Federalism, Social Policy and Territorial Inequality in Contemporary Brazil

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-- Preliminary draft --

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Political scientists are divided over the effects of the federal state format on effective policy-making. Some see federalism as a system that creates opportunities for experimentation and thus as the best way to make governments accountable to variation in citizen preferences (Buchanan, 1995; Tiebout, 1956; Weingast, 1995) while others describe federalism as a system of costly duplication of policies and bureaucracies which implies high costs of achieving coordination among different governments sharing policy responsibilities (Rodden and Rose-Ackerman, 1997). Such opposing views refer to a specific subtype of federal state, though, namely a variant that is predominant in the Anglo-Saxon world, one in which subnational units are entitled to make decisions about their own policies.

In fact, studies on federalism have increasingly demonstrated that the binary distinction between federal and unitary states is too simple, and so it falls short of the necessary discriminatory capacity required for a category to be useful for comparative purposes (Braun, 2000; Rodden, 2004). Indeed, there are varieties of federalism with discernible impact on outcomes (Obinger, Leibfried, and Castles, 2005; Stepan, 2004; Stepan and Linz, 2000). As a result, the current debate is not any more over whether or not federalism matters, but instead it is grounded in how good proposed typologies are as descriptive tools and how well each one predicts performance differences. However, the discriminatory capacity of typologies as descriptive tools is not exogenous to the purpose of associating outcomes to institutional design. Social scientists build typologies to address specific causal hypothesis, and so their usefulness highly depends on the problem one aims at solving.

Students of federalism are interested in very different and not necessarily convergent outcomes. The stability of democracies, the reduction of inequality, the behaviour of party systems, the capacity of holding countries together are all central and not exhaustive themes of the field (Eck, 2006). As a result, different typologies of federalism -- namely, dual x cooperative, inequality-reducing x inequality-inducing; power-sharing x power-separating; intra-state x inter-state, to cite only a few -- can be potentially useful for different research questions.

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This article explores the impact of federalism on territorial inequality, by examining social policy outputs and outcomes in contemporary Brazil. For this purpose, it employs the taxonomy developed by Kazepov and Barberis (2013) to examine the impact of the redistributive, regulatory, and supervisory role of the central government over territorial inequality. It shows that different policy outputs and outcomes can be associated to the extent of income redistribution between constituent units, as well as to the freedom they are entitled to have on policy decision-making. Nevertheless, some caution must be taken to assert that such factors cause performance differences, mainly because other factors can plausibly affect outcomes.

1. Concepts

When Aaron Wildavsky (1984:68) argued that "[...] *uniformity is antithetical to federalism* [and that], *there is no escape from a compelling truth: federalism and equality of result cannot coexist*", he had one specific model of federation in mind: one in which policies are framed at the subnational level. Indeed, when subnational units have the right to decide about their own policies, territorial differences both in policy design and amount of spending can plausibly lead to inequality of outcomes.

Nevertheless, empirical studies have shown considerable variation among either unitary or federal states regarding the right of subnational governments to make policy decisions. Among unitary ones, the continental Napoleonic model entails much less authority over policy design to local governments than the Scandinavian model (Braun, 2000; Kübler, 2006). Likewise, the Anglo-Saxon federations -- United States, Canada and Australia -- do display the characteristic taken as classic of all federations: exclusive right to decide on most policies. However, in Germany and Austria, the commitment to guarantee nationwide homogeneous policies has implied a limitation on the scope of subunits' authority, meaning that they have the right to act on policy implementation (Braun, 2000; Obinger et al., 2005). Linz and Stepan (2000) envisaged a similar distinction, by stating that federations can exhibit either inequality-reduction or inequality-inducing outcomes.

Two mechanisms are advanced by the literature as crucial for reducing place-inequality. The first one is the extent of income redistribution among subunits (Banting, 2006; Banting and Corbett, 2002; Beramendi, 2012; Prud'homme, 1995). The second refers to the freedom left to the units in charge of policy implementation (Beramendi, 2012; Kazepov and Barberis, 2013; Sellers and Lidstrom, 2007). Subunits' authority can be further distinguished between the right to decide on policy design -- policy decision-making -- and the right to act on policy implementation -- policy-making (Braun, 2000). The proposition was summarized by Beramendi (2012:8): "*The incidence of inequality appears to be larger n those unions with high levels of decentralization of interpersonal redistribution and low levels of interregional redistribution*". Hence, the redistributive, regulatory, and supervisory role performed by central governments can have an impact on the inequality of policy outcomes between subunits.

Kazepov and Barberis (2013) provided a taxonomy of the territorial organisation of policies that can be useful for examining whether or not the redistributive, regulatory,

and supervisory role of central governments can reduce territorial inequality. According to the authors, country's territorial arrangements can be: (i) *local autonomy centrally framed*; (ii) *centrally framed*; or (iii) *regionally framed*. Unitary and federal can be found in any of them.

In local autonomy centrally framed arrangements, municipalities *"retain a high autonomy in managing and funding policies, but this is embedded in a nationally defined regulatory context, which contributes – through the direct provision of many benefits and services or specific guidelines – to keep territorial differentiation under control"* (Kazepov and Barberis, 2013: 223). In centrally framed countries, "*the legislative power belongs to the central state in a context in which the degree of freedom also allocated to the subnational territorial levels, having managing and funding responsibility, is very low (...). This implies a strong limitation of the intra-national variation (...)"* (Kazepov and Barberis, 2013: 224-5). Finally, in regionally framed countries, "*the regulative responsibility belongs to the subnational level, which has an exclusive legislative responsibility (...) this group of countries is characterized by different subnational arrangements* [and so]*, this group presents a strong territorial differentiation in the amount of benefits (...)."* (Kazepov and Barberis, 2013: 225).

Therefore, the literature suggests a causal relation between the redistributive, regulatory, and supervisory role performed by central governments and place-inequality in policy outcomes. However, this causal relationship has seldom been empirically tested.

Kazepov's and Barberis' taxonomy was developed to analyse welfare policies, and so they describe countries as having adopted different territorial models of social assistance. However, it is plausible to argue that such models are policy-specific, and so, countries can be described as sheltering different models, in case we enlarge the number of policies to be examined.

I argue that the three models co-exist in Brazilian social policies. Although municipalities are the main providers of most public services in Brazil, territorial arrangements are policy-specific. Primary health care as well as pre-schooling and primary education, urban development, public transport, garbage collection are fully in charge of local governments. As a result, public service delivery critically depends, among other factors, on decisions made by municipal governments. However, their degree of discretion in policy-decision making varies according to policy.

First, the Bolsa-Família Program is centrally framed. All eligibility criteria are set by the central government along with the delivery of benefits. Municipalities can enrol the target-population in the centrally-managed Single Registry for Social Programs (*Cadastro Único*), but the entitlement decision is exclusive to the central government. As a result, there is no intra-national variation either in the amount of beneficiaries' benefits or access (Bichir, 2013).

Second, basic education[3] and health policies, by their turn, have adopted a local autonomy centrally framed model. Constitutional mandates earmarking subnational governments' revenues to these two policies, and so limit their spending decision-making autonomy. At least 25% of their total revenues must be addressed to education. In

[3] In Brazil, basic education comprehends pre-schooling as well as primary and high school.

addition, 60% of such expenditure should be used entirely to pay teachers actually teaching. As for health, municipalities must spend at least 12% of their total revenues, a constitutional mandate that was introduced in 2000. As for education, although earmarking dates back to the 1934 Federal Constitution, constitutional amendments approved in 1996 and 2006 created incentives for subunits to offer more school slots and get more transfers from either their respective states or municipalities and the Union.[4]

Moreover, in both policies entitlement is free and universal, meaning that subnational governments cannot legally deny benefits and services for those fulfilling eligibility criteria. National standards, as well as monitoring capacities, are established in national framework laws. Although municipalities retain some autonomy in managing and funding policies, this is embedded in a nationally defined regulatory context.

In one aspect these two policies have different central-local arrangements, though. Freedom left to municipalities in education is larger than in health. For historical reasons, states and municipalities have their own education systems, meaning that they are entitled to make decisions about curriculum, the length of the school day, teaching methods, and so on. In health, federal transfers are attached to policies, meaning that similar programmes are adopted nationwide by all municipalities. For both policies, though, the central government has conditioned conditional transfers to the adoption of central-led guidelines during the period under analysis.

Third, urban policies are regionally framed. In urban infrastructure, garbage collection, housing, and public transport, national regulation is rather limited, except for those programmes in which subnational governments employ federal grants to build popular housing and sanitation systems. These remain neither universal nor regular, though. Municipalities also have a high level of discretion regarding culture, recreation and sports policies. In practice, the regulative responsibility belongs to the subnational level. As far as the managing and funding responsibilities are concerned, these policies are characterised by different subnational policy choices.

Therefore, taking municipalities as the unit of analysis is a good way of exploring the relationship between different territorial policy arrangements and inequality of policy outcomes. As municipalities are the same and territorial arrangements differ, Brazil is close to providing a natural experiment to test whether or not the redistributive, regulatory and supervisory role of the central government have a role in reducing territorial inequality. Although it is not possible to draw a direct comparison between social conditions in each municipality, given that the performance indicators observed are not the same, differences in *patterns of inequality* can be compared. Given that the municipality and its attributes are strictly the same, variations in performance as a whole can be attributed to the policies being examined, although territorial policy arrangements cannot presumably be taken as the only policy dimension affecting social policy outcomes.

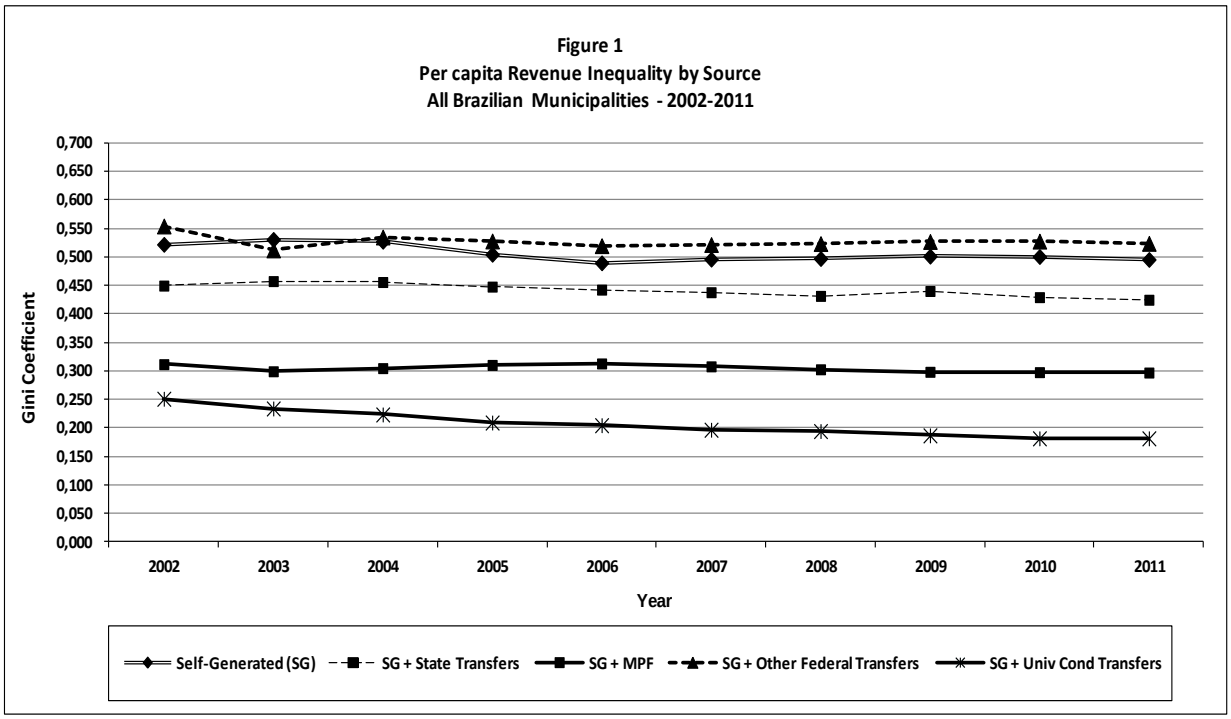
[4] These kind of rules are by no means a new component of the federal regulation of subnational finances. Binding subnational government's revenues to education was first adopted by the 1934 Federal Constitution and reproduced by all the following ones, except by the 1937 FC (Araujo, 2013).

The next section will examine the extent of redistribution centralised taxation provides for municipalities while the two following ones will examine the role of central regulation and supervision.

2. The redistributive role of centralised taxation

As stated above, literature suggests that the extent of redistribution among territorial units is crucial for reducing territorial inequality. If service provision is decentralised and local governments have different taxing and spending capacities, one condition for reducing inequality in service provision is to reduce territorial inequality on spending capacities. This section explores the extent of redistribution of the Brazilian fiscal systems, by examining what happens on the municipalities' revenue-side.

Figure 1 presents data on the revenue inequality among Brazilian municipalities from 2002 to 2011. Inequality is measured by means of Gini coefficients on their different main revenue sources.



Source: National Treasury Secretary.
Elaboration: Center for Metropolitan Studies

Revenue inequality in local self-generated taxes display higher values: from 0.522 in 2006 to 0.496 in 2011. In general, the Gini coefficient on the tax-raising capacity of Brazilian municipalities is systematically around 0.500. It means that if Brazil were a Tieboutian world, revenue inequality among municipalities would be very high.

When state constitutional transfers enter into municipal budgets revenue inequality is reduced to Gini values around 0.450. States are obliged by the federal

constitution to share amongst their municipalities at least 25% of the total proceeds from their value-added tax, as well as 50% of the sums raised through vehicle tax (Souza, 2003). According to the federal constitution, 75% of these transfers may take the form of rebates, that is, they must be calculated on the basis of the municipalities' contributions to the receipts of each tax. Thus, self-generated taxes plus state-shared revenues can be taken as a reliable indicator of cross-city wealth inequality.

It is up to some federal transfers to have a great impact in reducing cross-municipality revenue inequality. There is a sharp reduction in inequality when revenues from the *Municipality Participation Fund* (MPF) and the universal conditional transfers are added to local self-generated proceeds. The MPF is based on a share of 23.5% of the total collection of two exclusive federal taxes: income tax and the tax on industrialised products. Ten per cent of this amount is earmarked for division among the state capitals, with each individual quota calculated as per a formula which is directly related to population and inversely related to the state's per capita income. The remaining 90% is divided as per a formula that favours less populous municipalities.

Universal earmarked transfers, in turn, were introduced throughout the 1990s and constitute a third source of local government revenues. In health, they have become universal since they have been addressed to all municipalities in 1998, when municipalities completed the long process of voluntarily adherence to the Unified National Health System (SUS – Sistema Único de Saúde), which started in 1990. Federal transfers are earmarked for local government primary health services and are calculated on a per capita basis. They are conditional on the adoption of pre-defined forms of spending and are only disbursed if and when these programmes are implemented[5]. In education policy, earmarked transfers are universal because all sub-national governments are bound to the same rules by the constitution, although they operate at the state level. As for the period covered by this study, 15% (up to 2008) to 20% (from 2008 on) of state and municipal revenues were automatically retained and recorded on an annual basis in a state-level fund[6]. Within each state, revenues are redistributed among state and municipal governments, according to the number of school slots offered per year (Gomes, 2013).

All Brazilian municipalities considered the Gini coefficient for self-generated + federal constitutional transfer falls to around 0.300. Conditional transfers, for their part, have had an increasingly important inequality-reducing effect from 2003 on. In other words, federal and state transfers attached to health and education end up displaying an important impact toward poorer municipalities. In 2011, their entry into municipalities' budgets reduced the Gini coefficient to below 0.200. The main contribution for their place-inequality reduction effect comes from the Union transfers earmarked to education, whose average participation in municipalities' total budgets grew from 10% in 2006 to 14% in 2011 (Araujo, 2013: 81). As for health, although the amount of the Federal Ministry's transfers toward states and municipalities increased steadily from 2003 to 2011, from around BR$ 40 billion to more than BR$ 70 billion. Moreover, such increase

[5].These programmes include: basic health care; hiring of doctors, nurses and health providers; provision of medicines, vaccination surveillance, and neonatal care.

[6]. In fact, there are 27 state-level funds.

was disproportionately addressed to North and Northeast states, while most States of the Southeast and South showed smaller increases. Finally, primary care and epidemiological surveillance were the most benefited programs (Machado et al, 2014)[7].

However, other federal transfers, among which those attached to oil revenues are the most important, have had a significant revenue-inequality effect. Their entry into municipal budgets increases the Gini coefficient to values even superior to those found for self-generated revenues, that is, above 0,500.

Therefore, the spending capacities of Brazilian municipalities — and, by extension, their capacity to produce public policies — would be highly unequal were it not for the federal constitutional transfers and the conditional transfers earmarked to health and education. Although there remains revenue-inequality after all transfers are made, the extent of inequality-reduction produced by the Brazilian fiscal system is not negligible when municipal budgets are observed from the revenue-side[8].

3. Territorial inequality in social policy outputs

A second condition suggested by the literature for reducing territorial inequality is central regulation and supervision of subnational policies. The empirical test of this proposition can be made by the comparison of the outputs of local autonomy centrally framed and regionally framed policies. It makes no sense to include the outputs of centrally framed policies in the comparison, since the Bolsa-Família Program's benefits and eligibility criteria are all the same all over the country.

Nevertheless, it is possible to explore the impact of local autonomy on decision-making by comparing the outputs of those policies displaying the two other territorial arrangements. As education and health policies are more regulated by centrally-led guidelines than urban development, we can compare their respective outputs. In the two first ones, subnational spending thresholds are not only set by the constitution but federal and state-level transfers earmarked to these policies limit decision-making on expenditures. Hence, two mechanisms limit the authority of municipalities on the

[7]. These outcomes are consistent with Silveira et al (2013) findings, who developed a methodology to measure the redistributive effects of the Brazilian fiscal system which included spending on welfare benefits, health and education besides direct and indirect taxes. When applying it to 2003-9, authors found that spending on health and education drops out the Gini coefficient of household income.

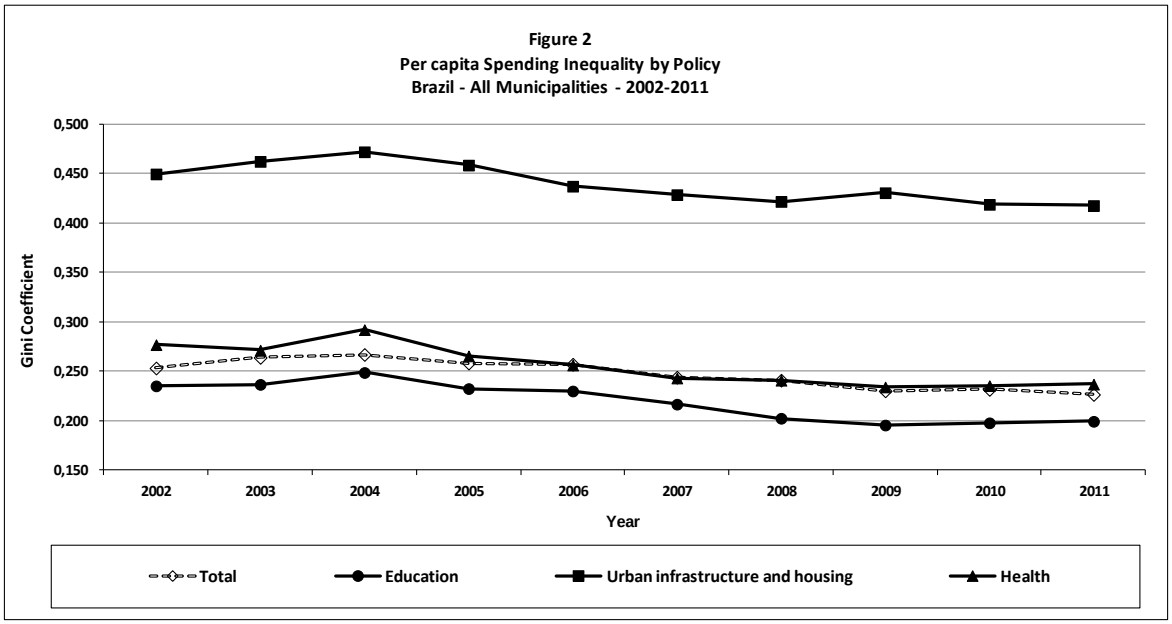
[8]. Transfers can affect the policy choices of subnational political officials and, consequently, the performance of jurisdictions. Weingast (2009) argues that an excessive reliance on central government transfers has a detrimental effect on subnational incentives to assist the production of wealth and encourages them to spend beyond their means. I do not dispute this proposition and believe it deserves empirical testing, since Weingast reasoning is rather deductive than empirically demonstrated. Nevertheless, Rodden (2006) showed that large subnational deficits tend to appear only under two combined conditions, namely transfer dependence and soft budgets constraints. Under hard budget constrains (which include central supervision of subnational indebtedness), the presence of transfers does not necessary lead to large deficits.

spending-side: constitutional guidelines oblige them to spend at least 40% of their revenues on health and education altogether, as well as the lion's share of conditional transfers being earmarked to these two policies. On the other hand, spending on urban policies is not regulated by any federal law. Indeed, although municipalities rely upon federal and state-level transfers to provide such programmes, it is up to them to decide the amount of spending and the entitlement rules.

We can assume the per capita spending on these policies is a good proxy of policy outputs. If municipalities have discretion to decide about the amount of spending in all three policies but their autonomy to decide is differently regulated by central guidelines, the per capita amount can be reasonably taken as an indicator of the relationship between freedom to decide and inequality on outputs. Figure 2 shows data on the Gini coefficients of the per capita spending of all Brazilian municipalities from 2002 to 2011 in health, education and urban policies.

It confirms what Figure 1 showed: the spending capacities of Brazilian municipalities are considerably reduced by means of different types of transfers. From 2002 to 2011, the Gini coefficient of their total spending was around 0.250. It slightly increased in 2003 to fall again from 2006 on. In 2011, it was 0.227. Hence, cross-municipality spending capacity -- and so, their potential capacity to provide services -- is considerably reduced by means of centrally managed tax redistribution.

Figure 2 clearly shows that regulated and non-regulated policies display different patterns of territorial inequality. Urban policies (housing and urban infrastructure), in which central government supervision is low and local governments exert their policy competencies with great autonomy, display the highest indexes of territorial inequality on the spending-side. In contrast, education and health, in which central government regulation and supervision is high and local governments' decision-making on expenditures is limited, display much lower Gini coefficients.



Source: National Treasury Secretary. **Elaboration**: Center for Metropolitan Studies

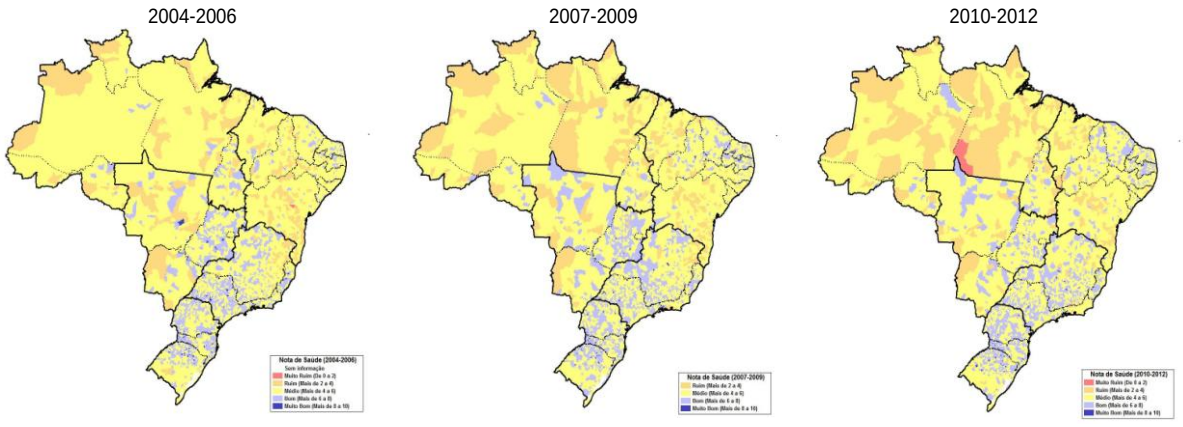
As for the centrally regulated policies, Gini indexes declined from 2004 on. Such decline coincides in time with the introduction of a federal government policy of transferring greater amounts of universal earmarked transfers toward poorer municipalities (see in Figure 1 that the MPF place-inequality reduction effect remained constant while universal conditional transfers increased).

4. Territorial inequality in social policy outcomes

Effective policy-making not only refers to the interregional and interpersonal redistribution though. The concept can be further extended to comprehend social policy outcomes. To explore territorial inequality in social conditions, I have worked, along with Sandra Gomes and Edgard Fusaro, on the *Municipal Health Index* and the *Municipal Education Index* (see the methodological annex). Such indexes measure basic health standards as well as early childhood care and the performance of primary education, areas that are under the responsibility of the municipalities in Brazil. So, when I herein refer to health and education, I am not referring to secondary or higher education or to the more complex services of health care. It would not be possible to compare all the Brazilian municipalities if these parameters were included in our model.

Inequality in health standards is a lot less acute between Brazilian municipalities than inequality in the performance of municipal education systems. This conclusion can be seen in maps 1 and 2. To produce them, the education and health indexes were distributed across five ranges, each the same size[9]. Maps 1 shows the trajectory of health standards, whereas map 2 shows the situation for municipal education.

Map 1 - Territorial Inequality in Health Outcomes
2004-2012 - Brazilian Municipalities



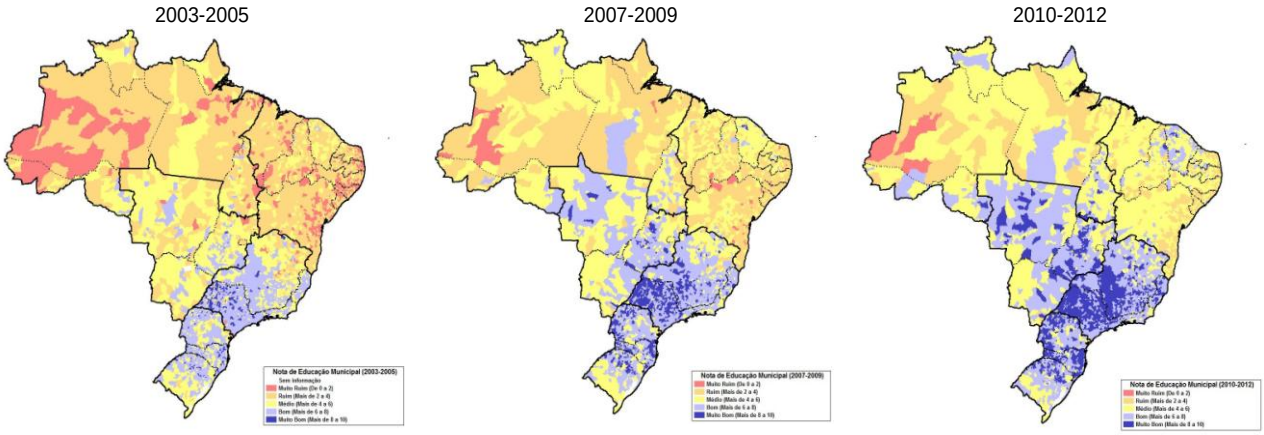
Source: Centro de Estudos da Metrópole (available at: http://www.fflch.usp.br/centrodametropole/1160)

[9] The ranges for the indexes were: 0 to 2; 2 to 4; 4 to 6; 6 to 8; 8 to 10.

In health, extreme values are rather rare. The vast majority of municipalities obtained indexes between 4 and 8. Indexes between 2 and 4, reflecting poor health standards, are also rare. There are a few municipalities in which health standards could be considered to be excellent when compared to others. There are no cases in which health standards could be considered to be terrible. This territorial distribution in health standards shows relative stability from 2004-2006 to 20107-2012.

The municipal education systems show rather different results. At the beginning of the 2000s, "islands of excellence", in other words municipalities with indexes between 8 and 10, were concentrated in São Paulo state. Municipalities with a good performance, whose indexes varied from 6 to 8, were concentrated in the south and south-east regions. By contrast, a reasonable number of municipalities in the north and north-east regions obtained scores between 2 and 4. These areas also had a significant number of municipalities with an index below or even equal to 2.

Map 2 - Territorial Inequality in Education Performance
2004-2012 - Brazilian Municipalities



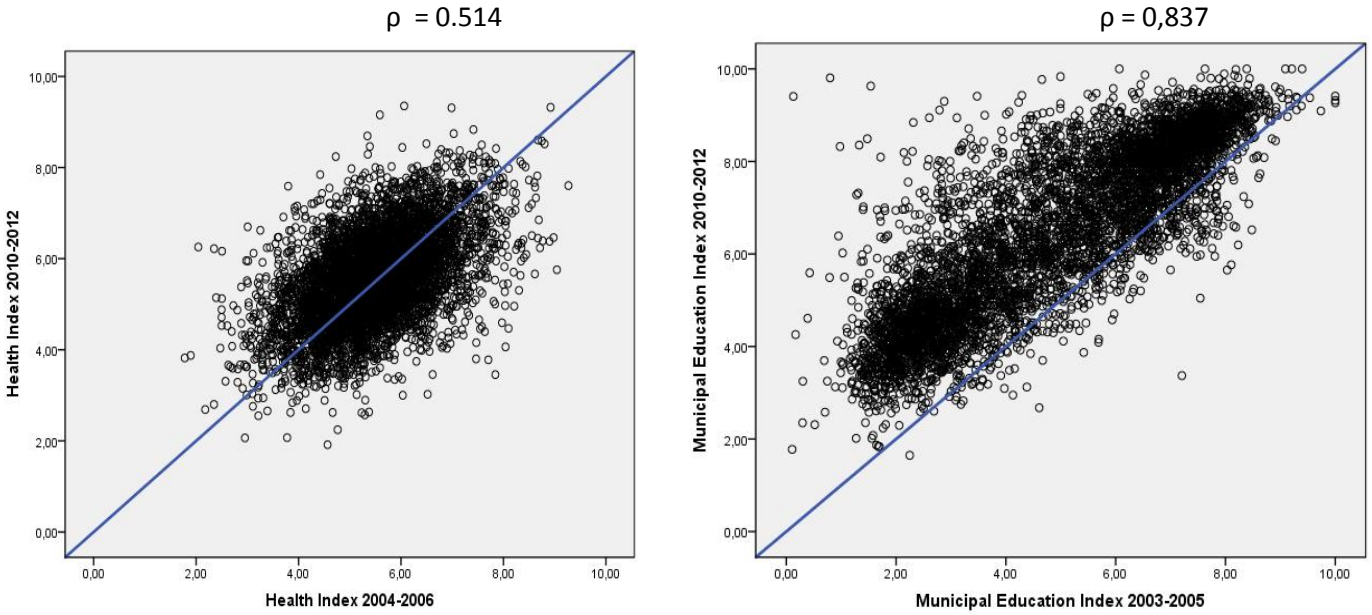
Source: Centro de Estudos da Metrópole (available at: http://www.fflch.usp.br/centrodametropole/1160)

This pattern of inequality remained in place throughout the last decade, even though the number of municipalities with an index below or equal to 2 fell substantially, and the number of municipalities with higher values in the index also increased. The combination of these results suggests that the indexes improved, but the divide between better-off and worse-off regions remained at least stable, if not increased. There was, simultaneously, an improvement in the performance of municipal education in a significant group of municipalities, accompanied by stagnation in others.

The trajectories of the health and education standards over the course of the decade can best be observed in figure 1, which compares the two periods for which we collected data and both policies. The municipalities located below the 45 degree line were

those that obtained a performance index in 2010-2012 below that at the start of the decade 2000, whereas municipalities that improved their social conditions are located above this line.

Figure 1 - Health and education outcomes in Brazilian municipalities 2004-2012



Source: Centro de Estudos da Metrópole (available at: http://www.fflch.usp.br/centrodametropole/1160)

Firstly, one sees that for both policies, a large number of the dots, which represent each one of the municipalities, is close to the line. In general, this indicates that the trajectory, for better or for worse, tends to be that the municipality obtained a final index close to the one obtained in the beginning of the years 2000. Dramatic deterioration or improvement is, then, rare, where incremental change is the most common path.

Despite this, in education, the distance from the line for a large number of municipalities is greater than it is for health, meaning that improvement in municipal education performance had a faster path in the last decade. Moreover, For municipal education, on the other hand, the number of municipalities that improved their performance is much greater than those that worsened. However, there are a significant number of municipalities that have shown a deterioration in their health standards over the course of the decade.

Results leave little margin for doubt. We constructed a comprehensive measure (in other words, one that observes various aspects) for health and education standards in Brazil and concluded that the inequality in health standards in the 2000s was much less acute than the inequality in pre-school and primary education - education areas that come under the responsibility of the municipalities. This territorial inequality in the performance

of policies did not alter considerably over the course of the 2000s. In reality, the improvement in the educational indicators was accompanied by the stability of territorial inequality in education standards between municipalities in nearly all the country's regions.

5. Conclusions:

Comparativists of federalism argue that this form of state and place-reduction of inequality can indeed coexist. Two conditions are required for this goal to be obtained: fiscal structures providing for interregional revenue redistribution and limited autonomy for local governments to make decisions about the policies they are in charge of.

There are evidences that Brazil can be taken as one such case. Constitutional transfers as well as conditional ones earmarked to health and education reduce cross-municipality inequality on the revenue-side. Of course, interpreting such transfers as pork tends to under-evaluate their nature, origins, and outcomes. As for origins, they are associated with the achievement of national goals, be it economic development or social rights. Indeed, they are a core institution of Brazil's state-building process, dating back to the 1934 and 1946 Federal Constitutions. In order to achieve national goals, current constitutional and conditional transfers are attached to constitutional rules aimed at binding current and future heads of local governments. Instead of freeing them to please their constituencies at will, federal regulations are aimed at limiting their room to spend their own revenues to short-minded concerns. Hence, regulated policies reflect central-level authority to guarantee that local government revenues will indeed be addressed to accomplish specific policy goals. Therefore, local autonomy central-led policies restrict the full discretion of local governments regarding allocation of their own revenues and the grants they receive.

Evidences shown in this paper reveal that the extent of place-inequality reduction achieved by the two mechanisms examined are limited. In spite of inter-jurisdiction income redistribution, territorial inequality between municipalities' spending capacities is still considerably high, since its Gini coefficient is above 0,200, after all transfers are made. As a result, place-inequality in the outputs of centrally framed policies is not negligible either. The cross-municipality Gini coeficient for health and education expenditures varies between 0,200 and 0,300 meaning that municipalities do display differences in their per capita spending on these policies.

Nevertheless, evidences also show that place-inequality is limited in centrally framed policies, even when local governments have some autonomy to make decisions about. Central-led policies display lower levels of place-inequality on the spending-side than those that are framed by regional or local governments. Moreover, limited autonomy to make decisions about policies is associated with less inequality in policy outcomes, as the comparison between health and education showed. Finally, the introduction of federal transfers attached to performance education are associated with improving the educational scores of municipal-level students.

Obviously, the evidences shown in this paper fall far short of being a realistic causal model of place-inequality reduction. A good many factors may influence territorial inequality in policy outputs and outcomes in addition to revenue redistribution and central-led regulation and supervision.

As for local governments' policy expenditures, policy legacies, net available revenues, and local official policy priorities tend presumably to play a role toward place-inequality. As revenue redistribution and central regulation reduce but not eliminate inequality among jurisdictions both on the revenue and spending-side, evidences suggest that bounded place-inequality is the most probable result. That is, place-inequality in outputs tend to vary within certain boundaries, within certain bounded intervals. Therefore, bounded place-inequality tends to be the most probable outcome when redistribution and central-led regulation are combined with the possibility of local disagreement.

As for policy outcomes, a good many factors should be added to those examined in this study. Outcomes in health and education are presumably affected by area-specific determinants. There is no sense to expect that mass vaccination and mass attendance to school will obtain comparable outcomes at the same speed. Thus, similar inputs -- meaning, levels of spending and number of per capita professionals -- can presumably imply very different processes toward declining rates of disease and school performance. Moreover, there are evidences that state-level policies do play a role in the implementation of service policies in Brazil (Arretche, 2000; Gomes, 2009), a factor not examined in this study. In the language of experimental studies, it is a fact that some of the municipalities being studied received an "additional treatment" to the one being examined in this study. Furthermore, it is fairly plausible to assume that outcomes results will be affected by interference between policies observed. An improvement in education standards can have a positive effect on health standards or vice versa. Hence, the relationship between revenue redistribution and central-led regulation and supervision, on the one hand, and place-inequality reduction, on the other, can be plausibly mediated by other factors.

Nevertheless, the evidences shown in this paper reflects an important feature of the policy-making process, regardless of whether it is directly caused by role played by the central government.

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Methodological annex: Municipal Health Index and Municipal Education Index

Data on health and education standards was collected for all the Brazilian municipalities for three three-year periods: 2003-2005; 2007-2009; and 2010-2012 for health and 2004-2006; 2007-2009; and 2010-2012 for education. For all the factors examined, the average for the three-year period was calculated to avoid possible biases due to the performance of an indicator at a specific point in time.

The *Municipal Education Index* and the *Municipal Health Index* was built using ten performance indicators. The indicators were selected to enable the measuring of results and, in exceptional cases, the service provision. They were also selected as a way of measuring health and education standards that are affected by municipal policies, avoiding, however, introducing external parameters to the "treatment" produced by the national policies and local conditions. In addition, by selecting ten indicators, the aim was to increase the number of parameters analysed, as a way of avoiding an analysis bias caused by anomalous behaviour by a single indicator. The *Municipal Health Index* and the *Municipal Education Index* can therefore be taken as indicators of health and basic education standards and the result of the policies implemented.

Each index is the result of a total of all the values obtained for each one of the ten indicators, whose original values were standardised (on a scale of 0 to 1). Each indicator has the same weight in the analysis model, as is shown in Figure 1.

Figure 1
Basic Structure of the Model

Indicadores	1	2	3	4	5	6	7	8	9	10	Índice Final
Município 1	1,00	0,60	0,76	0,45	0,56	0,32	1,00	1,00	0,50	1,00	7,19
Município 2	0,50	1,00	1,00	0,00	0,43	0,98	0,40	0,30	1,00	0,00	5,61
Município 3	0,40	0,44	0,56	0,75		1,00	1,00	1,00	0,23	1,00	6,38
Município 4	0,70	0,76	0,00	0,87	0,00	0,00	0,99	0,00	0,00	0,11	3,43
Município 5	1,00	0,00	0,20	0,23			0,87	0,32	0,76	1,00	5,48
Município n	0,00	0,00	0,76	0,98	1,00	1,00	0,88	0,32	0,11	0,33	5,38

In cases where there is no information available for a specific indicator in a given municipality, the following procedures were adopted, taking into consideration whether or not the municipality was responsible for the lack of information.

Inference by denial – this situation only occurs for the health indicators. In Figure 1, municipality 3 did not submit information to the official bodies on indicator 5. This indicates that the municipality refused to be evaluated by the national information systems and did not, for example, supply information to DATASUS [Brazil's Unified Health System computer department]. In this specific situation, in the calculation of the *Municipal Health Index* this information would have the same effect as using "0 (zero)" for

the specific standardised indicator, as this index is obtained by using the total of all the standardised indicators.

Inference by exclusion – there are situations in which the absence of information on the municipality for one specific indicator does not indicate a wish not to be evaluated, but rather the impossibility of attributing responsibility to the municipality for the service provision being evaluated. This applied exclusively to the education indicators. In figure 1, this would be the case for municipality 5, for indicators 5 and 6. One example of this situation would be the indicator for students in the "5ª śerie" [year 6] to the "8ª série" [year 9] for a municipality that does not offer enrolment from the "5ª śerie" to the "8ª série". In this case, therefore, the absence of information is the result of the absence of competence in the execution of the policy. Here, the *final index* of the municipality only includes the set of valid indicators, corresponding to an average of the values available. The 5.48 final index for municipality 5 was calculated based on the average of the values of the 8 indicators available (4.38 / 8 = 0.5475) multiplied by 10, which is the total number of indicators.

The following indicators were selected for health: (i) early neonatal mortality rates; (ii) the infant mortality rate; (iii) the proportion of live births of mothers who have attended seven or more prenatal visits; (iv) ratio of smear tests in women aged 25 to 59 in the female population for this age group; (v) tetravalent vaccine cover (DTP/Hib); (vi) incidence of tuberculosis; (vii) incidence of dengue fever. Due to the availability of data and to comply with the principle of examining different parameters of the population's health situation, we had to work with separate indicators. We therefore collected data on the (viii) rate of hospital admissions for acute respiratory infections (ARIs) in children under the age of five for the 2004-2006 three-year period and on the percentage of children under the age of five who are underweight for their age for the 2007-2009 three-year period. To measure adult health, we collected data on (ix) the rate of hospital admissions following a stroke (40 years and over) for 2004-2006 and the rate of hospital admissions following a stroke (30 to 59 years) for 2007-2009. Finally, for oral health, we included (x) the average number of basic individual dental procedures in 2004-2006 and the cover provided by the Oral Health teams under the Family Health Strategy in 2007-2009.

For education, we collected data about (i) potential cover, up to the age of six; (ii) rates for school years repeated up to the "4ª śerie" [year 5] of primary education; (iii) rates for school years repeated from the "5ª śerie" to the "8ª série" of primary education; (iv) school drop-out rates up to the "4ª śerie" of primary education; (v) school drop-out rates from the "5ª śerie" to the "8ª série" of primary education; (vi) age-grade distortion up to the "4ª śerie" of primary education; (vii) proportion of municipal schools with a standardised score in the Prova Brasil ("8ª série" of primary education) below the average standardised score in Brazil; (viii) proportion of municipal schools with a standardised score in the Prova Brasil ("8ª série" of primary education) below the average standardised score in Brazil; (ix) average standardised score in the "4ª śerie" of primary education; (x) average standardised score in the "8ª série" of primary education.

All the component indicators for the indexes were standardised on a scale of 0 to 1, to facilitate the interpretation of the data. As such, the following standardisation was used:

$$V_{ji}^{P} = \frac{V_{ji} - V_{j,Min}}{V_{j,Max} - V_{j,Min}}$$

where *j* corresponds to the number of the variable and *i* to the municipality.