap. Thus, need factors attenuate partially MFP transfers inequity across quintiles. Contrastingly, fiscal gap is in equally distributed in the highest MFP transfers quintiles.

Column IV reveals that municipalities in the highest quintile presents on average R$ 468 above fiscal need, and that jurisdiction in the lowest quintile present on average R$ 204 below the expected fiscal need. Inequalities in net fiscal gap across quintiles reveals that municipalities in the highest (lowest) quintile are either with expenses above (below) or with tax revenue below (above) their fiscal need. This inequality increases if we include devolutive state transfers variable as a covariate, mostly in the intermediate quintiles (second to fourth), since municipalities in the middle ranges receives a smaller share of this kind of transfer.

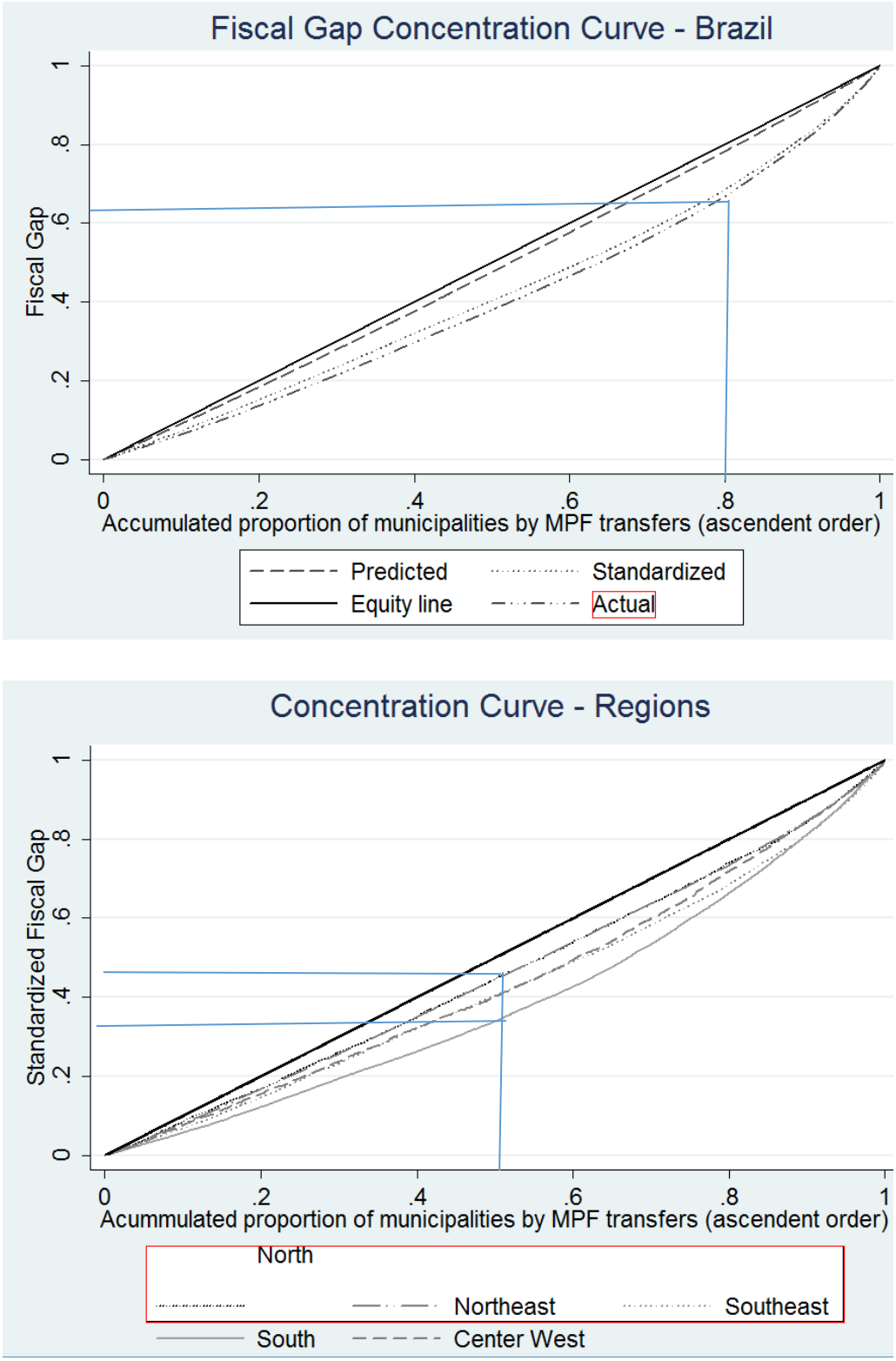
Main results can be summarized by an inequality curve, most know as Lorenz curve. Figure 1 brings the share of municipalities by per capita MPF transfers for our three fiscal gap variables (actual, standardized and predicted) by regions and total. The horizontal axis brings the accumulated proportion of municipalities by per capita MPF transfers in an ascendant order. The solid line represents the equity line in which municipalities distribution across both horizontal and vertical axis are uniform.

We note that in upside figure 1, municipalities in the highest MPF transfers quintile (20% of the municipalities with the highest per capita MPF transfers) produce approximately 35% of the total fiscal gap observed in the municipalities. Different from it, municipalities in the lowest quintile produce less than 15% of the accumulated fiscal gap. This analysis reinforces the inequity found in the fiscal gap distribution: the first range with 20% of municipalities indicate that less than 20% of the total fiscal gap.

It is noteworthy that actual distribution (hatched and dotted line) is the most distant line from equity line. The standardized distribution (dotted line) is less unequal, and it means that after we control for municipalities socio-demographic differences, the net fiscal inequality found across quintiles decreases. This last indicates that predicted need is unequal, municipalities in the highest MPF quintile

should receive more transfers, however in a smaller proportion. The area under the predicted need and the standardized need represents how much the fiscal gap is unequal across MPF quintiles and this inequality is neither associated to need factors nor equalizing.

FIGURE 1 - Inequality curves (2010)



Concentration curves by region (low graphic in Figure 1) confirms that fiscal gap across MPF quintiles, for the reason described in the previous paragraph, are more unequal in the South region and less unequal in the Northeast region. This

analysis is relative to regions: we are not able to affirm that Southern region should get more MPF transfers or Northeast less. Additionally, as previously discussed in section 3, standardized analysis is not causal and it does not allow us to suggest (or discard) that municipalities presents a larger fiscal gap because of MPF transfers.

Next, we investigate which factors (variables) help to comprehend the fiscal gap disequilibrium across MPF ranges. A global measure of inequity is the concentration index.[4] This index brings the relative distribution of fiscal gap as an accumulated proportion of MPF transfers. Thus, concentration index is an inequality measure associated to the equity curve, in which the calculated index corresponds to the área under or above the equity line and the concentration curve (that could be above or below the 45º degree line). Analysis of the composition of the concentration index allows us to comprehend the effect of each factor (any independent variable, it does not matter if covariate or need factor), controlling for the variable distribution across MPF transfers.

TABLE 4 - Factors' contribution to fiscal gap inequality

	Contribution to concentration index	
Need factors	Absolute	Percentage
% aged (over 60 years old)	0.0323	17.2%
% young (under 15 years old)	(0.0066)	-3.5%
% Infant mortality	0.0016	0.8%
% Illiteracy	0.0002	0.1%
% Acess to treated water	0.0003	0.2%
IDH income	0.0066	3.5%
IDH education	(0.0059)	-3.2%
Gini Index	0.0022	1.1%
Population	0.0026	1.4%
IDH - FGV	0.0001	0.0%
Sub-total	0.0333	17.7%
Non need factors		
State devolutive transfers	0.0445	23.6%
SUS (health) matching grants	(0.0027)	-1.4%
Fundeb (education) matching grant	0.0046	2.4%
GNP	0.0037	2.0%
Density	0.0029	1.5%
% Urban population	0.0152	8.1%
Sub-total	0.0683	36.2%
Horizontal Inequity Index	0.1884	

[4] For a formal approach see O'Donnell et. Al. (pp. 95-96; 2008)

Table 4 brings the percentage contribution of each variable in the concentration index. Need factors are associated to more justified reasons for potential inequality between groups because it reflects more fiscal gap associated to lower HDI, or higher share of elderly I, or smaller fiscal base (population). Different from it, the non need factors point out how much of the concentration index is explained by factors associated with other characteristics as share of rural population, density and other transfers.

The estimated percentages of contribution to inequality across MPF Quintiles suggest that need factors present a positive contribution of 17.7% to fiscal gap inequality across quintiles. This last result means that if we consider only need factors, jurisdictions in the highest quintile should receive more transfers (as we found in the predicted distribution in column III in Table 3). At least partially, current MPF transfers are promoting some equalization across municipalities.

Contrastingly, non need factors (covariates) present a positive contribution to 36% of the estimated inequality of fiscal gap across MPF groups. Thus, municipalities in the highest MPF quintile present more fiscal gap due factors not associated to fiscal need, as the share of rural population and state devolutive transfers.[5] Actually, this analysis brings the factors that most influence fiscal gap concentration across MPF quintiles. According to this analysis the single factor that mostly helps to understand fiscal gap inequality across MPF ranges is state devolutive transfers, since the highest the MPF quintile the highest the per capita state transfers.

TABLE 5 - MPF transfers and other variables (total and across regions)

Regiao	North	Northeast	Southeast	South	Center West	Brazil
Fiscal Gap	-0.727	-0.730	-0.743	-0.893	-0.758	-0.793
Tax revenue	0.240	-0.067	-0.180	-0.245	-0.025	-0.076
State transfers	0.179	0.080	0.145	0.479	0.215	0.281
HDI - income	-0.040	-0.085	-0.168	-0.234	-0.272	-0.066
FUNDEB	0.209	0.307	0.066	0.004	-0.038	0.039
SUS	0.094	-0.033	0.015	0.140	0.093	-0.013

This result reveals a conflict between equalization and the MPF rules for distribution. MPF transfers are positively associated to state devolutive tax. Most interestingly, this effect is not uniform across regions. As described in Table 5, the correlation among MPF transfers and other revenue resources are different across regions. While devolutive state transfers are being positively associated with MPF transfers in the South region, in the Northeast region this correlation is low. As depicted in Figure 2, state transfers increase fiscal inequality in the South region and are neutral in equity terms in the North East region. Contrastingly, matching grant resources to education (FUNDEB transfers) are positively associated with MPF transfers in the northeast region and neutral in the South.

To conclude, we should note that results from Table 3 reveals that municipalities in the intermediate range (third quintile) have the highest difference

[5] As argued by Boadway (2004), in regions in which public provision costs are quite high it is probably ineffcient to try to promote equalization. In Brazil, rural areas are not usually poorer than urban areas (MENDES, MIRANDA e BLANCO, 2008).

between predicted and standardized fiscal gap. Although this group of municipalities receives MPF transfers above the municipalities form the lowest quintile, they are the municipalities with the lowest tax revenue, or with the lowest fiscal capacity, and they are also the jurisdiction with the lowest per capita state transfers among all municipalities. Furthermore, municipalities in the third quintile of MPF transfers get low intergovernmental transfers (matching grants) for health and education expenses (see Table 2 and Table A in apêndix). In contrast, in all regions, municipalities with a larger share of rural population are larger receptors of MPF transfers. Finally, another important implication of our analysis is that some sociodemographic characteristics, as HDI or Gini index, do not help to understand most of the fiscal inequality found across municipalities and, because of that, if these variables are included in future MPF rules changes they could not help to attain fiscal equalization, or still produce more inequality. Further causal analysis is needed to confirm if MPF transfers produce neither efficiency nor equalization.

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APPENDIX

TABLE A - Per capita average across regions and quintiles (in 2010 R$)

Northeast	Poorest	2º	3º	4º	5º	Total
Population	108,754.5	24,010.3	13,371.1	7,275.3	3,379.6	30,893.5
MPF tranfers	311.8	449.8	558.5	746.0	1,484.5	619.0
Fiscal Gap	(736.5)	(860.3)	(948.4)	(1,070.0)	(1,596.8)	(978.8)
Tax Revenues	93.6	52.9	46.6	41.3	50.3	55.9
Expenses	830.0	913.2	995.0	1,111.3	1,647.1	1,034.7
State Tranfers	173.7	129.5	139.7	139.6	215.6	151.0
SUS	146.3	124.6	119.7	120.7	128.1	126.8
FUNDEB	222.0	271.0	292.6	304.9	329.7	280.8
% share of urban pop.	0.59	0.43	0.40	0.40	0.39	0.4
South	Poorest	2º	3º	4º	5º	Total
Population	109,978.0	18,223.9	11,551.7	6,209.4	2,965.8	23,140.4
MPF tranfers	275.3	452.4	554.7	787.3	1,653.7	900.7
Fiscal Gap	(751.5)	(978.0)	(1,024.6)	(1,352.1)	(2,185.9)	(1,420.5)
Tax Revenues	260.0	187.0	123.3	107.3	111.5	146.4
Expenses	1,011.4	1,165.0	1,147.9	1,459.4	2,297.4	1,566.9
State Tranfers	418.9	459.7	445.6	583.5	799.6	587.1
SUS	100.0	73.8	79.2	87.3	97.8	89.1
FUNDEB	208.7	211.9	204.3	207.7	215.9	210.6
% share of urban pop.	0.82	0.62	0.53	0.45	0.31	0.5
Southeast	Poorest	2º	3º	4º	5º	Total
Population	189,832.8	21,110.1	12,611.6	6,707.2	3,329.2	48,957.3
MPF tranfers	261.4	448.2	552.9	782.2	1,609.6	747.3
Fiscal Gap	(884.9)	(1,133.8)	(1,087.9)	(1,266.4)	(2,071.8)	(1,300.0)
Tax Revenues	323.0	162.5	107.1	114.2	125.6	168.2
Expenses	1,207.9	1,296.3	1,195.0	1,380.6	2,197.4	1,468.2
State Tranfers	549.1	566.7	437.7	447.1	645.0	529.4
SUS	114.7	88.3	82.9	88.7	99.3	95.4
FUNDEB	227.2	242.8	229.2	233.2	258.6	238.1
% share of urban pop.	0.86	0.71	0.66	0.60	0.59	0.7
North	Poorest	2º	3º	4º	5º	Total
Population	72,276.2	16,979.7	8,052.8	14,778.5	2,585.4	37,679.0
MPF tranfers	288.1	437.7	550.7	807.7	1,565.1	582.4
Fiscal Gap	(853.7)	(965.4)	(1,045.5)	(1,159.7)	(1,780.5)	(1,058.4)
Tax Revenues	92.0	70.6	66.0	133.3	136.1	96.6
Expenses	945.7	1,035.9	1,111.5	1,292.9	1,916.6	1,155.1
State Tranfers	215.7	286.4	270.6	231.7	395.9	262.5
SUS	122.4	119.5	132.7	121.0	131.0	123.3
FUNDEB	248.9	267.2	301.3	286.3	317.0	271.1
% share of urban pop.	0.52	0.43	0.48	0.51	0.54	0.5
Center West	Poorest	2º	3º	4º	5º	Total
Population	102,602.5	16,763.9	11,291.0	5,838.7	3,106.9	25,545.4
MPF tranfers	280.0	453.0	557.6	792.5	1,548.7	769.9
Fiscal Gap	(906.5)	(1,015.3)	(1,089.0)	(1,363.1)	(1,950.5)	(1,301.3)
Tax Revenues	190.3	162.1	135.3	150.9	165.4	161.6
Expenses	1,096.8	1,177.4	1,224.3	1,513.9	2,115.9	1,462.9
State Tranfers	409.1	456.4	459.5	544.5	675.9	518.8
SUS	124.2	120.9	107.4	108.9	122.1	117.4
FUNDEB	207.4	229.3	222.5	239.1	217.4	223.4
% share of urban pop.	0.82	0.67	0.65	0.60	0.54	0.6