

Regional Disparities, Public Policies and Economic Growth in Brazil

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Abstract

More recent studies have focused on the different channels through which fiscal decentralization can affect the issue of disparities such as taxes and duties, the autonomy of spending and vertical fiscal imbalance. The present work investigates the relationship between fiscal decentralization, regional disparities e economic growth within 26 Brazilian's states and Federal District, in the period 2001-2012. Attention was given to channels through which decentralization can affect inequality: human capital, vertical fiscal imbalance, population's geographic concentration, and local taxes. The empirical analysis, suggests that a decentralized fiscal structure can reduce regional disparities by implementing better government policies that favor local economic development.

Keyword: Fiscal decentralization, regional disparities, economic growth, panel data
JEL Classification: H47, H77, O11.

1. Introduction

Considering Tiebout hypothesis, as competition among private firms leads to the efficient provision of private goods, so too competition among sub-national's governments lead to efficiency in the provision of local public goods.

“...communities that provide the services individuals like and provide them efficiently will experience an influx of individuals; communities that fail to do so will experience an outflux.” (Stiglitz, 1999).

Allocation of responsibilities and resources across all levels of government are a crucial part of the institutional set-up driven by regional convergence or divergence. According to Drazen (2002), special interest groups use political mechanisms to increase transfers and subsidies that they receive. There is a predominant view that fiscal decentralization increases the efficiency of sub-national's finances (Bartolini, Stossberg and Blochliger, 2016). However, Boadway (2001) alerts that while fiscal

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decentralization increases efficiency at the lower level jurisdiction some federations show some fiscal conflicts with national aims.

Governments are in the broad sense of pursuit provision equality of outcome, equality of opportunity and social insurance. Tax-transfer as its standard process through the tax system seems to be the main way chose by policymakers to face regional disparities. Alternatively, fiscal decentralization can promote a better match of policies with citizens preferences (Oates, 1972), but it also reduces the scope for central government intra-regional transfers. As such, fiscal decentralization issue and its trade-off present arguments both in favor of an equalizing role and of a diverging role.

Governments like to implement fiscal incentives to attract investors or even to accelerate regional economic growth in the short run. There is no consensus in the public economics literature or empirical evidence that these fiscal instruments should actually have as consequence only positive results. In fact, costs and benefits take place when fiscal incentives are implemented. We can have some benefits as higher revenue with new investors, more jobs, positive impacts on complementary activities, higher economic growth and favored sectors or regions development mainly in the short run. However, fiscal incentives have costs as tax revenue loss with lower tax rates and consequently lower public good provision, higher administrative costs, and distortion of the relative prices into the economy. The tax revenue loss could be by exemptions, investment allowances, accelerate depreciation, tax credits, tax rate relief, tax deferrals, duty exemptions, financing incentives or even zero-rating³.

In regional terms, fiscal incentives also have specific benefits and costs. Regional incentives could create regional balance in terms of jobs and entrepreneurship. However, regional incentives could also generate a loss of comparative advantage and national income by relocating firms and exacerbate political influence in regions. Further, these fiscal incentives could increase the risk of countervailing measures by foreign governments and also large incentives could create pressure to give similar amounts to other firms. (Cohen and Le Goff - 1987)

In fact, there exist tax incentives around the world⁴. Van Parys (2012) finds evidence of the CIT rate and the tax holiday affecting FDI in Latin America and the Caribbean and the impact of tax incentives on investment in Africa is insignificant. Boadway and Shah (1995) also analyzed tax incentives in Central American and Caribbean Countries. James (2013) shows us the prevalence of tax incentives

³ Zolt (2015) provides an overview of tax incentives and their impacts in developing countries.

⁴ Despite the negative impact of the tax incentive and as it there exist, Bird (2000) alerts to *keep it simple*, to *keep records* and to *evaluate the results*.

around the world characterizing different regions kinds of tax incentives and discretionary procedures is a common kind of tax incentives across all the regions and Sub-Saharan Africa uses discretionary procedures the most. Klemm and Van Parys (2009) studied tax incentives in Latin American, Caribbean and African countries for the period 1985–2004 and they showed that there exist evidence for strategic interaction in tax holidays but no evidence for investment allowances and tax credits. They showed also that lower corporate income tax rates and longer tax holidays are effective in attracting FDI.

2. Fiscal Incentives and Regional Inequalities in Brazil

Brazil implements fiscal incentives just to promote regional development. It offers a tax reduction for a period of ten years, an income tax reduction or a reinvestment policy of the tax due for specific enterprises by aiming development in north and northeast regions. Also, Brazil has an incentive to accelerated depreciation and discount on social contribution just to motivate location of enterprises in some regions. Furthermore, Brazil implements some fiscal incentives by motivating specific sectors to invest in free trade zones, exemptions, investment allowances, tax credits, tax rate relief, tax deferrals, duty exemptions, financing incentives and zero-rating⁵.

Brazil has been characterized by extreme regional disparities and the northeast and north regions continue to lag economically behind those other regions. However, there exists significant improvement in socioeconomic indicators made by these regions and it has even led to a gradual convergence in living standards. According to the data from Brazil's statistical agency (IBGE), the south and southeast regions generate around 70% of the country's GDP. However, while disparities persist there are signs of convergence across regions and some factors should explain this catch up such as the emphasis on social programs by the Brazilian central government, the large public investments in infrastructure and fiscal incentives provided by the federal government and the states through tax exemptions and subsidized credit. (Kumar, 2012)

3. Empirical Evidence of the public policies and regional convergence in Brazil

This study focuses on 26 Brazilians States and Federal District, in the period 2001-2012. The time period spans over more than 10 years allowing for enough time variation to capture changes in regional disparities and economic phenomena, such as the great decreasing of fiscal revenue and increasing of public expenditures. Given the lack of 5.570 Brazilian municipalities data, this regional level is enough to investigate internal geographical differences, and at the same time sufficiently large to

⁵ In fact, fiscal incentives in Brazil are much more complex because we have a federal country with regional and municipal fiscal autonomies.

avoid strong effects of cross-border commuting. According to Bartolini, Stossberg and Blochliger (2016), competition and better allocation of resources, are the two mainly channels that sub-central governments can increase their tax base.

We considered in our model the most frequent control variables in the literature on fiscal decentralization as:

- *Government Size (GS)* - Variable obtained by the expenditure / GDP ratio of each state, that reflects the size of state government in the economy;
- *Human Capital (HK)*- Set of skills, knowledge, and personality attributes that favor the achievement of work so as to produce economic value. They are experts bought by a worker through education, expertise, and experience. It is expressed by the ratio between the sum of the number of years of study completed by persons aged 25 years and over and the number of people in this age group. That is a regional component production;
- *Geographic Concentration Index (GEO)*- Reflects the distribution of people and companies in the national territory. It determines the emergence of agglomeration economies in some areas. The concentration of people and firms is beneficial to the economy;
- *Gross Capital Formation (GKF)* - The amounts related to investment expenditures;
- *Population (POP)* – The current population, births and deaths of today and throughout the year, net migration and population growth. As population growth is greater than a change in GDP, it is expected in the short term that the variable behaves negatively in relation to GDP. This variable expresses the availability of labor for a particular region;
- *HSanit* - Expenditure on health and sanitation. It is a proxy of the degree of urbanization; and
- *Tax autonomy* – Is the ratio of sub-central government tax revenue in total revenue and we used the total amount of ICMS (Imposto Sobre Circulação de Mercadorias e Serviços) tax collection.

The econometric model consists of variables at the state level. Thus, the following equation was estimated, where the subscript i indicates the state and t refers to the year:

$$y_{it} = \alpha + \beta FD_{it} + \gamma X_{it} + \theta_i + \delta_t + \varepsilon_{it}$$

where FD corresponds to different measures of decentralization. In view of the large Brazilian regional disparity, the data states were arranged in four models, low, medium, high and overall, according to the level of spending in each state. Whereas the level of Brazilian regional disparity, related to the level of development of each state, takes an inverted U-shaped, the set of control variables includes GDP per capita and its squared value for each state. This assumption holds on the idea that the level of regional

disparity should rise in the first phase of development (low model) because shocks and some natural factors of production are geographically located. Thus, the diffusion of development should reduce inequality following an inverted U-relationship. Therefore, a state with a high share of manufacturing is expected to display lower regional disparities than a state mainly based on services.

Population and firm's distribution over the regional territory may determine the emergence of agglomeration in some areas affecting regional inequality. As the concentration of people and firms is beneficial to economic development as it increases productivity, regardless of the impact on regional disparities is ambiguous (OCDE, 2014). In the case of regions with concentrated activities, the gap with other regions less concentrated tends to increase disparities. Finally, an indicator of geographic concentration by reflecting the degree of the population living in urban areas to account for agglomeration.

5. Estimation results

Analyzing the ICMS tax collection in the short term, given the ICMS variable, a higher amount of government revenue, provided by ICMS tax collection, provides resources to state governments to promote their spending. That is, it is another source of income beyond debt. The greater the amount of revenue available to the government, the lower is its indebtedness to acquire such resources. As a result, the 1% increase in revenue generates an increase in GDP by 0.4%. And of course, for the poorest regions in development, this contribution becomes greater. The case of the *ICMS square* aims to deal with the collection in the long term. In other words, as this revenue increases, there is a counterpart of an increasing in corporate taxation. In that, it jeopardizes the productivity of private capital, and the impact of a 1% increase in the collection in the long term will result in a decrease in GDP by 0.0039% initially. The start value may be small, but in the long term, higher tax burdens affect the level of competitiveness of companies. In which these will migrate to regions with greater tax incentives. This migration could affect the economic growth of the region from which the company left. And as state governments increase their size in the economy, given the GS variable, via spending and collections, it will reach a point at which the correlation with GDP becomes negative. As it informs the behavior of the coefficients are in line with the behavior of the ICMS. That is, higher collections are the counterparts of higher expenses. Being that a 1% increase in the size of state governments, they negatively impact GDP by 0.02% initially. This greater effect is verified in the High regions because they have the largest concentration of companies.

The empirical evidence obtained in this study suggests that the existence of higher years of schooling, characterized by the variable HK, contributes positively to economic growth. That is, a 1%

increase in education contributes to an increase in GDP by 2% on average. In relation to the population variable, represented by POP, the model reflects that the larger the population, the lower is the real GDP growth rate, keeping GDP constant. Thus, a 1% increase in population, reflected in a decrease in GDP of 0.28% on average. That is, keeping the other variables constant in the model, a population increase will cause a decrease in GDP in real terms. This assumption is in accordance with the macroeconomic literature, in which a country maintains a favorable economic growth, other factors that contribute to the increase of the GDP must grow in the same proportion as the population growth, contributing to the regional development.

The concentration of people and firms, expressed by the variable GEO, is beneficial to the economy in general. In which a 1% increase in this variable contributes to an increase in GDP by 0.02%. There is an inversely proportional relation for the Middle and Low regions. In terms of the Union, Brazil in most of its regions lacks infrastructure in which it compromises the level of urbanization, harming the level of concentration of businesses and people in the Middle and Low regions. This explanation becomes more plausible if we compare both models with the High region of Brazil. In which this region is endowed with greater infrastructure and health and sanitation conditions. Like the southeastern region of Brazil. This fact shows that the 1% increase in health and sanitation spending, Health-Sanit, reflects an increase in GDP of 0.15%. This analysis corroborates the variable GEO. And analyzing the short-term debt of the States, characterized by the variable DEB, which aims to finance state expenditures aimed at economic management, encouraging credit and consumption, contributes positively to GDP. The increase of 1% in debt favors an increase in GDP by 0.09%. It is noted that there is a greater participation of the debt in the Middle and Low regions, due to the fact that these regions have fewer concentrations of private capital in their regions, depending in large part on the investments of the government aiming infrastructure, to foment the economic activity and to be able to attract companies to these regions. In the medium to long-term, it contributes to regional development. In general, the amounts spent on investments favor GDP, according to the economic literature. In which 1% increase in investments, provide an increase in GDP by 0.07%. As the regions of the High model already have a solidified infrastructure in relation to the other regions, they need less investment in this area. Note the negative sign for the Low regions. These are regions that still need to be developed in basic areas that guarantee the basic subsistence conditions, so that after these cities have a solid base in having airports, roads and other investments in infrastructure that promote regional development. These regions characterize the inhospitable regions of Brazil, due to their socioeconomic and geographical conditions.

Human capital, HK, is the set of skills, knowledge, skills and personality attributes that favor the achievement of work so as to produce economic value. They are experts bought by a worker through education, expertise and experience. It is expressed by the ratio between the sum of the number of years

of study completed by persons aged 25 years and over and the number of people in this age group. It is a component of regional production. The variable POP is the current population, births and deaths of today and throughout the year, net migration and population growth. A negative signal is expected in High because the larger the population, the greater the need for GDP growth to maintain economic growth. That is, the population growth is greater than change in GDP, it is expected that in the short term the variable pop, behaves negatively in relation to GDP. It expresses the availability of labor for a particular region.

The variable GEO reflects the distribution of people and companies in national territory - can determine the emergence of agglomeration economies in some areas. The concentration of people and firms is beneficial to the economy. In the GEO formula, pi is the relationship between the regional and national population and "ai" is the relationship between the area of each state and the national one. Its calculation is based on Blöchliger, Bartolini and Stossberg (2016) given by:

$$\sum_{i=1}^N (pi - ai)/2$$

And the variable *HSanit*, reflects expenses with health and sanitation, proxy of degree of urbanization. The public debt of each state Debt, variable Debt, data take into account: direct administration and indirect administration (autarchies, foundations, joint stock companies and public). Public debt is the debt contracted by the government with financial entities or persons of the society to finance part of their expenditures that are not covered by tax collection or to achieve some economic management objectives, such as controlling the level of activity, credit and consumption, or even raising dollars abroad. The amounts related to investment expenses, is given by GKF and the revenue generated to finance these expenses is given by the collection of ICMS that is in this model the total amount of ICMS tax collection and ICMS square, reflects variations in the collection. And finally, the variable GS is obtained by the expenditure / GDP ratio of each state. It reflects the size of state government in the economy.

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increase of the GDP, must grow in the same proportion as the population growth, contributing to the regional development.

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0.0039% initially. The start value may be small, but in the long term, higher tax burdens affect the level of competitiveness of companies. In which these will migrate to regions with greater tax incentives. This migration could affect the economic growth of the region from which the company left. And as state governments increase their size in the economy, given the GS variable, via spending and collections, it will reach a point at which the correlation with GDP becomes negative. As it shows the behavior of the coefficients they are in line with the behavior of the ICMS. That is, higher collections, are the counterparts of higher expenses. Being that a 1% increase in the size of state governments, they negatively impact GDP by 0.02% initially. This greater effect is verified in the High regions because they have the largest concentration of companies.

According to the statistics $r\hat{o}$ and Durbin Watson, the model was consistent due to the fact that it did not present autocorrelation between the residues. The Chow test showed that the intercept of each individual does not change over time, that is, the model does not present structural breaks in the parameters in relation to the regression Y. There is no presence of external factors that affect the model. By means of the Hausman test, it is suggested that the intercept of each parameter does not vary with time. Therefore, according to both tests, the variables were worked on fixed and non-random effects. Finally, the White test verified that the residues are distributed normally, the parameters are few dispersed around the mean, therefore the model presented as homoscedastic. Due to Brazil being a country with great territorial extension, with great disparities economic partners between the regions, in which new poles industries in the regions may arise, improvement of infrastructure in the regions and other variables that promote the regional development, this study aims to serve as a pillar aiming at its continuity in observing and accompanying regional development for the coming periods.

Conclusions

This paper is intended to provide a perspective on the structure of fiscal relations in Brazilian States setting. Our tests found a significant relationship between the level of fiscal decentralization and the economic development of states. Considering that the ICMS is the main source of revenue of the Brazilian states, in a Country of continental dimensions. And even if its relationship with regional economic growth is an inverted U-shape, the growing political trend of fiscal concentration in the hands of a central government must raise strong concerns about the consequences. These consequences include distorting of local needs, internal common market, compromising vertical equity objectives, fiscal inefficiency and inequity. Or even, through greater concentration of decision-making power, corruption.

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APPENDIX A

Table 1: variables summary and data source

Label	Variable	Geral	High	Middle	Low	Expected Sign	Signed Sign
constant	const	-1087.0000	1.999**	-2373.0000	-5.287***	-	-
		-0.9046	-0.7988	-2409.0000	-1910.0000		
ICMS	l_ICMS	0.4091***	0.3882***	1.101***	1.038***	+	+
		-0.1154	-0.0968	-0.3107	-0.2075		
ICMS²	Sq_l_ICMS	-0.01363***	-0.01442***	0.03821***	-0.03660***	-	-
		-0.0039	-0.0032	-0.0102	-0.0072		
HK	l_HK	2.071***	2.663***	1.001***	1.641***	+	+
		-0.0933	-0.1384	-0.1704	-0.1746		
Pop	l_Pop	-0.2802***	-0.1528***	-0.05555*	-0.2410***	+	-
		-0.0332	-0.0414	-0.0310	-0.0252		
Geo	l_Geo	0.02027***	0.0036	-0.0093	-0.0052	+	+
		-0.0063	-0.0188	-0.0092	-0.0084		
Hsanit	l_HSanit	0.1596***	0.0302	-0.0147	0.2943***	+	+
		-0.0320	-0.0357	-0.0269	-0.0395		
Public Debt	l_Debt	0.09778***	0.0244	0.07358***	0.1163***	+	+
		-0.0134	-0.0218	-0.0150	-0.0277		
GKF	l_GKF	0.07609***	0.0338	0.04269**	-0.05191**	+	+
		-0.0206	-0.0231	-0.0196	-0.0251		
GS	l_GS	-0.2232***	-0.0231	-0.0260	-0.05653***	-	-
		-0.0268	-0.0201	-0.0192	-0.0187		
R ²		0.9148	0.9580	0.8771	0.9611		
Durbin-Watson		1.918.046	1.819.453	1.650.061	1.822.895		
r ₀		-0.047367	-0.005791	0.1108	0.0011		

Table 2: Correlation coefficients and tests

Correlation coefficients

l_PIBep	l_HK	l_Geo	l_HSanit	l_GKF	
1.0000	0.9108	0.0144	0.4635	0.4391	l_PIBep
	1.0000	-0.0534	0.4547	0.4227	l_KH
		1.0000	-0.0283	-0.0753	l_Geo
			1.0000	0.8581	l_Urb
				1.0000	l_FBK
		l_ICMS	sq_l_ICMS	l_GS	
		-0.0167	-0.0085	-0.4019	l_PIBep
		0.0462	0.0578	-0.3121	l_KH
		-0.1513	-0.1459	-0.0129	l_Geo
		0.1504	0.1509	-0.1818	l_Urb
		0.1771	0.1789	-0.1994	l_FBK
		1.0000	0.9980	0.0249	l_ICMS
			1.0000	0.0216	sq_l_ICMS
				1.0000	l_TG

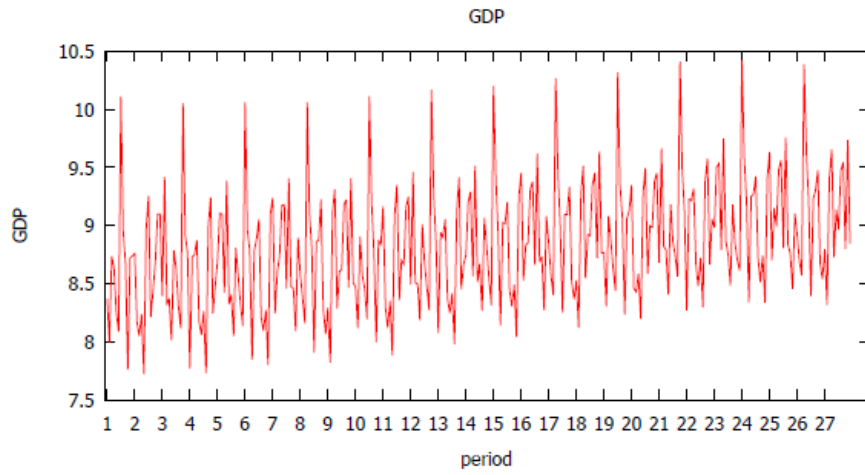
Test	p-value	Test result
Chow	0.00000690	fixed effects
Hausman	0.00000000	fixed effects
White	0.00000000	homocedastic

Table 3: Summary and source of variables

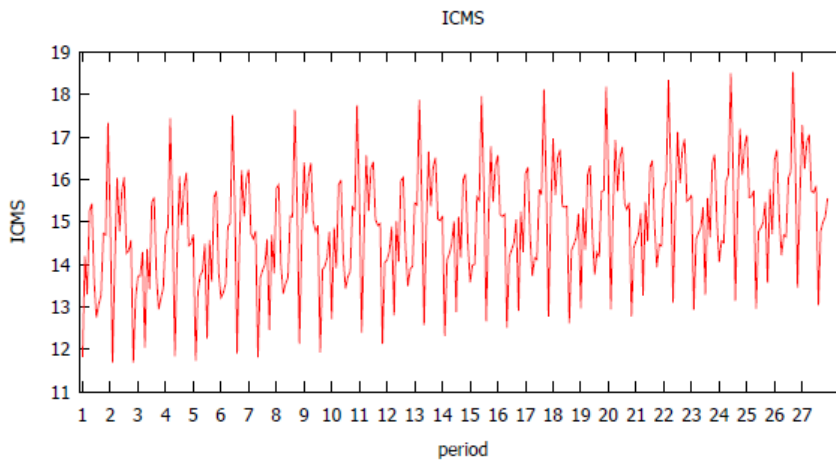
Label	Variable	Definition	Source
HK	I_HK	Human capital is the set of skills, knowledge, skills and personality attributes that favor the achievement of work so as to produce economic value. They are experts bought by a worker through education, expertise and experience. Expressed by the ratio between the sum of the number of years of study completed by persons aged 25 years and over and the number of people in this age group. It is a component of regional production.	http://www.ipeadata.gov.br/Default.aspx
Pop	I_Pop	Current population, births and deaths of today and throughout the year, net migration and population growth. A negative signal is expected in High because the larger the population, the greater the need for GDP growth to maintain economic growth. That is, as population growth is greater than a change in GDP, it is expected that in the short term the variable pop, behaves negatively in relation to GDP. Expresses the availability of labor for a particular region.	http://www.imb.gov.br/down/godados2012.pdf https://www.ibge.gov.br/estatisticas-novopoortal/sociais/populacao/9103-estimativas-de-populacao.html?&t=downloads
Geo	I_Geo	Reflects the distribution of people and companies in national territory - can determine the emergence of agglomeration economies in some areas. The concentration of people and firms is beneficial to the economy. In the GEO formula, "pi" is the relationship between the regional and national population and "ai" is the relationship between the area of each state and the national one.	Calculated: $\sum_{i=1}^N (pi - ai)/2$
HSanit	I_HSanit	Reflects expenses with health and sanitation, proxy of degree of urbanization.	www.tesouro.fazenda.gov.br/.../pge_exec_orc_estados_1995_2013.../91083ff8-d5dd-4...
Public Debt	I_Debt	Public debt of each state Debt data taking into account: direct administration and indirect administration (autarchies, foundations, joint stock companies and public companies) .. Public debt is the debt contracted by the government with financial entities or persons of the society to finance part of their expenditures that are not covered by tax collection or to achieve some economic management objectives, such as controlling the level of activity, credit and consumption, or even raising dollars abroad.	http://www4.bcb.gov.br/fis/dividas/lestados.asp
GFK	I_GFK	These are amounts related to investment expenditures	www.tesouro.fazenda.gov.br/.../pge_exec_orc_estados_1995_2013.../91083ff8-d5dd-4...
ICMS	I_ICMS	Total amount of ICMS tax collection	https://www.confaz.fazenda.gov.br/legislacao/boletim-do-icms
ICMS ²	Sq_I_ICMS	ICMS to the square, reflects variations in the collection	https://www.confaz.fazenda.gov.br/legislacao/boletim-do-icms
GS	I_GS	Variable obtained by the expenditure / GDP ratio of each state. It reflects the size of state government in the economy.	IBGE www.tesouro.fazenda.gov.br/.../pge_exec_orc_estados_1995_2013.../91083ff8-d5dd-4...

APPENDIX B

Graffic 1: GDP



Graffic 2: ICMS



Graffic 3: ICMS Square

