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Essays on Municipal Public Finance in Brazil

By

Rachel Elizabeth Gardner

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of the

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Committee in charge:

Professor Jeremy Magruder, Co-chair

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ABSTRACT

Essays on Municipal Public Finance in Brazil

by

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This dissertation studies local public finance in Brazil, with a focus on how federal and state government policies affect local spending and revenue generation. In Chapter I, I provide a descriptive analysis of local public finance in Brazil, with a focus on local revenue generation. In addition to describing the system of public finance in Brazil from a municipal perspective, I discuss the major challenges facing local governments in Brazil and in other low and middle income countries and present the reader with a descriptive picture of local revenue generation in Brazilian municipalities using publicly available data on municipal accounting records, municipal population and GDP, and municipal revenue generation infrastructure and administration.

In Chapter II, I study the relationship between intergovernmental transfers and local revenue generation in Brazil. A major consideration in designing an intergovernmental transfer system is the concern that government transfers may “crowd out” local revenue generation. While traditional public finance theory suggests that this will be the case, empirical findings often refute this theoretical prediction in favor of the so-called Flypaper Effect. I take advantage of exogenous changes to state formulas determining the municipalities’ share of value-added tax resources as an instrument for endogenous transfers to estimate local revenue generation responses to transfers. I find no evidence that government transfers reduce local per capita revenue generation in the context of two states in Northeastern Brazil, contributing to the limited body of rigorous evidence finding that intergovernmental transfers do not necessarily reduce incentives for local revenue generation and that the Flypaper Effect can indeed exist in certain contexts.

In Chapter III, I measure the impact of Brazil’s personnel expenditure limits imposed as a component of its Law of Fiscal Responsibility, implemented in 2001. Personnel expenditure limitations require that municipalities spend no more than 60% of liquid current receipts on

personnel. I measure the expenditure limit's impacts on a series of public finance outcomes by comparing changes in outcomes among those bound by the limits (those that were initially above the limit) to those just below the limit using a difference-in-difference regression framework with municipality fixed effects and controlling for state-specific flexible time trends. Chapter III adds to the large body of literature examining the impacts of tax and expenditure limits (TELs) but is one of the few to do so outside of the US context. It is also one of the few studies of expenditure limitations rather than tax limitations, as most of the US TELs are focused on limiting taxation rather than spending. While Brazil's personnel expenditure limits are generally successful in reducing personnel expenditures, municipalities seem to be substituting non-personnel expenditures for personnel expenditures rather than slowing the growth of total expenditures. At the same time, the expenditure limits seem to encourage municipalities to ease their spending constraints by increasing revenues where they can. The net effect is a small but significant reduction in deficit spending.

DEDICATION

I dedicate this dissertation to my parents, who gave me every educational opportunity imaginable, who have been a never-ending source of love and support, and who have always made sure that I knew they were proud of me.

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CHAPTER I: LOCAL REVENUE GENERATION IN BRAZIL

1 CHAPTER INTRODUCTION

The Decentralization Theorem states that, absent any economies of scale in the provision of services or externalities across jurisdictions, welfare will be at least as high or higher when local governments provide Pareto-efficient levels of consumption within their jurisdictions compared to when a single uniform level is provided across all jurisdictions. (Oates 1999) The policy prescription that comes out of the Decentralization Theorem is that local governments should have responsibility for the provision of public goods for which benefits are accrued solely within their jurisdiction and for which there are no economies of scale. Given that local governments take on a substantial amount of responsibility for the provision of public goods in many countries, the next question becomes “how will local governments finance these services?” The options are (1) through redistribution of resources collected centrally in a system of intergovernmental transfers, (2) by enabling local governments with sufficient tax collection authority to achieve their financing needs independently or (3) a combination of both.

If the answer is both (which it usually is), the next question is “which level of government should have authority over which taxes?” This question is commonly known as the “tax assignment problem” in public finance literature. Bird (2009) provides an excellent overview of the theoretical discussion concerning tax assignment from Richard Musgrave’s first treatment of the tax assignment question in 1959¹ through discussion of the question in the 2000’s, summing up the traditional public theory literature with the statement, “the reductionist conclusion with respect to tax assignment that emerges from the standard literature is more or less that the central government should do everything that matters.” The specific normative rules established by different authors are more nuanced, but the policy prescriptions eliminate all of the following types of taxes as inefficient for local governments to collect: (1) taxes on bases with high inter-jurisdictional mobility², (2) most taxes with progressive rates (taxes with progressive rates with the purpose of re-distributing resources and personal taxes with progressive rates that cannot be efficiently implemented at the local government level), (3) taxes on bases that are distributed highly unequally between some jurisdictions, (4) taxes that are likely to lead to “tax wars”³, and (5) taxes for which there are economies of scale in administration.

¹ Bird notes that the tax assignment question was not explicitly addressed by Musgrave until 1983.

² Oates (1999) clarifies that local governments should avoid *non-benefit* taxes on mobile factors in particular.

³ This is similar to the argument that mobile units should not be taxed, but for a slightly different reason. In the first argument, the rationale is based upon the premise that mobile units will receive benefits without paying while in the “tax war” argument, the rationale is that competition to attract mobile units (e.g. businesses) will drive down taxes everywhere, with the net effect that tax revenues will be too low.

Bird argues that the second-generation fiscal federalism literature⁴ does little to increase the set of taxes recommended for local governments. Bird (2009) establishes his own set of recommendations for sub-national tax assignment based on the literature: (1) that own-source revenue be sufficient for at least the richest subnational governments to finance services they provide that benefit primarily local residents, (2) that, as much as possible, subnational revenues should burden local residents only, (3) that governments be given enough control over their revenues so that they are able to affect the volume of revenues significantly at the margin with their policy choices (e.g. changes to the tax rate) in order for them to be publicly responsible for their expenditure choices, and (4) that subnational taxes not substantially distort the allocation of resources.

Perhaps because theory suggests that few taxes are appropriate for local governments to administer or perhaps because central governments are reluctant to give up control over the most lucrative sources of tax revenues, such as income and value-added taxes, local governments in most developing countries are typically limited to collecting property tax, user charges and fees and sometimes vehicle taxes. (Bird 2009, Bahl and Bird 2010) Most studies find these sources of revenues alone to be insufficient to fund big-ticket public services such as education and health, which many local governments are tasked with providing. It is thus no surprise that local governments in low and middle-income countries are typically highly dependent on intergovernmental transfers to finance their spending. (Bahl and Bird 2010) While some argue that local tax powers must be expanded, local governments in most developing countries are often collecting very little even from those revenue sources over which they do already have authority. (Bahl and Bird 2010) This is certainly the case in Brazil.

This chapter aims both to provide a descriptive analysis of local revenue generation in Brazil and to provide an understanding of the major challenges facing local governments in Brazil and in low and middle income countries more generally. The remainder of this chapter is organized as follows: Section 2 provides an overview of the organization of government in Brazil and municipal responsibilities for delivering public services; Section 3 describes the sources of revenue available to municipalities through Brazil's system of public finance; Section 4 discusses the key local revenue generation challenges that typically face local governments in low and middle income countries; Section 5 provides a picture of local revenue generation in Brazil using publicly available data on municipal accounting records, municipal population and GDP, and municipal revenue generation infrastructure and administration; Section 6 offers concluding remarks for this chapter; and Section 7 presents figures and graphs for this chapter.

⁴ Second-generation fiscal federalism largely refers to work that models public agents as self-interested beings maximizing their own welfare and responding to incentives as opposed to models that assume public agents to be making public finance decisions to maximize social welfare.

2 BRAZILIAN FEDERALISM AND DIVISION OF RESPONSIBILITIES

2.1 (VERY) BRIEF HISTORY OF BRAZILIAN FEDERALISM

Brazil has a relatively long history as a federalist government. The first sub-national entities were introduced in Brazil's system of regional management by Portugal in 1534 in an effort to prevent other colonial powers from gaining a strong foothold in Brazil. While this first attempt at introducing a system of decentralized governance was largely a failure, later attempts were more successful, and regional leaders of various types have long been a check on the central government's authority. ("O Brasil: Períodos históricos") At the same time, the concentration of administrative and fiscal power across tiers of government has undergone several changes over the past century, with a particularly pronounced move towards centralization during Brazil's military dictatorship from 1964 to 1985. Following the end of the military dictatorship in 1985, a new Constitution⁵ was introduced in 1988. It aimed to reverse much of the centralization of power that had taken place over the previous twenty years and to ensure local power over both political decisions and government revenues. (Mora and Varsano 2001)) As is the case in most countries, the relationship between different tiers of governments in Brazil is best described as one that is fluid and ever-evolving rather than set in stone, even under the same Constitution. Each piece of legislation that introduces a new rule on local spending or local tax collection takes away a little bit of local authority, and each new responsibility that shifts to local governments decentralizes governance just a little more.

Today, Brazil's government is made up of a Federal District (Brasília) and three administrative tiers: the central government, 26 state governments and just over 5,560 municipal governments within the boundaries of the 26 states. The precise number of municipalities varies from year to year as some separate and others integrate. Municipal governments are led by a mayor (Prefeito), vice-mayor (vice-Prefeito) and members of city council (Câmara Municipal), who are elected every four years, in up to two rounds of elections.

2.2 MUNICIPAL SPENDING RESPONSIBILITIES

Article 30 of the Constitution lays out municipal responsibilities for the provision of public goods. Municipalities are charged with providing and managing essential public services of local interest—specifically including public transport, early childhood and primary education programs, and public health services—and with managing urban planning. Through other laws, the national government specifically regulates minimum spending in two of these categories of public services — education and health. In addition to minimum expenditures on education and health, municipalities also face a number of constraints limiting expenditures on personnel.

⁵ For the remainder of this chapter, "the Constitution" refers to Brazil's current Constitution, introduced in 1988.

2.2.1 EDUCATION

The provision of basic education (early childhood education and elementary school) is the responsibility of municipalities under Law 9394 (Brazil's Law of Educational Guidelines), which defines Brazil's educational structure and outlines in detail the roles and responsibilities of the nation, the states and the municipalities in providing education at all levels. While the responsibility of providing secondary and higher education falls on the states and the federal government, municipalities may provide education at these levels so long as they also fulfill their responsibilities toward basic education. Education at public institutions must be free for all students, and states and municipalities are further responsible for providing school transport for schools that fall within their respective educational systems. Law 9394 also sets minimum education spending requirements for all levels of government. Municipal governments must spend no less than 25% of all tax revenues received (including those collected at the federal or state level and transferred to municipalities) on the maintenance and development of public education.

2.2.2 HEALTH

While all municipalities are charged with providing, at a minimum, basic health services, some assume responsibility for providing a full municipal health system, according to minimum standards overseen by the state. Article 198 established the existence of minimum required health service expenditures, which are to be set by the federal government for all levels of government (national, state and municipal) at least every five years. By 2000, states and municipalities were to spend a minimum of 7% of resources on health, and by 2004, municipalities were to spend 15% of tax revenues received (including those collected at other levels of government and transferred to municipalities) on health. Current law (Complementary Law 141 of 2012) maintains the 15% minimum for municipalities.

3 MUNICIPAL SOURCES OF REVENUE

In this section, I describe the various sources of revenues available to municipalities to meet their responsibilities to citizens. Revenues are grouped into three broad categories: intergovernmental transfers (defined as transfers received from revenues generated by other government entities), locally generated revenues (defined as revenues collected from a municipality's citizens) and other miscellaneous sources of revenue.

3.1 INTERGOVERNMENTAL TRANSFERS

Transfers account for the vast majority of municipalities' receipts (93% on average in 2011⁶). Chapter I, Section 6 (Articles 158 through 162), of the Brazilian Constitution describes Brazil's system of intergovernmental transfers. Article 158 specifically describes municipalities'

⁶ Author's calculations, based on data described in Section 5

revenue rights. Some of the intergovernmental transfers that municipalities receive are classic vertical transfers (i.e. transfers that are made across tiers of government) while others have elements of both vertical transfers and horizontal transfers (i.e. transfers across jurisdictions within the same tier of government). The direct constitutional transfers received by municipalities are mostly unconditional in nature, except for the requirement that municipalities spend a minimum share of all tax monies collected (whether municipal revenues or federal and state taxes) on health and education. Some of the constitutional transfers received by municipalities instead come through Brazil's national education fund, to which all municipalities must contribute a share of certain direct constitutional transfers and which must be spent on education, or through health funds, which must be spent on health services.

3.1.1 FEDERAL REVENUES RETURNED TO THEIR SOURCE

There are several federal transfers that do little more than re-distribute taxes collected back to the municipality where they were collected. The first of this type of transfer is income and profit taxes collected on salaries and other payments paid directly by the municipality (IRRF), 100% of which is returned to the municipalities where the tax was collected. The second of this type of transfers is the rural property tax. While urban property taxes are the domain of municipalities, the federal government collects rural property taxes (IRT) but must transfer 50% back to the municipalities in proportion to the taxes collected on properties in their jurisdictions. A 2003 amendment (Constitutional Amendment 42) allows municipalities to enter into agreements with the federal government permitting the municipality to take on the responsibility of collecting the IRT and allowing the municipality to keep all of the revenues rather than having the federal government collect this tax on the municipality's behalf. The third of this type of tax is the vehicle tax. The federal government must return 50% of taxes collected on automotive vehicles back to the municipality in which the vehicle is licensed.

3.1.2 MUNICIPAL PARTICIPATION FUND

One of the major sources of transfers received by municipalities is the Municipal Participation Fund (FPM), which is comprised of 22.5% of federal income and profit taxes and taxes on industrial products (IPI) (excluding salaries and payments paid directly by the municipality, described in subsection 3.1.1). A 2007 amendment (Constitutional Amendment 55) stipulated that an additional 1% to of income and profit taxes would be transferred to the Municipal Participation Fund and was to be available within the first 10 days of December of each year.⁷ How the FPM is to be distributed across municipalities is to be set in separate laws. The current law (Decree-Law 1881 of 1981) allocates resources according to population size. In 2011, Municipal Participation Fund transfers made up 41.6% of all transfers received by municipalities and 39.7% of all receipts.⁸

⁷ An additional 21.5% of income and profit taxes go to a State Participation Fund, and 3% of the income and profit tax revenue must be used to finance regional development projects aimed at increasing productivity in Brazil's poorer regions (the North, the Northeast and the Center-West).

⁸ Author's calculations, based on data described in Section 5

3.1.3 STATE VALUE-ADDED TAX (ICMS)

One of the most significant changes to the distribution of fiscal power introduced in the 1989 Constitution was that made to the value-added tax (the Tax on Operations Related to the Circulation of Goods and Inter-state and Inter-municipal Transportation Services and Communications, or ICMS). Authority over the ICMS was reassigned from the federal government to state governments (a rare design for value-added taxes). The only condition placed on states' use of ICMS resources was that 25% of ICMS resources must be returned to municipalities. Article 158 also lays out some rules regarding how ICMS revenues are to be distributed to municipalities. Three quarters of the 25% of resources going to municipalities (18.75% of the state's ICMS revenues) are to be distributed in proportion to the amount of value-added ICMS resources collected in that municipality. Each state may determine how the remaining ¼ of the 25% of the resources received by municipalities (6.25% of total ICMS revenues) is distributed across municipalities within its state. States have adopted a variety of policies for determining how the ¼ of municipalities' ICMS resources will be allocated, including policies that take into account population or land area, and distribution formulas that simply allocate resource equally across all municipalities. Others states have introduced formulas that aim to reward municipalities for protecting the environment, for improving social indicators (specifically in the areas of health and education) or for collecting more in local taxes. Most states use a weighted combination of several factors in their formulas. In 2011, the ICMS made up just over 20% of municipal transfers received and just fewer than 20% of total receipts on average.⁹

3.1.4 FEDERAL TAX ON EXPORTED INDUSTRIAL PRODUCTS

Municipalities also receive a share of the federal Tax on Industrial Products (IPI) (essentially a value-added tax on industrial products) that is transferred from the federal government to states. The IPI is a federal tax, but 10% of IPI revenues are transferred to the states in proportion to a state's contribution to the IPI. A maximum of 20% of the total amount of transfers could go to any single sub-national government entity.¹⁰ Twenty-five percent of the transfers received by the state must be transferred to municipalities, using the same criteria as those used to distribute ICMS resources. Note that this amount is in addition to the 22.5% of the IPI that is transferred to the Municipal Participation Fund (FPM). In 1996, Complementary Law 87 (popularly known as the Lei Kandir) shifted the right to collection of goods and services for which the final destination was export from the states to the federal government. These goods and services were re-classified as IPI-Export products. While the amount of the IPI-Export taxes that is returned to the state depends on agreements reached between the states and the federal government, the rules governing what municipalities will receive from each state are clearer. Municipalities are to receive 25% of the sum of IPI-Export transfers received by the state, and this amount is distributed in the same way that the ICMS is distributed.

⁹ Ibid.

¹⁰ Excess funds would be distributed across other states according to the same "value-added contribution" criteria.

3.1.5 FEDERAL ECONOMIC CONTRIBUTIONS

Municipalities also receive a share of a class of federal revenues called contributions for the intervention in the economic realm (*contribuição de intervenção no domínio econômico* or CIDE), which are collected on specific economic activities and are to be used for specific purposes related to that economic activity. For any economic contribution, 29% of the revenues collected by the federal government must be transferred to the states and the federal district, according to laws established for each category of economic activity for which economic contributions are charged. The states, in turn, must transfer 25% of their CIDE transfers to the municipalities in their territory (Article 159, Section III).

One of the most notable of the CIDEs are those collected on oil and gas activities and used for subsidies on the price of transport of ethanol, natural gas and petroleum by-products; to finance transportation infrastructure projects; or to finance environmental projects related to the oil and gas industry. The states' twenty-nine percent share is distributed according to the following criteria: 40% in proportion to the amount of paved road that exists in each state (calculated by the Department of Transportation), 30% in proportion to consumption of oil and gas in each state (calculated by the National Petroleum Agency), 20% in proportion to population (calculated by the National Institute of Geography and Statistics), and 10% distributed equally across all of the states and the federal district. (Law 10336) Of the 29% received by states, the 25% that goes to municipalities must be used to finance transportation infrastructure projects. Half of the pool of transfer money is distributed according to the same criteria as those used to distribute the Municipal Participation Fund (FPM), and half is distributed in proportion to municipal population.

3.1.6 NATIONAL EDUCATION FUND

In addition to unconditional resources, which may be spent on education, the primary source of funding for education is the National Education Fund. Called the Fund for the Management and Development of Elementary Education (FUNDEF) between 1996 and 2006, this fund was altered and became the current Fund for the Management and Development of Basic Education (FUNDEB) (valid through 2020). The National Education Fund is made up of obligatory contributions from municipalities and states. These contributions are set as a fixed share of most of the major transfers received by states and municipalities. In the case of municipalities, the fund currently draws 20% of Municipal Participation Fund transfers, and transfers from the state value-added taxes (ICMS), taxes on industrial products (IPI), IPI-Export taxes, vehicle taxes, and rural property taxes.¹¹ Prior to 2006, FUNDEB drew 15% from these transfers rather than 20%, and the change to the National Education Funds saw large increases in resources devoted to the education fund. The resources contributed to the fund count toward municipalities' minimum education expenditure requirements.

¹¹ States must contribute 20% of State Participation Funds and the value-added (ICMS) and estate taxes that they collect.

Resources are distributed to municipalities based on a weighted sum of the number of students matriculated the previous year in public elementary school (in the case of the earlier FUNDEF law) and in public early childhood education programs and public elementary school (in the case of FUNDEB). The weights assigned to the number of students depend on a number of factors, but students in early childhood education programs and young adult programs are weighted slightly lower than students in elementary education, rural students are weighted slightly higher than urban students, students in full-day programs receive higher weights than those in half-day programs. Special education students receive slightly higher weights than standard students, as do students in schools that are traditionally disadvantaged (indigenous schools and *quilombola*¹² schools). Under both FUNDEF and FUNDEB, minimum values for funding per student are determined on an annual basis. When resources received by states and municipalities fall below these minimum values, federal government contributions are used to make up the additional resources needed to ensure that minimum funding levels are met.

Both FUNDEF and FUNDEB further require that funds be spent on maintenance and development of education for the levels specified by each fund (elementary school in the case of FUNDEF and, in the case of FUNDEB, elementary school and early childhood education for municipalities and elementary and middle school for states). A minimum of 60% of fund resources received must be used to pay educational professionals for their work in public schools (teachers, school coordinators, etc.). The specific rules on which professionals and which functions count toward the 60% is somewhat different across the two funds. The remaining 40% of resources may be spent on a variety of educational expenditures, including personnel, school infrastructure development, surveys and data collection with the purpose of improving the reach and quality of education, and purchase of materials used for education or for school maintenance (e.g., cleaning products, office materials, etc.). (“Lei de Diretrizes e Bases da Educação Nacional” 1996).

3.1.7 FUNDING FOR HEALTH SERVICES

The degree to which municipalities manage their own health systems varies and depends on municipalities’ capacities and whether they assume responsibility for providing a full municipal health system or opt to provide basic health services only. Municipalities providing a full municipal health system (which includes ambulatory and hospital services in addition to standard basic health services that all municipalities are expected to provide) receive additional health funding from state and national governments but must meet a series of national requirements considered to be mandatory elements of a full health system. States are responsible for providing additional health services that municipalities are unable to provide themselves (typically due to lack of capacity). Consequently, state-to-municipality transfers for health services can vary and depend largely on municipal population and capacity. Unlike educational fund resources, health funding is not distributed according to a fixed

¹² Quilombos are settlements (typically in the rural interior of the country) that were founded by escaped slaves, other disadvantaged or oppressed groups and fugitive and that remain in existence today.

formula. Several criteria are technically assessed to determine resource allocations across states and municipalities, including: (1) the epidemiological profile of the region, (2) epidemiological profile of the population in question, (3) quantitative and qualitative characteristics of the health service system in the area, (4) technical, economic and financial development in the preceding period, (5) budget spent on health, (6) investments forecasts laid out in municipalities' five-year plans, and (7) compensations made to other spheres of government for the delivery of health services in the area. Municipalities can also enter into individual agreements with other municipalities or with states to either compensate another entity for providing services on its behalf or provide services on behalf of another entity and be compensated in return.

3.1.8 OTHER (VOLUNTARY) TRANSFERS

In addition to the constitutional transfers guaranteed to municipalities and the health system transfers they receive, municipalities also may receive “voluntary transfers” from the federal government, which include any other transfers made based on independent agreements between the federal government and municipalities. In fact, the National Treasury Office calculates voluntary transfers by subtracting from total transfers all constitutional and health transfers. (Government of Brazil National Treasury Office) They can be current or capital transfers and are typically for the purposes of cooperation, aid or financial assistance.

3.2 LOCALLY GENERATED REVENUE

Article 156 of the Constitution gives municipalities the right to collect three types of taxes: taxes on urban property and buildings (called the IPTU), taxes on transfers of real estate titles (called the ITBI) and taxes on services of any nature (called the ISSQN), excluding those services covered under states' collection rights and excluding exported services. Combined, locally generated revenues made up around 5.7% of total municipal revenues on average in 2011.¹³

3.2.1 URBAN PROPERTY TAX

The property tax (IPTU) is one of the most significant taxes collected by municipalities. Assessed market value is used as the basis for calculating property taxes, and it is up to municipalities to determine the assessed market value of properties in their territories. Tax rates, valuation methods and the frequency with which values are re-assessed all vary from municipality to municipality. Curitiba (the capital of the Southern state of Paraná), for example, has a progressive tax structure in which a rate of 0.20% is charged on the first R\$34,288¹⁴ of a property's value, a higher rate of 0.25% is charged on the next R\$8,643 above R\$34,288 (implying a ceiling of R\$42,931 for the 0.25% tax rate), 0.35% is charged on the next R\$8,643

¹³ Author's calculations, based on data described in Section 5

¹⁴ In 2013, the exchange rate of reais to dollars was roughly R\$2/US\$1.

above R\$42,931, and 0.55% on the remaining value of the property for those worth more than R\$60,076. In Curitiba, the tax code does not distinguish between commercial and residential properties for the purpose of assessing property taxes. (Municipality of Curitiba Secretary of Finance) In Cuiabá (the capital of Mato Grosso, in the Center-West of the country), on the other hand, the municipality charges a higher rate on urban land without permanent construction than it does on land with permanent construction. This is presumably to encourage land development. A flat rate of 0.4% is charged on the assessed market value of urban property that includes construction of a permanent nature, and 2% is charged on the assessed value of urban land that does not include permanent structures. (Municipality of Cuiabá)

3.2.2 MISCELLANEOUS SERVICE TAXES (ISSQN)

ISSQN (also referred to simply as ISS) tax revenues have usurped the IPTU's position as the largest source of local revenue over the past decade or so. The ISSQN can be charged on a large number of services, including professional services (such as legal services, engineering services, economic advising, medical services, etc.); air, rail or sea transport; artistic services; and services related to the distribution and sale of lottery tickets. Municipalities can choose the tax rate they wish to charge and often charge different rates depending on the service. In the city of São Paulo, for example, medical services are taxed at a rate of 2% while other professional services are taxed at a 5% rate. Despite the fact that the Constitution stipulates that a Complementary Law should govern the tax rate ceiling, the first ISSQN ceiling was not introduced until 1999 under Complementary Law 100. The maximum rate of 5% introduced at that time has been maintained in the most recent revision to ISSQN law under Complementary Law 116 of 2003.

3.2.3 MUNICIPAL FEES

In addition to the taxes discussed above, municipalities have the authority to collect fees. The Constitution stipulates that fees can be charged for the exercise of police powers or for use of specific, divisible municipal services that are rendered or made available to the public. The Constitution also makes clear that fees cannot have the same base for calculation as taxes. Common fees include those related to owning and driving a motor vehicle (including charges for driver's licenses, license plate fees, obligatory driver's education, psychological test fees, etc.), permit fees for using public space (e.g., occupying public land or advertising in public space), permit fees for building or renovating property, and licenses for operating a business (stationary or ambulatory), among many others.

3.2.4 LIMITS TO MUNICIPALITIES' TAXATION POWER

Article 50 of the Constitution also clearly lays out some basic rules that limit governments' taxation and fee collection power. These rules apply at all levels of governance, from municipal to federal. First, collection or increase of any tax or fee must be established formally in a law. Second, any tax or fee must treat payers in equivalent situations equally and

cannot discriminate on the basis of profession or professional function. Third, government entities are prohibited from charging taxes or fees retroactively, charging the same tax or fee twice in the same financial year, charging new taxes or fees for at least 90 days after a new law is passed, using them for the purposes of confiscation, limiting the transport of people or goods across jurisdictions (with the exception of tolls on roadways maintained by the public entity in question), charging taxes to religious organizations, political parties, unions, non-profit organizations, or charging taxes on print materials (books, newspapers and magazines) or paper to be used for the printing of these materials.

3.3 OTHER SOURCES OF LOCAL REVENUE

3.3.1 ECONOMIC CONTRIBUTIONS FOR ELECTRICITY

As of 2002, municipalities were given the right to collect economic contributions on electricity services, which must be included on electric bills. As discussed in Section 3.1.5, other economic contributions are collected only at the national level. These are different from fees only in that they do not need to be spent directly on the provision of electricity but may be spent on other electricity-related projects.

3.3.2 REVENUES FROM MUNICIPAL INCOME-GENERATING ACTIVITIES

Municipalities also generate some local income in a number of ways. First, they may receive income from assets they own in the form of returns on financial investments or rent paid on properties owned by the municipality, for example. Some also receive income from municipal industrial and agricultural activities, typically generated by state-owned enterprises or on state-owned land.

In addition, municipalities receive income from services rendered. These can include hospital services, transportation services, sale of goods, inspection services, or data processing services, among other services. While these are classified in Brazil as receipts from service activities rather than as fees, the line between the two is fuzzy. Many receipts from service activities are essentially fees charged directly at the point of service (often termed “user fees”).

3.3.3 CREDIT

Brazilian municipalities may also borrow money from private entities as well as from other government entities and borrowing can be used for any number of public purposes. Programs may be national, state-led, independently financed by other levels of government or co-financed by international organizations such as the Inter-American Development Bank. Some of the many examples of lending programs that exist include national state lending programs to finance the paving of roads (Government of Brazil Ministry of Cities), to invest in electronic systems and staff training to improve public financial management (PNAFM), to build pre-schools (PROARES) or to develop tourism in a municipality (PRODETUR). Municipalities also

often borrow short-term in anticipation of tax and fee receipts that are expected to arrive later. Municipalities face two major constraints on their total allowed amount of debt: a maximum of 100% of real liquid receipts¹⁵ (under Provisionary Measure 2185 of 2001 and Law 9496 of 1997) and 120% of liquid current receipts¹⁶ (under Federal Senate Resolution 40 of 2001). (Rocha 2007) While high levels of public debt have historically been a concern at the national and state levels and municipalities face a number of debt constraints, the vast majority of municipalities fall well below these limits. (da Costa 2008)

3.4 FISCAL RESPONSIBILITY AND LIMITS ON SPENDING

In efforts to ensure that planning and financial management is incorporated into municipal spending decisions and to keep municipal spending in check, Brazil has a number of laws that place restrictions on municipal governments' spending and borrowing.

3.4.1 THE LAW OF FISCAL RESPONSIBILITY

The Law of Fiscal Responsibility (Complementary Law 101) was a landmark piece of legislation governing public financial management in Brazil. It aimed at establishing guidelines for public finance at all levels of government (federal, state and municipal) in order to ensure responsibility in fiscal management, defined by the law as "planned and transparent action, in which risks are anticipated and deviations that are capable of affecting public account balances are corrected, through the attainment of expenditure and receipt objectives and compliance with limits and rules for forgone taxes, personnel expenditures, social security and others, public debt, credit operations, including those in anticipation of receipts, granting of credit guarantees and carry-over debt." Passed in 2000 and first implemented at the beginning of 2001, it placed limits on debt, imposed additional and more rigorously enforced limits on personnel expenditures, required public reporting on key fiscal indicators, required all levels of government to generate budget plans and identify revenue sources for new on-going expenditures and placed particularly strict limits on spending and borrowing in years leading up to elections.

The Law of Fiscal Responsibility owes its existence, in large part, to Brazil's 1998 economic crisis. The IMF had been pressuring Brazil to address growing public debt in earnest following a series of economic crises and the introduction of a monetary stabilization plan (the Plano Real) in 1994. Despite this pressure, it was not until the 1997 Asian fiscal crisis sent Brazil into crisis again that the government acted forcefully to stem the debt spiral. Following the 1998 elections, the re-elected President Cardoso worked with Brazilian legislators to address public financial management in a systematic and comprehensive way. The IMF approved a

¹⁵ For municipalities, Real Liquid Receipts are calculate by taking total receipts (current and capital) over the past year and subtracting funds received from the National Education Fund, health funds received, loans received, capital receipts from the sale of capital goods or assets, voluntary transfers and donations received. (Rocha 2007)

¹⁶ For municipalities, liquid current receipts are equal to total current receipts minus social contributions and automatic deduction from transfers taken by the federal government for the national Education Fund (FUNDEF/FUNDEB).

series of cash disbursements and Stand-By Arrangements accompanied with relatively loose conditions that structural adjustment be made to the fiscal system in order to reduce public debt levels. The Law of Fiscal Responsibility was the first successful attempt in Brazil to truly address the public system of financial management as a whole. While the IMF had a strong role to play in its passage, the Law of Fiscal Responsibility was generally portrayed as a Brazilian initiative in order to engender support from legislators and sub-national governments affected by the new law. (IMF Independent Evaluation Office 2003, Goldjfan 2003) Since its implementation, the Law of Fiscal Responsibility is held up by the IMF as a model to other countries considering adopting these types of laws.

In Chapter III of this dissertation, I show that the personnel limits introduced in the Law of Fiscal Responsibility do indeed succeed in forcing municipalities bound by the limit to reduce the growth of their personnel expenditures, though municipalities seem to substitute toward non-personnel expenditures in lieu of personnel expenditures rather than slowing the growth of total expenditures. Nonetheless, the limits also encourage municipalities to ease their spending constraints by increasing revenues where they can (particularly in municipal income-generating activities), the net being a small but significant reduction in deficit spending. One of the law's biggest impacts, however, is likely to be its contribution to developing a culture of fiscal responsibility and accountability, an impact that is neither easy to quantify nor easy to evaluate rigorously given the national nature of the legislation.

3.4.2 LIMITS ON PERSONNEL SPENDING

Municipalities face a number of constraints limiting expenditures on personnel. First, municipalities may not spend more than 60% of liquid current receipts¹⁷ on personnel. The original law to defining these limits (Complementary Law 82, known as the Lei Camata) was introduced in 1995, and the limits established in that law remain in place today. The Law of Fiscal Responsibility (Complementary Law 101) maintained the same basic limits but made a number of changes to render the limits more effective: they increased financial penalties on those municipalities that failed to comply and held mayors criminally responsible for failure to comply; they introduced a system of monitoring when municipalities approached the limit; and they imposed stricter timelines for reducing personnel expenditures when municipalities rose above the limits in election years.

Of the 60% of resources spent on personnel, the Law of Fiscal Responsibility further established maximums on the share that could be spent on legislative personnel (7%) and executive personnel spending (the remaining 53% of liquid current receipts). A 2009 amendment (Constitutional Amendment 58) changed the limit to vary with municipal size, and the limitation on legislative personnel spending now ranges from 3.5% for municipalities with populations of over 8 million to 7% in municipalities with populations of 100,000 or fewer.

¹⁷ Liquid current receipts are described in more detail in Section 6. For municipalities, they are equal to total current receipts minus social contributions and automatic deduction from transfers taken by the federal government for the national Education Fund (FUNDEF/FUNDEB).

Second, the constitution details a number of limits aimed specifically at keeping the total amount of money spent on City Council members' salaries in check. First, the maximum number of city council members is based on municipal population and ranges from 9 members in municipalities of 15,000 people or fewer to 55 members in municipalities with 8 million or more residents. Second, maximums on city council member salaries are set in relation to state legislature salaries and range from 25% of state legislators' salaries for municipalities of fewer than 10,000 residents and 75% in municipalities with 500,000 residents or more. Finally, no more than 5% of total municipal receipts may be spent on City Council member salaries.

4 CONSTRAINTS TO SUB-NATIONAL REVENUE GENERATION

Before proceeding to a discussion of the challenges faced by local governments, it is important to have a basic understanding of the practicalities of administering taxes and fees. First, any tax collection system will require a local government to: (1) identify the revenue base (i.e. individuals, products, activities, businesses or properties on which taxes will be levied), (2) assess the value of the revenue base (e.g., property values) (3) determine tax rates, (4) issue tax bills, (5) respond to appeals, (6) collect taxes, (7) enforce tax obligations in cases of delinquency. (Slack 2009, RTI International 2007)

Fees typically take one of three general forms: registration fees, service fees or user fees. Registration and service fees are very similar in nature to taxes, the main characteristic distinguishing the two being the incidence of their collection. Whereas taxes are charged with the intention of raising revenues for the provision of public services, fees are charged to the beneficiary of a public service in order to pay for at least part of the costs associated with providing that service.¹⁸ Registration fees are often charged for operating a business or for owning and using a motor vehicle, and service fees can include any number of fees charged like taxes but used for the provision of specific public services (police fees charged on property or fire prevention fees charged on kWh of electricity used are two examples from Brazilian municipalities). For administration purposes, these fees are essentially equivalent to taxes, in that registration fees require the same set of actions to administer as do taxes. By user fees, I refer to fees charged for particular services at their point of use. These may include such fees as park entry fees, bridge tolls, fees for use of health services or fees for attending public schools (the latter two are both common in developing countries). Because user fees are charged at the point of use, their administration can be quite simple, unless service providers must verify exemptions or provide reduced rates for sub-populations whose characteristics cannot be directly observed (for example, individuals whose incomes are below the poverty line), as opposed to pregnant women or infants).

¹⁸ There is an interesting debate over where to draw the sometimes hazy distinction between taxes and fees (Henchman 2013), a debate into which I do not enter this paper.

In addition to weak revenue bases in general resulting from small economies, local governments face a number of challenges in collecting taxes and fees over which they do have authority. Those that emerge from the literature are grouped into the following categories: (1) political resistance to taxes and some fees, (2) disincentives to collect local revenues, (3) high levels of informality, (4) high evasion rates and costly enforcement mechanisms and (5) underdeveloped administration systems. These categories are used for analytical purposes, but they are all deeply intertwined.

4.1 POLITICAL RESISTANCE TO TAXES AND FEES

It is widely accepted that people do not enjoy paying taxes. Collection of taxes and user fees is thus not usually a popular action, and studies often find that mayors or other local government leaders pay a political price for improving tax collection efforts, though the evidence to date is concentrated in high-income countries. (Veremir and Heyndels 2006, Bosch and Sollé-Ollé 2007, Sobal 1998, Besley and Case 1995) While a rational taxpayer should evaluate property taxes as they would any other tax, it is often postulated that property taxes (one of the major sources of revenues available to local governments) are particularly unpopular because they are both highly visible since they are typically paid by the taxpayer as a tax (rather than being deducted from income or included in the price of a good) and because they are paid in lump sums rather than in small amounts over time. (Slack 2009, Bird 2010) The phenomenon of distinguishing between different taxes on the basis of how they are charged is described as “fiscal illusion” in the public finance literature. (Sanandaji and Wallace 2010, Breeden and Hunter 1985) As a result of fiscal illusion, improving property tax collection (one of the few taxes over which local governments typically have authority) can be particularly politically costly for local political leaders.

In developing countries, where poor administration often results in infrequent re-evaluation of property values, updating property values after many years of failing to do so can cause particularly visible (and unpopular) jumps in assessed property values and the resulting taxes charged on properties. This has certainly been the experience of some Brazilian cities in recent years. In the city of Rio de Janeiro, for example, a proposal was developed prior to 2012 to reform property tax collection by (1) reducing property tax rates from 1.2% to a maximum of 0.6%, (2) introducing a progressive (rather than flat) tax rate structure, (3) increasing the number of properties charged the IPTU from 40% of all properties to 97% of all properties and (4) re-assessing property values (which had not been done in 15 years). While it did eventually pass, the bill was delayed until after 2012 since the mayor and many city council members were up for re-election. (“RJ: Paes apresenta projeto que eleva IPTU” 2102) In others cities (including Ribeirão Preto and Guarulhos in the state of São Paulo and Ibirubá in Rio Grande do Sul), similar reform efforts leading to large, visible increases in property taxes met with substantial political resistance, so much so in the case of Ribeirão Preto that the City Council narrowly voted down a second proposal to revoke the changes introduced there (11 were against revoking, 9 were in favor and 1 abstained). (D'Agostino 2013, Tiengo 2013, “Aumento de IPTU gera polêmica em município do interior do RS” 2103)

Fees present another source of funds that are common in developing and developed countries alike and are generally believed to be met with less political resistance from citizens than are taxes, presumably because the connection between payment and services is direct and because they may be perceived as more voluntary in nature than many other taxes and fees. In fact, it is sometimes argued in high income countries that political leaders rely on many small fees rather than taxes to generate revenues in order to make revenue generation less visible to the public. (Henchman 2013, Sanandaji and Wallace 2010) While fees may often face less political resistance than do property taxes, developing country governments face international resistance to reliance on certain user fees, particularly those charged for health and education services. In the 1990's the World Bank was very influential in encouraging the introduction of user fees to recover part of the costs of delivering big-ticket public services (namely education and health). They were seen as an economically efficient and simple solution for ensuring that funds were available to deliver quality services to all, including the poor. (Yates 2009) Since then, equity concerns over user fee schemes have caused them to fall into disfavor with the international community as a means to finance health and education expenditures, and many (including the World Bank) now actively advocate for their abolition. (Yates 2009, Kattan and Burnett 2004) As a result, national governments and local governments alike face substantial international pressure to avoid the use of user fees to help cover the costs of health and education. Most suggested revenue replacement schemes (including national health insurance schemes and increased use of other tax funds) tend to rely on national-level government initiatives and funding and so necessarily result in greater dependence on the central government transfers. It must be noted that this is particularly a challenge in Africa, where reliance on user fees in health and education is widespread, though diminishing. Brazil's own societal norms are reflected in its Constitution guaranteeing free and universal access to public education and health restrict the use of health and education user fees considerably.

4.2 DISINCENTIVES TO COLLECT LOCAL REVENUES

It is often argued that inter-governmental transfer systems set up to ensure that local governments have sufficient resources to fund the services for which they are responsible actually serve to replace local revenues rather than to supplement them. Bradford and Oates (1971) develop a theory of public finance establishing that there should be no difference in local governments' propensity to spend intergovernmental transfers and private funds. The resulting prediction is that transfers received will be returned to taxpayers at the same rate that they are collected, crowding out local revenue generation. Many empirical studies have confirmed this prediction but many have also found that money tends to stay in local government coffers rather than taxpayer pockets— a phenomenon known as the Flypaper Effect. (Inman 1979, Fisher 1982 and Wyckoff 1991, Inman 2008) The few studies that have been conducted on Brazil tend to find evidence consistent with a Flypaper Effect. (Litschig 2009, Chapter II of this dissertation) This is an ongoing debate that is by no means limited to low and middle-income countries. In fact, most of the work on the subject has been conducted in high-income countries.

Some formulas used in developed and developing countries alike to determine the distribution of intergovernmental transfers do, however, generate clear disincentives to collect local revenue. Typically termed “equalizing transfers,” these transfer formulas use fiscal need (based, for example, on the differences between local governments’ expenditure needs and the revenues they collect) to determine the share a local government will receive of a given transfer or fund. These types of transfer mechanisms clearly reward those that collect less and so create a disincentive for local revenue generation. Most experts prescribe the use of measures of fiscal capacity (i.e. local governments’ revenue-generating potential) to determine need instead of effort (Shah 2006, Boex and Martinez-Vazquez 2007), though the data requirements of measuring fiscal capacity can be more demanding. (Boex and Martinez-Vazquez 2007) Some governments have also opted to create incentives for local revenue generation in their transfer distribution formulas by determining a portion of the formula based on some measure of revenue generation effort. At least six¹⁹ of Brazil’s twenty-six states, for example, have included measures of fiscal effort among the indicators they use in formulas to determine the share of VAT money they distribute to municipalities. To the author’s knowledge, no studies exist measuring the effectiveness of these types of revenue generation incentives.

4.3 INFORMALITY

Informality is potentially challenging from a tax collection perspective because the first step necessary to collect taxes or administrative fees is identification of the revenue base. Fundamentally, a government must know who (individuals and businesses) or what (in the case of property) exists in their jurisdiction in order to be able to collect taxes or registration fees on these entities or properties. Informality is not a challenge exclusive to tax and fee collection at the local level. Neither is it exclusively a developing-country phenomenon, though it is widely accepted that the informal sector tends to play a much larger role in the economies of developing countries than in developed countries.

4.3.1 INFORMALITY IN THE LABOR MARKET

Informality in the labor market presents particular challenges to the collection of income taxes, which is more often the realm of the central government. At the same time, municipal governments in some countries do have authority to collect income taxes (e.g., the United States) or services taxes (e.g., Brazil). As devolution of responsibility for the provision of public services continues and policy recommendations favor increased tax authority for local governments, it is likely that more countries will grant local governments income and service taxation powers in the future.

¹⁹These six states are Mato Grosso, Mato Grosso do Sul, Minas Gerais, Piauí, Rio de Janeiro and São Paulo.

Establishing accurate counts of the size of the informal labor market is in and of itself a challenge, due both to the fact that workers in this sector are not registered and to the fact that no single definition of “informality” exists. Henley et al (2009) use data from a nationally representative annual household survey (PNAD) between 1992 and 2004 to measure informality in Brazil and to show that how one defines “informality” can be of substantial consequence for one’s estimates. They estimate informality along three dimensions: (1) not having a signed labor card (essentially a formal contract registered with the government) from an employer or another individual or firm if self-employed, (2) not being registered with a social security “institute” or having made contributions for social security and (3) being self-employed or employed in a firm of fewer than five people in specific activities classified by PNAD as “informal,” including domestic, non-remunerated, subsistence and temporary work, as well as other work not classified as “creative and technical” or “administrative”). The authors find that roughly 63% of Brazil’s working population is informal when one uses just one of the three aforementioned definitions, and that 40% are informal workers according to all three.

If reducing informality is an objective of the government, understanding the causes of informality are essential to address it. One set of views portrays the informal sector as being primarily a result of labor market distortions that cause a dual economy, in which a lucky few enter the formal market and receive wages and benefits above unconstrained equilibrium while others are relegated to the low-productivity informal sector (a.k.a. the shadow economy), where low wages and underemployment abound. The classic Harris-Todaro (1970) model exemplifies this view of the informal sector. Models that view informality as being a result of policies that distort formal-sector wages and cause them to be higher than their market-clearing value (under minimum-wage policies, for example), also posit that such policies cause formal sector unemployment to be artificially high and ultimately force large numbers of workers into the informal sector.²⁰ (Rauch 1991) In these models, removing market-distorting policies should serve to increase the size of the formal sector. It should be noted, however, that this may not necessarily be optimal from a revenue generation standpoint, since taxes raised from each individual would be lower and tax administration costs may increase as more individuals are subject to taxation.

Maloney (2004) synthesizes evidence that paints quite a different picture of labor market informality: one in which informal employment is equivalent to formal small business self-employment in the developed world. In this picture of the informal sector, workers choose to be self-employed for the same reasons as would individuals in the developed world—to be

²⁰ The prospects for increasing the size of the formality sector and improving local revenue generation under the Harris-Todaro model, however, are bleak. Under this model, labor market distortions stem from the discrepancies between wages and benefits in the agricultural sector versus those in the urban employment sector. High wages in the urban formal sector yield high expected returns to migration. Migrants will obtain a high-paying formal sector job with some probability, and those that do not are either unemployed or underemployed and underpaid in the informal sector. One of the key predictions of this model is thus that increasing opportunities in the urban formal sector may actually serve to increase the size of the informal sector and the number of unemployed, causing more strain on urban municipal governments. In fact, the only useful policies prescribed for reducing the size of the informal sector under the Harris-Todaro model are ones that reduce rural-urban migration through improved wages and living conditions in rural areas.

one's own boss, to have a flexible schedule, to adjust to a paucity of desirable alternatives in wage-paying employment, etc. Because labor codes are not well enforced, self-employed workers also choose the degree to which they participate in the formal sector to optimize the benefits of participating in the formal sector minus the costs associated with formalizing. If informality is indeed a choice, as many studies imply, then a number of factors will matter in determining the degree to which workers are formal versus informal. These factors include: the degree to which labor codes are enforced (Ihriga and Moeb 2004), the opportunity costs of being self-employed (e.g., the wage one would have earned as an employee) (Funkhouser 1996), the size and quality of benefits associated with registering one's self-employment activities (e.g., pension plans, access to and the extent of protection provided by formal contracting mechanisms, access to credit) (Fugazza and Jacques 2003), the extent to which benefits can be accessed without formalizing, and the cost of formalizing (e.g., taxes, registration fees, time it takes to register a business, and increased exposure to bureaucratic extortion in some settings). (Antunesa and Cavalcanti 2007, Ihriga and Moeb 2004, Johnson et al. 2000, De Soto 1990) As a result, a number of actions may serve to reduce informality, including enforcing labor codes more strictly, making investment that will serve to improve economic opportunity in general (investment in education being a classic example), improving the number and quality of benefits associated with formality, carefully restructuring social benefit systems, or reducing the cost barriers to formalization. (Maloney 2004)

Several important considerations should be kept in mind when analyzing proposed efforts to reduce informality in the labor market from a public finance perspective. First, increased enforcement alone is bound to encourage some exit from employment all together rather than entry into the formal sector. Thus, increased enforcement may, at best, increase the tax base by less than might be hoped and, at worst, stifle economic activity as a whole and further shrink local governments' tax and fee base. Second, while reducing the cost of formalization through reduction in business registration fees and taxes is likely to reduce the size of the informal sector, it is not necessarily the case that the net effect on municipal revenues will be positive. In the same way that a business may choose to exclude some buyers from the market by charging higher prices in an effort to maximize profits, it is entirely plausible that the imposition of high business registration fees and income taxes on higher-earning firms and workers, for whom formality is worthwhile, at the conscious exclusion of lower-earning firms and workers that choose instead to remain informal due to the high costs of formality is the optimal strategy from a local revenue generation perspective. Third, the actions needed to reduce informality are far from costless and may impose more of a spending burden than the revenue they generate.

4.3.2 INFORMALITY IN THE PROPERTY MARKET

Identifying informal properties is certainly an easier task than identifying informal workers simply because land and houses do not change location. The difficulty that arises from informal housing with respect to tax collection is not so much in locating the units but in identifying the owner that should be taxed and the boundaries of each property. The literature

distinguishes between several classes of property titling in different ways. Based on classifications used in Besley and Ghatak (2009), I classify them into three levels of thoroughness (and, as a result, differing levels of administrative burden imposed on governments): (1) those aimed primarily at asserting ownership, (2) those aimed at also facilitating the transfer, purchase or sale of titles and (3) those aimed at accomplishing (1) and (2) as well as also allowing one to enter into contracts relating to property (property rental and the use of property being the most common examples).

From a pure stance of public revenue generation, all that is necessary are a simple ownership cadaster that clearly establishes property lines, the individual who owns the land and some basic methodology and data for assessing the value of the land. It is even possible to conduct such an exercise without the voluntary cooperation of the public. That being said, it must be kept in mind that informal property is typically located in communities where access to public services is limited. Since taxes are typically paid with the understanding that one will receive public services in return, collection of property taxes from areas that are receiving few or no services from the government is extremely regressive and is likely to meet with high levels of resistance. In practice it is typically not the case that property registration is conducted solely for the purposes of tax collection. Typically the opposite is true; property rights and titling are first established in order to secure land rights and improve economic and social conditions of those receiving title, with the eventual possibility of property tax collection looming on the horizon. In Rio de Janeiro, for example, upgrading of *favelas*²¹ through the city's Favela Bairro program tended to result in residents eventually paying utility fees for services received by the city and in the city's charging property taxes in cases when land was regularized. (Handzic 2010)

Improved property rights are often advocated because they are expected to increase economic activity and development through a number of channels. First, it is often argued that land titling allows banks to lend money for productive investment to the formerly un-bankable by providing a source of collateral. Increased investments, in turn, should encourage economic growth. (De Soto 2000) Evidence that titling has been successful in increasing access to credit exists (Wang 2012) but is scarce. Most studies find no evidence of changes in borrowing as a result of receiving ownership rights to one's land. (Field 2005, Galiani and Schargrodsky 2010) It is typically argued that a property title and the right to transfer title alone are insufficient. A more complete property rights system is required in order to ensure that lenders can assert property ownership with minimal transaction costs (Deininger and Goyal 2010) and can collect on their collateral in cases of delinquency. (Field 2005)

Since the whole of the benefits of investment can be captured when tenure is secure, improved property rights have been found to encourage investment in property improvement and investments in agricultural production. (Galiani and Schargrodsky 2010, Hornbeck 2010, Goldstein and Udry 2008, Deininger et al. 2008, Field 2005) Secure property rights (including

²¹ "Favela", which in fact means honeycomb, is the term used for Brazilian slums. The term presumably comes from the fact that houses in these areas are built very close together and often one on top of the other.

tenure security and the ability to buy and sell one's property) also allow for the development of more dynamic and efficient rental and real estate markets (Macours et al. 2010, Deininger et al. 2008). Both serve to increase property values. (Hornbeck 2010, Feder and Feeny 1991) Higher property values should, in turn, yield legitimately higher property value assessments for taxes (whether values are based on regular re-assessments or whether values are based on sale values), assuming a local government has a functioning assessment system in place.

4.4 HIGH RATES OF TAX EVASION AND COSTLY ENFORCEMENT SOLUTIONS

Informality and tax evasion are deeply intertwined, since the obligation to pay taxes and fees is one of the primary costs of formality. Early theoretical models of tax evasion predicted the intuitive conclusion that greater enforcement (either through harsher penalties or through more or improved auditing) should reduce the probability that taxpayers evade. Over time, models were extended to also allow for tax avoidance "technology," in which one can avoid taxes through different channels (e.g. changing behavior taking into account tax liabilities, evading taxes, etc.) and allowed for taxpayers to spend on "avoidance technology" (e.g., by hiring an accountant to figure out how to legitimately reduce one's tax burden, by spending money on hiding money, or by earning less). The complicated nature of these models meant that clear predictions of the relationship between tax avoidance and changes in taxes or in enforcement could no longer be made without developing strong assumptions concerning the form of individuals' utility functions. (Slemrod and Yitzhaki 2002)

At the national level, Brazil's tax auditors are renowned for their thoroughness, their relentlessness and their unwillingness to go easy on the rich, the famous and the politically connected. With national tax evasion rates estimated to be far below many other Latin American countries, auditing efforts are generally perceived to be successful, though Brazil's approach relies not just on enforcement but also on substantial monitoring (particularly of corporations). (Soto 2012) However, no rigorous analysis of the effectiveness of the extreme measures used in Brazil has been conducted to the author's knowledge.

Several field experiments have been conducted in a variety of settings, and most suggest that enforcement works to reduce tax evasion. In a large-scale experiment in the state of Minnesota, Slemrod et al. (2001) evaluate the impact of sending a letter to taxpayers stating that their tax files would be "closely examined." Tax payment of the treatment group (those who received the letter) increased relative to the control group among low and middle income taxpayers. The effect was wholly concentrated in taxpayers with self-employment and farm income, who have more room to subjectively interpret their income and expenditures, and who also have not paid estimated taxes. This is interpreted as evidence that increased auditing does indeed serve to reduce evasion. Several caveats to these results are in order, however. First, the authors consider the fact that the letter may not have represented a serious threat and so may not represent the full impact one would expect to see with increased auditing. Further, the impact of such a letter sent year-after-year without an audit occurring is likely to diminish the effectiveness of the letter itself. Third, because the outcome being measured is reported

income rather than evasion, results for self-employed and farm workers should be interpreted with caution. While these groups can most easily manipulate their reported income and expenditures, the subjective nature of their returns are also the most vulnerable to scrutiny. Thus, in light of the “close examination” risk, these taxpayers may err on the side of caution and strategically report fewer business expenditures than they legitimately could in order to avoid any scrutiny. Nonetheless, the increased threat of detection did result in tax collection increases among this group. The authors also find that reported income among high-income earners actually decreases as a result of the increased threat of enforcement. These results are not explained by increased reliance on tax preparers. The authors present an alternative theory that taxpayers may believe that high incomes are more likely to be audited and posture that “the answer must be that members of this group tend to believe that the outcome of the audit process is more manipulable...than other taxpayers.” (Slemrod et al. 2001, p.480) It seems more likely that high income earners are nearer to the perceived “audit threshold” shared by all and, as a result, strategically report less income in order to fall below the threshold. This seems more plausible than a conclusion that their understanding of the tax system is fundamentally different from that of other taxpayers. Finally, the authors point out that the perception of increased auditing may not have substantial impacts on overall tax revenues (in the experiment, tax revenue increased by less than 2% of total tax liability) and so should be considered with caution.

Other studies find similar results. In Denmark, randomly assigned audits in the previous year and randomly assigned audit threats in the next year each served to increase income reported by taxpayers, implying that the perception that one is likely to be audited succeeds in increasing tax collection (presumably due to decreased evasion). While each served to increase reported income, there was no additive effect of the two. Results are again driven by taxpayers with self-reported income, which makes up a small share of all taxpayers, rather than income reported by a third party. (Kleven et al. 2011) Pomeranz (2012) conducts an experiment in which letters are sent to Chilean firms from the Tax Authority with randomly selected probabilities of a value-added tax (VAT) audit mentioned in the letter. Overall, a higher perceived probability of audit increases VAT payments. The effect is much less pronounced in transactions that are less easily followed via paper trail, implying that paper trails themselves hold firms accountable and may reduce the need for auditing. They further find that the information about increased audit probability seems to flow up the value chain, since VAT payments increase not only among those firms that receive a message stating a higher audit probability but also among firms that supply those that have received this message. The findings generally point to the potential role for well-designed and carefully targeted enforcement mechanisms such as auditing schemes but also point to an important role for monitoring through increased efforts to establish paper trails.

Many studies suggest that “tax culture” and “tax morale” play an important role in the degree of tax evasion pervading a country or region (see reviews in Torgler 2002 and Torgler 2005). Some suggest the use of carrots rather than sticks to encourage tax payment, and many countries (particularly Asian countries) offer rewards such as being entered into a lottery (in the

Philippines), potential receipt of rewards such as free public parking, VIP airport lounge privileges (in South Korea), a picture with the emperor (in Japan) or prize draws (used by some local governments in the United Kingdom as rewards for filing electronically). (Feld et al. 2006, Behavioural Insights Team 2012) Many municipalities in Brazil offer 5% to 10% discounts for paying all taxes up-front, rather than in installments.

Lab experiments seem to corroborate beliefs that rewards for good tax collection behavior are more effective than punishment (Feld et al. 2006), but this approach remains to be tested in the field. It is worth noting that the use of rewards for good audits does nothing to address the fact that audits are expensive. It still may be the case that positive reinforcement is cheaper. In the penalty approach, the probability of being audited tends to be far more influential on tax behavior than the size of the punishment. Given individuals' seemingly irrational tendency to participate in lotteries with larger pools despite the lower expected values of winning (Cook and Clotfelter 1993), it may be the case that fewer audits would be needed in order to encourage good behavior than are needed under the punishment scenario, if the reward for good behavior is sufficiently attractive.

It is often suggested that a more effective and less costly approach to raising taxes would be to channel taxpayers' sense of civic duty to improve tax morale. Appealing to civic responsibility is a seductive alternative to auditing and punishment approaches due not only to the considerably lower cost required for such efforts but also to the cooperative rather than competitive relationship they encourage between the state and its citizens. However, evidence to date suggests that efforts to appeal to individuals' sense of moral obligation²² and civic duty²³ can be effective at improving attitudes towards taxes but have been ineffective at changing tax behavior. (Torgler 2004, Blumenthal et al. 2001, McGraw and Scholz 1991) All hope for "softer" methods of improving tax collection is not lost, however. In another experiment conducted in 1967 (Schwartz and Orleans 1967), taxpayers were randomly assigned to one of four group surveys: one that received a survey with questions emphasizing one's values regarding the civic obligation to pay taxes²⁴ (the "conscience group"), one that received a survey emphasizing penalties associated with tax evasion²⁵ (the "sanction-treated group"), one that received a general survey only and one that received no survey (the latter both being

²² In Torgler (2004), for example, the letter to treatment groups read, "If the taxpayers did not contribute their share, our commune with its 6226 inhabitants would suffer greatly. With your taxes you help keep Trimbach attractive for its inhabitants." (Torgler 2004, p. 240)

²³ In Blumenthal et al. (2001), the "civic duty" treatment arm watched a video describing the changes introduced in the 1986 Tax Reform Act and emphasized citizens' civic duties to pay taxes.

²⁴ Examples include: "How guilty do you think a person should feel who knowingly does not pay his tax on the interest which he earned?" "Would you consider a citizen's willful failure to pay tax on interest an indication that he is unwilling to do something for the country as a whole?" "Which of the following activities do you think should be given additional Federal Government support if everyone paid the tax they owe on their interest?" (Schwartz and Orleans 1967, pp.287-288)

²⁵ Examples include: "What do you think are the chances that the Internal Revenue Service will examine your return to find out whether you reported all of your interest?" "Failure to report all interest would involve 'subscribing to a false tax return.' The fine for such an offense is \$5,000. Do you think this fine is set so high to deter people from evading their tax on interest, or to make up for the money lost due to tax evasion, or for some other reason?" "A jail sentence of three years could be imposed for willful failure to pay tax on interest. Under what conditions do you think the Government should impose a jail sentence?" (Schwartz and Orleans 1967, pp.286-287)

control groups). Difference-in-difference estimates reveal that, while both the “conscience group” and the “sanction-treated group” increased reported adjusted gross income more than the control groups, the “conscience group” did so by significantly more. It is likely that, while it doesn’t hurt, channeling feelings of civic duty into action will not always be as simple as sending a letter or playing a commercial. It is also likely that the appropriate tools to encourage civic responsibility will not be the same in every context.

It is frequently noted that individual taxpayers’ “tax morale” is related to what they feel others are doing. Thus, individuals are more inclined to pay their taxes if everyone else also does so. A strong relationship between “tax morale” and individuals’ sense of what others are doing has certainly been found to exist in cross-country analyses from Latin America. (Torgler 2005) Some countries have tried tapping into peer pressure to encourage “tax morale.” The United Kingdom, for example, has experimented with the use of peer pressure as a means to collect delinquent taxes by replacing their standard form letter with a “peer pressure” letter reading “Nine out of 10 people in the UK pay their tax on time.” A subset of the letters further added “You are one of the few in your town²⁶ who have not paid us yet.” Payment of delinquent taxes rose by 5 percentage points compared to the control group when only the first message was received and by 15 percentage points when one’s own behavior was compared to the norm. (Behavioural Insights Team 2012) These findings offer a promising low-cost tool for local governments to use to improve local revenue generation but will need to be tested in settings where tax evasion and tax avoidance are, in fact, significantly higher. It also remains to be seen whether simply sending a letter will continue to have the same effect when they have been sent year after year.

Still others suggest that low “tax morale” is a result of government failure to deliver on its contract with the people, due to corruption, poor management of resources, ineffectiveness or some combination of the three. (see discussion in Torgler 2002) Indeed, in an analysis of the correlates of “tax morale”²⁷ in Latin America, Torgler (2005) finds that “trust in the President” (used as a proxy for trust in the government) positively predicts “tax morale.” It may thus be the case that efforts to reduce government corruption could serve not only to generate better government, but also to improve citizens’ willingness to hold up their end of the bargain as an additional benefit. (Torgler 2005, review in Güth et al. 2005) There are certainly suggestions that citizens punish corrupt politicians when corruption is revealed. Ferraz and Finan (2008) take advantage of anti-corruption efforts begun by the Brazilian government in 2003, in which municipalities are selected at random to have their use of national transfer funds audited. They construct a novel dataset measuring the level of corruption²⁸ based on the number of corruption-related irregularities reported in the audits. Comparing results for municipalities with similar levels of corruption but that were audited just before or just after the 2004

²⁶ Some letters specified the town and others specified the postcode.

²⁷ The following survey question is used to measure tax morale: “On a scale of 1 to 10, where 1 means not at all justifiable and 10 means totally justifiable, how justifiable do you believe it is to: Manage to avoid paying all his tax.” (Torgler 2005, p.136)

²⁸ The authors are careful to distinguish between mismanagement and corruption, which is defined by the authors as “any irregularity associated with fraud in procurements, diversion of public funds, or over-invoicing.” (Ferraz and Finan 2008, p.710)

elections, they find that politicians whose corruption was exposed before the elections were less likely to be re-elected than those whose corruption was exposed after the elections. Effects were found to be stronger in municipalities with a local radio station, presumably because local politicians' corruption reports received more coverage in these municipalities. On the flip side of the coin, good performance was rewarded in the polls; non-corrupt mayors were more likely to be re-elected in municipalities when audited just before the election and a local radio station existed to report the positive outcomes. While voters punish and reward politicians for being more or less corrupt through their voting behavior, it remains to be seen whether they do the same through their tax payment behavior. The growing literature on corruption still does not indicate unambiguously how best to fight corruption (see review in Olken and Pande 2011), and secondary questions of the causal link between reduced corruption and citizens' willingness to pay taxes has yet to be addressed.

4.5 UNDERDEVELOPED ADMINISTRATION SYSTEMS

Local governments also often face administrative constraints to successful tax and fee generation systems. (Bahl and Bird 2010, Fuest and Riedel 2009) Administration of taxes requires a system to identify taxpayers, a system for determining the amount of taxes owed, a system for collecting the money, a system for reconciling tax disagreements between the taxpayer and the government, and a system for dealing with delinquent payments. In the case of property taxes, a system for developing and revising property value assessments at regular intervals, which is no simple task should be in place. While some fees (and particularly user fees) can be slightly simpler to administer since they typically require payment of fees in order to access the services or rights covered by a fee, other fees (business registration fees, for example) require enforcement systems or verification systems if exceptions are made (for low-income citizens, for example). Thus local governments, and especially small local governments, typically face two major sources of administrative constraints: cost constraints and capacity constraints.

The cost structure of many tax administration systems is likely to be characterized by economies of scale and so administration in a single local government (particularly those that are small) may simply not be efficient. (Bird 2009) This is not a problem unique to tax collection at the local level and should also be considered when it comes to determining which public functions to decentralize. (Prud'homme 2003) If there are economies of scale, the solution need not be to return all revenue generating authority to higher levels of government. An alternative may be for local governments to maintain tax collection authority and contract out some of these services (for example, mapping of properties, property valuation, auditing, etc.) to private organizations that can work with multiple local governments and operate at a lower cost. (Bird 2009)

Not everything about the administration of taxes is necessarily more costly or less efficient when administered locally, however. Since local governments are smaller and can theoretically adapt more quickly, they are often believed to be more prone to experimentation

with new ideas in government. For tax collection, some thus suggest that new and innovative methods of collecting taxes cheaply may come out of these experiments and eventually expand to other municipalities. (Mikesell 2003) This is certainly emblematic of Brazil's experience with decentralized governance. The use of conditional cash transfer programs, for example, began in two Brazilian municipalities (Campinas and Brasília) in 1995 (Lindert et al 2007) and other municipalities followed suit with similar programs. Brazil eventually implemented the program nationwide, and the program (Bolsa Família) is Brazil's flagship anti-poverty program.

Information management systems (electronic or otherwise) and sufficient and properly trained personnel are all important for a local government's ability to administer tax and fee collection systems efficiently. The physical and human capital needed is often lacking in local governments, particularly so in many developing countries. Some of these capacities may be built. Central and state-level governments have introduced a variety of programs aimed at improving local public management capacity through training. Other capacity constraints are likely to improve as technology continues to improve. As information and communication technology (ICT) becomes more efficient, more user-friendly and increasingly accessible throughout the developing world (even in small, rural areas), so-called "e-government" has the potential to overcome many of the administration challenges if it is channeled properly. First and foremost, ICT solutions hold the potential promise of greatly reducing the personnel burden and operational costs associated with manually processing paper records of taxes and fees. The use of e-filing systems may also be particularly beneficial in areas where the perception of corruption in government is perceived to be high, a reality in many developing countries. Taxpayers can be sure that, at the very least, their tax money is arriving at the government coffers and not staying in the pockets of the tax collectors and that they are not the only persons paying taxes while others reduce their tax obligation by bribing tax officials. This appeals to taxpayers' sense of "fairness." ICT may offer some enforcement benefits as well, as governments develop methods to create electronic "paper" trails of taxable economic activity, which is likely to greatly reduce the need for auditing. (Pomeranz 2012)

At the national level, Brazil was a world pioneer in developing an integrated tax e-filing system (called RECEITANET). While no rigorous comparison of the cost-effectiveness of RECEITANET compared to the old system has been conducted, it is generally believed to be a resounding success and has served as an example for many other countries. RECEITANET was launched in 1997 and by 2003, 96% of taxpayers filed their income tax returns online. It is believed to have reduced administrative costs not just for the government but also for other agencies that processed tax claims (e.g. banks and the post office²⁹), to have greatly improved physical security and to have reduced human error in tax calculations (both at the individual and at the administrative level) and the time costs associated with correcting these errors. (Vasconcellos and Rua 2005)

²⁹ Brazil's post offices offer many banking services in order to ensure easy access to banking services throughout the country.

While ICT offers much potential for improving revenue generation at every level of government, including at the local level, it must be used appropriately in order to be effective. Simply installing an information-technology system will not magically improve local revenue generation. Even at the national level, examples abound of systems that are not maintained, government administrators who are ill equipped to use the system, and citizens who are reluctant file online. (Heeks 2002) In the case of Brazil's RECEITANET transition, one of the reasons cited for its success is the fact that the government accompanied its technology investment with substantial investments in staff training and public dissemination. (Vasconcellos and Rua 2005) The fixed costs and capacity needed to plan for an effective information system, invest in information system development, train personnel, and familiarize the public with the system may be particularly burdensome or challenging for small local governments. The Brazilian government and the Inter-American Development Bank began to offer loans to municipalities in 2002 to invest in improved governance strategies, which tended to include investments in computerized information management systems to manage costs and revenue generation as well as training expenses for administrative staff to learn to use the systems. While the program is believed to be successful, with the average percentage of assessed property taxes that are collected increasing from 48% to 71% and the average percentage of registered service providers paying their taxes increasing from 56% to 68% between 2002 and 2011 (Ministério da Fazenda 2011), no rigorous evaluation of the program's success was conducted.

5 A PICTURE OF LOCAL REVENUE GENERATION IN BRAZIL

In this section, I provide a picture of revenue generation in Brazil in recent years. I examine the extent to which taxes and fees contribute to municipal revenues and differences in patterns across regions, income level and population sizes. I also present descriptive statistics of revenue generation infrastructure and administration in Brazil. I use several sources of publicly available data in the descriptive analyses in this section: (1) annual municipal accounting data downloaded from Brazil's National Treasury Office³⁰ and available from 1989 through 2011, (2) information on municipal population available through 2010, downloaded from Brazil's national health information system (DATASUS)³¹, (3) municipal GDP data downloaded from the Institute for Applied Economic Research (Ipea³²), available in 1996 and from 1999 to 2009, and (4) information on municipal characteristics from an annual municipal survey conducted by Brazil's national institute of statistics (Instituto Brasileiro da Geografia e Estatística, IBGE)³³ available intermittently between 2004 and 2009.

³⁰ Available at: http://www3.tesouro.fazenda.gov.br/estados_municipios/index.asp

³¹ <http://www2.datasus.gov.br/DATASUS/index.php?area=0206>

³² <http://www.ipeadata.gov.br/>

³³ Data downloaded from: <http://www.ibge.gov.br/munic2004/> and <http://www.ibge.gov.br/munic2005/>

5.1 SOME DESCRIPTIVE STATISTICS

I first present a general picture of the state of municipal revenue generation in Brazil. Columns (1) and (2) of Table 1 present global averages of local revenues per capita, local revenues collected per dollar of GDP (a common measure of “fiscal effort”), and the ratio of transfers to local revenue (symbolizing municipalities’ dependency on transfers). To present snapshots of the variables’ evolution over time, data by region are presented for the years 2000 and 2009. Columns (3) through (12) present the same information region by region.

Nation-wide averages indicate that municipalities have increased revenue generation between 2000 and 2009—in per capita terms and as a share of GDP—and are receiving less of their budget from transfers. However, revenue generation is still low on average. As a crude comparison, revenue generation in Brazil was roughly US\$72³⁴ per capita in 2009, whereas municipalities in the US were generating roughly US\$2,000 per capita just a few years earlier (“In the US, about 36,000 Municipal and Township Governments Have Combined Annual Revenues of \$375 Billion” 2007). By 2009, municipalities were still collecting less than one cent per dollar of municipal GDP and were receiving fifty times more transfers than local revenues.

There are clear regional differences in municipal revenue generation per capita. Municipalities of the Southeast collect the most, both in per capita terms and as a share of GDP, and were among the least dependent on transfers in both 2000 and 2009. It is no surprise that the Southeast’s revenue generation record has been better than that of other regions, as it includes Brazil’s two most populous cities and largest economies (São Paulo and Rio de Janeiro) as well as the country’s fifth largest economy (Belo Horizonte). Figure 1 presents a scatterplot of revenue generation per capita over population and shows not only the extent to which Brazil’s two largest cities dwarf that of other municipalities in the country but also that per capita revenue generation in these cities is well above that of the vast majority of municipalities. Revenue generation in the municipalities of the South of Brazil tends to be close to, but slightly lower than, than that of the Southeastern municipalities. The Center-West was lagging just behind the South in the year 2000 but caught up to the South by 2009.

While The North and the Northeast collect far less local revenue per capita than other regions, they have seen tremendous advances in revenue generation over the period between 2000 and 2009. At the start of the decade, municipalities in the North collected just over one quarter of the revenues those in the Southeast collected per capita and less than half of the revenues those in the Center-West collected. Revenue generated per dollar of GDP was substantially lower than in the Center-West, the South and the Southeast, and the ratio of transfers to local revenue was 3.6 times that of the Center-West and 8.8 times that of the Southeast. Revenue collection in the Northeast (traditionally Brazil’s poorest region) was even below that of the North; municipalities in the Northeast collected less than half of the revenues those in the North collected per capita, though they collected only slightly less per dollar of GDP

³⁴ I assume an exchange rate of R\$1.7 per US\$1 for 2009.

than Northern municipalities. With a transfers-to-revenue generation over double that of the North, Northeastern municipalities were also far more dependent on transfers for their budget than municipalities in any other region. By 2009, municipalities in both regions had increased revenue generation substantially. Revenues per capita in the North and the Northeast increased by roughly 180% and 160%, respectively, and local revenues generated per dollar of GDP (“fiscal effort”) nearly doubled.

Regional variations in the growth of local revenue per capita, in local revenue collected per dollar of GDP and in the ratio of transfers to local revenue do not seem to be driven by substantially different changes in the denominators of each indicator. Although not identical, growth in population, GDP and transfers is relatively uniform across regions over the 2000 to 2009 period.

In Figure 2, I present Lorenz curves of per capita local revenues from the years 2000 and 2009. The Lorenz curve’s slight shift to the left between 2000 and 2009 indicates that the gap between those collecting the most and those collecting the least is diminishing. Changes seem to be concentrated in gains in the middle of the distribution rather than at the lowest end of the distribution. However, revenue generation remains quite unequally distributed across municipalities in 2009. In Figure 3, Lorenz curves for 2009 per capita local revenues and municipal transfers received are compared. While the distribution of municipalities’ own revenue is far from even, transfers are relatively (though not perfectly) equally distributed across municipalities in per capita terms.

Figures 4 and 5 further highlight the substantial differences in the composition of current receipts across municipalities of different sizes. Figure 4 presents the share of current receipts in 2009 coming from local revenues, transfers, federal income tax collected on salaries paid by municipalities and all other sources by GDP quintile. Figure 5 does the same by population size groups³⁵. The smallest municipalities (whether in terms of economic size or population size) are nearly fully dependent on transfers and get very little of their revenues locally. As one moves on to examine larger and richer municipalities, local revenues make up an increasing share of current revenues. Local revenues make up nearly one quarter of all current receipts among municipalities in the top GDP quintile and over one quarter of current receipts among the 40 municipalities with populations over 500,000.

5.2 TAXES AND FEES DISAGGREGATED

I next examine sources of local revenues more closely. Figure 6 presents average per capita local revenues, both total local revenues and local revenues by major source (service taxes, property taxes, property transfer taxes and fees) over time between 1995 and 2009 in constant reais. There are several points worth noting in this figure. First, local revenues increased substantially and consistently between 2000 and 2008, though they fell slightly in

³⁵ Groupings are determined based on the population grouping commonly used by the Brazilian government.

2009 (likely due to the worldwide economic downturn). Second, dramatic increases in service tax collection seem to be driving changes in local revenues. Third, other sources of local revenue change over the period, though not to the extent that service taxes do. Collection of property taxes has fallen a bit since 1995, but has been on a gradual rise since 2000; collection of property transfer taxes has risen slowly but steadily over the whole period; and the collection of fees generally declined slightly.

Figure 7 presents local revenues by major source over GDP quintile in 2009 (at the end of the period shown in Figure 6). Fees tend to contribute to local revenues in a relatively similar way across municipalities of different sizes, except among the wealthiest quintile of municipalities, which rely slightly less on fees for revenues. Sources of tax revenues exhibit more divergent patterns across municipalities of different sizes. While all municipalities rely predominantly on service taxes for local revenues, the share that service taxes contribute to local revenues varies across GDP quintiles. Municipalities with the smallest economies tend to rely much more heavily on service taxes, with well over half of their meager local revenues coming from that source. They rely slightly more on property transfer taxes and slightly less on property taxes, as one would expect given that property taxes require more developed administrative systems than do taxes on property transfers. As one moves on to examine wealthier quintiles, service taxes make up a smaller and smaller (though always substantial) share of local revenues, property taxes grow in importance, and the importance of property transfer taxes shrinks.

More striking are regional differences in sources of local revenues, displayed in Figure 8. Fees again tend to contribute a similar share to local revenues in all groups, though the South does rely on fees slightly more than other regions and the Southeast slightly less. The Southeast, the South and the Center-West (the higher performers in terms of local revenue generation) rely on property and property transfer taxes for over 30% of their local revenues—substantially more than do the lower-performing North and Northeastern regions. While the Northeast relies on property and property transfer taxes for roughly 25% of their local revenues, the North relies very little on urban property taxes and transfer taxes for local revenues. This may be reflective of the fact that the North is more rural than other regions. Municipalities that rely less on property-related taxes tend to get substantially more of their local revenues from service taxes instead, and regional differences are large. While municipalities in the North rely on service taxes for roughly 75% of their local revenues, municipalities in the Southeast, the South and the Center-West rely on services taxes for around 50% (with the South relying on services taxes least). The Northeast falls in the middle between the North and the other regions. Figures 9 and 10 present the same graphs but for the years 2004 and 1995, respectively, in order to examine changes over time. The changes over time have been striking. All regions have begun to rely more and more on service taxes and have become less dependent on property-related taxes as well as on fees. As Figure 6 and the next section demonstrates, this is likely driven by improvements to service tax collection infrastructure rather than to major decreases in revenues from other sources.

5.3 REVENUE GENERATION INFRASTRUCTURE AND ADMINISTRATION IN BRAZIL

In this section, I examine information on revenue-generation infrastructure from IBGE's municipal profile data. Table 2 presents a national-level picture of the information available. Note that certain questions were only asked in certain years. As a result, variables are missing in many years. Panel A examines information related to service tax infrastructure. It is no surprise that reliance on service taxes has grown; while 77% of municipalities had a service provider registration system in 2004, 91% of municipalities had one by 2009. Figure 11 examines the share of municipalities with provider registration systems by region across years for which data are available (2004, 2006 and 2009). The picture bolsters the stories that came through in previous data presented; in 2004, nearly all municipalities in the South, the Southeast and the Center-West already had service provider registration systems. The Center-West lagged a bit behind the former two in 2004 but entirely caught up by 2009. In 2004 the Northeast had the smallest share of municipalities with service provider registration systems (a little more than 50%). That share increased to nearly 85% by 2009 and surpassed the North, which saw the share of municipalities with service provider registration systems rise from just over 60% to just over 80% between 2004 and 2009.

Municipalities have also made efforts to computerize their registration systems. Figure 12 presents the share of service provider registration systems that were computerized by the year that such systems were in existence. By 2004, 80% of the services provider registration systems in existence were computerized. Of those systems that were already in existence by 2004, the share that was computerized grew steadily to 85% and 90% in 2006 and 2009, respectively. Among registration systems that were introduced in 2005 or 2006, just 59% were computerized, but the share grew quickly to 73% by 2009. Among systems introduced in 2007, 2008 or 2009, 64% were computerized.

Panel B examines information related to property tax infrastructure. There has been little movement in the share of municipalities that charge property taxes and that have property registration systems, since the share of municipalities that used property taxes was already 94% in 2006. Note that in 2006 the share of municipalities that had property registration systems was sometimes higher than that which charges property taxes. This is entirely possible, as municipalities may register property for reasons other than tax collection (for example, in order to keep ownership records, in order to charge taxes on property transfers or in preparation for introducing a future property tax). There is similarly little movement in the share of municipalities with computerized property registration systems, which was at 87% in 2004, rose to 89% by 2006 and remained the same in 2009.

While nearly all municipalities have a property registration system, mapping of property values is somewhat less common. In 2006, just 72% of municipalities had mapped property values. This number increased slightly by 2009 but remained below 80%. Among those with property value maps, around 80% were in digital format in 2006, with little changed through 2009. Figures 13 and 14 present these data by region for 2006 and 2009. Generally, these

figures show that, as with other measures of tax collection infrastructure, the South, the Southeast and the Center-West tend to be better equipped with property tax collection infrastructure. The Northeast is again least well equipped and lags slightly behind the North. Similarly, among municipalities with property value maps, more of those in the South, Southeast and Center-West tend to have digitized maps while fewer tend to have them in the North and Northeast. Since there were only minor changes in the aggregate, it is not surprising to see only minor increases within each of the regions in property value map existence or digitization of property value maps between 2006 and 2009.

Based on numbers from 2004, property registration seems to be updated with less frequency than service provider registration; in 2004, the average number of years since property registration had last been updated was 3.7 compared to 2.5 for service provider registration, and municipalities had last updated property values three years ago on average in 2004. Figures 15 through 17 present box plots of the number of years since service provider registration systems, property registration systems and property value maps, respectively, by region. While the median number of years gone without updating systems is less than five across all regions and most municipalities had updated their systems in the past two to three years, there are a notable number of municipalities that, as of 2004, had not updated their systems in the past 10, 20 and even 30 years in some cases. Generally, updating has lagged slightly in the South and the Southeast, but this is more likely due to the fact that these regions tend to have more municipalities with systems in place. Many of the municipalities have also likely had systems in place for longer and so have had a longer period of time over which to fail to update them.

If the formalization of property lays the groundwork for property registration and later property tax collection, the existence of property formalization programs is of interest for future tax revenue generation potential. Table 2 (Panel B) presents available information on the existence of property formalization programs (federal, state and municipal). Overall, the share of municipalities with a land regularization program rose slightly between 2004 and 2008, from 16% to 20%. In 2008, municipalities were asked whether an urban program exists and whether a rural program exists. It's clear that rural programs are somewhat more common than urban programs. This may be because rural land reform has long been a high-profile political topic in Brazil and thus gets relatively more government attention. Urban property regularization programs are most relevant for collection of the standard municipal property tax, as municipalities keep all urban property taxes collected. However, rural efforts to formalize property are also relevant for two reasons. First, municipalities may choose to collect the rural property tax independently and keep all proceeds. Second, even when the federal government collects the tax, municipalities receive a share of rural taxes collected in their jurisdictions. Table 3 presents a breakdown of land regularization programs by region and population size. Land regularization programs are most common in the Center-West and the North, both areas with considerable rural land expanses. In both, around 30% of municipalities have some sort of land regularization program. In the South and Southeast, roughly 20% of municipalities have these programs. Land regularization programs are least common in the North and are present

in roughly 15% of municipalities in the region. Most municipalities in the South, the Center-West and the North have regularization programs in both urban and rural areas, and roughly half do in the Northeast and the Southeast. Of those municipalities that do not have both urban and rural programs, most have rural programs only. The North and the Northeast have considerably more municipalities with regularization programs in urban areas only. However, the Northeast also has a particularly high share of programs that were not classified by the municipality as urban or rural and so it is particularly difficult to determine the true shares in that region.

Just 10% of the smallest municipalities have land regularization programs while over 90% of the largest ones do. This may have more to do with the extent to which property informality is considered a problem in municipalities; large and numerous *favelas* in big cities, for instance, may be seen as necessitating more governmental action than would a small cluster of unregistered properties in a very small town. Interestingly, however, land regularization is more concentrated in rural programs in the largest cities and more concentrated in urban programs among smaller municipalities.

Figure 18 presents the share of municipalities that collected various fees in 2004 and 2009 broken down by region. Regional breakdowns in patterns of fee collection are similar to those for property taxes: generally more municipalities in the South and Southeast charge fees, followed closely by the Center-West, and those in the North and Northeast are least likely to charge fees, with Northeastern municipalities taking least advantage of fees to collect revenues. These patterns hold true across all types of fees. Changes between 2004 and 2009 vary depending on the type of fee. The most notable changes are the substantial increases in the share of municipalities charging electricity fees across all regions. Center-Western municipalities seem to be relying increasingly on every type of fee except fire fees, which roughly 2% fewer municipalities use in 2009 than in 2004. In the North and the Northeast, the share of municipalities relying on electricity and police fees increased, but the share relying on garbage and urban cleaning fees dropped or stayed the same. In the South and Southeast, the use of garbage fees increased and the use of police fees dropped in both regions. Reliance on urban cleaning fees increased slightly in the Southeast and dropped somewhat in the South. The share of municipalities charging fire fees was low across all regions but increased slightly in all but the North.

Figure 19 presents the share of municipalities that collected various fees in 2009 broken down by population size. As is the case with taxes, larger municipalities were generally more likely to collect every type of fee. This was particularly true for garbage and police fees. Interestingly, municipalities in the range of 50,000 to 100,000 people were most likely to charge electricity fees. The same was true for urban cleaning fees, though the differences were less pronounced. It may be that largest municipalities are more likely to engage in private-public partnerships for these activities rather than charge fees for these services themselves. Table 4 presents the share of municipalities engaging in private-public partnerships for the provision of a number of public services and shows that large municipalities are substantially more likely to

engage in these private-public partnerships than are small municipalities. While fire fees are uncommon across all population groups, those in population range of 50,001 and 500,000 are most likely to charge fire fees. It is likely the case that most municipalities fund fire prevention service through general tax funds rather than through specific fire fees.

6 CHAPTER I CONCLUDING REMARKS

This chapter aims to provide the reader with a detailed understanding of the context in which the data discussed in the remaining two chapters are analyzed, with special attention to local revenue generation. The chapter starts by providing the reader with an overview of Brazil's public finance system from a municipal perspective, moves on to discuss the major challenges facing local governments in Brazil and in low and middle income countries more generally in collecting local revenues, and, finally, examines local revenue generation and revenue generation administration in Brazil's municipalities using publicly available data on municipal accounting records, municipal population and GDP, and municipal revenue generation infrastructure and administration.

The challenges facing local governments in Brazil and other developing economies are numerous. Weak revenue bases, political resistance to taxes, disincentives to collect local revenues, high levels of informality, high evasion rates plus costly enforcement mechanisms and underdeveloped administration systems may all contribute to low levels of local revenue generation. While these challenges are not necessarily exclusive to developing economies, they do tend to be more pronounced in these settings. These challenges are also not necessarily limited to local governments. Due to their size, however, many local governments face greater barriers to overcoming these challenges. Descriptive analyses in Section 5 suggest that these challenges are also more pronounced in smaller and poorer municipalities (particularly those in less developed parts of the country).

Brazilian municipalities remain highly dependent on transfers for the revenues they need to provide public services to their citizens. However, while municipal revenue generation remains low in Brazil, it certainly has increased. Most of this improvement has been driven by increases in the collection of service taxes. Many municipalities have introduced service provider registration systems over the past decade, and the share of electronic systems continues to rise. Eventually, this may serve not only to improve record-keeping by the municipality but also to facilitate the creation of electronic "paper trails"—one of the most effective means of reducing tax evasion.

On the other hand, little improvement has been made to municipalities' other major source of revenue—the property tax. While nearly all municipalities already had property registration systems in place by 2004, and nearly 90% of these systems were already computerized, property value maps are not as common and are not digitized. Not explicitly addressed in the data available for these analyses, however, is the frequency with which property values themselves are re-assessed. Anecdotal evidence suggests that many

municipalities fail to re-assess values at regular intervals. In recent years, municipalities have felt increasing pressure to increase local revenues due to a combination of reductions in transfers from the central government resulting from the worldwide economic downturn, continued rises in the minimum wage, and imposition of the Law of Fiscal Responsibility (which limits the share of revenues that can be spent on personnel). Anecdotal evidence also suggests that municipalities are now increasingly turning their attention toward updating their property value assessments and systems. While these efforts have met with political resistance at times, it is likely that they will continue.

7 CHAPTER I FIGURES AND TABLES

TABLE 1: LOCAL REVENUE GENERATION STATISTICS IN 2000 AND 2009

	(1)		(2)		(3)		(4)		(5)		(6)		(7)		(8)		(9)		(10)		(11)		(12)	
	Region		All Regions		North		Northeast		Center-West*		South		Southeast											
	Year	2000	2009	2000	2009	2000	2009	2000	2009	2000	2009	2000	2009	2000	2009	2000	2009	2000	2009	2000	2009	2000	2009	
Municipal Revenues Per Capita (Constant 2000 values)		25.66 (50.95)	42.25 (64.19)	11.53 (39.30)	32.21 (70.01)	6.44 (13.39)	16.95 (36.23)	26.66 (49.90)	52.58 (65.07)	33.49 (46.65)	52.93 (52.65)	42.77 (69.79)	60.31 (81.64)											
Municipal Revenues / GDP		0.0056 (0.0093)	0.0077 (0.0097)	0.0038 (0.0134)	0.0074 (0.0158)	0.0032 (0.0035)	0.0060 (0.0065)	0.0054 (0.0077)	0.0078 (0.0087)	0.0061 (0.0080)	0.0076 (0.0078)	0.0081 (0.0124)	0.0097 (0.0115)											
Ratio of Transfers to Municipal Revenues (Dependency Ratio)		258.8 (7696.4)	49.0 (65.8)	299.2 (1575.5)	63.8 (76.4)	678.5 (13723.1)	81.4 (85.3)	82.5 (585.6)	30.2 (45.6)	34.0 (40.9)	27.3 (24.5)	33.9 (55.3)	32.7 (49.2)											
Population		30,806 (186786)	34,373 (201873)	28,697 (96107)	34,209 (114791)	26,748 (97769)	29,888 (115129)	21,541 (70092)	24,277 (81567)	21,663 (73131)	23,332 (81672)	43,362 (308148)	48,386 (327642)											
GDP per Capita		4,047 (4646)	5,303 (5870)	2,680 (2016)	3,998 (2809)	1,872 (3273)	2,552 (4681)	4,988 (4370)	7,478 (6720)	5,714 (4590)	7,402 (4651)	5,327 (5429)	6,496 (6830)											
Transfers per Capita		449.6 (817.9)	1484.2 (753.9)	483.0 (2921.7)	1303.2 (588.5)	335.4 (149.8)	1203.4 (484.5)	511.9 (231.3)	1705.1 (796.2)	506.7 (226.2)	1711.8 (805.7)	502.0 (283.0)	1592.8 (860.7)											

*Excludes the Federal District (Brasília)

Standard errors are presented in parentheses.

FIGURE 1: SCATTERPLOT OF PER CAPITA LOCAL REVENUE OVER POPULATION

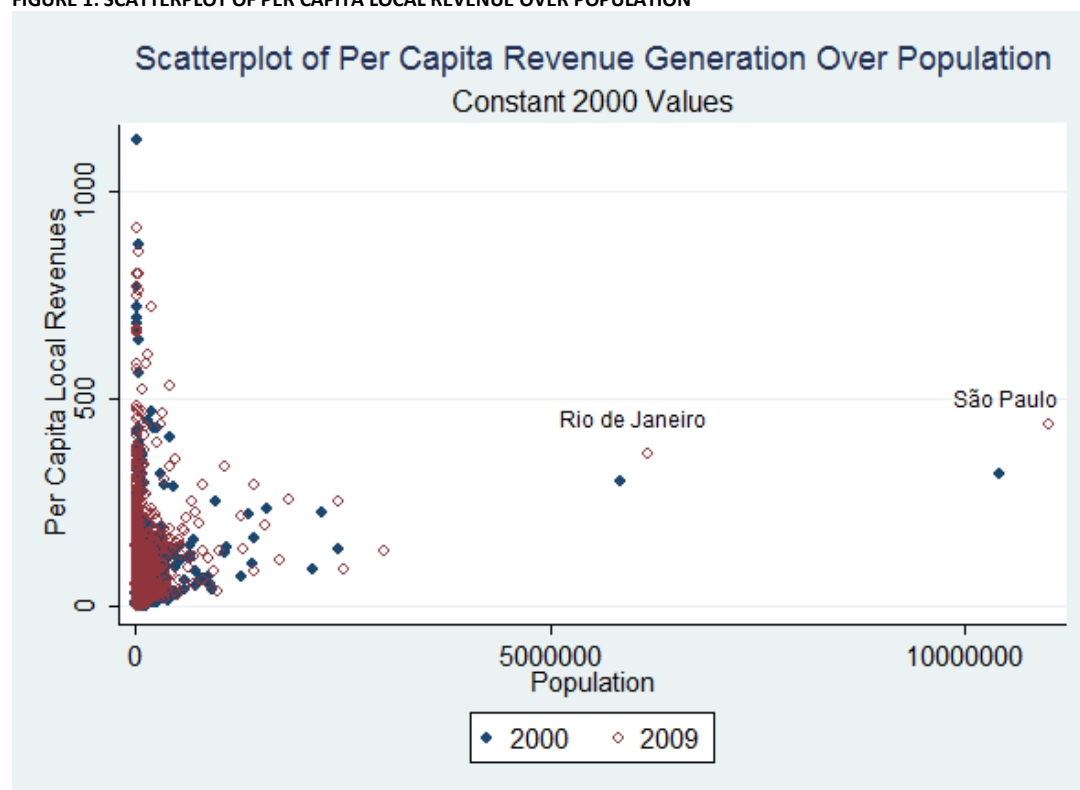


FIGURE 2: COMPARISON OF LORENZ CURVES OF PER CAPITA LOCAL REVENUES IN 2000 AND 2009

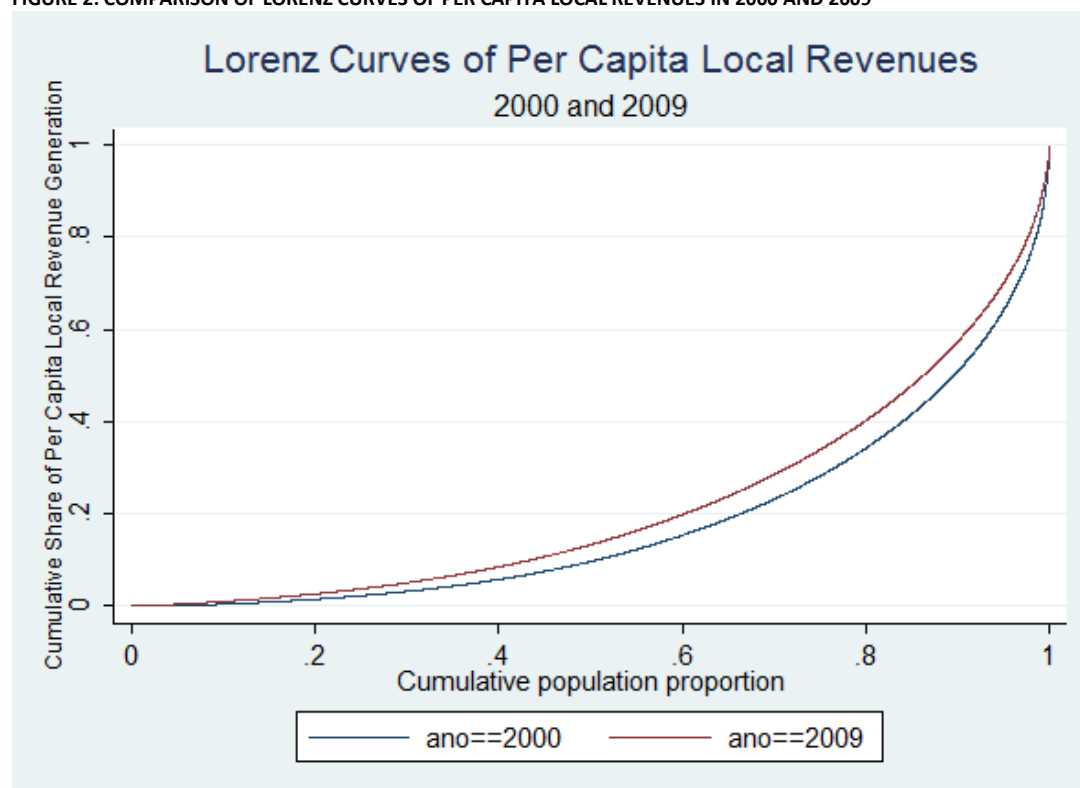


FIGURE 3: COMPARISON OF LORENZ CURVES OF PER CAPITA LOCAL REVENUES AND TRANSFERS IN 2009

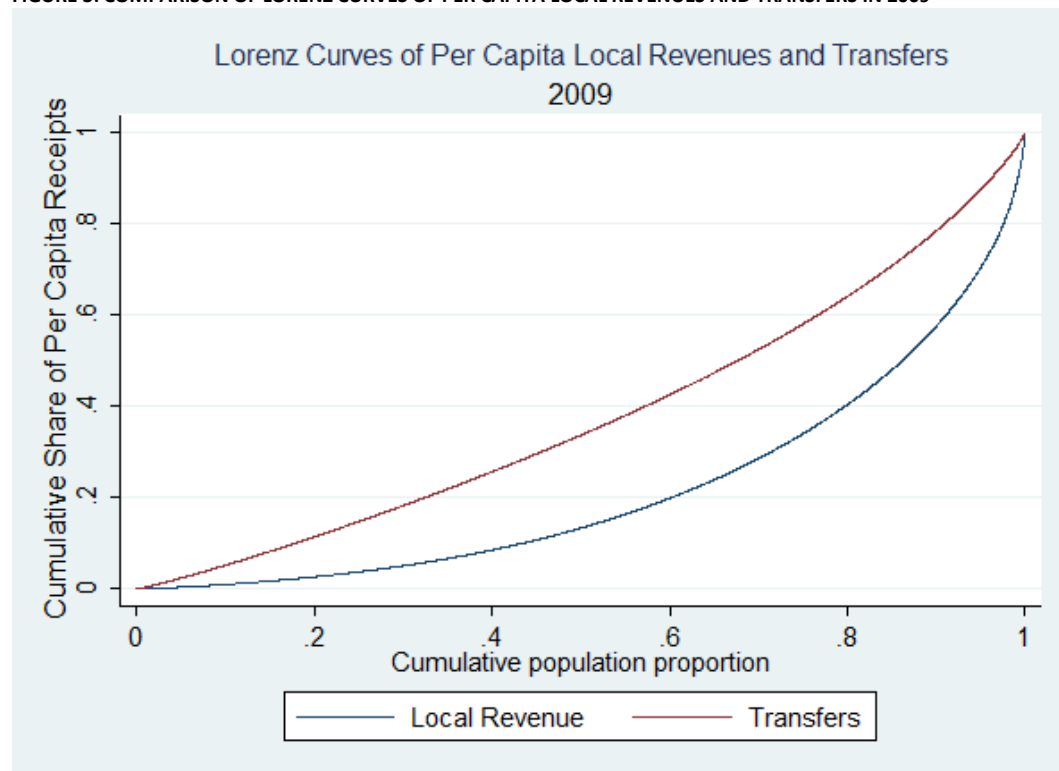


FIGURE 4: SHARE OF CURRENT RECEIPTS BY REVENUE SOURCE IN 2009, OVER GDP QUINTILES

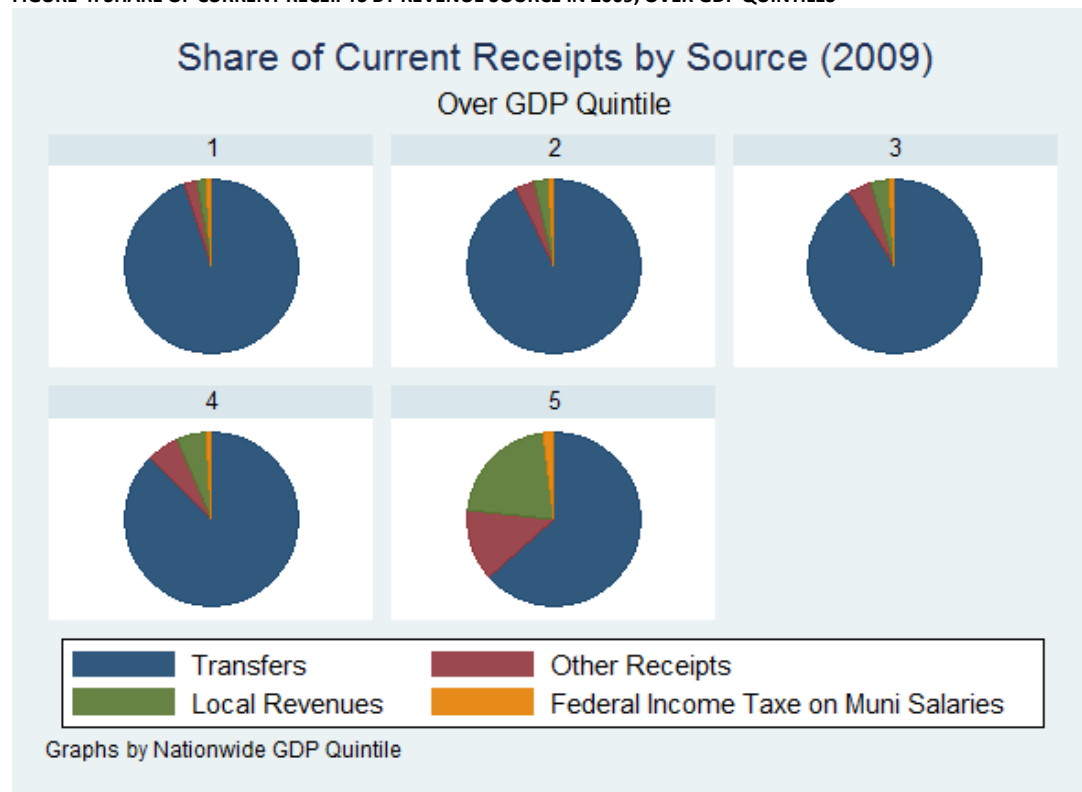


FIGURE 5: SHARE OF CURRENT RECEIPTS BY REVENUE SOURCE IN 2009, OVER POPULATION GROUPS

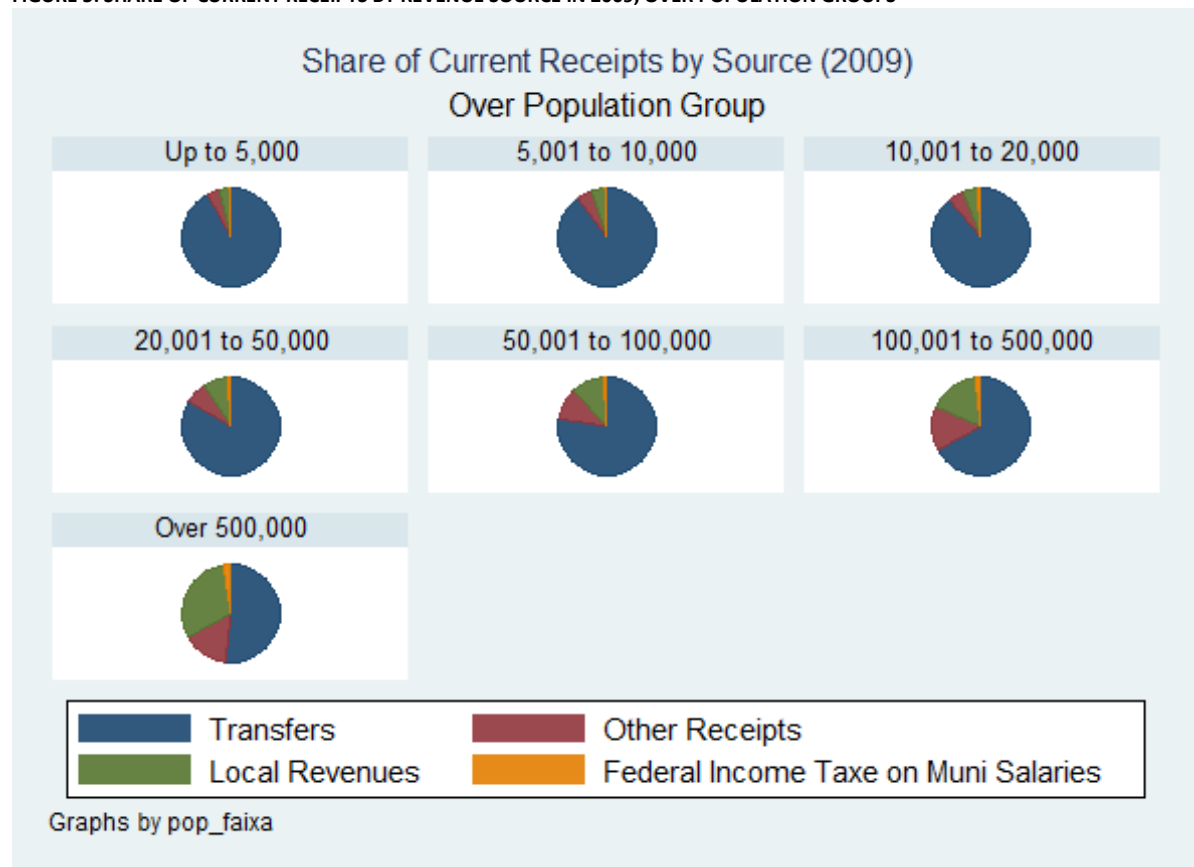


FIGURE 6: PER CAPITA EVENUE GENERATION OVER TIME BY SOURCE

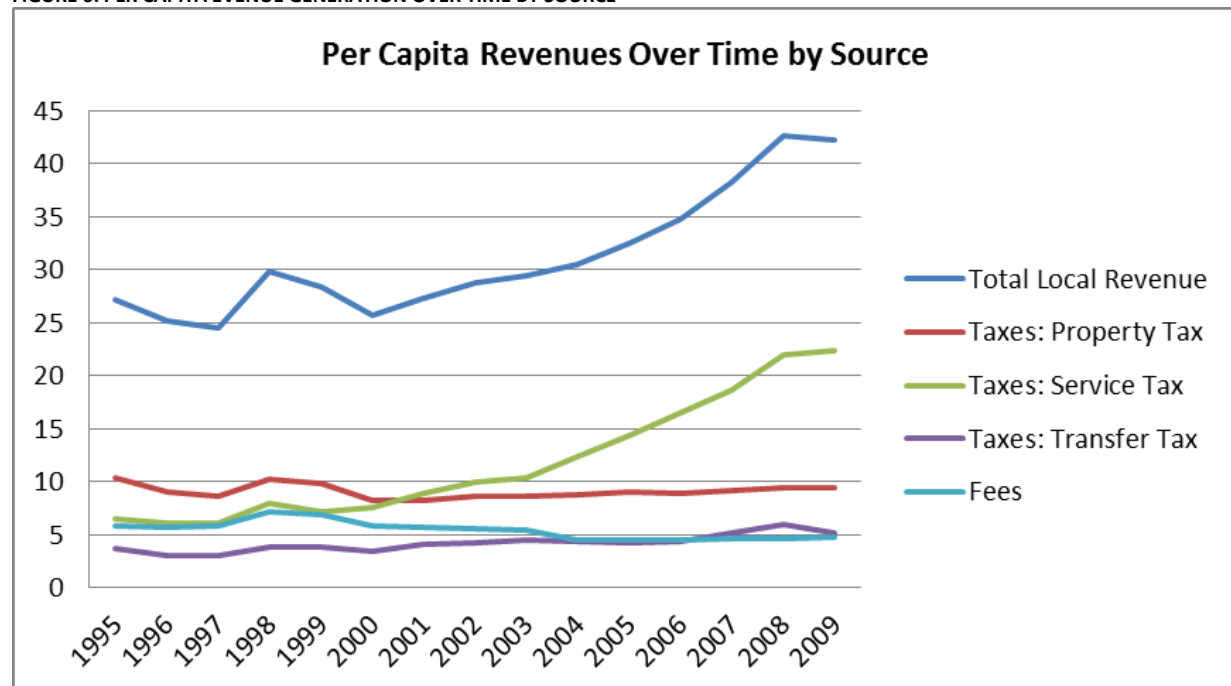


FIGURE 7: SOURCES OF LOCAL REVENUE IN 2009, BY GDP QUINTILE

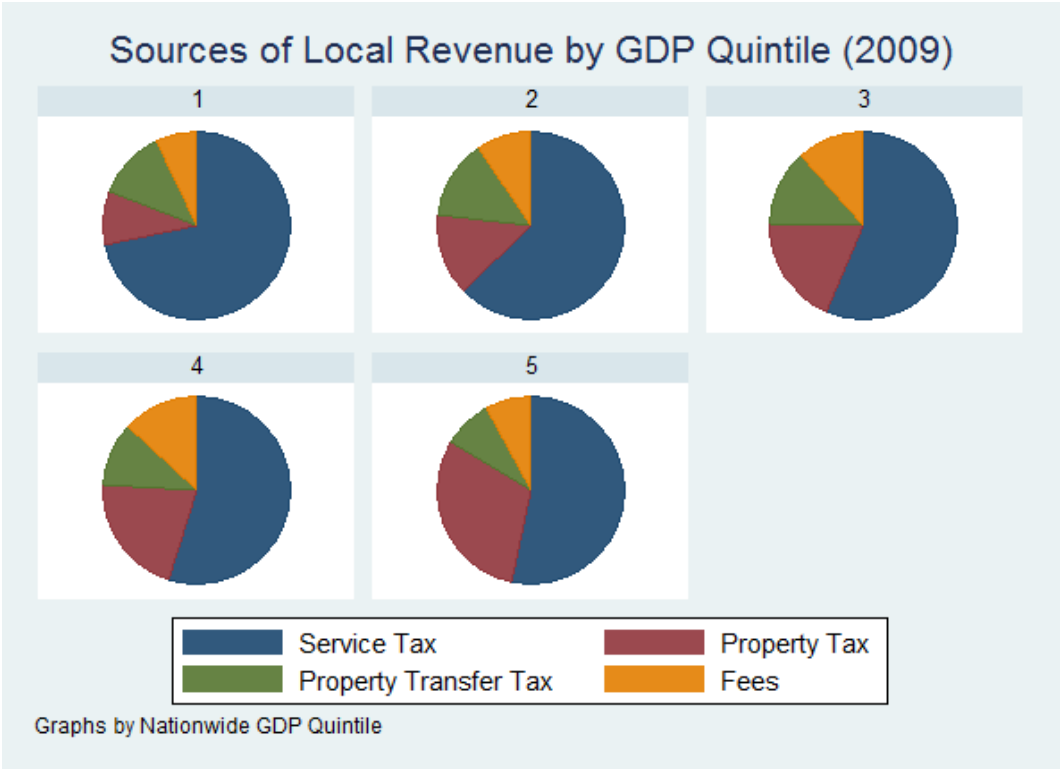


FIGURE 8: SOURCES OF LOCAL REVENUE BY REGION (2009)

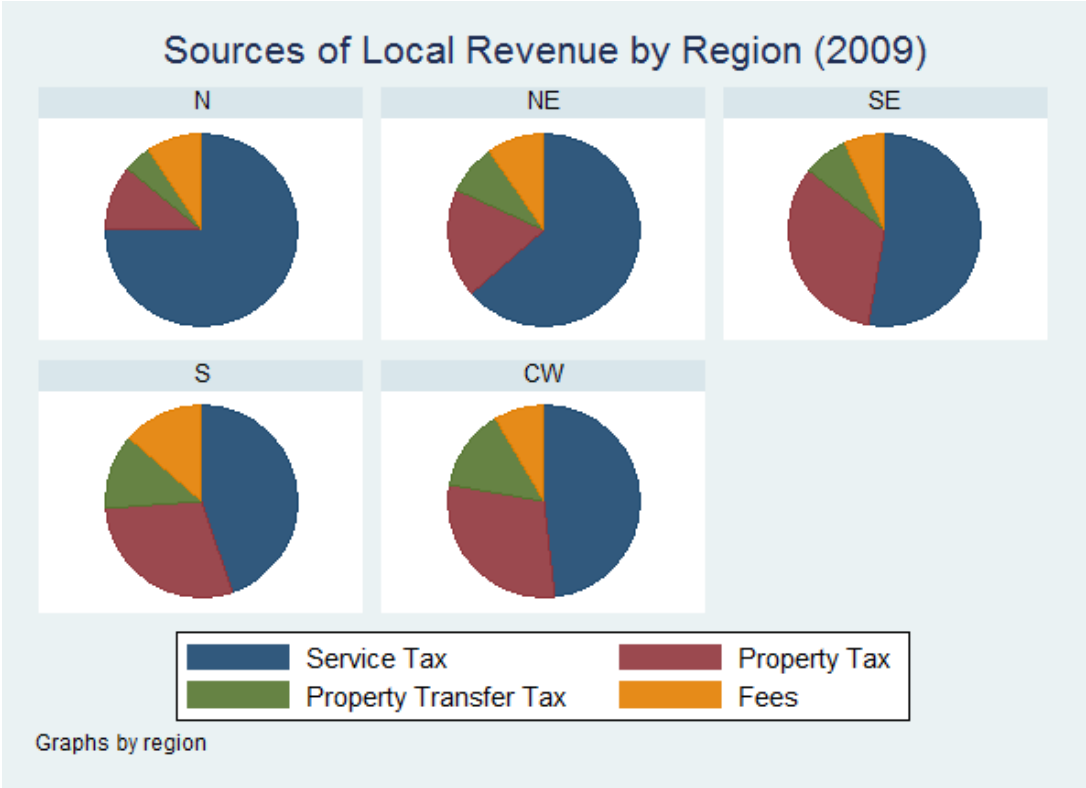


FIGURE 9: SOURCES OF LOCAL REVENUE BY REGION (2004)

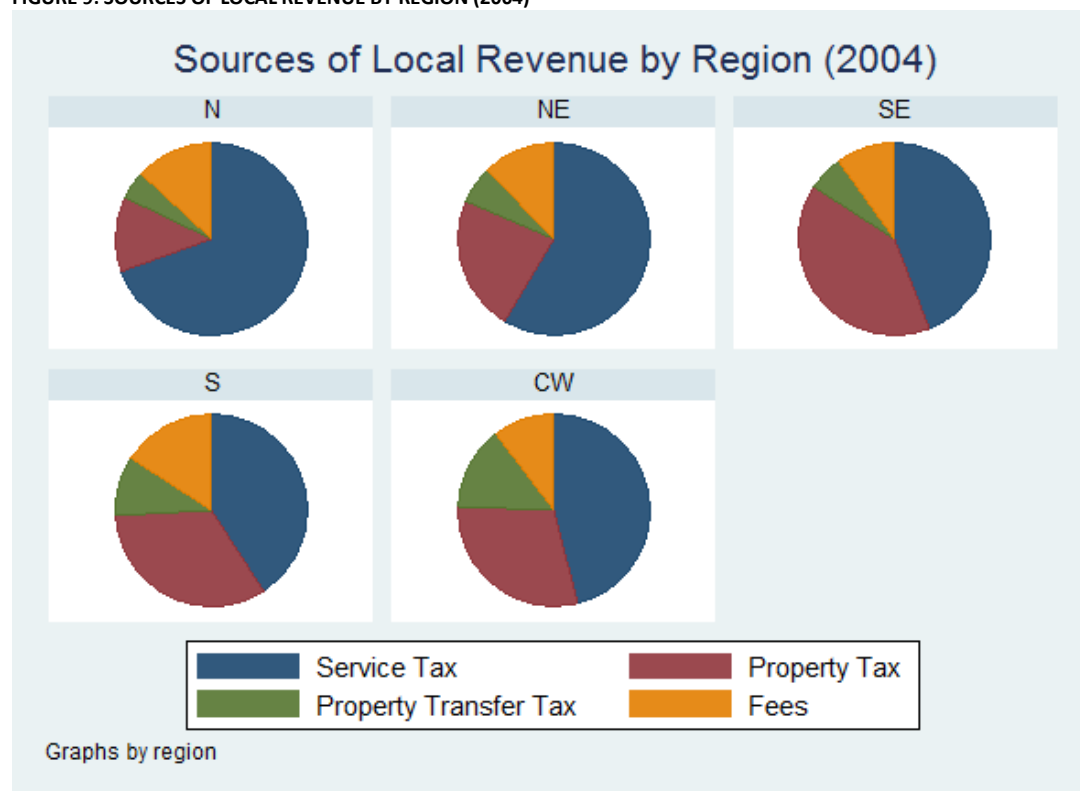


FIGURE 10: SOURCES OF LOCAL REVENUE BY REGION (1995)

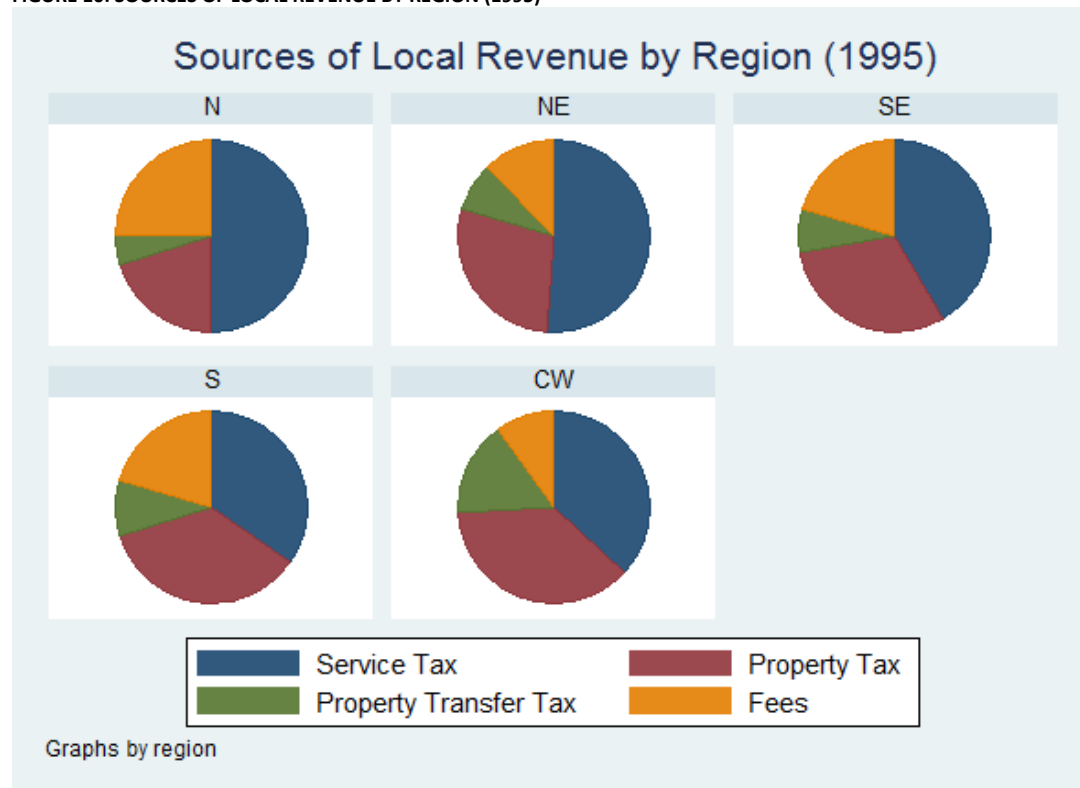


TABLE 2: SUMMARY OF REVENUE GENERATION INFRASTRUCTURE AVAILABLE IN MUNICIPALITIES

Year	2004	2006	2008	2009
Panel A: SERVICE TAX (ISSQN)				
Service provider registration system exists	77%	84%		91%
Among municipalities where system exists:				
% with computerized registration system	80%	81%		86%
Years since registraiton was last updated	2.56			
Panel B: PROPERTY TAX (IPTU)				
Property tax charged		93%		94%
Property registration system exists	94%	94%		94%
Among municipalities where system exists:				
% with computerized registration system	87%	89%		89%
Years since registraiton was last updated	3.73			
Property value map exists		72%		79%
Among munis with property value map:				
Map information is digital		78%		80%
Year since property values updated	3.00			
% with program to formalize land ownership (municipal, state or federal)	16%		20%	
% with urban land regularization program			13%	
% with rural land regularization program			18%	
Panel C: FEES				
Electricity Fees Charged	61%	70%		72%
Garbage Fees Charged	48%	50%		50%
Urban Cleaning Fee Charged	44%	43%		43%
Fire Fees Charged	3.6%	3.7%		4.6%
Police Fees Charged	56%	55%		51%

FIGURE 11: SHARE OF MUNICIPALITIES WITH PROVIDER REGISTRATION SYSTEM OVER TIME, BY REGION

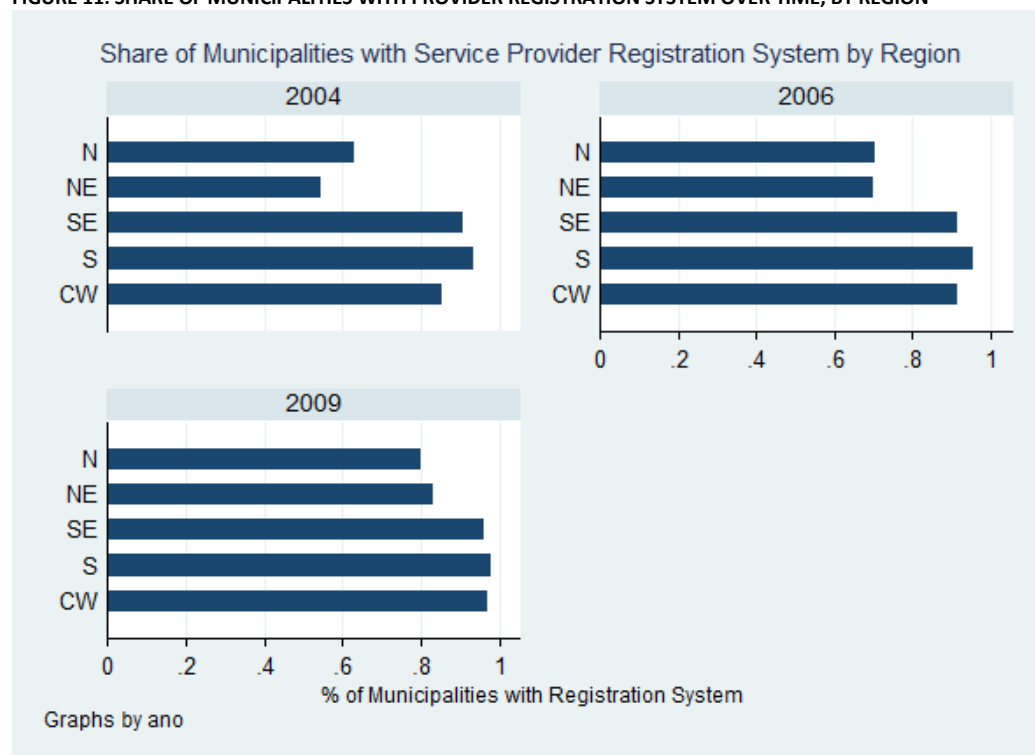


FIGURE 12: CHANGES IN SHARE OF SERVICE PROVIDER REGISTRATION SYSTEMS THAT WERE COMPUTERIZED

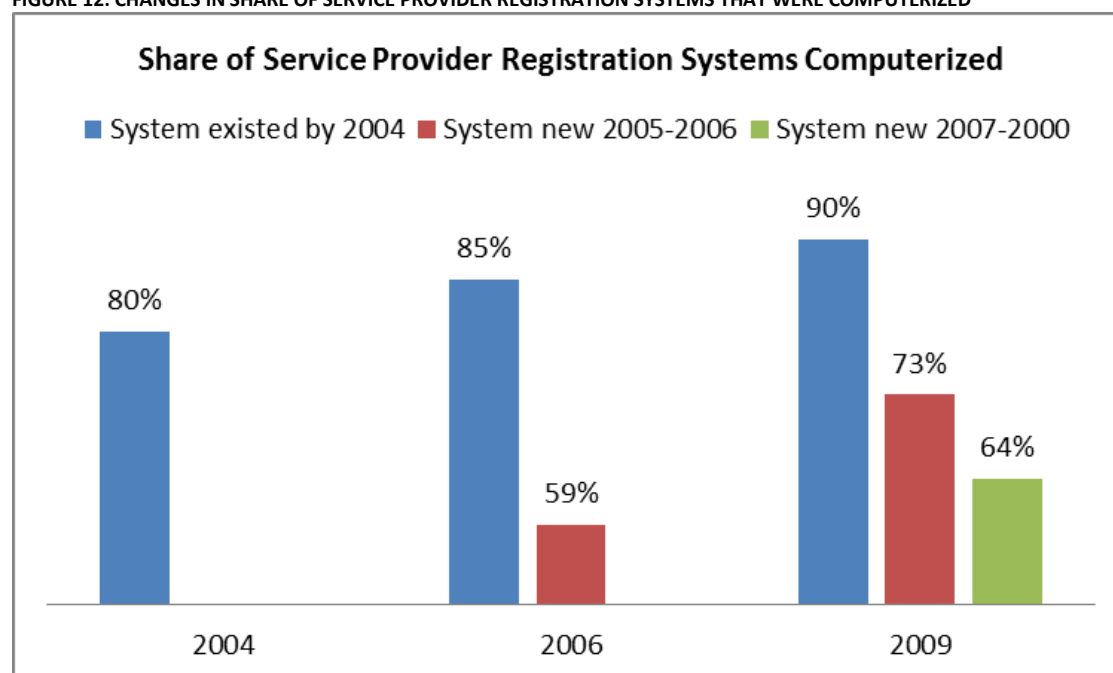


FIGURE 13: SHARE OF MUNICIPALITIES WITH PROPERTY VALUE MAP, BY REGION AND YEAR

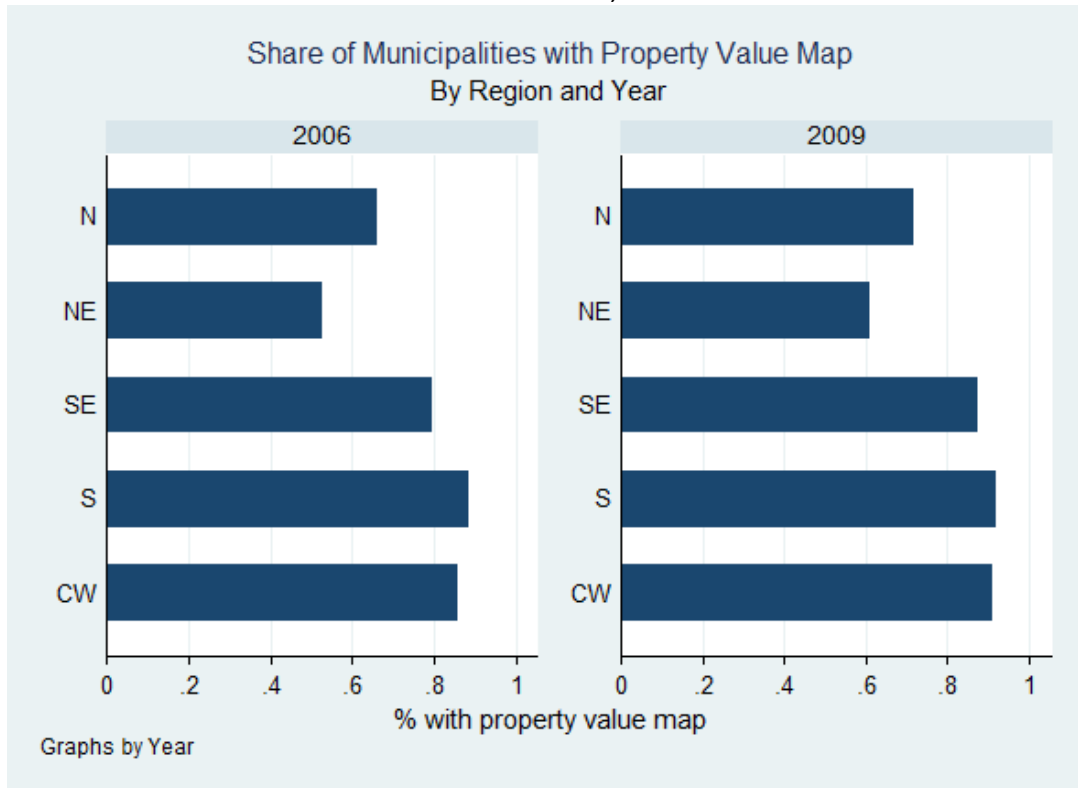


FIGURE 14: SHARE OF MUNICIPALITIES WITH DIGITIZED PROPERTY VALUE MAP, BY REGION AND YEAR

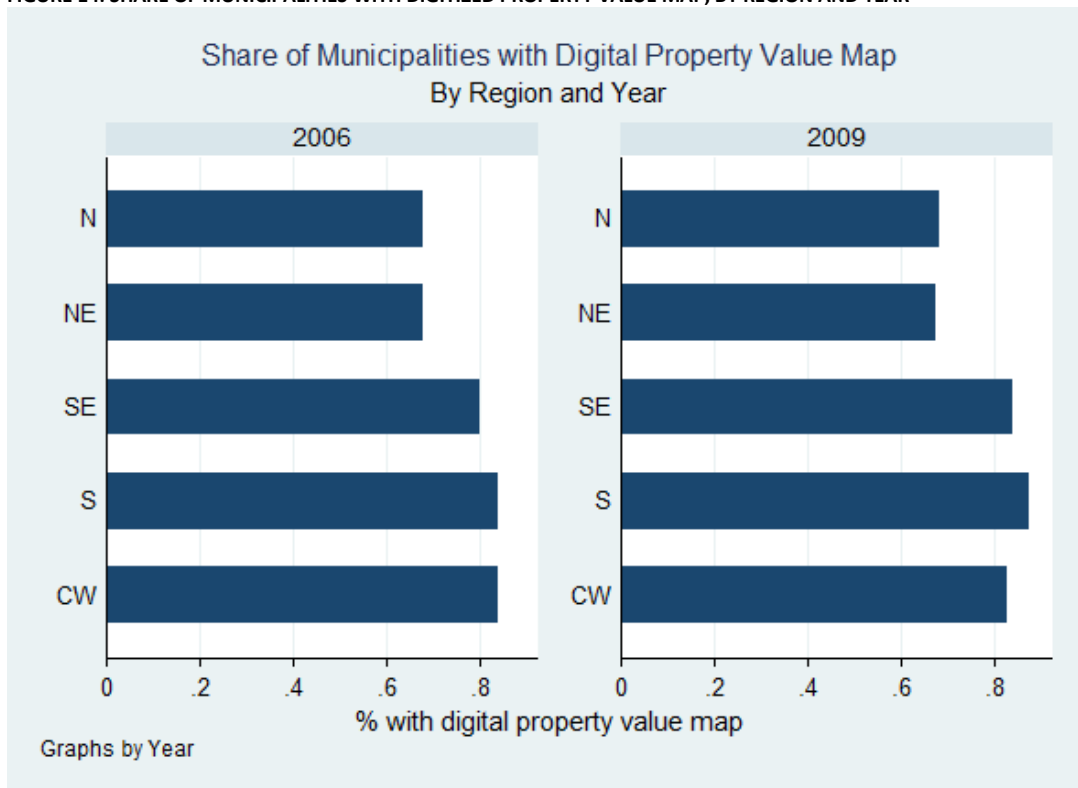


FIGURE 15: YEARS SINCE SERVICE PROVIDER SYSTEM WAS LAST UPDATED BY REGION (2004)

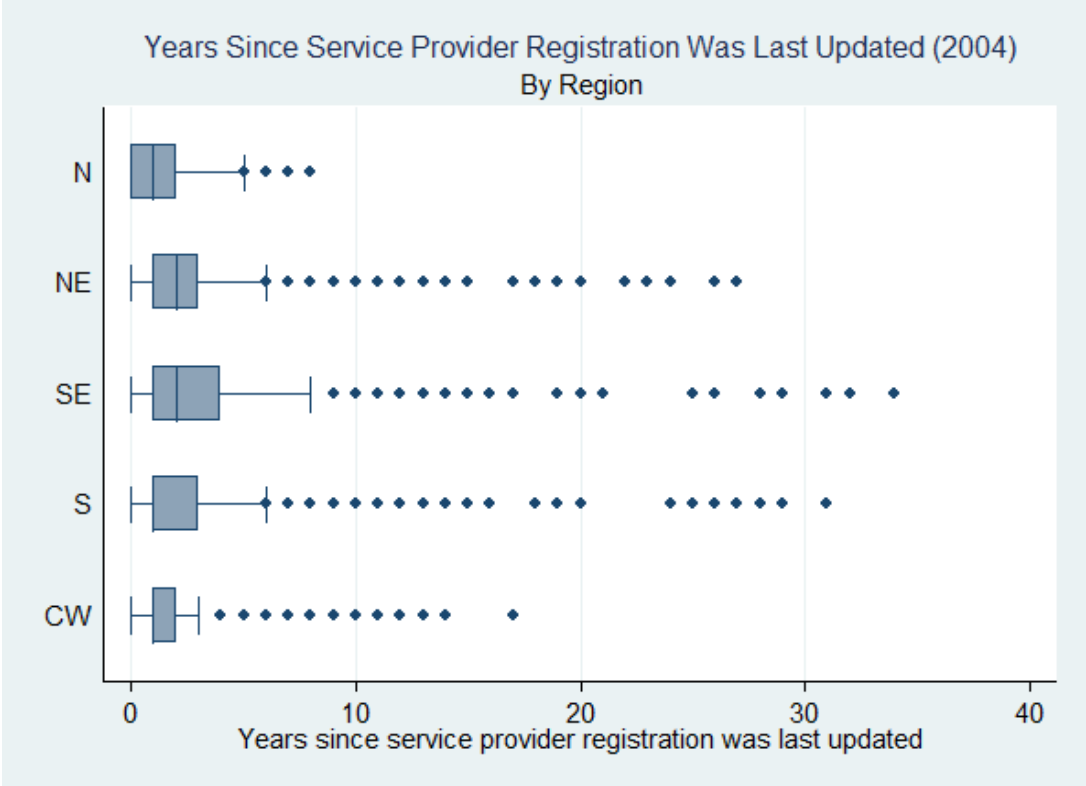


FIGURE 16: YEARS SINCE PROPERTY REGISTRATION WAS LAST UPDATED BY REGION (2004)

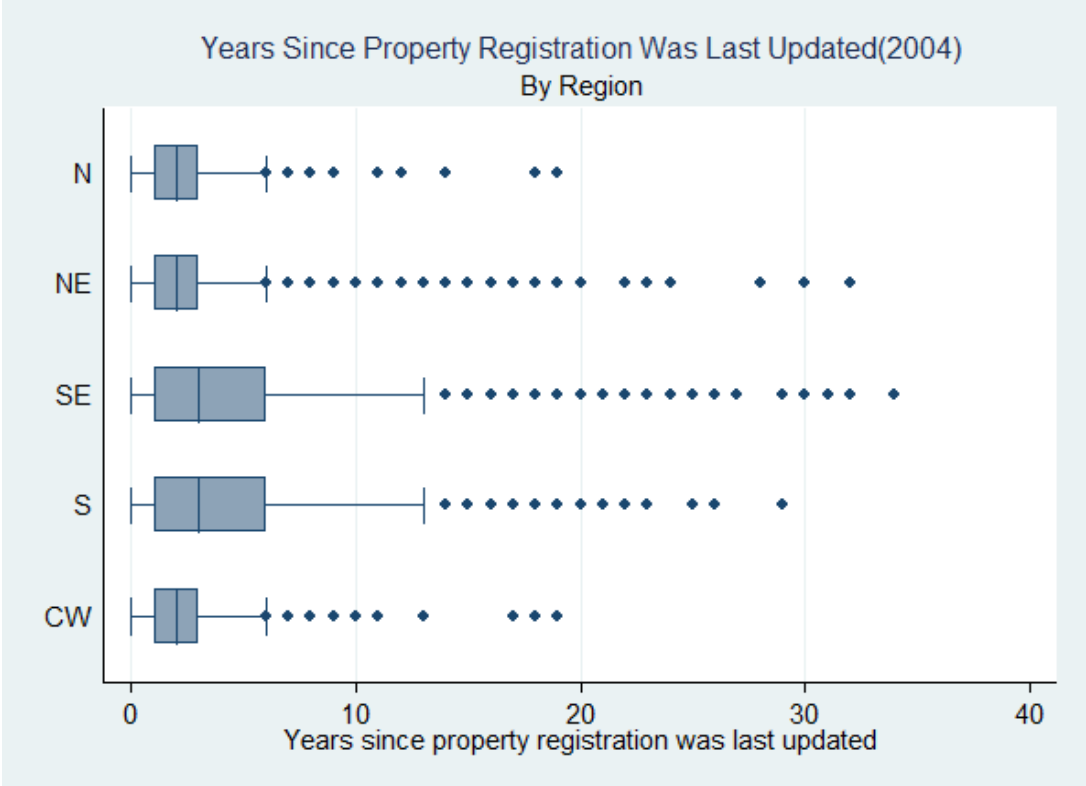


FIGURE 17: YEARS SINCE PROPERTY VALUE MAPS WERE LAST UPDATED BY REGION (2004)

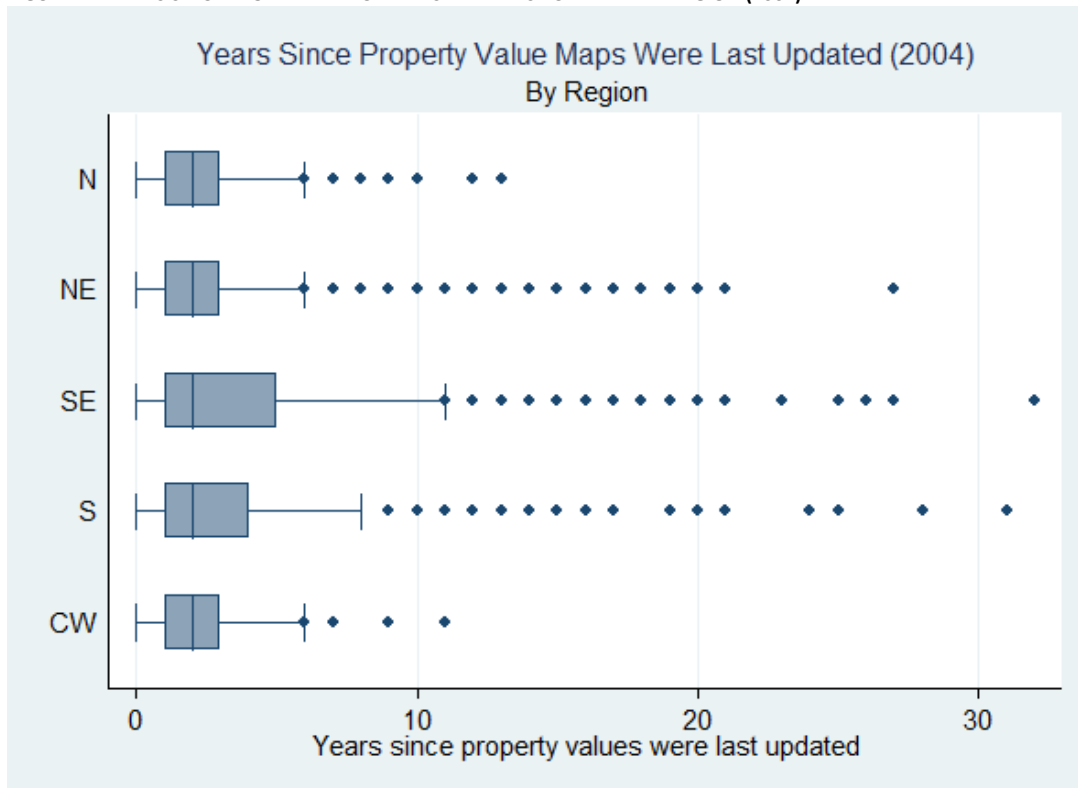


TABLE 3: SHARE OF MUNICIPALITIES WITH LAND REGULARIZATION PROGRAMS, BY REGION AND POPULATION GROUP (2008)

	% with land regularization program	Of municipalities with program			
		% with urban program only	% with rural program only	% with rural and urban programs	% not specified
Region					
North	29.3%	7.0%	17.1%	66.7%	9.3%
Northeast	15.3%	7.4%	22.7%	48.3%	21.6%
Southeast	19.8%	2.1%	43.4%	52.0%	2.4%
South	21.3%	0.8%	19.5%	74.5%	5.2%
Center-West	31.6%	2.1%	14.6%	75.7%	7.6%
Population Group					
Up to 5,000	10.4%	5.4%	20.0%	63.8%	10.8%
5,001 to 10,000	13.0%	4.2%	17.0%	63.0%	15.8%
10,001 to 20,000	17.4%	4.2%	25.9%	55.2%	14.6%
20,001 to 50,000	26.9%	4.0%	27.3%	60.4%	8.4%
50,001 to 100,000	42.3%	3.7%	29.1%	64.2%	3.0%
100,001 to 500,000	63.6%	0.7%	37.8%	61.5%	0.0%
Over 500,000	91.9%	0.0%	32.4%	67.6%	0.0%

FIGURE 18: SHARE OF MUNICIPALITIES CHARGING COMMON MUNICIPAL FEES (BY FEE, REGION AND YEAR)

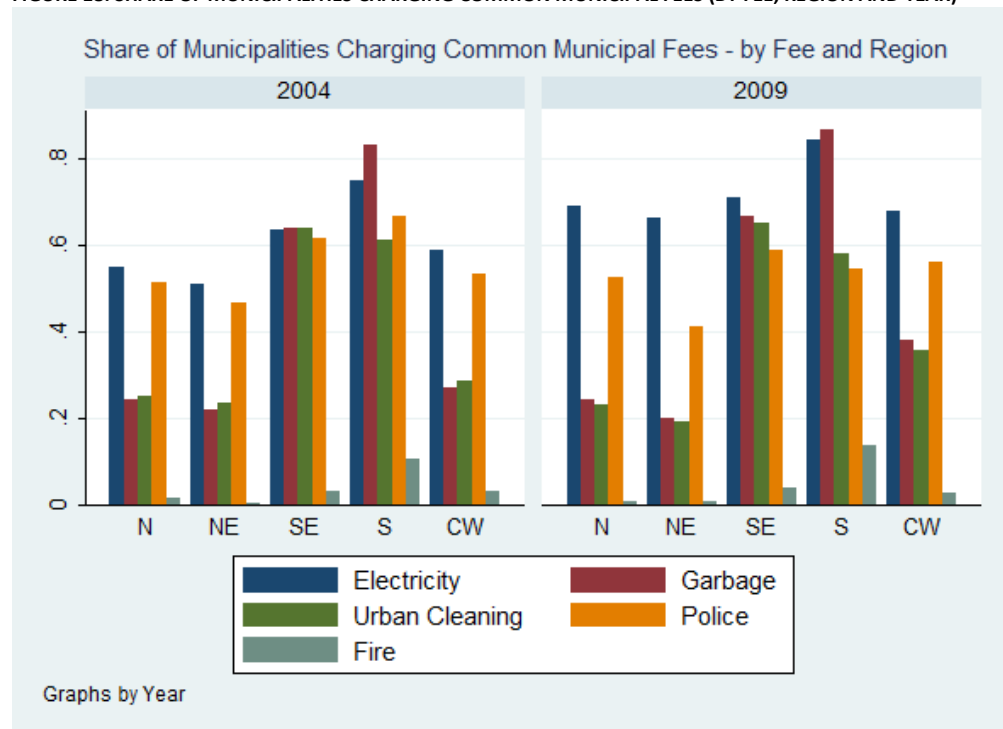


FIGURE 19: SHARE OF MUNICIPALITIES CHARGING COMMON MUNICIPAL FEES (BY FEE, POPULATION SIZE AND YEAR)

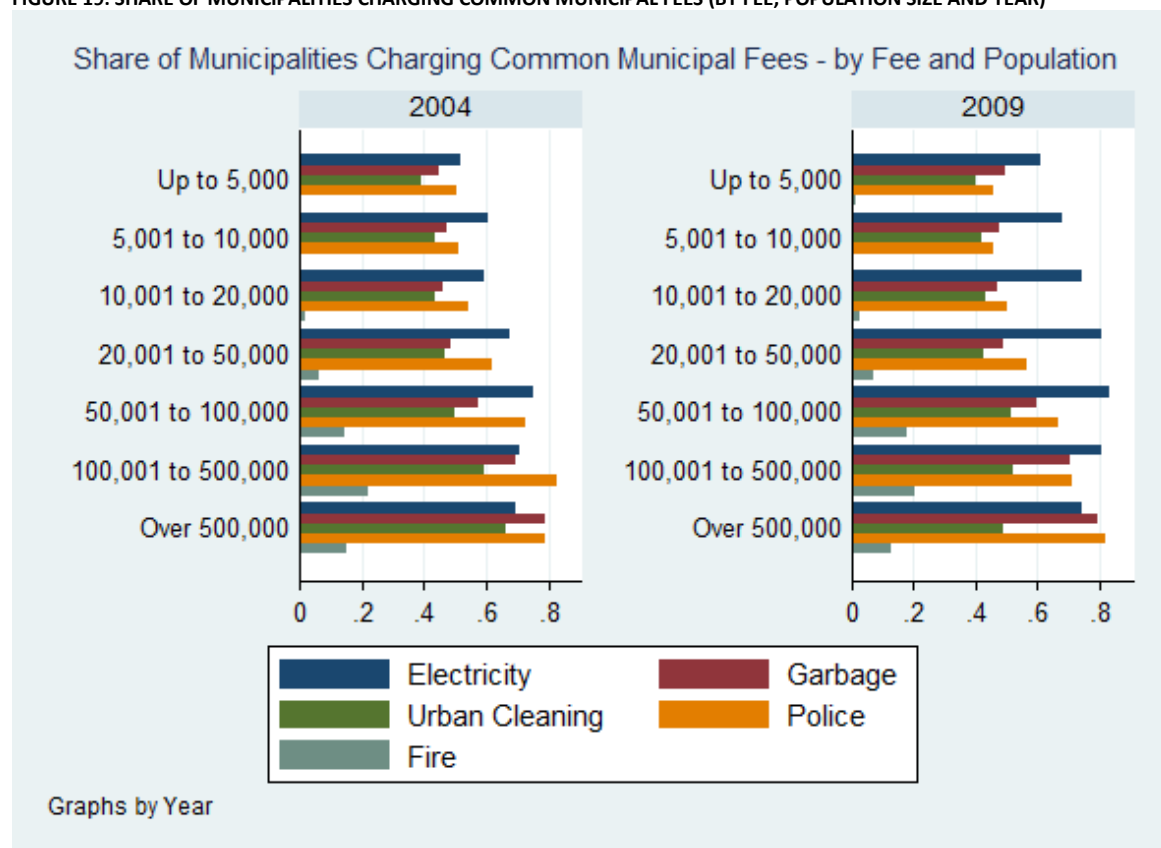


TABLE 4: SHARE OF MUNICIPALITIES WITH PUBLIC-PRIVATE PARTNERSHIP AGREEMENTS BY SERVICE AREA (2005)

Population Size	<i>Education</i>	<i>Health</i>	<i>Social Assistance</i>	<i>Housing</i>	<i>Transportation</i>	<i>Urban Development</i>	<i>Sanitation</i>
Up to 5,000	5.6%	7.9%	4.7%	1.5%	0.8%	0.8%	1.0%
5,001 to 10,000	6.1%	7.0%	7.2%	1.8%	1.7%	0.9%	1.7%
10,001 to 20,000	9.2%	9.1%	7.4%	2.0%	1.8%	1.2%	2.8%
20,001 to 50,000	11.8%	10.8%	11.1%	2.9%	2.3%	2.1%	2.3%
50,001 to 100,000	23.0%	21.4%	24.9%	5.8%	5.4%	4.2%	6.7%
100,001 to 500,000	37.9%	35.6%	41.6%	13.2%	10.5%	10.0%	9.6%
Over 500,000	51.4%	45.7%	62.9%	34.3%	25.7%	28.6%	17.1%

CHAPTER II: LOCAL REVENUE RESPONSES TO INTERGOVERNMENTAL TRANSFERS

1 CHAPTER INTRODUCTION

One of the major concerns raised when considering the design of any government transfer system—whether transfers are made to households or individuals in the form of cash (for example from welfare or unemployment checks) or goods (health insurance coverage, for example), whether transfers are made to charitable organizations, or whether they are made to local governments—is that transfers may “crowd out” other resources by creating a disincentive to generate money from other sources. When discussed in terms of households or individuals, the typical concern is that government welfare programs create a disincentive for individuals to work (Cullen and Gruber 2000; Krueger and Meyer 2002) and that public insurance programs simply substitute for insurance that would otherwise have been purchased by individuals rather than providing coverage individuals would not otherwise have had (Gruber and Simon 2008). When discussed in terms of charitable organizations, the concern is that individual donors may reduce financial support to charitable organizations when the organizations receive more support from public transfers (Payne 1998). When discussed in terms of transfers to local governments, the concern is that transfers will reduce local governments’ efforts to collect their own revenues through local taxes and fees.

The concern over crowd-out of local revenues is evident in the prescriptive policy literature on intergovernmental transfers (Bird and Smart 2002; Smart 2007). Crowd-out may not be undesirable or inefficient from the perspective of local governments, as they are likely making a decision that is optimal from a local point of view. However, replacement of local revenues is certainly not the intended outcome of most intergovernmental transfer systems. In fact, intergovernmental transfer systems are typically intended to correct fiscal imbalances—both vertical and horizontal—and crowd-out of local resources would essentially serve to undo precisely what intergovernmental transfers are designed to do in the first place. If local governments use transfers primarily to replace local money, then transfers become an inefficient means of correcting fiscal imbalances.

Crowd-out may also undermine political support for intergovernmental transfer systems. Low or reduced fiscal effort in receiving governments can make the entities giving resources (whether wealthier municipalities in horizontal sharing schemes or higher levels of government in vertical sharing schemes) perceive receivers as relying on them unnecessarily and not “doing their part,” which in turn makes the transfer systems less politically tenable.

While most of the economic theory literature on intergovernmental transfers predicts that transfers reduce local fiscal effort, this theoretical prediction has not always held up in practice (a phenomenon known in the public finance literature as the “Flypaper Effect”). In this

study, I examine whether unconditional intergovernmental transfers to municipalities do in fact crowd out local revenue generation, using changes in state-level policies governing the share of value-added tax (VAT) resources received by each municipality as an instrumental variable for transfers.

The remainder of this chapter is organized as follows: Section 2 discusses what the current literature has to say about the relationship between government transfers and local revenue generation; Section 3 presents the data I use for my analyses; Section 4 discusses my estimation strategy; Section 5 presents summary statistics of my data; Section 6 presents my estimation results; Section 7 presents some additional robustness checks; Section 8 verifies that public spending results are consistent with revenue generation results; Section 9 discusses potential explanations for my findings; Section 10 presents my conclusions; and Section 11 presents figures and tables for this chapter.

2 THEORETICAL AND EMPIRICAL RELATIONSHIP BETWEEN TRANSFERS AND LOCAL REVENUE GENERATION

In a formative work on the fiscal impacts of government grants, Bradford and Oates (1971) show the theoretical equivalence between grants to collective bodies and grants to individuals under certain, relatively plausible conditions: that the political process be able to be represented by a (1) single-valued and (2) continuous mapping of budgetary outcomes, (3) that no two equilibrium states exist for which everyone has more income in one than the other (which Bradford and Oates refer to as a government “responsiveness” condition and essentially requires that citizen preferences govern budgetary decision-making) and (4) if an individual has zero income, then that individual is not better off in the current state than he or she would be if government were providing the same set of services but had more collective money available (which Bradford and Oates boil down to essentially meaning that “it doesn’t pay to be poor”). These conditions lead to the conclusion that there should be no difference in the propensities of local governments to spend government grants and private funds, and most of grant monies received by local governments should end up back in the pockets of taxpayers. In essence, grant money “crowds out” local revenue using the language of the public finance literature.

2.1 EVIDENCE OF CROWD-OUT

While the theoretical underpinnings of the “crowd-out” prediction are strong, empirical evidence has been mixed. Many recent papers using strong identifications strategies do find evidence that local revenues are crowded out by intergovernmental transfers.

For example, Gordon (2004) takes advantage of infrequent updating to poverty estimates determining national Title I education funding to estimate the impact of grants on school spending and local school funding. While she finds no evidence of local resource crowd-out in the short-run, over a three-year period a \$1 increase in Title I funding resulted in roughly

a \$1 decrease in local revenue. Duggan (2000), for example, uses the introduction of a program to provide incentives to hospitals for treating the poor when the percentage of poor among the treated rose above a 25% threshold. Among the study's findings is that local governments reduced subsidies to public hospitals by an amount equal to the incentive payments received as a result of the new policy. In other words, state government transfers from one source entirely crowded out local transfers. Knight (2002) uses states' political bargaining strength in securing highway funding (measured by state representatives' membership on the transportation authorization committee, proportion of a state's representatives in the majority party and average tenure of a state's representatives) as an instrument for state highway funding received and shows that state spending goes down by roughly 80 to 90 cents for every dollar received in federal highway grants. Using a large-scale, court-mandated reform to school finance in New Hampshire, Lutz (2006) finds that around 92 cents per dollar of additional funds received by districts are returned to citizens in the form of reduced taxes, evidence in favor of the equivalence hypothesis. Finally, a recent paper on Ghana (Mogues and Benin, 2012) is one of the few to study this question in a developing-country context, where resources are scarce and funding from local revenue makes up a particularly small share of local budgets. Using several different identification approaches, the authors consistently find that a 10% increase in grants reduces local revenue generation by roughly 4%.

2.2 EVIDENCE TO THE CONTRARY: THE FLYPAPER EFFECT

While many papers do find evidence of local revenue "crowd-out", decades of public finance research has also produced evidence to the contrary, finding that grant money tends to increase spending at a rate higher than the marginal propensity to spend private (local taxpayer) money. In an oft-cited review by Hines and Thaler (1995), estimates of spending per grant-dollar received ranged from 25 cents to one dollar, far above local governments' marginal propensity to spend out of income, estimated to be 5 to 10 cents per dollar. Other reviews of the Flypaper Effect literature include Inman (1979), Fisher (1982) and Wyckoff (1991) and Inman (2008). This common empirical finding that local governments do not treat grant money and local taxpayer money equivalently was dubbed the "Flypaper Effect" because money "sticks where it hits", and like the grant money to which it refers, the name has stuck.

Some have argued that the so-called Flypaper Effect is explained by little more than a poor identification strategy. Essentially, the size of grant received by local governments may be correlated with unobserved factors that also affect local revenue generation and public spending choices. For example, perceived need for grants (e.g. due to high local poverty rates or worsening local economic situations) may factor into how governments allocate grant money. The same factors that create the need for the grant are also likely to affect a local government's ability to generate revenue locally. (Payne 2009, Besley and Case 2000) Many papers have also pointed to the fact that grant distribution is a result of a political process in which government representatives bargain for grants according to the preferences of their constituents. (Knight 2002, Besley and Case 2003) Because grants are determined through this political bargaining process, grant receipts are likely to be correlated with local government

preferences, which will also directly impact local public expenditure choices. (Knight 2002, Besley et al 2004) Regardless of the precise source of bias, there is a legitimate concern that the so-called Flypaper Effect may be chalked up to poor identification strategies.

Some more recent well-identified papers continue to confirm the existence of a “Flypaper Effect”, at least in some settings. Card and Payne (2002), for example, instrument for the introduction of more equalizing school financing systems using legislative and judicial actions across states and over time as instrumentals and find that a \$1 increase in state aid to local districts resulted in increases in district education spending of 50 to 65 cents. This 50 to 65-cent increase is compared to an expected 10-cent increase in the absence of a Flypaper Effect, given a typical education budget share of about 10%. Instrumenting for unconditional grants in Sweden using a discontinuity in the allocation formula, Dahlberg et al (2008) report evidence of a lack of crowding-out—spending increases by the full amount of the grant change. While tax rates do decrease statistically significantly in some specifications, changes are very small in magnitude. Litschig (2009) takes advantage of discontinuities in the formula for allocating one of Brazil’s major national unconditional grants to municipalities (the Fundo de Participação Municipal, or FPM) that arose from population-based cutoffs. Using a regression-discontinuity approach, he finds that spending increases nearly dollar-for-dollar (or real-for-real, in this case) with FPM grants and that local revenue collection does not react, indicating evidence of zero crowd-out.

2.3 RECONCILING THE DEBATE

The persistence of the Flypaper Effect causes much chagrin among economists because it appears, on the surface, to be irrational. In their zeal to restore rational order to the world, economists have attempted to understand the Flypaper Effect using a number of plausible explanations, including constrained local tax collection, flaws in assumptions about the political decision-making process and behavioral explanations.

One explanation that is entirely consistent with Bradford and Oates (1971) is formalized by Brookes and Philips (2008). They propose the argument that budgetary rules imposed on local governments that constrain elected officials’ ability to generate local revenues may yield situations in which local governments are constrained in their optimal allocations of private and public spending. In the presence of these constraints, local governments will rationally spend intergovernmental grants rather than return the money to citizens in order to move closer to the unconstrained optimum. Bradford and Oates (1971) themselves proposed this possibility when identifying conditions under which equivalence between grants and private money might not hold. Brookes and Philips (2008) evaluate the institutional constraints explanation using data on the Community Development Block Grant program combined with data on limitations to municipal taxes and expenditures and find that the Flypaper Effect is stronger in more restrictive fiscal settings. This certainly represents the Brazilian case, where municipalities are limited in the types of taxes and fees they are permitted to charge (the chief sources being property taxes, miscellaneous service taxes and some fees for local services such as garbage,

water, police, etc.). Bradford and Oates (1971) and Brookes and Philip (2008) present the institutional constraints explanation in terms of limits imposed by higher levels of government, but these constraints need not be imposed from above. Low revenue-raising capacity can also act as a constraint to local governments' ability to raise revenues at the optimal level. This is also particularly salient in the Brazilian setting, where both tax evasion and poorly managed local tax collection systems present notable challenges to local revenue generation.

Another set of explanations calls into question the assumption that citizen preferences govern budgetary decision-making. Typically this is modeled through the median voter model, which predicts that "majority-rules" systems will yield policy outcomes that converge to the preferences of the median voter. This approach has become a standard method for modeling government spending behavior as a simple utility maximization problem. Some question the degree to which policy-makers truly are responsive to voter preferences, however, and instead assume that policymakers maximize an objective function that places a higher value on public spending than does the median voter. In some models, this is due to the personal objective functions of the policymakers, who place higher value on public spending than does the median vote. The higher value placed upon public spending can be explained cynically by policymakers looking for an easy way to pocket money from public coffers, more benevolently by policymakers who believe strongly in the mission of public service provision or indifferently by policymakers who gain greater job satisfaction from working with larger budgets. These alternative models further assume that information with respect to the receipt of external grants is asymmetric (with policymakers having better information than do citizens). (Filimon et al 1982, Romer and Rosenthal 1978) Policymakers' interest in maintaining budgets higher than median voter preferences gives them an incentive to underrepresent the amount of grant money received. Since taxpayers are not aware of the full amount of grant money received by the local government, they do not expect grant money received to be returned to them or, by the same token, understand increases in public spending to be driven by reductions in the marginal cost of public services.

Finally, it has also been proposed that the flawed assumption of fungibility explains the Flypaper Effect. (Hines and Thaler 1995) There is indeed a good deal of support from the behavioral economics literature that individuals engage in "mental accounting," a process of categorizing money according to qualitative labels rather than treating all income as equal for consumption purposes. Theoretical explanations for why individuals engage in mental accounting vary. Sometime mental accounting is modeled as a psychological tool employed to overcome problems of self-control in saving for the future (Shefrin and Thaler 1988), but it has also been explained through a model in which individuals have a value function that is reference-dependent, that is concave in gains and convex in losses and places greater weight on losses than on gains, and they choose whether or not to integrate gains and losses in income (i.e. treat money as fungible) in an effort to maximize their own happiness (Thaler 2008). Empirical evidence suggests that individuals engage in mental accounting both in how they allocate money across expenditure categories (Thaler 2008; Antonides et al 2011; Heath and Soll 1996) and in how they treat different sources of income. The separate treatment of

different income sources is of particular relevance for this context. Numerous studies have shown that windfall income is treated differently from anticipated income (Johnson et al 2006; Hsieh et al 2010; Milkmana and Beshears 2009), that unearned income is treated differently from earned income (Christiaensen and Pan 2012; Cherry 2001) and that how the income was earned matters (Duflo and Udry 2004) when individuals and households choose how to use their money. If one believes the evidence of the behavioral phenomenon of mental accounting, it is quite plausible that taxpayers and political leaders engage in the same process of mental accounting and treat grants and taxpayer money as separate sources of income that are not necessarily as interchangeable as traditional economic theory would suggest.

Using changes in state-level policies governing the share of value-added tax (VAT) resources received by each municipality as an instrumental variable for transfers, I examine the extent to which unconditional intergovernmental transfers to municipalities adjust local revenue generation and find a null reaction in local revenue generation.

3 DATA

The key sources of data I have available to use in conducting this analysis are annual municipal financial reporting data, information on municipal population and municipal GDP data.

To measure the primary outcome of interest (local revenue collection) I use municipal finance data. Since the year 2000, the Law of Fiscal Responsibility has made the national government responsible for consolidating and publishing electronic data on accounting information for all entities in the three spheres of government (national, state and municipal). In 2002, a single national accounting system was to be used by all municipalities, standardizing information. The Law of Fiscal Responsibility represents more of a formalization and standardization of existing practices rather than a new practice altogether, as municipal accounting data has been collected and publicly available since 1989. Data are available for most, but not all, of Brazil's municipalities (of which there are roughly 5,565³⁶). Key variables of interest for this study are locally generated revenues (primarily taxes and fees), government transfers, which are disaggregated by major type of transfer and municipal expenditures. Total expenditures and expenditures by major function (e.g. personnel and capital investments) are available as of 1989, and expenditures by public service area such as education, health, social assistance, etc.), are available starting in 1996. Disaggregated expenditures by functional and public spending category are used in my discussion in Section 9, where I aim to examine the potential explanations for the existence of a Flypaper Effect in this setting.

Municipal-level GDP data are downloaded from the Institute for Applied Economic Research (Ipea) and used for descriptive statistics and as potential control variables. Data from Ipea are presented only in constant values from the year 2000 whereas public finance data are

³⁶ The precise number can vary from year to year, as municipalities become incorporated or split from each other.

available in current-year values only. Since no GDP deflators were readily available from Brazil's standard public data sources, I generate my own. I use state-level GDP data, which is available in both current and constant 2000 values, to generate a state-specific deflator (current values divided by constant values) for Rio Grande do Norte and Paraíba. Ideally I would include GDP as an additional control variable in my regressions. However, GDP is only in 1996 and then annually beginning in 1999, which leaves me with only one pre-formula change year for which I have GDP data. In Section 7.1, I demonstrate that municipal GDP has surprisingly little explanatory power and does not affect the magnitude of significance of measures of estimates of the impact of the expenditure limits, while excluding 1998 matters substantially. As a result, I choose to exclude GDP as a control variable from all regressions, since its value as a control variable is limited and the cost of including it as a control is high.

I also use two pieces of information downloaded from Ipea to generate a variable that measures the share of votes received by the mayor in the most recent election in an attempt to roughly measure the degree of public support enjoyed by the mayor. Most mayoral elections are decided in the first round. However, in the few case in which two rounds were needed, I take outcomes from the second round of elections to construct this measure.

Finally, I use information on municipal characteristics from an annual municipal survey conducted by Brazil's national institute of statistics (Instituto Brasileiro da Geografia e Estatística, IBGE)³⁷ in my discussion of the potential mechanisms behind my results. I use 2004 and 2005 data on whether property registration systems are computerized, whether a map of property values exists and whether a service provider registration system exists to measure municipalities' tax collection capacity and data on the existence of distance communication activities with citizens (newsletters, website, availability for communication by phone, email, snail mail or fax, etc.), whether the municipality has a website, whether there is there is a local radio station (AM or FM), and whether there is a provider of internet services in the municipality to measure the degree to which citizens are likely to be informed about local government decision-making.

4 ESTIMATION STRATEGY

Absent any endogeneity concerns, one could simply regress locally generated revenue (LGR) on government transfers in a standard OLS format of the following sort:

$$LGR_{mt} = \beta_1 G_{mt} + x_{mt} + \gamma_m + \delta_t + \varepsilon_{mt} \quad (1)$$

Generally, identifying a causal relationship between intergovernmental transfers and local municipal spending and collection is difficult because omitted variables are likely to bias estimates. Besley and Case (2000) describe why policy impact estimates that take advantage of variation across time and space may still lead to biased results. Essentially, they argue that

³⁷ Data downloaded from: <http://www.ibge.gov.br/munic2004/> and <http://www.ibge.gov.br/munic2005/>

omitted variables are particularly worrisome in the case of government policies because government policies are determined through political processes in which individual preferences determine which policies are implemented where, illustrating their point using state workers' compensation benefit policies.

Knight (2002) relates this argument to public finance and illustrates how political factors (namely states' negotiating strength, measured by state representatives' membership on the transportation authorization committee, proportion of a state's representatives in the majority party and average tenure of a state's representatives) are indeed correlated with grant receipts. He further shows that using these measures as instruments for highway grant receipts generates evidence of local spending "crowd-out," in contrast to specifications that do not account for these political factors.

Even if not politically determined, endogeneity may still arise. Many formulas used to determine grant allocation are based on social and/or economic factors, which may be correlated with revenue generation. Particularly worrisome from an identification standpoint are distribution formulas that use fiscal indicators such as fiscal effort or (in the case of some ICMS distribution formulas in Brazil) outcomes or spending in targeted policy areas such as education and health. In cases where local governments are able to adjust their receipts by changing local fiscal decisions, grant receipts are still likely to be endogenous even when based upon a transparent and apolitical formula.

Some studies overcome the endogeneity problem by instrumenting for transfers based on arguably exogenous components of known grant distribution formulas. Dahlberg et al (2008), for example, take advantage of a discontinuity existing in the formula for distributing a piece of cost equalizing grants in Sweden, for which only local governments with out-migration rates above 2% in the past ten years are eligible. They use this piece of the distribution formula to instrument for receipts of cost-equalizing grants. Mogues and Benin (2012) estimate the impact of transfers on local revenue generation by instrumenting for transfers in Ghana using the formula for a major source of transfers, excluding the part of the formula determined by local revenue generation. Similarly, Gordon (2004) takes advantage of the fact that formulas determining national Title I grant allocations to districts in the United States are updated only every ten years, when new Census estimates of poverty come out and instruments for changes in Title I receipts using these discrete changes in allocation. I take a similar approach using changes in state laws governing how one source of unconditional transfers for municipalities (the ICMS) is distributed across municipalities in a given state.

4.1 CHANGES TO ICMS DISTRIBUTION LAWS

The Imposto Sobre Circulação de Mercadorias e Serviços (ICMS) is Brazil's version of a value-added tax (VAT) and is one of the major sources of unconditional transfers received by municipalities. Unlike many countries' VAT, the ICMS is controlled at the state level rather than by the national government. At the same time, it is a constitutional transfer and so is governed

by a set of national rules described in Brazil's Constitution. The Constitution stipulates that $\frac{1}{4}$ of money collected must be distributed to municipalities within a state. While the Constitution requires that $\frac{3}{4}$ of the 25% of resources going to municipalities (18.75% of total resources) be distributed based on municipalities' contribution to the ICMS (i.e. the amount of value-added resources generated in that municipality), it also gives states the liberty to decide how the remainder of the municipalities' share ($\frac{1}{4}$ of the 25% of the resources received by municipalities, or 6.25% of total ICMS resources) is distributed to its municipalities. Typically, the portion of ICMS resources to be allocated to each municipality is fixed annually, and the amount of resources a municipality receives each week varies depending on total ICMS resources collected by the state.

States have adopted a variety of policies for determining how the $\frac{1}{4}$ of municipalities' ICMS resources will be allocated. From time to time they alter the criteria used to distribute the 6.25% of ICMS resources at their discretion, and these alterations often result in substantial changes in municipalities' total share of the ICMS pie. I use two such policy changes introduced in the Northeast Brazilian state of Rio Grande do Norte and Paraíba.

Rio Grande do Norte was the first of the states in this study to change their ICMS distribution policy. In a 1997 law (State Law 7.105), the state reduced the share of ICMS receipts distributed according to relative value-added contribution to total ICMS resources from 90% to 80%, and introduced an "equal distribution" policy, in which resources are evenly distributed across all of the state's municipalities. The remaining 10% of resources would continue to be distributed based on relative population, as it had before 1997.

In December of 1998, Paraíba's legislative assembly passed State Law 6.700, which reduced the share of ICMS resources distributed according to value-added from 95% to 80%. The five percent of resources distributed based on relative population remained the same, and the remaining 20% of ICMS resources over which the state had distributional discretion would be distributed equally across all of the state's 223 municipalities. The change was phased in over a two-year period, with 82.5% of resources were distributed according to value-added contribution and 12.5% distributed equally in 1999.

Replacing a small percentage of the resources allocated according to value-added contribution with an equal-sharing component to ICMS distribution formulas had substantial re-distributive implications in both states, resulting in large increases in resources for small municipalities and minimal changes for large municipalities. Figures 2 through 5 present whisker plots of municipalities' per capita ICMS receipts over time for each population quartile in each state. They clearly demonstrate that smaller municipalities see substantial gains in their per capita ICMS receipts when the new distribution policies come into place than do larger municipalities. Per capita receipts of municipalities in the bottom two population quartiles more than double (Figures 2 and 3), municipalities in the third quartile see more moderate gains (Figure 4), and municipalities in the top quartile see no obvious deviation from the growth trajectory of their per capita ICMS receipts (Figure).

4.2 ESTIMATING EQUATION

The introduction of equal-sharing rules into states' ICMS distribution formulas were permanent shocks to municipal transfers that were exogenous to municipal decision-making and so serve as perfect instruments for transfers. I take advantage of the fact that the equal-sharing rule had substantially different implications for the amount of transfers received per capita by municipalities to identify variation in the intensity with which the introduction of the new ICMS formula impacts municipalities' ICMS receipts matter for the amount of transfers per capita received by municipalities. I do so by generating an intensity of treatment instrument (I_{mst}) that is equal to the share of ICMS resources each municipality receives under the equal sharing rule (1/167 for Rio Grande do Norte and 1/223 in Paraíba) divided by the municipality's population at the beginning of the period used in the analysis (1995). In small municipalities, where the equal share of the pie results in a much higher share of the pie per capita, the intensity of treatment will be larger. In large municipalities, where the equal share of the pie results in far fewer resources per capita, the intensity of treatment will be much smaller.

$$I_{ms} = \frac{1/M_s}{POP_m} \quad (2)$$

I then instrument for total per capita transfers received by municipality m in state s and in year t (T_{mst}) using the intensity of treatment I_{ms} interacted with a dummy variable equal to 1 in the post-treatment period (A_{st}) in Equation (3). I allow for flexible state-specific time trends by including state-year dummy variables and I include municipality-fixed effects.

$$T_{mst} = \alpha_1 (I_{ms} * A_{st}) + \gamma_m + \delta_{st} + \omega_{mst} \quad (3)$$

In the second stage of my estimating equation, I estimate the impact of changes in transfers on local revenue generation using instrumented transfers:

$$L_{mst} = \beta_1 T_{mst} + \gamma_m + \delta_{st} + \varepsilon_{mst} \quad (4)$$

The variable L_{mt} represents per capita locally-generated revenues of municipality m in year t , and \hat{I}_{mt} represents instrumented per capita ICMS receipts. The full estimating equation includes municipality-level fixed effects (γ_m) and state-year dummies (δ_{st}), which control for total ICMS resources available in a given year and other changes to state conditions that affect all municipalities. Municipality fixed effects are collinear with I_{ms} and the variable indicating the "After" period (A_{st}) is collinear with state-year fixed effects in Equation (3) and so are not presented in the regression equation.

4.3 IDENTIFYING A VIABLE SAMPLE

4.3.1 DATA-YEARS TO BE INCLUDED IN THE STUDY

In order to reduce the influence of potential unobserved municipal trends that may be correlated with my instrumental variable, I use a policy discontinuity design and limit the sample of data-years in my study to those right around the time of the introduction of the new ICMS formulas (1995 to 2001). In the Brazilian case, two key sets of events in years before 1995 and after 2001 highlight the reasons why a policy discontinuity design is employed.

First, a series of economic crises resulted in several changes in Brazil's currency (see Figure 7 for timeline). In 1995, Brazil finally instituted a successful monetary stabilization plan and the Real was introduced. Because these economic crises inevitably have substantial impacts on local public finances (Reisen 1990), by devaluing the real value of revenue collected or contracting the tax base for example, I first limit my analysis to the post-stabilization period, beginning in 1995.

Second, other changes in Brazil's municipal finance system are likely to be mixed up with the changes in revenue generation due purely to changes in transfers received if I include years after 2000. Figure presents whisker plots of local revenue generation over time, by state. The most striking features of these plots are the large increases in local revenue generation in 2002 and, to a lesser extent, in 2001. These increases are likely related to the introduction of the Law of Fiscal Responsibility, a major policy change introduced in 2001 that imposed expenditure and debt limitations at every level of government (national, state and municipal).³⁸ Not only is the Law of Fiscal Responsibility likely the reason for the large jump in local revenue generation that we see beginning in 2001 and accelerating in 2002, but the new law likely had differential implications for municipalities of different sizes (for example, larger municipalities may have had a larger tax base and more developed tax collection infrastructure and so could can more easily react to limits on spending as a share of revenues and limits on borrowing by increasing revenue than could smaller municipalities). As a result, my instrumental variable (which relies in part on variation in population to identify variations in the intensity with which the ICMS policy changes matter for municipalities) is likely to be correlated with the impacts of these other policy changes. In order to avoid confounding the impacts of these other policies with the impacts of the program and maintain a clean analysis, I limit the years included in my study to those before the Law of Fiscal Responsibility is in effect (i.e. through 2000 only). Figure 7 provides a summary timeline of the events described in this section and the changes in ICMS distribution formulas.

³⁸ The Law of Fiscal Responsibility is described in detail in Chapter III.

4.3.2 ELIMINATING MAJOR OUTLIERS

Figure 8 presents scatterplots of per capita revenue generation over population by state for the year 1995 (the first year of data in my analysis sample). It is quite clear that some cities generate local revenue on a scale that dwarfs that of most other municipalities. Plots for other data-years are similar. Some of the most extreme cases are the states' capital cities (Natal in Rio Grande do Norte and João Pessoa in Paraíba). This is a typical phenomenon in Brazil, which is highly unequal not just in terms of individual wealth distribution but also in terms of resource distribution across municipalities. This is particularly true in the Northeast region, where both Rio Grande do Norte and Paraíba are located. The differences in values are so large that even changes in revenue generation in the small number of municipalities with the highest per capita revenue generation will dwarf those occurring in most municipalities, which will bias my analyses even though I control for average revenue collection values through municipality fixed effects.

To deal with this concern, I run all analyses excluding municipalities that are major outliers in years prior to the introduction of the new equal sharing formulas. I define outliers according to the following criteria: (1) in each year and in each state I calculate the value of per capita revenue generation of the 75th percentile of municipalities, (2) I double the value calculated in Step 1, (3) in each year prior to the policy changes (through 1997 for Rio Grande do Norte and through 1998 for Paraíba), I identify those municipalities that collect more than double the value calculated in Step 2 (i.e. more than double the per capita value of the 75th percentile of municipalities in a given state) and (4) all municipalities identified in Step 3 in at least one of the pre-policy change years are labeled as outliers and excluded from the analysis. This process eliminates about 37 percent of my observations (120 outliers out of 321 municipalities).

Table 2 compares outlier and non-outlier municipalities along a series of key variables, including my instrumental variable, in years prior to the policy change. Outlier municipalities are very different from non-outliers. They are far larger than non-outliers, are far richer in absolute terms and fifty percent richer on average in per capita terms, they receive over double what non-outliers receive in transfers per capita, and (not surprisingly) they collect more revenue as in per capita terms and as a share of GDP than do non-outliers. The average value taken on by my instrumental variable is also significantly different between outliers and non-outliers. Figure 9 presents the same scatterplots as those in Figure 8, but excluding outliers defined by the process described in the previous paragraph. Removing outliers rids the sample of the drastic differences in per capita local revenue generation seen in Figure 8 but does compromise the external validity of my sample. Thus this paper can speak to the existence of a Flypaper Effect outside of those municipalities that collect the most per capita in local revenue. In a series of robustness checks, I conduct the same analyses defining outliers varying the cutoff at which I define an outlier (twice the value of the 70th and 80th percentiles) to verify that results are not driven by the precise choice of cutoff in Step 1.

5 SUMMARY STATISTICS

5.1 INSTRUMENTAL VARIABLE

As explained in Section 4, I take advantage of permanent, exogenous changes in ICMS distribution laws to instrument for municipal transfers. My instrumental variable (I_{mst}) measures the intensity with which the new equal sharing rules matter for per capita ICMS receipts that a municipality will receive. Figures 10 and 11 present bar graphs of the intensity of treatment with which the policy affects municipalities (i.e. the values taken on by I_{mst}) in Rio Grande do Norte and Paraíba, respectively. Figures exclude outliers. I_{mst} takes on values that range from 1.68E-10 to 3.66E-09 in Rio Grande do Norte and 4.14E-11 to 3.65E-09 in Paraíba, excluding outliers. With a coefficient of variation in I_{mst} of 0.623 in Rio Grande do Norte, 0.753 in Paraíba and 0.709 across both states in each year, there is substantial variation in the degree to which the new equal sharing rules matter for determining a municipality's per capita share of the ICMS pie.

5.2 MUNICIPAL RECEIPTS

Table 3 presents summary statistics of per capita receipts by type of receipt, total expenditures, population and GDP by population quartile in Rio Grande do Norte and Paraíba. Summary statistics are presented for the period before the introduction of new ICMS formulas (1995 to 1997 for Rio Grande do Norte and 1995 to 1998 for Paraíba) and after the introduction of the new formulas (1998 to 2000 for Rio Grande do Norte and 1999 to 2000 for Paraíba) for municipalities that are in the sample (those not defined as outliers according to the process described above). Summary statistics are presented by population quartile because my instrumental variable I_{mst} (the intensity with which the new equal sharing rules matters for the per capita share of ICMS receipts that a municipality will receive) is driven by municipal population, with smaller municipalities receiving a larger share of the ICMS pie per capita after the formula change and larger municipalities receiving a smaller share. All values are in constant values from the year 2000, normalized using the state-level GDP deflators described in Section 3.

Transfers account for the vast majority of current receipts. In the pre-policy change period, annual transfers received by municipalities averaged around R\$20,180,000 (R\$251 per capita), accounting for 96% of the roughly R\$20,920,000 (R\$260 per capita) in average current receipts. In the post-policy change period transfers averaged around R\$28,400,000, accounting for 95% of current receipts. On average, municipalities received R\$1,803,000 in ICMS transfers (around R\$13 per capita) prior to the policy change, which was equivalent to roughly 8.9% of all transfers. After the policy change, ICMS transfers made up a similar but slightly larger, share of total transfers, and municipalities received an average of R\$28,400,000 in ICMS transfers (around R\$35 per capita), roughly 10% of transfers.

While transfers are smaller in absolute terms in smaller municipalities and larger in larger municipalities, the municipalities with the smallest populations actually receive substantially more per capita than do other municipalities. The same pattern is true when comparing other population quartiles to larger quartile, but differences in per capita receipts are far smaller across quartiles 2, 3 and 4 than differences between quartile 1 and any of the other quartiles. Current receipts follow essentially the same pattern, since transfers make up such an overwhelming share of current receipts.

The distribution of ICMS transfers, on the other hand, is quite different. Prior to the changes in the ICMS distribution formula, larger municipalities were receiving more ICMS resources both in absolute terms and in per capita terms. Prior to the formula change, municipalities in the top population quartile were receiving nearly 90% more per capita than municipalities in the bottom population quartile and 55% and 65% more per capita than the third and second quartiles, respectively. After the change in the ICMS distribution formula, the smallest municipalities actually receive around 40% to 50% more per capita from the ICMS than do municipalities in the top quartile, and the second and third quartiles received amounts per capita that were essentially on par with the top population quartile. These patterns echo the argument in Section 4.1 that the changes in ICMS distribution formulas have substantial re-distributive impacts on municipalities, particularly for smaller municipalities.

Local revenue generation in these two states is quite small relative to all receipts, and in per capita terms. Local revenue generation accounts for just below 1% of total current receipts on average both before and after the introduction of the new ICMS distribution formulas. Municipalities collected a little more than R\$2 per capita on average in the pre-policy change period and just over R\$3.5 per capita in the post-policy change period. In per capita terms, local revenue generation is higher in the bottom and top population quartiles relative to the middle two quartiles prior to the new ICMS laws, and discrepancies between the first and fourth quartiles and between the second and third quartiles are very small. In the post-policy change period, discrepancies across quartiles are smaller.

In addition to municipal receipts, population and GDP data are presented to round out the picture of the profile of municipalities. Municipalities in the top population quartile have over 20,000 people over average, while those in the bottom quartile, with around 3,600 people on average, are less than one fifth the size of those in the top quartile in both periods. Of note is the fact that GDP per capita is quite similar across population quartiles, though it is slightly higher in the top population quartile in both periods.

Figure 12 presents a fitted scatterplot of demeaned local revenue generation over my instrumental variable (the intensity with which the formula change matters for a municipality's per capita share of the ICMS pie) before and after the formula changes were implemented (the 1995 to 1997 period and the 1999 to 2000 period, respectively). The before picture and the after picture are strikingly similar, with no detectable change in the relationship between local revenue generation and my instrumental variable. These figures exclude confidence intervals

for ease of viewing the graph, but there is complete overlap in the confidence intervals. This provides a preliminary illustration that municipalities do not seem to respond to increases in ICMS receipts by changing their own revenue generation.

6 ESTIMATION RESULTS

6.1 CHECKING IDENTIFYING ASSUMPTIONS

My identification strategy is a fixed-effects instrumental variables approach and requires that (1) state-level changes to ICMS distribution laws are not influenced by municipal leaders (the independence assumption), (2) state-level changes to ICMS distribution impact local revenue generation only through transfers (the exclusion restriction) and (3) state-level changes to ICMS distribution laws be strong predictors of municipal ICMS transfers. In Section 6.1.1, I discuss why the independence assumption is likely to hold. In Section 6.1.2 I check the exclusion restriction by checking that there is no significant relationship between local revenue generation and the new ICMS distribution index in years prior to the introduction of the index changes. In Section 6.2 I verify that my instrumental variable is a strong predictor of municipalities' ICMS receipts.

6.1.1 INDEPENDENCE ASSUMPTION

The introduction of new state laws governing ICMS distribution is quite believably exogenous to local municipal governments' decision-making. In Brazil, state laws are made by deputies in the State Legislative Assembly. Unlike in many countries (e.g. the United States, others), seats in Brazil's state legislative assembly are awarded based on party representation rather than geographic representation. Voters vote for specific candidates, after which, an *electoral quotient* is calculated by dividing the number of valid votes (non-blank, regular voted) by the number of seats available in the Legislative Assembly. Next, a *party quotient* is calculated by dividing the number of valid votes for each party by the electoral quotient, rounded to an integer value (i.e. if electoral quotient is 5.8, then party quotient is 5, and if its 0.8, then their party quotient is 0 and they don't get any seats in the Legislative Assembly). The party quotient integer determines the base number of seats received by each party. Any additional open seats are distributed one-by-one to each party, starting with the party with the largest party quotient and going down from there to the party with the smallest party quotient (but having a minimum of one representative), and the process repeats until there are no more extra seats (Bresciani 2010, Tribunal Regional Eleitoral do Rio Grande do Norte (2010)).

Since state legislative assembly deputies have no systematic incentive to represent local interests that may coincide with municipal government interests and there is no systematic relationship between local governments and state lawmakers, it is reasonable to describe changes in ICMS distribution laws as an exogenous change imposed by the state legislature on municipal governments. While municipal governments can lobby the state government if they

so choose, there is no evidence that they did so in the case of the three policy changes studied in this paper.

6.1.2 EXCLUSION RESTRICTION

The second critical assumption I must make for my identifications strategy to be valid is that state-level changes to ICMS distribution impact local revenue generation only through transfers (the exclusion restriction). Since the changes to the ICMS distribution formula benefitted smaller municipalities (both in economic terms and in terms of population) more than larger municipalities, this assumption could be violated if there would have been differential trends in local revenue generation over time across small versus large municipalities in the absence of the policy change.

To verify that the exclusion restriction is likely to hold, I check that there is no significant relationship between local revenue generation and the new ICMS distribution index over time in years prior to the introduction of the index changes. To do so I run a series of regressions on data using only pre-treatment years (1995 to 1997), in which I essentially pretend that treatment occurred years earlier than it actually did and test whether there is a relationship between local revenue generation and the intensity of the treatment instrument in years prior to the introduction of the equal sharing rules. I test the exclusion restriction by regressing per capita local revenue generation (L_{mst}) on a placebo instrumental variable comprised of the intensity of treatment instrument (I_{mst}) interacted with a dummy variable identifying fake “placebo” treatment years ($A_{st}^{Placebo}$), described in Equation 5 below. I test fake treatment years for each of the pre-formula change years in my analysis (1996 and 1997). The existence of a significant coefficient estimate for ρ_1^p would be evidence of a likely violation of the exclusion restriction.

$$L_{mst} = \rho_1^p \left(I_{ms} * A_{st}^{Placebo=p} \right) + \gamma_m + \delta_{st} + \omega_{mst} \quad (5)$$

Results of the placebo tests are presented in Table 4. I conduct the placebo exercise including all municipalities and excluding outliers. I show results not only for my primary definition of outliers (municipalities whose per capita local revenue generation is greater than double the value for that of the 75th percentile in any of the pre-policy change years) but also for a range of definitions generating higher and slightly lower cutoffs for what constitutes an outlier (double the value of the 80th, 85th and 90th percentiles and 60th and double the value of the 70th percentile, respectively).

In the analyses that include all municipalities, the significant negative coefficient on the 1997 placebo test would be cause for concern that there may be a differential trend in local revenue generation between those who gain most in per capita terms from the equal sharing rule and those who gain least from the equal sharing rule. Problematic differential time trends fully dissipate by the time I move down to my primary definition of outliers. The disappearance of the differential time trend is not driven by increases in standard errors as the sample size

decreases. Standard errors stay similar across all specifications in which outliers are removed and are much smaller than in regressions that include all municipalities.

6.2 RESULTS

Table 5 presents my primary regression results. Columns (1) through (3) present results absent any municipality fixed effects, and Columns (4) through (6) present results with municipality fixed effects. Columns (1) and (4) present OLS estimates; Columns (2) and (5) present first-stage estimates; and Columns (3) and (6) present IV-2SLS estimates.

First stage estimates consistently predict a very strong relationship between the introduction of the new equal-sharing formula and municipal transfers, with confidence levels above 99% and F-statistics well above the rule-of-thumb cutoff of 10.

Basic OLS estimates would seem to indicate that municipalities *increase* local revenue generation (results significant at the 99% confidence level) by 0.1 cents per additional dollar of transfers received. However, IV-2SLS estimates indicate a null relationship between transfers and per capita revenue generation. These estimates imply that municipalities do not react to increases in transfers received by reducing local revenue generation, evidence that a Flypaper Effect does indeed exist in this context.

7 ROBUSTNESS CHECKS

In the following section I run three checks on the robustness of my analyses: 1) verification that excluding GDP as a control variable is unlikely to substantially change results and comes at substantial cost because of the limited availability of GDP in years before the ICMS formula changes, 2) verification that results are similar when less and more restrictive definitions of what constitutes an outlier municipality are used and 3) adding additional states into the analysis as that had no policy changes over 1995 to 2000 as “control states”, in a triple difference analysis.

7.1 TESTING RAMIFICATIONS OF EXCLUDING POLITICAL VARIABLES AND GDP AS A CONTROL VARIABLE

Ideally, in addition to municipal fixed effects and state-year dummies, I would include time-variant controls for GDP and political factors that are likely to influence a municipal government’s political will to raise taxes (the mayor’s share of the vote in the last election) to account for the strength of a mayor’s political mandate. However, these data are not available for all years included in the main sample. Voting records are only available for download as of 1996, and GDP is only available in 1996 and from 1999 onward. As a result, including these variables leaves me with few years of data. In Table 6, I verify that excluding mayor’s vote share and GDP are unlikely to change my results. To do so, I compare estimates without and with

these variables using only data-years for which both variables are available (1996, 1999 and 2000).

Columns (1) through (3) present the main regression estimates using all data-years between 1996 and 2000. In Columns (4) through (6), I restrict the observations included in the regression to those for which the mayor's vote share and GDP information is available (which essentially restricts the data-years to 1996, 1999 and 2000), but I exclude the additional control variables. The sign and magnitude of the coefficient estimates change substantially, even before I include GDP as a control variable. However, significance does not change, and the null result remains. Columns (7) through (9) present results when the mayor's vote share in the most recent election and municipal GDP per capita are included as additional control variables. Adding these control variable changes the key coefficient estimate only slightly and has no effect on the significance of my estimates. Surprisingly, GDP itself has no explanatory power. All in all, this series of tests indicates that the exclusion of these additional control variables is unlikely to be of any import for my results.

7.2 VARYING THE DEFINITION OF AN OUTLIER

In order to reassure the reader that results are not driven by my choice of definition of outlier, I present the same results as those presented in Table 5 altering slightly the cutoff used to define an outlier. The primary definition I use for outliers is any municipality that has receipts per capita greater than double the value of the 75th percentile in at least one of the pre-policy change years. I vary the definition of outliers by defining outliers by values double the 70th and 80th percentiles. Results are presented in Tables 7 and 8. Generally, results are similar regardless of the precise cutoff used to define outliers. In both cases, IV-2SLS fixed effects estimates without municipality fixed effects seem to indicate 0.2 cent *increase* in local revenue generation as a result of increases in transfers, but significance disappears once municipality fixed effects are included.

7.3 INCLUDING OTHER STATES AS ADDITIONAL CONTROLS

I next add additional states into the analysis as that had no policy changes over 1995 to 2000 as "control states": one nearby state that had no equal sharing rule over that period (Pernambuco) and one nearby state that had an equal sharing rule throughout the entire period (Sergipe) and verify that results are robust to the inclusion of these "control states". Figure 13 presents a map of the Northeast of Brazil showing the location of each state included in this version of the analysis. Rather than a double difference, I use a triple difference described by the following first and second-stage equations (Equation (5) and Equation (6), respectively):

$$T_{mst} = \lambda_1 (I_{ms} * A_{st} * C_s) + \lambda_2 (A_{st} * C_s) + \lambda_3 (I_{ms} * A_{st}) + \lambda_4 (I_{ms} * C_s) + \gamma_{ms} + \delta_{st} + \omega_{mst} \quad (5)$$

$$L_{mst} = \beta_1 T_{mst} + \gamma_{ms} + \delta_t + \varepsilon_{mst} \quad (6)$$

In control states, the variable identifying the post-formula change period (A_{st}) is defined as equal to one beginning in 1998, the year that the first treatment state (Rio Grande do Norte) changed ICMS formulas. The variable L_{mt} represents per capita locally-generated revenues of municipality m in year t , and \hat{l}_{mt} represents instrumented per capita ICMS receipts. C_s denotes whether or not a state changed ICMS formulas over the period 1995 to 2000 and is equal to one for Rio Grande do Norte and Paraíba and is equal to zero for Pernambuco and Sergipe. As before, the full estimating equation includes municipality-level fixed effects (γ_{ms}) and state-year dummies (δ_{st}), which control for total ICMS resources available in a given year and other changes to state conditions that affect all municipalities. Note that the interaction terms $A_{st} * C_{st}$ and $l_{ms} * C_s$ are collinear with the state-year fixed effects and municipality fixed effects, respectively, and so are not included in the equation.

Table 9 presents results for the triple difference estimates. As in Table 5, Columns (1) to (3) present results excluding any controls or municipality fixed effects; Columns (4) to (6) add municipality fixed effects and Columns (7) to (9) add political controls. Results are nearly identical to those in Table 5, indicating that evidence in favor of the existence of a Flypaper Effect is robust to the inclusion of additional “control states”.

8 VERIFYING RESULTS WITH EXPENDITURES

I next examine the Flypaper Effect from the flip side of the coin: public expenditures. In the absence of a Flypaper Effect, we would expect to see public spending increase by less than the full transfer amount received by local governments. I verify that spending results are consistent with my findings in Section 6.2 by employing exactly the same framework as in previous analyses but changing the dependent variable to be total public expenditures per capita rather than local revenue per capita (see Equation 6 below). A θ_{mst} coefficient equal to one would imply that we cannot reject the hypothesis that each dollar of transfers received is spent in full and would be consistent with what we would expect to find if a Flypaper Effect does exist in this setting. A θ_{mst} coefficient of less than one would imply that new transfers received are not spent in full and would be consistent with what we would expect to find if a Flypaper Effect did not exist.

$$S_{mst} = \theta_1 T_{mst} + \gamma_{ms} + \delta_t + \varepsilon_{mst} \quad (7)$$

Table 10 presents results for Equation 7. Ninety-five percent confidence intervals are presented for θ_{mst} . In Column (3), IV-2SLS estimates excluding control variables actually fall slightly above one, but once political variables are added as controls, estimates fall squarely within in the confidence interval for $\theta_{mst}=1$, indicating that the coefficient is not significantly different from one and corroborating my findings in Section 6.2 that a Flypaper Effect does indeed exist in this setting.

9 DISCUSSION

Common explanations for the existence of the Flypaper Effect include omitted variable biases in estimates, constrained local tax collection, flaws in the assumptions of the median voter model and behavioral explanations. I take care to rule out the first explanation (poor identification) as the driver of my results. Data availability limits my ability to distinguish between the former three explanations.

9.1 COLLECTION CONSTRAINTS

It is certainly plausible that constrained tax collection and sub-optimal spending levels in the first place is driving the Flypaper Effect in the case of Northeastern Brazil. Municipalities have permission to collect revenues in a limited number of ways and do so mainly through property taxes, taxes on some services not covered by the ICMS, and fees for certain public services such as water, garbage, fire or police. Not only are municipalities limited in the types of taxes they can collect, but they are also constrained in their capacity to collect these taxes. (Afonso et al 1998) To properly assess whether constraints on local revenue are driving my results, I would need variation in the degree to which revenue generation is constrained both before and after exogenous changes in municipal transfers. Laws governing municipal revenue generation are uniform within and across states, offering little to no variation in the legal constraints facing municipalities. Aragón (2010) provides some preliminary evidence from Peru that municipalities with an automated tax system or an updated cadaster (which Aragón equates with “low cost” tax collection) increase spending less and reduce tax collection more in response to grants than do municipalities without these tax collection tools in place. In a similar effort to look for evidence that capacity limitations could explain the Flypaper results in this study, I use data on municipal tax collection infrastructure (whether property registration systems are computerized, whether a map of property values exists and whether a service provider registration system exists) to proxy for tax collection capacity. Unfortunately, data are not available for download before the formula changes were in place and so I rely on data from the first years in which data are available for download in database format (2004 and 2005). I cut the sample according to these variables and run my main analyses separately for those with more developed and less developed tax collection infrastructure in 2004/2005 (Table 11). Column (1) presents coefficient results only for municipalities that have the given type of tax collection infrastructure, and Column (3) presents coefficient results only for those that don’t have a given type of tax collection infrastructure. Column (2) and (5) gives the number of observations in the sample for each regression, and Columns (3) and (6) give the number of municipalities included in each regression.

If limited tax capacity were the reason for the Flypaper Effect in this setting, we might expect to see a negative revenue generation response in municipalities with more collection capacity and no response in those with less capacity. However, I find no such evidence in Table 11. While there is a negative relationship between transfers and revenue generation in municipalities with a service provider registration, results are far from significant. While these

results do not provide evidence in support of the “collection constraints” explanation of the Flypaper Effect, they do not rule it out either.

It may be that the capacity is low across all of the municipalities in my sample (even those with more developed collection infrastructure) and so none of them are reaching their optimal level of revenue generation in the first place. It may also be that collection capacity is a function not just of collection infrastructure but also of institutions (political enforcement mechanisms, tax collection culture, etc.). Finally, it may be the case that my use of 2004 and 2005 measures of capacity is too removed from the pre-policy change period and that many of the municipalities with poor infrastructure prior to 1997 have since improved and so the set municipalities with better collection infrastructure (those most likely to reduce revenue generation in response to transfers) is too diluted with cases of municipalities that did not have the same infrastructure earlier.

9.2 DISCONNECT BETWEEN GOVERNMENT AND CITIZENS

It is equally plausible that the deviations from the median voter model are driving the Flypaper Effect observed in my findings. Brazil’s requirement that all citizens vote and resulting high voter turnout should bring local politics closer to a true “majority rules” environment than we might observe in other political contexts. However, studies on municipal-level corruption in Brazil demonstrate that when citizens gain information on municipal corruption, it influences how they vote in municipal elections. (Ferraz and Finan 2008) These findings illustrate not only that information matters but that citizens likely do not have full information on municipal spending decisions. As a crude measure of whether deviations from the median voter model are the cause of the Flypaper Effect in this setting, I examine whether public servants use increased transfers to increase spending on personnel (Table 12). I use the same IV framework as in previous regression but change the dependent variable to the share of resources spent on a particular function—current expenditures (Column (1)), personnel expenditures (a sub-category of current expenditures) (Column (2)) or capital expenditures (Column (3)). I find no evidence that more resources shift to personnel spending as transfers increase. A positive result might support a non-median voter explanation, but absence of positive result does not rule it out. Budget maximizing politicians (well-meaning or otherwise) could just as well spread out spending across various categories rather than concentrate spending on one particular function.

To truly address this question, one would need to identify variation in the extent to which the median voter model is likely to hold. Nearly-universal voting and lack of data on the level of information citizens have make ruling out (or ruling in) deviations from the median voter models as an explanation of the Flypaper Effect quite challenging in this setting. I can, however, look at whether there is a differential response to transfers in municipalities where citizens are likely to have more access to information about government decisions using municipal data on the existence of distance communication activities with citizens (newsletters, website, availability for communication by phone, email or snail mail fax), whether the

municipality has a website, whether there is a local radio station (AM or FM), and whether there is a provider of internet services in the municipality. Again, I must rely on 2005 data for these variables. I conduct separate IV-2SLS regressions for municipalities in which citizens have more and less access to information. (Table 13) If the “government non-responsiveness” explanation were at the heart of the Flypaper Effect and adequately captured in these analyses, we would expect to see a reduction in local revenue generation among municipalities where access to information is greater. Results again indicate no different relationship between transfers and revenue generation among municipalities where citizen access to information is greater vs. those where access to information is more limited. While these tables provide no evidence in support of the government “non-responsiveness” to citizen preferences, they do not definitely rule it out either.

9.3 MENTAL ACCOUNTING

Most of the literature on mental accounting focuses on individuals and households rather than groups of individuals or those representing groups of individuals, as would be the case in a median voter model. However, some of the empirical observations may illuminate what we would expect to see if behavioral explanations were at the heart of our Flypaper Effect. Many studies on mental accounting find that money is spent differently depending on its nature (e.g. money left in a will is spent on something meaningful while tax refunds are used to splurge, etc.). This phenomenon has been found to hold true at the level of local government in the case of tobacco lawsuit money received by states in the US, which is spent primarily on tobacco control programs despite the fact that the funds come without any condition on their use, (Singhal 2008) and government transfers from oil windfalls in Brazilian municipalities are spent primarily on investment (Postali and Rocha 2009).

As a crude test of the mental accounting explanation in this setting, I examine whether increased transfers raise the share of spending in particular public service areas using the same IV framework again but changing the dependent variable to the share of resources spent on a particular public service area. If mental accounting were at play, we might also expect to see municipalities spending extra transfers received in new areas outside of their pre-established budgets. Results (presented in Table 14) generally do not show significant changes in spending shares across states, with one exception: education and culture spending shares go down in response to the new transfers. Essentially, this means that municipalities are concentrating additional expenditures in goods other than education and culture. These results are consistent with a mental accounting explanation in that municipalities are not spending on activities that are required and consistently budgeted (akin to spending windfall income on something other than regularly budgeted groceries), but they neither fully confirm the mental accounting explanation nor rule out alternative explanations.

10 CHAPTER CONCLUSION

In this study, I take advantage of changes to state formulas determining municipalities' shares of value-added tax transfers as an instrument for unconditional transfers in order to estimate the local revenue generation responses to transfers in two states in Northeastern Brazil. I find that the Flypaper Effect prevails in this setting; I find no evidence that government transfers crowd out local per capita revenue generation. While data limitations prevent me from distinguishing between competing explanations for the mechanisms behind the Flypaper Effect in this context, this paper adds to the relatively small set of public finance studies that are able to identify exogenous changes in local government transfers to assess local revenue responses and reinforces evidence in the public finance literature that the long-debated Flypaper Effect does exist in certain contexts.

11 CHAPTER II FIGURES AND TABLES

FIGURE 1: ICMS DISTRIBUTION ACROSS MUNICIPALITIES

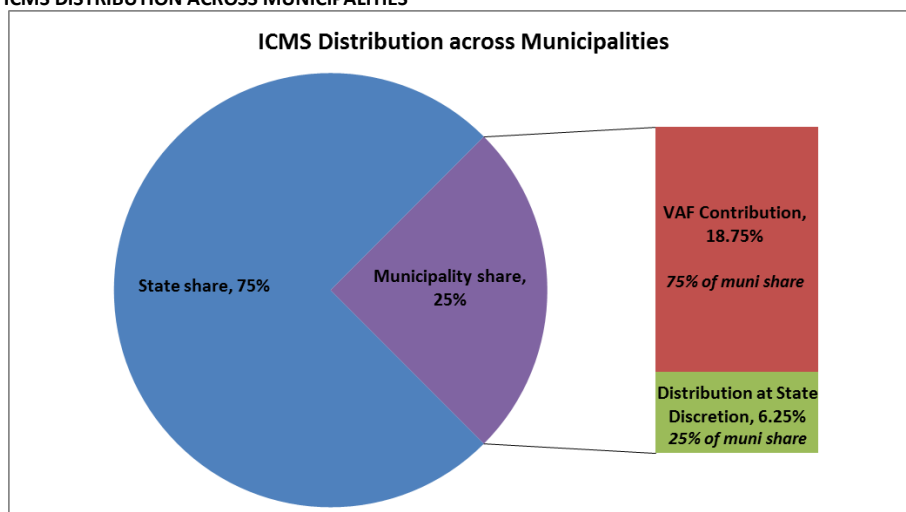


TABLE 1: CHANGES IN STATE ICMS DISTRIBUTION FORMULAS IN RIO GRANDE DO NORTE AND PARAIBA

	Before	After	Year of Change	Relevant Law
Rio Grande do Norte	15% value-added ICMS contribution 10% relative share of population	5% value-added ICMS contribution 10% relative share of population 10% equally distributed	1998	Law 7.105 (December 30, 1997)
Paraiba	20% value-added ICMS contribution 5% relative share of population	5% relative share of population 20% equally distributed	1999	Law 6.700 (December 1998)

(1) Note: The other 75% distributed across municipalities is distributed across municipalities according to municipal value-added contribution to ICMS revenue generation, by national constitutional mandate

FIGURE 2: PER CAPITA ICMS TRANSFERS OVER TIME BY STATE (BOTTOM POPULATION QUARTILE)

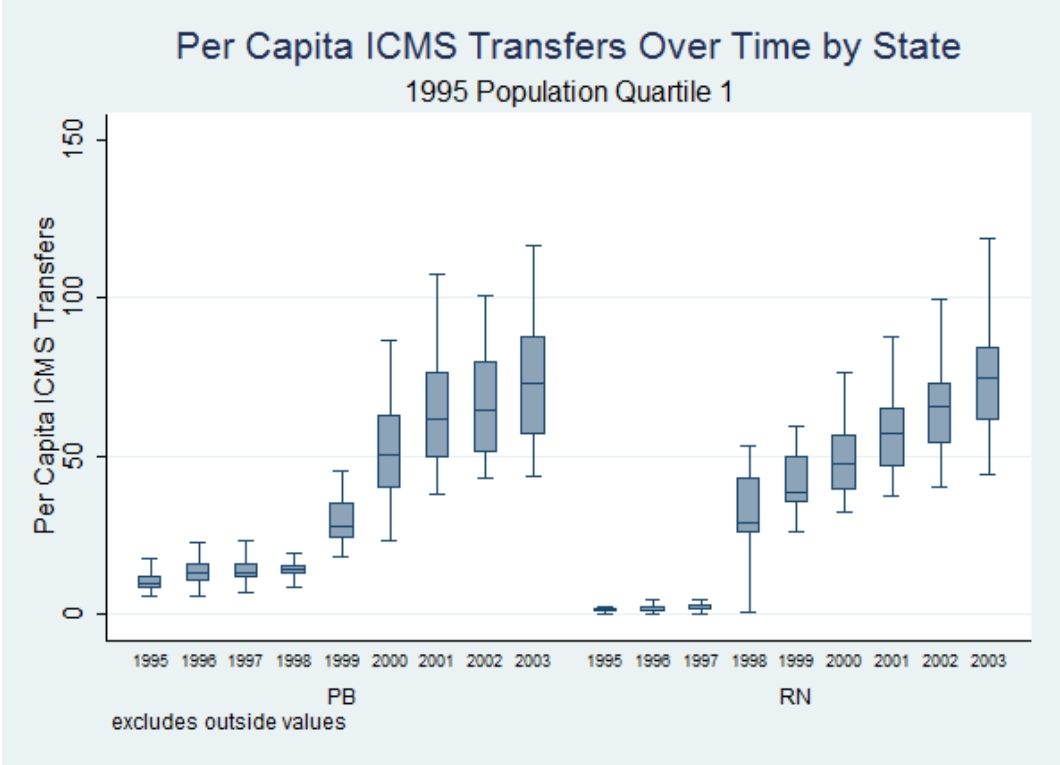


FIGURE 3: PER CAPITA ICMS TRANSFERS OVER TIME BY STATE (SECOND POPULATION QUARTILE)

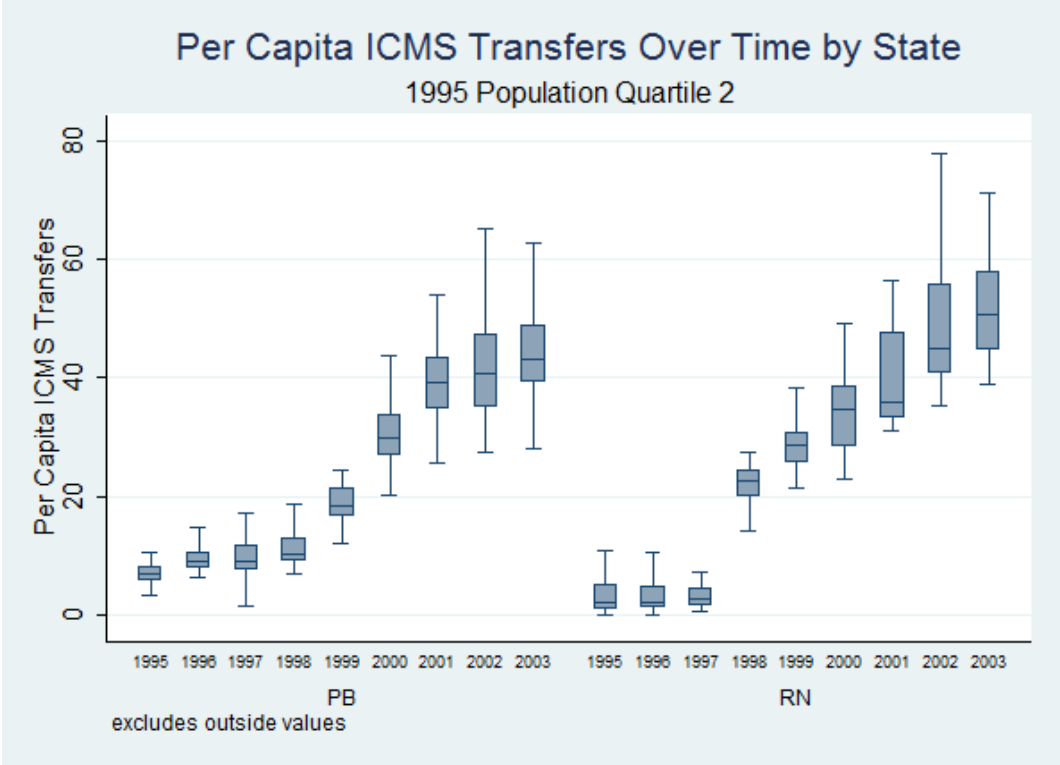


FIGURE 4: PER CAPITA ICMS TRANSFERS OVER TIME BY STATE (THIRD POPULATION QUARTILE)

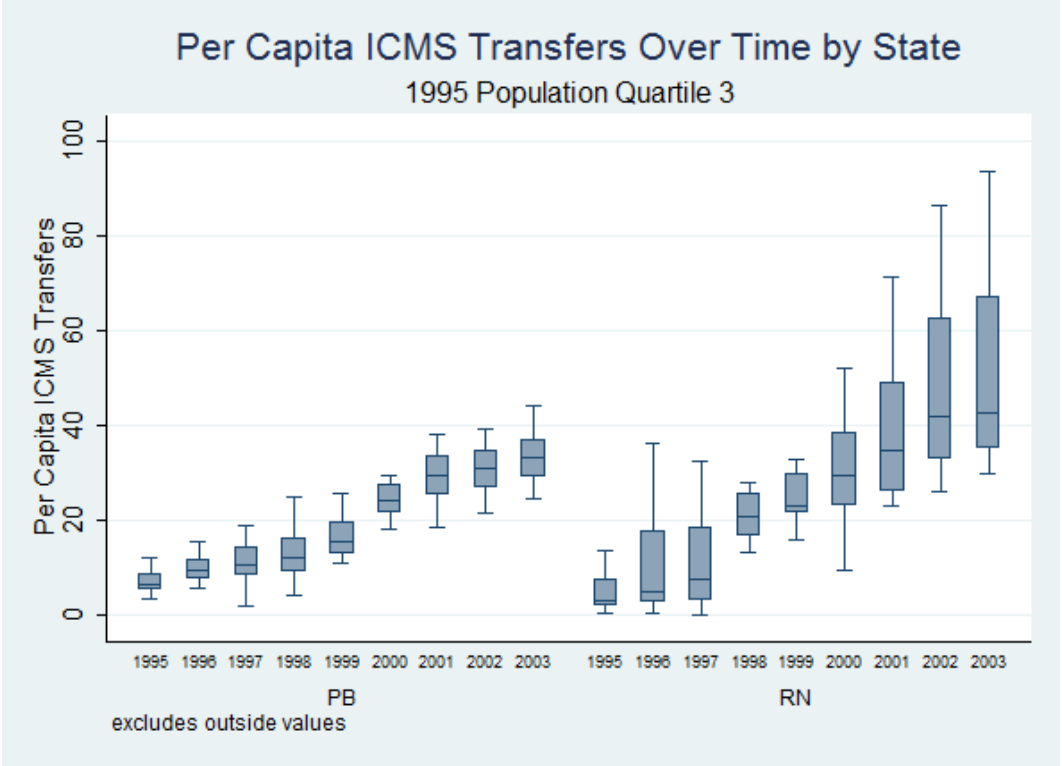


FIGURE 5: PER CAPITA ICMS TRANSFERS OVER TIME BY STATE (TOP POPULATION QUARTILE)

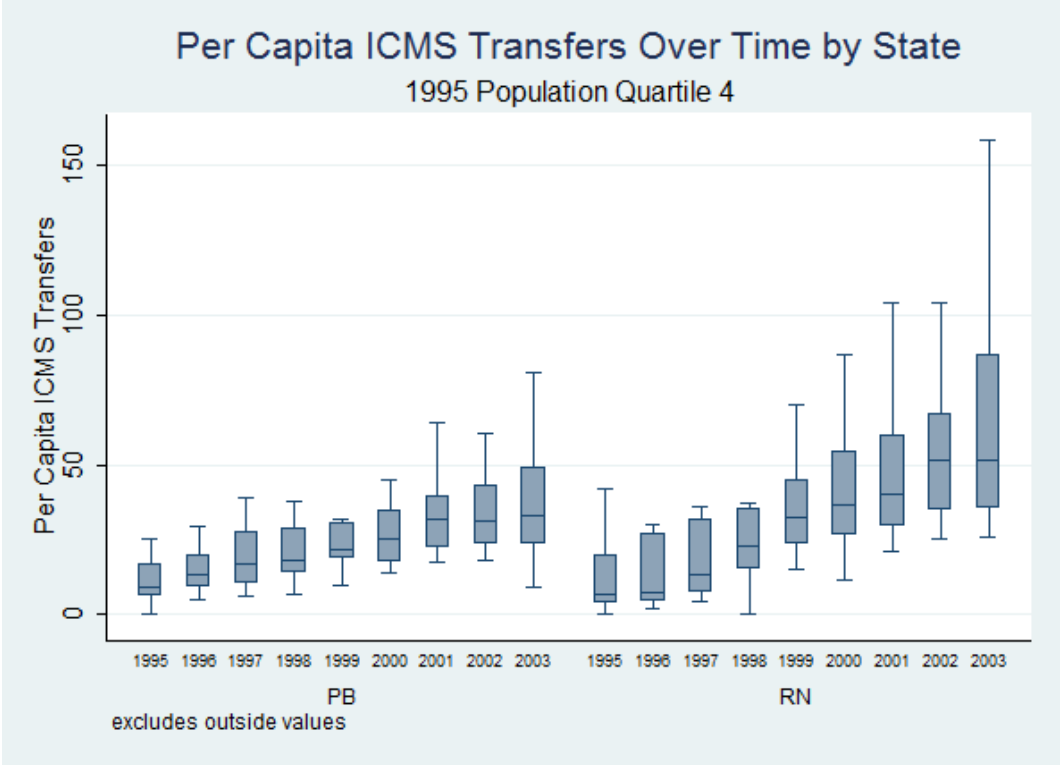


FIGURE 6: PER CAPITA LOCAL REVENUE GENERATION OVER TIME BY STATE

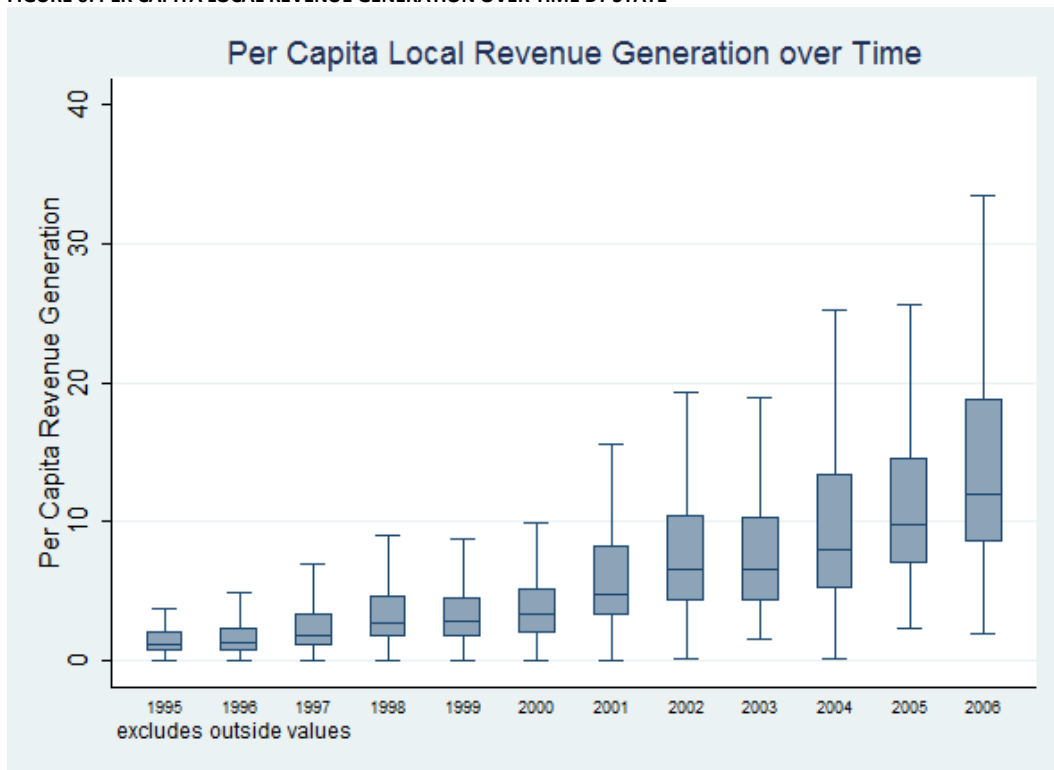
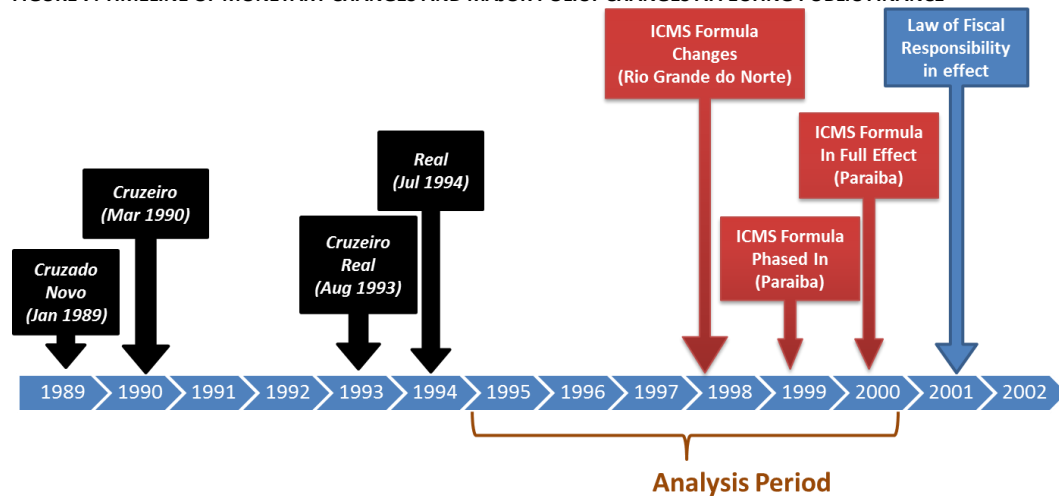


FIGURE 7: TIMELINE OF MONETARY CHANGES AND MAJOR POLICY CHANGES AFFECTING PUBLIC FINANCE



History of Brazilian Money

~1500-1942: Real: the original Brazilian money since the beginning of colonization

October 5, 1942: Cruzeiro: New money created. It was worth R\$1,000

February 13, 1967: Cruzeiro Novo: Military dictatorship introduced it and chopped off the last 3 zeros from the Cruzeiro

May 15, 1970: Cruzeiro (re-introduced)

February 28, 1986: Cruzado: cut off three zeros from the end of the Cruzeiro

January 16, 1989: Cruzado Novo: cut off three zeros from the end of the Cruzado

March 16, 1990: Cruzeiro: Changed name of the Cruzado Novo

August 1, 1993: Cruzeiro Real (cut off three zeros from the Cruzeiro)

July 1, 1994: Real (today's money). Worth \$2,750 Cruzeiros when Brazilians had to exchange the old money)

FIGURE 8: SCATTERPLOT OF PER CAPITA RECEIPTS OVER POPULATION -ALL MUNICIPALITIES (1995)

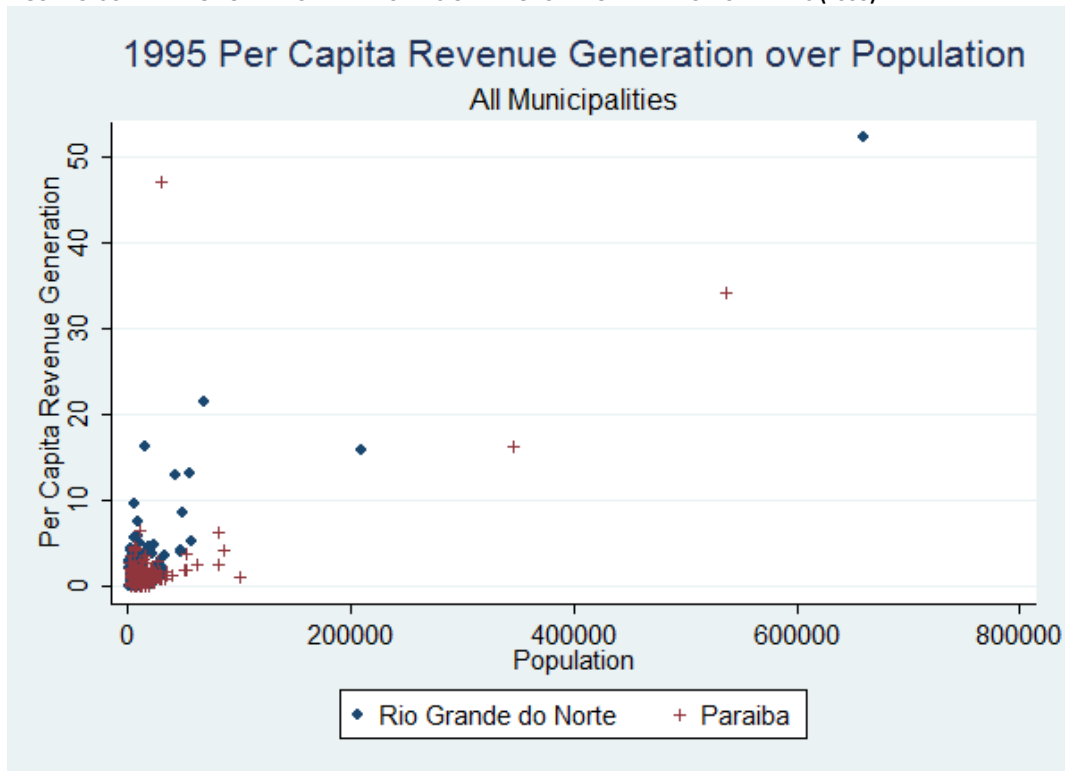


TABLE 2: COMPARISON OF OUTLIERS VERSUS NON-OUTLIERS

	Non-Outliers		Outliers		Difference	
	Mean	SE	Mean	SE	Diff in Means	SE
Population	10,176	(7952)	27,844	(81820)	17,668.86	(2,997.141)**
GDP (R\$100,000)	135.1	(144.8)	1,012.2	(4595.9)	877.2	(253.485)**
GDP Per Capita	1,298.8	(709.92)	1,928.2	(1459.2)	629.33	(91.459)**
Per Capita Transfers	198.2	(100.3)	228.6	(138.1)	30.39	(6.882)**
Per Capita Revenue Generation	1.73	(1.47)	5.40	(9.15)	3.67	(0.340)**
Local Revenue/ GDP	0.0018	(0.0014)	0.0034	(0.0032)	0.002	(0.000)**
Instrument (extent to which formula change matters for per capita share of ICMS transfers)	8.64E-10	(6.35E-10)	9.69E-10	(8.54E-10)	1.05E-10	(4.02E-11)***
# Municipalities Total	201		120			
# Munis in Rio Grande do Norte	109		58			
# Munis in Paraíba	92		62			

Outliers =1 if values 2x 75th percentile

Standard errors in parentheses

FIGURE 9: SCATTERPLOT OF PER CAPITA RECEIPTS OVER POPULATION EXCLUDING OUTLIERS (1995)

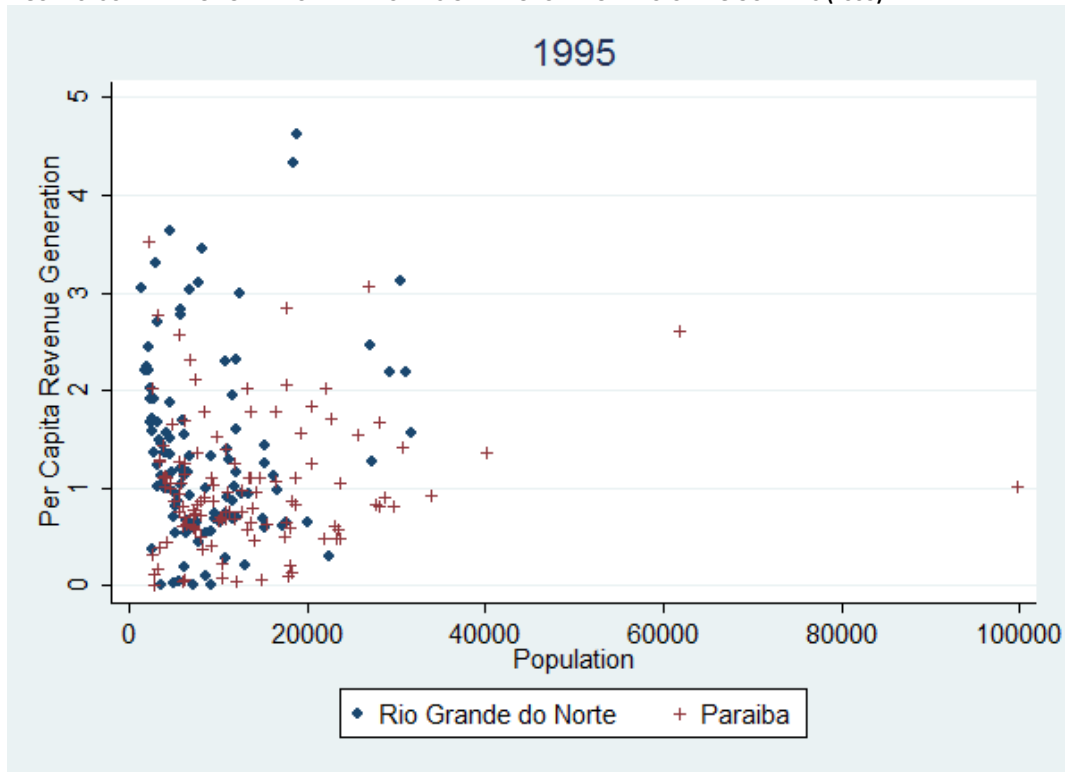


FIGURE 10: INSTRUMENTAL VARIABLE VALUES (RIO GRANDE DO NORTE)

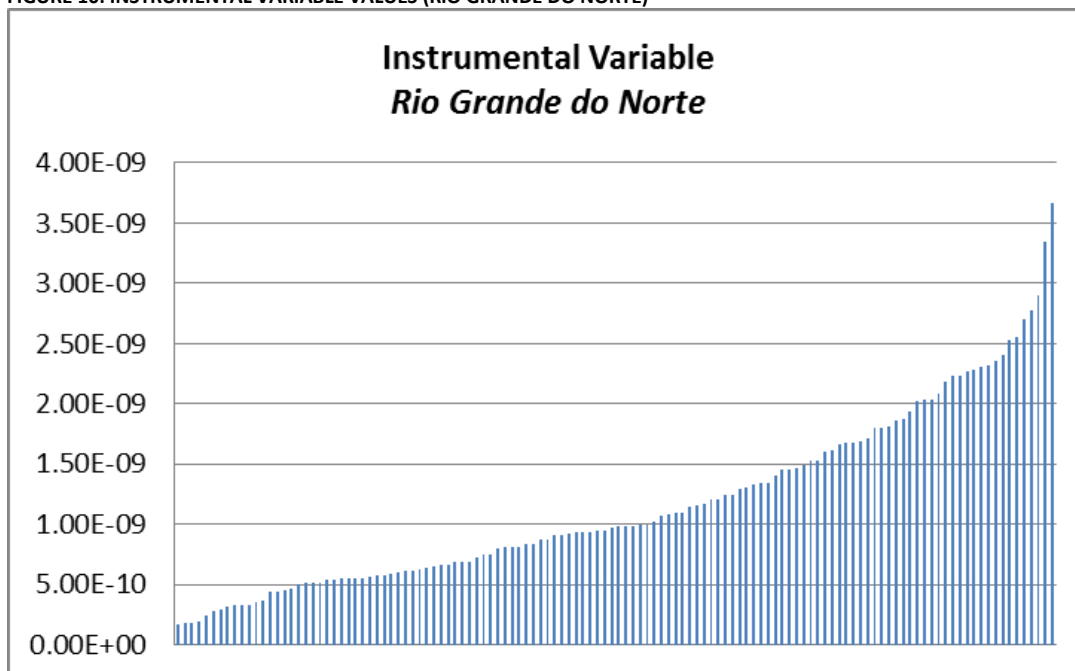


FIGURE 11: INSTRUMENTAL VARIABLE VALUES (PARAÍBA)

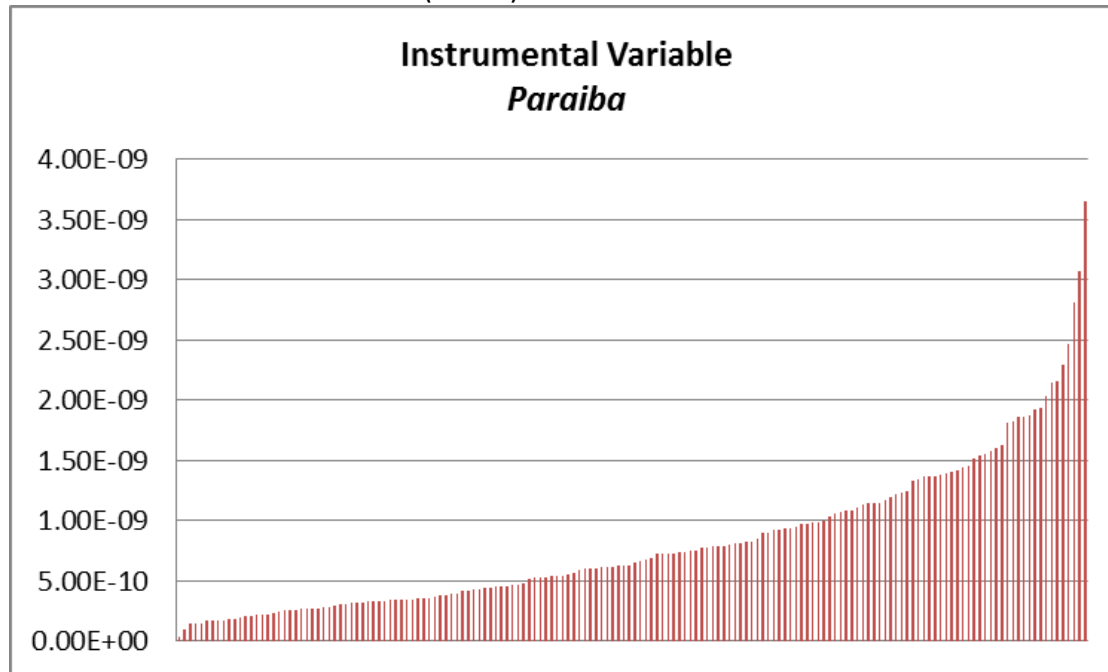


TABLE 3: SUMMARY STATISTICS BEFORE AND AFTER FORMULA CHANGE, BY 1995 POPULATION QUARTILE

Initial ICMS Index Quartile	Before Formula Changes (1995-1997)					After Formula Changes (1999-2000)				
	1995 Population Quartile				All	1995 Population Quartile				All
	1	2	3	4	Quartiles	1	2	3	4	Quartiles
Current Receipts										
Total Current Receipts (R\$100,000)	12.71 (1.43)	15.11 (3.80)	22.91 (6.04)	39.94 (20.23)	20.92 (13.83)	18.74 (3.12)	23.20 (4.53)	33.80 (8.11)	58.85 (20.54)	29.84 (17.00)
Total Receipts Per Capita	382.0 (126.1)	227.6 (50.2)	197.7 (51.7)	171.3 (50.6)	259.5 (124.6)	549.6 (163.9)	369.4 (69.6)	308.2 (64.1)	286.6 (68.9)	412.8 (167.6)
Transfers										
Total Current Transfers (R\$100,000)	12.33 (1.39)	14.56 (3.65)	22.11 (5.64)	38.37 (19.67)	20.18 (13.31)	18.29 (3.04)	22.30 (4.39)	32.54 (7.88)	54.11 (15.56)	28.40 (14.82)
Total Transfers per Capita	371.56 (125.92)	219.46 (48.90)	191.14 (50.03)	164.40 (48.04)	251.38 (122.65)	536.83 (162.90)	355.44 (69.53)	296.33 (60.75)	266.21 (57.65)	398.51 (166.25)
ICMS Transfers (R\$100,000)	0.405 (0.362)	0.851 (1.922)	1.522 (2.367)	5.792 (11.081)	1.803 (5.434)	1.482 (0.415)	1.989 (1.948)	3.099 (3.071)	6.797 (7.396)	2.827 (3.922)
ICMS Transfers Per Capita	10.49 (9.28)	11.82 (25.51)	12.68 (20.37)	19.72 (28.05)	13.04 (20.96)	43.38 (16.24)	31.20 (24.95)	28.22 (26.59)	31.44 (29.26)	35.05 (24.35)
Locally Generated Revenues										
Total LGR (R\$100,000)	0.077 (0.052)	0.122 (0.094)	0.211 (0.189)	0.610 (0.583)	0.225 (0.337)	0.118 (0.097)	0.226 (0.309)	0.340 (0.295)	0.808 (0.653)	0.319 (0.412)
LGR Per Capita	2.225 (1.516)	1.793 (1.381)	1.781 (1.582)	2.386 (1.864)	2.102 (1.630)	3.210 (2.274)	3.437 (4.190)	2.984 (2.513)	3.652 (2.332)	3.583 (3.247)
Population										
	3,687 (1,133)	6,759 (1,353)	11,798 (2,577)	24,349 (14,840)	10,269 (9,953)	3,559 (1,092)	6,447 (1,403)	10,860 (2,539)	22,556 (14,369)	8,986 (8,934)
GDP (R\$100,000) (1996 only for "Before" period)										
	35.6 (15.9)	62.0 (49.1)	121.3 (88.1)	295.2 (302.9)	120.1 (175.7)	58.3 (18.5)	104.3 (35.1)	187.4 (105.8)	461.5 (546.1)	164.5 (267.7)
GDP per capita										
	1,018.4 (448.4)	930.7 (655.2)	1,031.3 (760.2)	1,125.1 (520.7)	1,021.3 (614.1)	1,624.2 (290.3)	1,601.4 (519.2)	1,678.3 (835.1)	1,829.6 (776.0)	1,691.9 (696.0)
# Municipalities in sample (1995 for before and 2000 for after)										
	58	59	62	48	227	57	57	61	46	221

Note: All values are in constant 2000 values.

FIGURE 12: CHANGES IN PER CAPITA REVENUE GENERATION OVER INSTRUMENTAL VARIABLE BEFORE AND AFTER FORMULA CHANGE

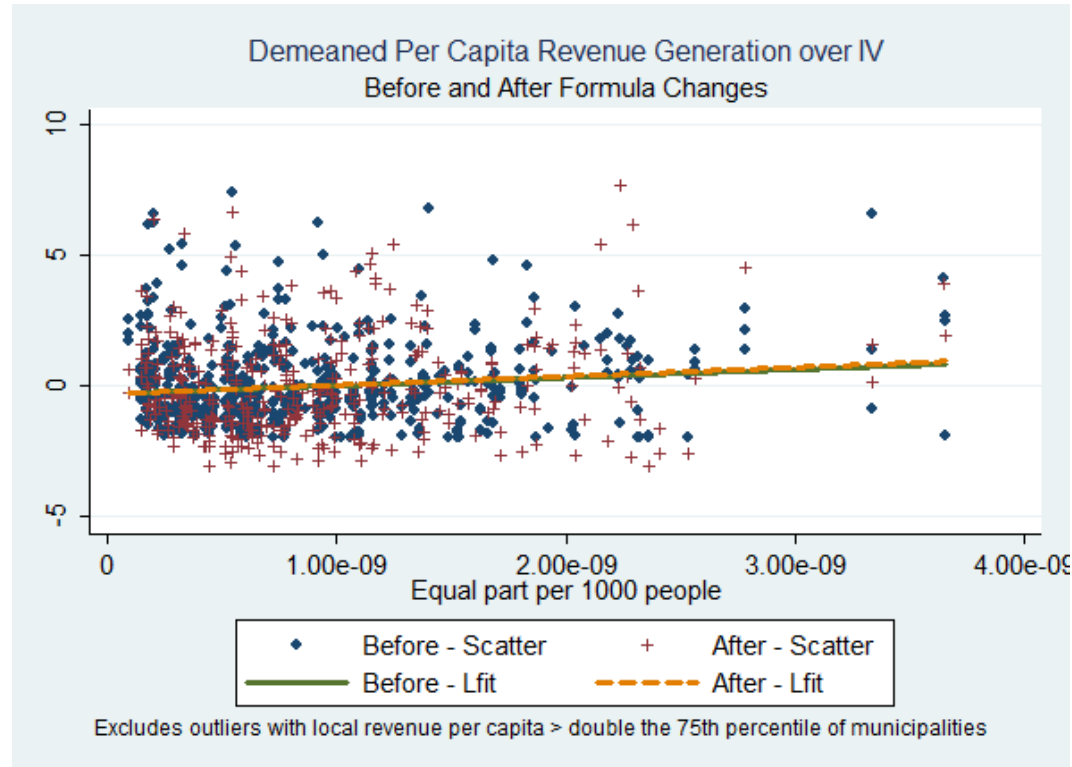


TABLE 4: VERIFYING EXCLUSION RESTRICTION USING PRE-INTERVENTION PLACEBO

	1996 Placebo Year	1997 Placebo Year	N	# Municiplaities
All municipalities	-6.169E+07 (3.909E+08)	-6.897E+08 (3.147E+08)*	981	383
Excluding Outliers with				
>2X 90th Pctile	-2.266E+08 (1.243E+08)+	-2.490E+08 (2.001E+08)	857	339
>2X 85th Pctile	-2.323E+08 (1.336E+08)+	-1.899E+08 (2.184E+08)	798	317
>2X 80th Pctile	-1.914E+08 (1.414E+08)	-1.014E+07 (2.128E+08)	741	296
Primary Outlier Definition:	-2.001E+08 (1.429E+08)	-2.340E+07 (2.092E+08)	708	284
>2X 75th Pctile of Revenue Generation				
>2X 70th Pctile	-2.535E+07 (1.438E+08)	1.589E+08 (2.142E+08)	634	257

Table presents coefficient estimates on Pre-Intervention Placebo (Equal Sharing Rule * Placebo Formula Change Year) from separate regressions with revenue generation as outcome

Data-years in regressions run from 1995 to 1997

Municipality and state-year fixed effects included in all regressions

+ significant at 10%; * significant at 5%; ** significant at 1%

Standard errors (in parentheses) clustered at the municipality level.

TABLE 5: MAIN REGRESSION RESULTS

	(1)	(2)	(3)	(4)	(5)	(6)
Outcome: Per Capita Locally Generated Revenues	OLS	IV 2SLS		OLS	IV 2SLS	
		<i>1st stage</i>	<i>2nd stage</i>		<i>1st stage</i>	<i>2nd stage</i>
Per Capita Transfers	0.0024 (0.0007)**		0.0016 (0.0009)	0.0018 (0.0014)		0.0023 (0.0020)
Treatment Instrument: Equal Sharing Rule (Per Capita) * After		8.744E+10 (8.2025e+09)**			8.927E+10 (9.128e+09)**	
Instrument: Equal Sharing Rule (Per Capita)		1.344E+11 (4.3204e+09)**				
Mean Value of Outcome	2.353 (2.380)	269.52 (159.02)	2.353 (2.380)	2.353 (2.380)	269.52 (159.02)	2.353 (2.380)
Observations	1,318	1,318	1,318	1,318	1,318	1,318
# Municipalities	289	289	289	289	289	289
R-squared	0.19	0.89		0.22	0.87	
F test	29.2	474.1		23.1	429.0	
Municipality Fixed Effects	NO	NO	NO	YES	YES	YES

Year fixed effects included in all regressions

*+ significant at 10%; * significant at 5%; ** significant at 1%*

Standard errors (in parentheses) clustered at the municipality level.

TABLE 6: TESTING RAMIFICATIONS OF EXCLUDING GDP AS CONTROL VARIABLE									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Data-Years		1995-2000		1996, 1999, 2000		1996, 1999, 2000		1996, 1999, 2000	
Outcome: Per Capita Locally Generated Revenues	OLS	IV 2SLS		OLS	IV 2SLS		OLS	IV 2SLS	
		1st stage	2nd stage		1st stage	2nd stage		1st stage	2nd stage
Per Capita Transfers	0.0018 (0.0014)		0.0023 (0.0020)	-0.0003 (0.0021)		-0.0007 (0.0030)	-0.0003 (0.0021)		-0.0004 (0.0030)
Treatment Instrument: Equal Sharing Rule (Per Capita) * After Mayor's share of vote in most recent election		8.927E+10 (9.1276e+09)**			1.036E+11 (1.5252e+10)**			1.043E+11 (1.5194e+10)**	
GDP Per Capita									
Mean Value of Outcome	2.353 (2.380)	269.52 (159.02)	2.353 (2.380)	2.752 (2.740)	327.97 (176.28)	2.752 (2.740)	2.752 (2.740)	327.97 (176.28)	2.752 (2.740)
Observations	1318	1318	1318	655	655	655	655	655	655
# Municipalities	289	289	289	284	284	284	284	284	284
R-squared	0.22	0.87		0.23	0.86		0.23	0.86	
F test	23.1	429.0		26.0	494.7		18.8	360.9	
Municipality Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES

State- year fixed effects included in all regressions

+ significant at 10%; * significant at 5%; ** significant at 1%

Note: After is dropped due to collinearity when GDP per capita is included.

TABLE 7: VARYING DEFINITION OF OUTLIERS (THOSE WITH GREATER THAN DOUBLE VALUE OF PER CAPITA RECEIPTS OF 70TH PERCENTILE)

	(1)	(2)	(3)	(4)	(5)	(6)
Outcome: Per Capita Locally Generated Revenues	OLS	IV 2SLS		OLS	IV 2SLS	
		<i>1st stage</i>	<i>2nd stage</i>		<i>1st stage</i>	<i>2nd stage</i>
Per Capita Transfers	0.0034 (0.0007)**		0.0030 (0.0008)**	0.0020 (0.0015)		0.0034 (0.0020)
Instrumental Variable: Equal Sharing Rule (Per Capita) * After		8.849E+10 (8.8778e+09)**			8.866E+10 (9.9197e+09)**	
Instrument: Equal Sharing Rule (Per Capita)		1.348E+11 (4.6691e+09)**				
Mean Value of Outcome	2.211 (2.297)	272.45 (161.11)	2.211 (2.297)	2.211 (2.297)	272.45 (161.11)	2.211 (2.297)
Observations	1182	1182	1182	1182	1182	1182
# Municipalities				262	262	262
R-squared	0.21	0.89		0.2	0.9	
F test	29.39	459.11		22.3	388.3	
Municipality Fixed Effects	NO	NO	NO	YES	YES	YES

State-year fixed effects included in all regressions

*+ significant at 10%; * significant at 5%; ** significant at 1%*

TABLE 8: VARYING DEFINITION OF OUTLIERS (THOSE WITH GREATER THAN DOUBLE VALUE OF PER CAPITA RECEIPTS OF 80TH PERCENTILE)

	(1)	(2)	(3)	(4)	(5)	(6)
Outcome: Per Capita Locally Generated Revenues	OLS	IV 2SLS		OLS	IV 2SLS	
		<i>1st stage</i>	<i>2nd stage</i>		<i>1st stage</i>	<i>2nd stage</i>
Per Capita Transfers	0.0026 (0.0008)**		0.0020 (0.0010)*	0.0019 (0.0014)		0.0026 (0.0020)
Instrumental Variable: Equal Sharing Rule (Per Capita) * After		8.683E+10 (7.7740e+09)**			8.828E+10 (8.7129e+09)**	
Instrument: Equal Sharing Rule (Per Capita)		1.330E+11 (4.1968e+09)**				
Mean Value of Outcome	2.395 (2.470)	268.268 (158.357)	2.395 (2.470)	2.395 (2.470)	268.268 (158.357)	2.395 (2.470)
Observations	1374	1374	1374	1374	1374	1374
# Municipalities	301	301	301	301	301	301
R-squared	0.18	0.88		0.21	0.87	
F test	30.27	484.46		23.9	431.3	
Municipality Fixed Effects	NO	NO	NO	YES	YES	YES

State-year fixed effects included in all regressions

*+ significant at 10%; * significant at 5%; ** significant at 1%*

FIGURE 13: LOCATION OF "TREATMENT" AND "CONTROL" STATES



TABLE 9: RESULTS INCLUDING ADDITIONAL CONTROL STATES

	(1)	(2)	(3)	(4)	(5)	(6)
Outcome: Per Capita Locally Generated Revenues	OLS	IV 2SLS		OLS	IV 2SLS	
		1st stage	2nd stage		1st stage	2nd stage
Per Capita Transfers	0.0015 (0.0004)**		0.0006 (0.0005)	0.0018 (0.0012)		0.0014 (0.0017)
Instrument: Equal Sharing Rule (Per Capita) * After*Treatment State		5.979E+10 (6.2974e+09)**			6.120E+10 (9.4723e+09)**	
Instrument: Equal Sharing Rule (Per Capita) * After		2.765E+10 (4.4710e+09)**			2.808E+10 (3.278e+09)**	
Instrument: Equal Sharing Rule (Per Capita)*Treatment State		6.114E+10 (4.2008e+09)**			2.808E+10 (2.5219e+09)**	
Instrument: Equal Sharing Rule (Per Cpaita)		7.328E+10 (3.0575e+09)**				
Mean Value of Outcome	2.624 (2.393)	247.49 (144.99)	2.624 (2.393)	2.624 (2.393)	247.49 (144.99)	2.624 (2.393)
Observations	2159	2159	2159	2159	2159	2159
# Municipalities	450	450	450	450	450	450
R-squared	0.21	0.88		0.27	0.87	
F test	22.9	596.0		23.8	338.7	
Municipality Fixed Effects	NO	NO	NO	YES	YES	YES

State- year fixed effects included in all regressions

+ significant at 10%; * significant at 5%; ** significant at 1%

Standard errors (in parentheses) are clustered at the municipality level.

TABLE 10: RESULTS FOR TOTAL PUBLIC SPENDING PER CAPITA

	(1)	(2)	(3)	(4)	(5)	(6)
Outcome: Total Municipal Expenditures Per Capita	OLS	IV 2SLS		OLS	IV 2SLS	
		1st stage	2nd stage		1st stage	2nd stage
Per Capita Transfers	1.043 (0.014)**		1.050 (0.017)**	0.972 (0.032)**		1.070 (0.051)**
Confidence Interval	(1.016 - 1.070)**		(1.017 - 1.082)**	(0.910 - 1.035)**		(0.971 - 1.170)**
Instrumental Variable: Equal Sharing Rule (Per Capita) * After		8.744E+10 (8.202e+09)**			8.927E+10 (9.128e+09)**	
Mean Value of Outcome	295.816 (172.337)	269.52 (159.02)	295.816 (172.337)	295.816 (172.337)	269.52 (159.02)	295.816 (172.337)
Observations	1318	1318	1318	1318	1318	1318
# Municipalities	289	289	289	289	289	289
R-squared	0.96	0.89		0.93	0.87	
F test	1247.8	474.1		833.3	429.0	
Municipality Fixed Effects	YES	YES	YES	YES	YES	YES

State- year fixed effects included in all regressions

+ significant at 10%; * significant at 5%; ** significant at 1%

Standard errors (in parentheses) are clustered at the municipality level.

TABLE 11: COLLECTION RESPONSES BY MEASURES OF REVENUE COLLECTION INFRASTRUCTURE EXISTING IN MUNICIPALITIES

	(1)	(2)	(3)	(4)	(5)	(6)
Type of Revenue Generation Infrastructure	Municipalities that have described type of revenue generation infrastructure <i>IV-2SLS Coefficient on per capita transfers</i>	<i>Observations</i>	<i># Munis</i>	Municipalities that do not have described type of revenue generation infrastructure <i>IV-2SLS Coefficient on per capita transfers</i>	<i>Observations</i>	<i># Munis</i>
Computerized Property Registration System	0.0026 (0.0030)	819	180	0.0023 (0.0029)	493	107
Has Property Value Map	0.0029 (0.0021)	658	147	0.0013 (0.0039)	660	142
Service Provider Registration System	-0.0010 (0.0044)	539	119	0.0041 (0.0021)	773	168

Municipality and state-year fixed effects included in all regressions

Tables display main coefficient estimates only.

*+ significant at 10%; * significant at 5%; ** significant at 1%*

TABLE 1.2: CHANGES IN FUNCTIONAL SPENDING SHARES AS A RESULT OF TRANSFER INCREASES

Outcome:	(1)		(2)		(3)	
	Current Expenditures as Share of Total	Current Personnel Expenditures as Share of Total	Capital Expenditures as Share of Total			
Coefficient on Instrumented Per Capita Transfers	0.006 (0.007)	-0.009 (0.010)	-0.006 (0.007)			
Outcome Mean (% of expenditures spent on given category)	88.802 (7.974)	37.589 (11.353)	11.198 (7.974)			
Observations	1,318	1,318	1,318			
# Municipalities	289	289	289			

Municipality and state-year fixed effects included in all regressions

+ significant at 10%; * significant at 5%; ** significant at 1%

TABLE 1.3: COLLECTION RESPONSES BY MEASURES OF CITIZEN ACCESS TO INFORMATION

Type of Citizen Access to Information	(1)		(2)		(3)		(4)		(5)		(6)	
	Municipalities that have described type of citizen access to information		IV-2SLS Coefficient on per capita transfers		Observations		# Munis		Municipalities that do not have described type of citizen access to information		IV-2SLS Coefficient on per capita transfers	
Distance communication with citizens	0.0015 (0.0026)	940	204	0.0030 (0.0028)	372	83						
Municipal webpage	-0.0017 (0.0033)	425	91	0.0043 (0.0029)	887	196						
Radio Station in Municipality	0.0040 (0.0028)	576	130	0.0011 (0.0027)	742	159						
Internet Provider in Municipality	0.0046 (0.0030)	364	79	0.0017 (0.0022)	954	210						

State- year fixed effects included in all regressions

Tables display main coefficient estimates only.

+ significant at 10%; * significant at 5%; ** significant at 1%

TABLE 14: CHANGES IN PUBLIC SPENDING SHARES AS A RESULT OF TRANSFER INCREASES

Category of Public Function	(1)	(2)
	Coefficient on Instrumented Per Capita Transfers	Outcome Mean (% of total expenditures spent on given category)
<i>Legislative</i>	0.000 (0.003)	6.078 (3.711)
<i>Judicial</i>	0.000 (0.002)	0.269 (1.811)
<i>Agriculture</i>	-0.003 (0.003)	1.939 (2.839)
<i>Education & Culture</i>	-0.014 (0.006)*	34.793 (8.209)
<i>Housing & Urban Development</i>	0.008 (0.006)	12.859 (7.416)
<i>Health & Sanitation</i>	-0.003 (0.007)	18.108 (8.122)
<i>Social Assistance</i>	0.005 (0.006)	7.295 (5.673)
<i>Transport</i>	-0.001 (0.003)	1.871 (3.041)
<i>Communication</i>	0.001 (0.001)	0.328 (1.107)
<i>Industry, Commerce, Energy & Mining</i>	0.001 (0.002)	0.486 (2.191)
<i>Other</i>	-0.005 (0.003)	6.581 (11.571)

Coefficient for separate IV regressions with spending share as outcome variable are presented.

Municipality and state-year fixed effects included in all regressions

+ significant at 10%; * significant at 5%; ** significant at 1%

CHAPTER III: IMPACTS OF EXPENDITURE LIMITS ON SPENDING AND RECEIPTS IN BRAZILIAN MUNICIPALITIES

1 CHAPTER INTRODUCTION

After several decades of decentralization, the past few decades have been marked by an increased focus on ensuring fiscal discipline at all levels of government. While tying policymakers' hands when it comes to monetary policy through the use of independent monetary authorities is commonly accepted as good practice in government, the value of restricting policymakers' discretion when it comes to fiscal policy is a hotly debated issue (see discussion in Fatás and Mihov 2003). While some theorists argue in favor of more discretion in fiscal policy in order to allow governments to be able to engage in countercyclical fiscal policy and smooth consumption across plentiful and lean times and while some studies do indicate that cyclical responsiveness is lower in governments facing more restrictive fiscal rules, (Tamim and Eichengreen 1995) the imposition of fiscal restrictions on sub-national government spending, taxation or debt is a common phenomenon in many countries. Much empirical evidence suggests that these fiscal limits are well-founded despite some theoretical arguments to the contrary; policymakers often tend to favor increases in public spending in plentiful times and limit the extent to which spending shrinks in lean times. (Manasse 2006, Hemming 2003) Many studies have found this to be particularly true in developing countries. (Iletzki and Végh 2008, Talvia and Végh 2005) Most empirical evidence also finds, rather than increasing output volatility by reducing sub-national governments' ability to smooth consumption, more restrictive fiscal settings are in fact often associated with lower output volatility and better economic performance (Fatás and Mihov 2003, Alesina and Bayoumi 1996). While the debate on the value of imposing fiscal restrictions has not been settled, one thing is certain: there is continued interest in placing fiscal policy restraints on national and sub-national governments alike.

Brazil has imposed fiscal constraints on all levels of government through its Law of Fiscal Responsibility, passed in 2000 and implemented beginning in 2001. It was an all-encompassing law that governed public finances at all three tiers of government (federal, state and municipal) and placed limits on debt, imposed limits on personnel expenditures, required public reporting on key fiscal indicators, required all levels of government to generate budget plans and identify revenue sources for new on-going expenditures and placed particularly strict limits on spending and borrowing in years leading up to elections. Many other countries have implemented similar fiscal responsibility laws or have introduced separate legislation either in the form of balanced budget laws of various types, with varying degrees of stringency and at various levels of government, or in the form of tax and expenditure laws (TEs) which limit either taxes, expenditures or both.

Most of the research on TELs comes from the United States, where TELs have primarily taken the form of property tax limitation (either in the form of limiting tax rates, limiting annual increases in actual revenue or limiting annual increases in property value estimates). Findings on their effectiveness as a tool to limit the size of government are mixed. Many studies find local governments to be adept at complying with limitations while adjusting other revenue sources and other spending to work around tax and expenditure limitations. Other studies do find TELs to be effective at limiting government spending, but raise concerns about their negative impacts on the quality of public services, namely education.

In this study, I focus specifically on the impacts of the tax and expenditure law (TEL) component of Brazil's Law of Fiscal Responsibility. I take advantage of the fact that the expenditure constraints were binding for some (those that were initially above the limit) but not for others (those that were initially below the limit) to measure the impact of the introduction of expenditure limits on public finance outcomes. I find that, while Brazil's personnel expenditure limits are generally successful in reducing personnel expenditures, municipalities seem to be partially substituting personnel expenditures with other types of expenditures rather than slowing the growth of total expenditures. At the same time, the expenditure share limits seem to encourage municipalities to ease their spending constraints by increasing revenues where they can (particularly in local income-generating activities). The net effect is a small but significant reduction in deficit spending.

The remainder of this chapter is organized as follows: Section 2 describes the personnel expenditure limits imposed through in Brazil's Law of Fiscal Responsibility; Section 3 presents a simple theoretical model of how municipal leaders adjust to personnel expenditure share limits; Section 4 presents a review of previous work on the impacts of tax and expenditure laws; Section 5 describes my estimation strategy; Section 6 describes the data I use to conduct my analyses; Section 7 presents some descriptive statistics; Section 8 presents estimation results; Section 9 verifies that my findings are not driven by a simple process of mean reversion; Section 10 concludes; and Section 11 presents figures and tables for this chapter.

2 BRAZIL'S LAW OF FISCAL RESPONSIBILITY

2.1 THE LAW OF FISCAL RESPONSIBILITY

The Law of Fiscal Responsibility (Complementary Law 101) aimed to establish guidelines for public finance at all levels of government (federal, state and municipal) in order to ensure responsibility in fiscal management, which is defined by the law as "planned and transparent action, in which risks are anticipated and deviations that are capable of affecting public account balances are corrected, through the attainment of expenditure and receipt objectives and compliance with limits and rules for forgone taxes, personnel expenditures, social security and others, public debt, credit operations, including those in anticipation of receipts, granting of

credit guarantees and carry-over debt”³⁹ The law was passed on May 4, 2000 and first implemented at the beginning of 2001.

Brazil’s 1998 economic crisis played a key role in getting the Law of Fiscal Responsibility Law passed. After a series of tough economic crises and devaluations through 1994, the Plano Real stabilization plan was introduced in 1994. While the plan was generally successful at keeping inflation under control (IMF Independent Evaluation Office 2003), it did little to address growing public debt, and the IMF exerted continuous pressure on Brazilian authorities to improve their fiscal position between 1995 through 1999, to little avail. The 1997 Asian fiscal crisis sparked another crisis in Brazil. Following his re-election in 1998, President Cardoso and the Brazilian authorities began discussion in earnest with the IMF. The IMF approved a series of cash disbursements and Stand-By Arrangements that came with conditions. One of these conditions was structural adjustment to the fiscal system in order to reduce public debt levels. Rather than generating rigid conditions for structural reform, the IMF and the Brazilian government agreed on a series of reform benchmarks. One of the key benchmarks was submission of a Law of Fiscal Responsibility to Congress by the end of December 1998 and enactment by the end of December 1999. (IMF Independent Evaluation Office 2003) The first law with any real bite was not passed until May of 2000 and became effective in January 2001. Both the Cardoso administration and the IMF recognized that the reforms needed to be seen by the public and sub-national governments as Brazilian-led rather than IMF-led in order for them to gain cross-party political support and persist through the next transition of power and so the Law of Fiscal Responsibility was generally portrayed as a Brazilian initiative. (Goldjfan 2003)

Since its implementation, the Law of Fiscal Responsibility has generally been heralded as an enormous success in terms of lowering public debt and fiscal instability and is held up by the IMF as a model to other countries considering adopting these types of laws. However, the national nature of the law has limited the number of rigorous studies conducted on its impacts. This paper focuses on the municipal-level impacts of one key component of the law: personnel expenditure limits.

2.2 PERSONNEL EXPENDITURE LIMITS

The two primary reasons cited for limiting personnel expenditures in Brazil are (1) to limit the part of government that has a tendency to grow the most and (2) to limit politicians’ ability to use public employment as a tool for awarding favors to supporters, buying votes, etc. Expenditure limits on personnel were not new in Brazil. In fact, the 1989 Constitution and a 1969 amendment to the previous Constitution both stipulated that a law should be made to govern expenditure limits. The first law to define these limits (Complementary Law 82) was introduced in 1995, following the introduction of the Plano Real monetary stabilization plan.

³⁹ Chapter I of the Law of Fiscal Responsibility: Preliminary Provisions

Personnel expenditure limits of 60% of liquid current receipts⁴⁰ were introduced at that time for all levels of government. In 1999, following Cardoso's re-election and in the wake of Brazil's 1998 economic crisis, a new law (Complementary Law 96) was introduced that elaborated on the expenditure limits contained in the previous law. Finally, the Law of Fiscal Responsibility maintained the same basic limits but made a number of changes to increase compliance with the limits.

Over time, the definition of personnel expenditures was expanded and clarified. In 1995, the law governing personnel expenditure limits defined personnel expenditures only as expenditures made on active and inactive personnel paid directly or indirectly by municipal receipts. The 1999 law added pensions to the definition of personnel expenditures and clarified that personnel expenditures included all remuneration, in cash or in kind, and specified that remuneration included any type of advantage, subsidy, retirement payment and overtime payments. Excluded from personnel spending would be fees paid for firing employees, including incentives to employees for voluntarily leaving their jobs. Article 18 of the Law of Fiscal Responsibility uses essentially the same definition of personnel spending as did the 1999 law but further clarified that all contracted work should be classified as "other personnel expenditures" and would count toward total personnel expenditures.

Unlike the original 1995 law, both the 1999 law and Article 23 of the Law of Fiscal Responsibility provided some guidelines on how spending on personnel could be reduced. First, municipalities would be allowed to reduce by a minimum 20% spending on commissioned jobs (*cargos em comissão*) or jobs that are not competitively determined (*função de confiança*). These classifications tend to include jobs for highly skilled workers, are used for management and advising positions, are typically well-paid positions and are given at the discretion of government leaders. Second, if spending needed to be cut further, government was dismissal (or forced resignation) of non-permanent public employees. Finally, if spending still needed to be cut, dismissal or forced resignation of permanent public employees would be allowed. Municipalities were also allowed to reduce the public work-day (furlows), with salary decreases proportional to reductions in time worked as an independent measure or in conjunction with reducing the number and pay of jobs.

The key components of the Fiscal Responsibility Law that aimed to increase compliance with the 60% personnel expenditure limits were (1) increased enforcement by imposing higher penalties on those municipalities that exceeded the expenditure limits, (2) introducing monitoring of government entities that were approaching the limit and (3) imposing stricter timeframes for adherence to limits during election years.

⁴⁰ Liquid current receipts are described in more detail in Section 6. For municipalities, they are equal to total current receipts minus social contributions and automatic deduction from transfers taken by the federal government for the national Education Fund (FUNDEF/FUNDEB).

Increased Enforcement

Municipal governments are expected to come back in line with the limits over the course of two quarters, with at least one third of the required reduction occurring in the first quarter. Until the Law of Fiscal Responsibility was enacted, penalties for failing to adhere to mandated spending limits consisted of forbidding any changes (revisions, readjustments or adaptations) to remuneration that would increase expenditures until spending was brought back within the 60% limit. The 1999 version of the law added some specificity to the previous law by expressly forbidding the following actions until spending was brought back within the legal limits: (1) granting of benefits or increases in remuneration of any kind, (2) creation of positions, jobs or functions or changes in career structure, (3) new hiring or contracting of personnel of any title (direct or indirect) that are paid for wholly or in part by the public authority (with the exception of re-staffing positions in education, health and public safety that have been vacated due to death or retirement), and (4) granting to workers any benefit that is not constitutionally required.

The Fiscal Responsibility Law maintained the same timeframe for returning to the 60% limit but introduced substantially stricter penalties for failing to do so. If municipalities failed to comply with the limits, they were forbidden from (1) receiving any voluntary transfers (which includes current or capital transfers from the federal or state government for cooperation, aid or financial assistance that are not constitutionally required and that are not intended for the public health system), (2) receiving any loan guarantees (directly or indirectly) from any other government entity, (3) engaging in any credit operation except operations to refinance loans for land, buildings or equipment and those aimed at reducing personnel expenditures.

Monitoring

After 2000, monitoring mechanisms were also introduced to reduce the likelihood that municipalities actually surpassed the 60% limit. First, whenever municipalities fell within 90% of the limit (i.e. when personnel spending reached 54%) the National Court of Audit (the *Tribunal das Contas*) would be notified. Once municipalities fell within 95% of the limit (when personnel spending reached 57%), prohibitions similar to those put in place in 1999 would apply to these municipalities nearing the 60% limit.

Stricter Election-year Timeframes

Beginning in the first quarter of the last year of a mayor's term, these measures would be implemented immediately, without the two-quarter grace period that existed in non-election years.

3 THEORETICAL MODEL

In this section, I develop a simple theoretical model to motivate the study. For the purposes of simplicity, I assume a single actor (the mayor) has ultimate authority to make decisions in the municipality. Citizen and municipal administration preferences are assumed to be taken into account to some degree in the mayor's objective function. The mayor's decision-making process is modeled as a two-step process. First, the mayor determines the optimal level of personnel and non-personnel spending, given the amount of revenues available to the municipality. Next, the mayor determines the optimal amount of taxes to collect, given the total revenue base available.

In the first decision-making step, a mayor maximizes a separable utility function over personnel spending (p) and non-personnel spending (n) subject to a budget constraint that total spending must be less than or equal to municipal revenues. For simplicity, I assume that municipal revenues are composed only of intergovernmental transfers (T) and taxes and fees collected from citizens (X). Utility is assumed to be concave. The origins of utility from spending are intentionally vague and are meant to allow for utility from personnel spending to be derived from citizens' utility for public goods produced using personnel spending (e.g. teachers in the classroom) and non-personnel spending (e.g. school or health center construction or maintenance) or for the objective function to be derived from nothing more than the mayor's self-interested utility for personnel spending (e.g., rewarding supporters and friends with government jobs) and non-personnel spending (e.g., gaining votes by building a new road or increasing social assistance benefits). When no spending limits are in place, optimal levels of personnel and non-personnel spending (p^* and n^*) are given when the marginal utilities of personnel and non-personnel spending are equal:⁴¹

$$\frac{dU^p}{dp} = \frac{dU^n}{dn} \quad (1)$$

Graphically, this yields the familiar solution that the mayor's indifference curve for personnel and non-personnel spending lies on the budget line (Figure 1). Optimal levels of p and n (p^* and n^*) can be re-written as a function of tax collection X , and utility at p^* and n^* can be re-written as a function of tax collection:

$$U(p^*) = U(p^*(X)) \quad (2)$$

$$U(n^*) = U(n^*(X)) \quad (3)$$

⁴¹ For simplicity, I model utility in terms of spending. This can also be modeled using utility over quantities of personnel and non-personnel goods provided, in which case marginal utilities are divided by the costs of each quantity (wages and cost of non-personnel goods). Results are essentially the same.

In the next step of decision-making the mayor determines the optimal level of taxes to collect, given optimal levels of personnel and non-personnel spending (p^* and n^*). Since taxes serve to slacken the budget constraint in Step 1, utility is increasing in taxes for both personnel and non-personnel spending. At the same time, tax collection is costly, whether because it reduces money available for citizens to spend on private goods or because it is unpopular and comes at the cost of votes. The mayor's objective function in Step 2 is thus characterized by utility of personnel and non-personnel spending (as a function of tax collection) minus the cost of tax collection:

$$U^p(p(X)) + U^n(n(X)) - c(X) \quad (4)$$

I assume the cost of tax collection to be convex. The tax collection optimization problem, given optimal personnel and non-personnel spending, is solved by the following equation:

$$\frac{\delta U^p}{\delta p} \frac{\delta p^*}{\delta X^*} + \frac{\delta U^n}{\delta n} \frac{\delta n^*}{\delta X^*} = c'(X^*) \quad (5)$$

Essentially this equation says that the marginal utility from increasing taxes (the sum of the marginal utility of higher personnel and non-personnel spending) is equal to the marginal cost of increasing taxes. The optimal solution is depicted graphically in Figure 2.

Constraining Personnel Spending

I next examine what happens when personnel spending limits are introduced. Personnel spending limits show up as an additional constraint in Step 1 of the mayor's optimization problem. Now, the mayor faces two constraints: (1) the same budget constraint as before and (2) the constraint that personnel spending be less than or equal to a certain share of transfers plus taxes (60% in the case of Brazil's expenditure limits):

$$C1: \quad p + n \leq T + X \quad (6)$$

$$C2: \quad p \leq \ell(T + X) \quad (7)$$

In some cases, optimal levels of personnel and non-personnel spending are such that C2 will not be binding, in which case the constraint should not change spending decisions in any way. However, C2 will be binding when optimal levels of personnel spending are higher than the spending limit allows. When optimal levels are higher, personnel spending will be equal to the spending limit. Given the budget constraint that total spending must be less than or equal to total revenues ($T+X$), it is trivial to show that the rest of the budget must be spent on non-personnel. Thus personnel and non-personnel spending can be characterized by the following equations when the personnel spending limits are binding:

$$\bar{p} = \ell(T + X) \quad (8)$$

$$\bar{n} = (1 - \ell)(T + X) \quad (9)$$

Figure 3 depicts the result of imposing the expenditure limits, assuming taxes stay the same. The expenditure limit is represented by a diagonal line. For any budget line, expenditures must on or to the left of the diagonal line. When taxes do not change and the expenditure limit is binding, personnel spending is lower than it would otherwise be, non-personnel spending is higher, total spending is the same, and utility is lower. However, the mayor may opt to adjust the level of taxes, given the new constraint. Figure 4 depicts how allocations of p and n adjust when taxes remain the same, increase and decrease. If the mayor does not increase taxes, the budget line will remain the same, and personnel spending will be below what it would be without the personnel spending limits, as is shown in the previous figure. If the mayor chooses to increase taxes (X'), the new budget line will be characterized by $T+X'$. Personnel spending will be higher than it would be without the adjustment to taxes but lower than under the mayor's optimal allocation, non-personnel spending will be higher, total expenditures will be higher, and utility will be lower. On the other hand, if the mayor chooses to decrease taxes (X''), the new budget line will be characterized by $T+X''$. Personnel spending will be below what it would be without the adjustment to taxes, non-personnel spending may be higher, lower or the same as what it would be under the mayor's optimal allocation without the limits, total expenditures will be lower, and utility will again be lower. Whether or not the mayor chooses to do so will depend on the tradeoff between the marginal cost of increasing taxes, the marginal utility of increasing personnel spending vs. the increased inefficiency (in the sense that marginal utility will be even lower) of spending even more on non-personnel spending. The objective function in Step 2 is now characterized by the following equation:

$$F(X) = U(\bar{p}(X)) + U(\bar{n}(X)) - c(X) \quad (10)$$

Solving the maximization problem given constrained personnel and non-personnel expenditure yields:

$$\frac{\delta U^p}{\delta p} \frac{\delta \bar{p}}{\delta X} + \frac{\delta U^n}{\delta n} \frac{\delta \bar{n}}{\delta X} = c'(X) \quad (11)$$

Since the cost of tax collection is increasing in X ($c'(X) > 0$), comparing the marginal cost of tax collection with and without the spending constraints in place allows one to determine the direction that tax collection moves as a result of the spending limits. To look at the impact of the spending limits on tax collection, I subtract the first-order-conditions of the unconstrained model (Equation 5) from the constrained model (Equation 11). Subtracting Equation (5) from Equation (11) yields the difference between the solutions with and without the spending constraints in place:

$$\begin{aligned}
c'(\bar{X}) - c'(X^*) &= \left[\frac{\delta U^p}{\delta p} \frac{\delta \bar{p}}{\delta \bar{X}} - \frac{\delta U^p}{\delta p} \frac{\delta p^*}{\delta X^*} \right] + \left[\frac{\delta U^n}{\delta n} \frac{\delta \bar{n}}{\delta \bar{X}} - \frac{\delta U^n}{\delta n} \frac{\delta n^*}{\delta X^*} \right] \\
&= \quad \quad \quad [> 0] \quad \quad \quad + \quad \quad \quad [< 0]
\end{aligned} \tag{12}$$

Since utility for personnel spending is concave and since personnel spending with the binding limits will be less than or equal to personnel expenditures without the limits, marginal utility for personnel spending with the limits is greater than or equal to marginal utility without the limits. Since personnel spending limits lead to equal or higher levels of non-personnel spending, marginal utility for non-personnel spending when the limits are in place will be less than or equal to marginal utility for personnel spending when the limits are not in place. Thus, the change in marginal utility from personnel spending will be greater than or equal to zero and the change in marginal utility from non-personnel spending will be less than or equal to zero.

There are three potential scenarios: (a) Equation (12) is less than zero, in which case there will be no change to tax collection, personnel spending will be lower than without the expenditure limits and non-personnel expenditure will be higher; (b) Equation (12) is greater than zero, in which case tax collection will increase, personnel spending will be less than or equal to what it would be than without the spending limits, non-personnel spending will be higher than it would be without the limits and total expenditure will be higher; or (c) Equation (12) is less than zero, in which case tax collection will shrink, personnel spending will be lower than what it would be than without the spending limits, non-personnel spending will be less than or equal to what it would be without the limits and total expenditure will be lower. Figure 5 presents each scenario graphically. Which of the three scenarios turns out to be the case will depend on the income elasticity of utility for personnel and non-personnel spending evaluated at the limit-constrained optimum relative to the optimum without expenditure limits as well as income elasticity of personnel and non-personnel spending relative to one another at each point. When the gap between income elasticity for personnel spending at the constrained point versus the point unconstrained by spending limits is higher relative to the gap for non-personnel spending, the mayor will opt for tax collection at a point where marginal cost is higher than it would be under the unconstrained optimum. The opposite will be true when the gap in income elasticity is larger for non-personnel spending than it is for personnel spending.

4 LITERATURE REVIEW

4.1 PREVIOUS STUDIES OF BRAZIL'S FISCAL RESPONSIBILITY LAW

Several Brazilian researchers have conducted studies of the impact of the Law of Fiscal Responsibility but all have been limited to before-after analyses. This is understandable, given the fact that the Law of Fiscal Responsibility was introduced nation-wide and applied to all federal entities at all levels of government (federal, state and local) simultaneously, but it is

problematic, as it does not allow one to assess what would have happened in the absence of the Law of Fiscal Responsibility. Further, very few of these studies focus on Brazil as a whole, limiting analyses to a particular state (e.g. Chieza et al 2008, Santolin et al 2009)) or municipalities of a particular size (da Costa 2008) or both (e.g. Gerigk and Clementer 2011).

Most of these exploratory studies find that the new law did not affect most municipalities because most were not near the 60% limit to begin with, but there were substantial reductions in the number of municipalities that were above the limit after the new law was introduced. (Giuberti 2005) Chieza et al (2008) find that personnel per capita spending actually increased after the introduction of the Law of Fiscal Responsibility. Menezes (2005) confirms that this is true for municipalities that were initially below the 60% expenditure (the majority of municipalities) but also finds that spending decreases among those that were initially above the expenditure limit and that the probability of being above the 60% expenditure limit drops substantially after the Law of Fiscal Responsibility is introduced.

Santolin et al (2009) look at changes in the relationship between spending and receipts before and after the Law of Fiscal Responsibility and find that the tendency to spend out of receipts increases after 2001, with the most prominent increase being in tendency to spend out of transfers. The tendency to spend out of own revenues increases only slightly, and the tendency to invest revenues is found to decrease. Menezes (2005) also finds that investment goes down in the period after the introduction of the Law of Fiscal Responsibility. Fioravante et al (2006) find results similar to those in other studies and also find that local revenue generation increases slightly after the new law, but no standard errors or confidence intervals are presented for any of their estimates.

All of these studies have aimed to assess the impact of the Fiscal Responsibility Law (LRF) as a whole, which is a worthy endeavor. I instead focus more narrowly on one important aspect of the law: expenditure limitations and comparisons of spending and taxation outcomes among those municipalities for which the limits were binding (those that were above the limit before the new law) and those for which the limits were not binding (those below the limit prior to the law). Doing so allows one not only to establish a more rigorous causal relationship between outcomes and this component of the law but it also allows one to understand the impacts of a key aspect of the Law of Fiscal Responsibility in the broader context of a long literature on the impacts of tax and expenditures laws.

4.2 IMPACTS OF TAX AND EXPENDITURE LIMITS

Many papers have examined the impact of TELs on the size of government over the years. Most quantitative studies of TELs that make some attempt at using a control group have been focused on the United States, likely because variation in timing of the introduction of TELs across states provides a natural context in which to study this phenomenon. Most of the studies from the US suggest that TELs result in few real changes to revenue generation and spending. (e.g. Kousser et al 2008, Mullins and Joyce 1996) Local governments find clever ways

to circumvent these laws, including increasing other taxes such as excise taxes, sales taxes and incomes taxes); increasing reliance on fees and user charges (Shadbegian 1999); reliance on “off-budget enterprises”⁴² (Bennett and Dilorenzo 1982); and state-level increases in spending that offset local revenue reductions (Shadbegian 2003). At the state level, some types of TELs (namely limits on increases in property assessment) have also been found to be associated with the introduction of lotteries (Glickman and Painter 2004), but evidence that TELs cause states to adopt lotteries is weak at best. The tendency to find clever solutions to TEL limits is certainly not unique to the United States. Descriptive reports indicate that Spanish rules constraining the numbers of permanent employees and pay levels results in increased use of temporary labor contracts and that French expenditure limits at the national level encouraged the national government to shift spending responsibilities to local authorities (Sutherland et al 2005) The failure of these laws to effectively limit taxation and expenditures is typically explained by their incomplete nature; most only limit specific types of taxes (property tax being a common one) rather than revenue generation in general, or spending out of taxes only rather than spending in general.

On the other hand, the evidence that TELs have no impact on sub-national public finance is not definitive. Poterba (1994), for example, examines the role that stricter deficit and taxation laws play in state governments’ reactions to budget shocks and essentially finds that fiscal rules matter. In his study, tax limitations do indeed seem to matter for tax collection responses to budget shocks; in states with tax and expenditure limits tax revenues increase by just 47 cents per dollar of unexpected deficit, compared to increases of \$1.03 in states without tax and expenditure limitations. Poterba and Rueben (1995) find that states with property tax limits have seen slower growth in both government employment and in government employee wages. The authors are quick to point out, however, that voter preferences for small government drive both preferences for both TELs and preferences for slower growth in the size of government and that their estimates suffer from omitted variable biases.

Figlio (1996) also finds evidence that tax limitations have, for better or worse, managed to reduce public spending on one particular type of public good: education. Looking at school-level data, he uses a difference-in-difference approach across states and finds evidence that schools in states with limits on local property taxes have higher student-teacher ratios, fewer hour of instruction and pay lower cost-of-living adjusted salaries than do schools in states that do not limit local property taxation. These spending reductions are found to come at a cost; students in states with property tax limits were found to have lower scores in reading, science, mathematics and, in some specifications, mathematics. Shabegian (2003), on the other hand, counters Figlio’s argument, finding that local governments do indeed reduce education spending per student but that state spending increases at the same time and entirely offsets reductions in local spending on average.

⁴²OBEs are publicly-owned enterprises that rely on fees to sustain themselves rather than taxes and, as such, are not subject to the same tax and spending limitations as the rest of the public budget.

Many discussions suggest that the specifics of the tax and expenditure limitations are critical in determining whether or not they manage to reduce government spending, as is the context in which the TEL is implemented. The stringency of the tax and expenditure limitation and the type of limitation (e.g. limits on increases on property values vs. limits on property tax rates) both matter for the extent to which the limits affect spending and taxes raised (e.g. Shabegian 2003 and Figlio 1996, respectively). Mitchell (2010) conducts a systematic study the impact of different types of TELs and finds that constitutional restraints, limiting spending rather than revenue, immediate refunding of surpluses and the requirement of a super-majority to override limits are the most effective tools at reducing state-level government spending in the US.

Not only does the stringency and type of laws matter for how local governments respond to fiscal limitations, but the context in which they are implemented (and particularly other constraints facing sub-national governments) seem to also matter in determining how sub-national governments respond to fiscal limitations. Rattsø and Tovmo (2002), for example, study local government fiscal reactions to budget deficit constraints in the context of Denmark. In parallel to Poterba's findings that fiscal rules matter, local governments are found to quickly adjust revenues and expenditures to compensate for budget shocks and maintain budget surpluses. This study also finds that reactions are asymmetric, with expansions in spending and no reduction in tax rates being the norm when shocks are positive and increases in tax rates occurring when shocks are negative, leading to a gradual expansion in the size of the local public sector. While the impact of fiscal controls is not addressed directly in the Rattsø and Tovmo study, results are compared to findings from Norway. While both countries exhibit very stable budget patterns irrespective of the business climate, they each adjust in different ways. In Denmark, where strong limits are placed on loans and investment, local governments tend to adjust both spending and taxes. In Norway, where local governments have very little discretion in tax collection, fiscal adjustments to budget shocks are made primarily through changes to investment (Rattsø and Tovmo 2002, Rattsø 1999).

Some specific aspects of Brazil's TEL implemented through the Law of Fiscal Responsibility are important to keep in mind. First, in sharp contrast to most TELs in the US (where most TEL studies have been conducted), Brazil's Fiscal Responsibility Law was aimed at keeping spending in line with receipts rather than keeping the size of government under control. Thus, unlike most US TELs, which limit tax generation, Brazil's TEL explicitly limits spending as a share of receipts. Second, in contrast to the case of Spain (described anecdotally in Sutherland et al 2005), where limits on full-time employees simply shifted the type of employment contracts used, the definition of personnel expenditures in Brazil was all-inclusive. Thus, switching from one type of personnel expenditures to another would be quite difficult. Third, limits were on personnel expenditures only, making shifting of resources from personnel spending to other types of spending a distinct possibility.

There are also some important aspects of the Brazilian context that are likely to influence its experience with TELs. First, Brazilian municipalities work under a number of other

tax and spending constraints. In terms of spending, municipalities are required by law to spend a minimum of 25% of tax revenues (whether federal or state transfers or taxes collected locally) on education and 15% on health. Thus, these public service areas are likely to be more protected from reduction in spending than they were in the US setting. In terms of taxation, the 1989 Constitution draws clear distinctions between the types of taxes different levels of government may collect, and municipalities' key sources of tax revenues are property taxes and taxes on certain types of services. Thus there is little room to expand the scope of their local revenue generation efforts. At the same time, municipalities suffer from very low collection rates even among those taxes they are allowed to collect (i.e., they collect far less than they should, given the tax rates). Thus there is substantial room to increase the scale of local collection.

5 ESTIMATION STRATEGY

5.1 ANALYSIS APPROACH

My approach is to compare municipalities for whom personnel expenditure constraints are binding and those for whom the constraints are not binding (those that spend above and below the limits prior to the implementation of the Fiscal Responsibility Law in 2001, respectively). Those above the spending limit will be considered as having been affected by the policy (essentially the treatment group) and those that spend below the limit will be treated as if they were not affected by the limits. This approach is in the spirit of a fuzzy regression discontinuity design, and the sample will consist of those just below and those just above the spending limit. Two considerations complicate the analysis.

First, municipalities fall above and below the 60% limit from year to year in pre-policy change years and it is not entirely clear which municipalities should be considered to be "affected" by the policy and which will not. My approach will be to use average municipal expenditure shares on personnel in 1998 and 1999, the two years for which I have data before the Law of Fiscal Responsibility was passed.

Second, it is quite possible that municipalities that are not above the cutoff may also react to the policy. Those far away seem to increase spending (the 60% mark acts like an anchor). If this is the case, standard estimates will be an over-estimate because all those below also react. On the other hand, those near the limit are put on notice when they reach personnel expenditure shares of 54% and must by law avoid new personnel expenditures when they reach 57%. Thus, those below the limit but near it likely also reduce or cut back on the expansion of expenditures. If this is the case, then comparing those only very near the limit will give me an under-estimate of the true effect. I deal with this by conducting all analyses for two sets of sample near the limit: (1) municipalities within twenty percentage points above or below the limit (those with personnel expenditures between 40% and 80%) and (2) municipalities within ten percentage points above or below the limit (those with personnel expenditures between

50% and 70%) and present a range for the magnitude of the estimated impact for all outcomes of interest.

5.2 IDENTIFYING EQUATION

My identifying equation will take the form of a standard difference-in-difference analysis, in which those municipalities above the personnel expenditure limits prior to the introduction of the Law of Fiscal Responsibility (O_m^{over}) are considered to be the “treatment” group and those below the limit are the comparison group. The “treatment” group is “treated” only once the new law is implemented in 2001. I examine a series of outcomes (Y_{mst}): 1) personnel spending as a share of liquid current receipts (the first order outcome of interest) to confirm that the limit succeeds in reducing personnel expenditure shares, 2) various types of spending (total, personnel and non-personnel, current, capital, and disaggregated by type of public service), in log values, to measure the expenditure limits’ overall impacts on spending, 3) total receipts and receipts disaggregated by major category (total receipts and total liquid current receipts, transfers, transfers by major categories, local revenue, and locally-generated income), in log values, to measure whether municipalities work to adjust their revenue streams to fall in line with the personnel spending share limits and 4) deficit/surplus spending as a share of total current receipts and the probability of being in deficit to measure the effectiveness of the personnel spending limits at reducing fiscal imbalances. Regression equations include municipality fixed effects (μ_m) and state-year dummies (δ_{st}).

$$Y_{mst} = \beta_1(O_m^{over} * A_t) + \beta_2 x_{mt} + \mu_m + \delta_{st} + \varepsilon_{mst} \quad (13)$$

As explained in the previous sub-section, it is not straightforward to define precisely which municipalities should be considered as having personnel expenditures above the legal limits prior to the introduction of the Fiscal Responsibility Law. My definition of “treatment” municipalities uses average personnel expenditure shares from the two years preceding the passage of the Fiscal Responsibility Law (1998 and 1999). Those with average expenditures shares above the limit are considered to be in the “treatment” group and those with average expenditure shares below the limit are considered to be in the “control” group.

I vary the range over which I define the treatment and control group in Equation (13). I run regressions: 1) using the full sample of municipalities above and below the relevant spending limit, 2) using only municipalities within twenty percentage points of the relevant spending limit and 3) using only municipalities within ten percentage points of the relevant limit. Estimates from samples 2 and 3 should be construed as the true estimates of impact. Results from sample 1 are presented in some tables for purposes of comparison.

6 DATA

The key sources of data I have available to use in conducting this analysis are annual municipal financial reporting data from 1996 to 2010. In addition, I also rely on information on municipal population, information on municipal elections and municipal GDP data.

6.1 MUNICIPAL ACCOUNTING DATA

My primary source of data is municipal accounting data publicly available and downloaded from Brazil's National Treasury Office⁴³ from 1989 onward. Data are available for most, but not all, of Brazil's municipalities (of which there are roughly 5,565⁴⁴). To determine municipalities' initial treatment status, I need both total personnel expenditures (which are available as a separate category in all years) and liquid current receipts, which must be generated. Liquid current receipts are essentially current receipts minus receipts that automatically get re-distributed to another fund (social contributions and funds deducted for Brazil's National Education Fund).

6.1.1 ON CALCULATING LIQUID CURRENT RECEIPTS

For municipalities, the two sources of revenue that must be removed from current receipts to calculate current liquid receipts are social contributions and municipal contributions to the National Education Fund. (See Equations (14)-(16) below)

Prior to 1998, social contributions are not reported as a disaggregated category in the municipal finance data and so I am unable to calculate liquid current receipts for years before 1998. This means that all analyses that examine outcomes as a share of current liquid receipts include data from 1998 forward only. Starting in 2000, social contributions are clearly defined as their own sub-category under total contributions in the municipal accounting data. The other sub-category of contributions is economic contributions, which includes contributions to professional associations that must be spent on bettering the state of that profession and contributions to other municipal funds for specific purposes. However, in 1998 and 1999, contributions are sub-divided into three categories: worker contributions to social security, contributions made to pension plans described in clause 9 of article 201 of the Constitution and "other contributions". The Law of Fiscal Responsibility clearly states that the first two categories (social security contributions and pension plan contributions described in clause 9 of article 201 of the Constitution) are to be deducted from total current receipts to calculate liquid current receipts.

While "other contributions" should not count as one of the two categories of social contributions according to the letter of the Law of Fiscal Responsibility itself, item 16 of a 2006

⁴³ Available at: http://www3.tesouro.fazenda.gov.br/estados_municipios/index.asp

⁴⁴ The precise number can vary from year to year, as municipalities become incorporated or split from each other.

technical note circulated by the National Treasury points out that lack of clear standard in how some types contributions are counted sometimes leads municipalities to exclude from the two categories of social contributions some contributions that should indeed be included. (Tesouro Nacional 2006) These contributions may be classified as “other contributions” rather than as social security or pension plan contributions. At the same time, the category of “other contributions” may also include some contributions that should not count as social contributions (for example, those that would be classified as “economic contributions” in later years). For my primary definition of liquid current receipts prior to 2000, I follow the letter of the law and deduct only the two categories outlined in the Law of Fiscal Responsibility itself should be deducted.

Also deducted from current receipts is a portion of key constitutional transfers that are automatically transferred to the National Education Fund and re-distributed across municipalities for spending on basic education. From 1996 until 2006 the education fund was called the Fund for the Management and Development of Elementary Education (FUNDEF). In 2005, FUNDEF was altered and became the current Fund for the Management and Development of Basic Education (FUNDEB) (valid through 2020). Education Fund contributions are automatically taken out of four specific transfers received by municipalities: the Municipal Participation Fund (FPM)⁴⁵ transfers, value-added tax (ICMS)⁴⁶ transfers, Kandir Law⁴⁷ transfers, and IPI Export⁴⁸ transfers. From 1998 through 2006, FUNDEF took 15% from each of these transfers for the education fund. FUNDEB replaced FUNDEF beginning in 2007, and an increase to a 20% Education Fund deduction from each of these four transfers was phased in over a three-year period (16.66% in 2007, 18.33% in 2008 and the full 20% beginning in 2009).

$$LCR_{mst} = CR_{mst} - Social_{mst} - ContrEduc_{mst} \quad (14)$$

$$ContrEducFund_{mst} = EFshare_t * [FPM_{mst} + LC87_96_{mst} + ICMS_{mst} + IPIExp_{mst}] \quad (15)$$

⁴⁵ The Brazilian constitution stipulates that 22.5% of national income and gains taxes and taxes on industrialized products are to be dedicated to the Municipal Participation Fund (FPM), which is money that must be transferred to municipalities. The share of FPM resources received by each municipality is determined primarily based on population.

⁴⁶ The ICMS is Brazil's value-added tax and is a tax on most goods and services. Unlike in most countries, it is run by the states rather than the federal government, and it belongs exclusively to the states and municipalities. Seventy-five percent of the value of ICMS taxes collected belongs to the state and twenty-five percent belongs to municipalities within that state). The rules governing ICMS distribution across municipalities within a state vary from state to state but are largely based on municipalities' value-added contribution to the amount of ICMS collected (a minimum of 75% of the pie is determined based on this criteria).

⁴⁷ The Kandir Law introduced exclusions to value-added (ICMS) taxes on exported goods. The exclusion of exported goods from the products that could be taxed under ICMS results in reductions in state and municipal revenue. Kandir Law transfers refer to transfers made by the federal government to compensate for these losses. Compensation rates and amounts are determined by the federal government.

⁴⁸ The IPI Export tax is a tax on exported industrialized products collected at the federal level. Unlike domestic IPI taxes, which are transferred directly to municipalities through the Municipal Participation Fund, ten percent (10%) of the IPI Export tax is transferred to the states according to a formula based on their contribution to the production of the industrialized products, with a series of limits. Of the resources transferred to the states, 25% of the IPI Export transfers received must be transferred to municipalities according to the same rules that govern ICMS distribution to municipalities.

$$EFshare_t = \begin{cases} 15\% & 1998 \leq t \leq 2006 \\ 16.66\% & t = 2007 \\ 18.33\% & t = 2008 \\ 20\% & t \geq 2009 \end{cases} \quad (16)$$

6.1.2 CHANGES IN CLASSIFICATION OF TRANSFERS AND LOCALLY GENERATED REVENUE ACROSS YEARS

One important re-classification of receipts is noteworthy. The Brazilian constitution generally gives the federal government ownership over income tax, and the federal government must share 22.5% of that money with states and municipalities through the Municipal Participation Fund. However, an exception is made for salaries paid by municipalities. The constitution stipulates that income tax collected on salaries paid by a municipality belong to that municipality rather than to the federal government. Income tax from salaries paid by the municipality was originally classified as transfers prior to 2002 but in 2002 it was instead classified as locally generated revenue. Because this is neither a source of local revenue directly within the municipality's control (the federal government is the entity that collects the tax and sets the tax rates) nor a traditional federal transfer (it is more like refund to municipalities on money they paid to the federal government), I remove this category from federal transfers in years prior to 2002 and from local revenue starting in 2002 and maintain it as a separate category across all years.

6.2 ADDITIONAL DATA SOURCES

Several additional data sources are used to generate control variables. I use annual municipal-level population data from Brazil's national health information system (DATASUS)⁴⁹ as a control variable. The same population information is used to calculate per capita values for variables presented in the next section.

Municipal-level GDP data are also downloaded from the Institute for Applied Economic Research (Ipea⁵⁰) and used for descriptive statistics and as potential control variables. Unfortunately, GDP data are available only beginning in 1999, which eliminate one of only two years of pre-expenditure limit data that I have available. In Section 8.1, I demonstrate that municipal GDP has surprisingly little explanatory power in my estimation models and does not affect the magnitude of significance of measures of estimates of the impact of the expenditure limits, while excluding 1996 through 1998 matters quite a bit. As a result, I choose to exclude GDP as a control variable from all regressions, since its value as a control variable is limited and the cost of including it as a control is high.

⁴⁹

<http://www2.datasus.gov.br/DATASUS/index.php?area=0206&VObj=http://tabnet.datasus.gov.br/cgi/defthtm.exe?ibge/cnv/pop>

⁵⁰ <http://www.ipeadata.gov.br/>

Finally, I rely on the number of votes received by the mayoral candidate who received the most votes in each municipal election from 1996 to 2008 and the number of valid votes cast in each municipal election, downloaded from Ipea. I use these two pieces of information to generate a variable that measures the share of votes received by the mayor in the most recent election in an attempt to roughly measure the degree of public support enjoyed by the mayor. Most mayoral elections are decided in the first round. However, in the few case in which two rounds were needed, I take outcomes from the second round of elections to construct this measure.

7 DESCRIPTIVE STATISTICS

In this section, I first present a general profile of municipalities that found themselves above the 60% expenditure limits prior to the Law of Fiscal Responsibility and compare them to those below the limit prior to the law. As a reminder to the reader, I define municipalities as being above the limit before the new law if the mean of their 1998 and 1999 personnel expenditure shares was greater than 60%. I look at descriptive statistics for the whole sample of all municipalities above and below the limit and for those just around the limit (e.g. within 20 percentage points and within 10 percentage points).

Next, I examine descriptively how outcomes of interest change before and after the policy change was introduced, by whether municipalities were above or below the 60% limit prior to the new law (i.e. by whether the constraint was binding).

7.1 PROFILE OF MUNICIPALITIES ABOVE AND BELOW THE SPENDING LIMITS BEFORE THE POLICY CHANGE

7.1.1 DISTRIBUTION OF MUNICIPALITIES ACROSS STATES AND REGIONS

Figure 6 presents a regional breakdown of municipalities that were above the 60% limit before the Law of Fiscal Responsibility was introduced. Panel A presents the breakdown using the full sample of all municipalities above the 60% limit. Panel B presents the breakdown for a restricted sample of only municipalities within 20 percentage points of the limit (that is, municipalities with pre-LRF personnel expenditure shares greater than 60% but at or below 80%). Panel C presents the breakdown for a further-restricted sample of only municipalities within 10 percentage points of the limit (that is, municipalities with pre-LRF personnel expenditure shares greater than 60% but at or below 70%), and finally, Panel D presents the same breakdown for the most restricted sample I examines: those within five percentage points of the limit (those with expenditure shares greater than 60% but at or below 65%). Figure 7 presents a similar set of pie charts, but for the entire sample rather than just those municipalities that were above the limit. Panel A presents the regional breakdown of all municipalities in the sample (above or below the limit); Panel B does the same for the restricted sample of municipalities within 20 percentage points of the limit (i.e. with personnel

expenditures greater than or equal to 40% and less than or equal to 80%); Panel C presents the regional breakdown of all municipalities within 10 percentage points of the limits; and Panel D presents the regional breakdown of all municipalities within 5 percentage points of the limit.

Figure 6 shows that the Southeast has considerably more municipalities with personnel expenditure above 60% than do other regions, with the Northeast making the second largest contribution, and the South making the third largest contribution. The number of municipalities in the treatment group from the Center-West and North is far smaller. When one compares this general regional breakdown to the regional breakdown in Figure 7, it becomes clear that the reason that some regions are represented more heavily in the “treatment” group is not that they are particularly egregious spenders on personnel relative to other regions. It is simply that there are more municipalities in these regions. The regional breakdown across “treatment” group is actually quite similar to the regional breakdown across the entire sample, and regions are relatively evenly represented in the treatment and control groups. It’s worth noting, however, that municipalities in the Northeast, the North and the Center-West (Brazil’s poorer regions) are slightly over-represented in the treatment group (i.e. they contribute slightly more to the treatment group than they do to the whole sample (and so contribute slightly less to the group of municipalities below the 60% limit) and municipalities in the South (Brazil’s second-richest region after the Southeast) are slightly under-represented in the treatment group. Regional distributions shift slightly as I limit the sample more and more, but the distribution across each of the restricted samples is not substantially different from the regional distribution across the entire sample.

Table 1 presents a breakdown of where municipalities above and below the limit are located in Brazil, first looking across all municipalities for which I have data and next looking just among those municipalities that are within 10 percentage points of the 60% personnel expenditure limit. Columns (1) and (6) of each table presents the total number of municipalities for a given state or region in the sample of all municipalities and the sample of municipalities within 10 percentage points of the 60% expenditure limit, respectively; columns (2) and (7) present the total number of municipalities in that state or region that are above the 60% personnel expenditure limit for the same two samples; columns (3) and (8) present the share of municipalities that are above the 60% limit in that state or region; columns (4) and (9) present the total number of municipalities in that state or region that are at or below the 60% personnel expenditure limit in the two samples; and columns (5) and (10) present the share of municipalities that are at or below the 60% limit in that state or region.

When looking at the full sample of all municipalities for which I have data, roughly 10% of municipalities in the Northeast, the Southeast and the center-West are above the 60% personnel expenditure limit before the Law of Fiscal Responsibility is introduced. At 18.5%, the share of municipalities in the North that are above the 60% limit is nearly double that of those three regions. With 7.1% of municipalities falling above the 60% limit, those in the South are the least likely to be above the limit. However, these regional groupings may obscure substantial differences across states within a region. In the North, roughly 20% to 30% of

municipalities are above the 60% limit in most states, but one very small state with only 4 municipalities (Roraima) has no municipalities above the limit. In the Northeast, around 5% to 10% of municipalities are above the limit in most states, but Sergipe and Pernambuco have substantially more (17% and 24%, respectively) and Rio Grande do Norte has slightly fewer (around 3%). The share in the Southeast varies considerably across states; in Minas Gerais just 4% of municipalities are above the limit; in Espírito Santo and São Paulo the number is around 11% to 12%, and in Rio de Janeiro the share is a whopping 42%. In the South, rates are more similar across states and range from roughly 5% to 9%. In the Center-West rates are also more similar but slightly more dispersed than in the South, with 5% to 6% of municipalities being above the limit in two states (Mato Grosso do Sul and Mato Grosso) and 14% being above it in Goiás. Limiting the sample of municipalities that are within 10 percentage points of the 60% limit (that is, those that have personnel expenditures between 50% and 70%) excludes nearly 70% of municipalities from the original sample of all municipalities. In other words, roughly 30% of all municipalities are within 10 percentage points of the 60% limit. Limiting the sample to those within 10 percentage points removes far more municipalities that were below the limit (around 70% to 80% in any given region) than it does those above the limit (around 16% to 35% in any given region). This is to be expected, since many municipalities were far below the 60% limit in the first place. In the restricted sample of those within 10 percentage points of the limit, the share of municipalities above the limit is 22.4% (305 municipalities), and the share below the limit is 77.6% (1,056 municipalities). While the actual shares change, the state-level patterns among the restricted sample (i.e. which states tend to have more or fewer municipalities above the limit than other states in the region) are similar to those reported in the previous paragraph.

7.1.2 DESCRIPTIVE PROFILE OF MUNICIPALITIES ABOVE AND BELOW THE LIMIT BEFORE THE LRF

I begin this section by presenting several scatterplots of personnel expenditures, non-personnel current expenditures, total expenditures and total receipts over personnel expenditure shares averaged across 1998 and 1999 (the variable I use to define whether or not municipalities were bound by the 60% expenditure share limit) in year prior to the introduction of the Law of Fiscal Responsibility. Scatterplots include fitted line plots. The purpose of these figures is to give the reader an idea of the extent to which these key outcomes were correlated with personnel expenditure shares before the personnel expenditure limits became binding. Expenditures and receipts are in per capita terms in order to make values more comparable for municipalities of a different size. Nonetheless, vast differences even in per capita receipts and expenditures still exist because of substantial inequalities in public finances that exist across municipalities in Brazil. For practicality of viewing the figures, scatterplots exclude outliers that have outcomes that greater than double the value of the 95th percentile of municipalities. Figures 8 through 10 present scatterplots for personnel expenditures; Figures 11 through 13 present scatterplots for non-personnel expenditures; Figures 14 through 16 present scatterplots for total expenditures; and Figures 17 through 19 present scatterplots for total receipts. In each case, scatterplots are presented for all municipalities above and below the personnel expenditure limit, for municipalities within 20 percentage points of the limit and for

municipalities within 10 percentage points of the limit. Figures 8 through 10 demonstrate the rather unsurprising fact that personnel expenditures are positively correlated with personnel expenditure shares, and Figures 11 through 13 demonstrate that non-personnel expenditures are negatively correlated with personnel expenditure shares. Essentially, those with lower personnel expenditure shares are spending less on personnel and more on non-personnel current expenditures. Figures 14 through 16 and Figures 17 through 19 demonstrate a slightly negative relationship between both personnel expenditure shares and total expenditures and total receipts, respectively. However, the relationship is weak, and fitted lines are nearly flat.

Tables 2, 3 and 4 present a general profile of municipalities that were above and below the 60% personnel expenditure limits before the Law of Fiscal Responsibility. It is clear from Table 2 that those above and below the 60% personnel limit are quite different in terms of how they allocate their money. It should not come as a surprise that those above the personnel expenditure limit spend significantly more of their budget on personnel and less on non-personnel. As the sample is restricted more those differences of course become smaller, but significant differences do persist. Current expenditures generally make up a larger share of expenditures than do capital expenditures, and municipalities above the limit spend a larger share on current expenditures and less on capital expenditures, though the difference between those above and below the limit shrink substantially as the sample is restricted. Across the whole sample, those above the limit spend roughly 2.6 percentage points more of their budget on current expenditures and 2.6 percentage points less on capital expenditures relative to those below the limit, but once the sample is limited to those within 10 percentage points of the limit this difference is reduced to a 0.6 percentage point difference, though it is still significant.

There are some notable differences in terms of spending allocations across public good categories, though most are small in magnitude. Those above the limit tend to spend more on activities related to government bureaucracy (planning/administration and legislative expenditures), and fewer of their expenditures are devoted to transportation-related activities and activities to promote productivity growth (industry, commerce, mining and resources and, in all but the most restricted sample, agriculture). Municipalities above the expenditure limit also spend more on other miscellaneous activities.

Municipalities above the personnel expenditure limit were significantly more likely to be in spending deficit than those below the limit (between 4.3 percentage points and 6.6 percentage point in the two restricted sample) prior to the Law of Fiscal Responsibility. While deficit spending over total municipal receipts was just 0.1% on average across all municipalities below the personnel expenditure limit, the share was 2.6% in municipalities above the limit. This provides some confirmation of a connection between personnel spending and deficit spending. Once the sample is limited to those within 20 percentage points of the limit, deficit spending among those below the limit increases tenfold, as many municipalities with lower deficits or even surpluses were also further below the personnel expenditure limit. Deficit spending among those above the limit decreases very slightly, as some of the most egregious

cases of over-spending are also removed from the sample. Among the restricted samples, differences between those below and above the limit remain significant, though only marginally so in the sample of municipalities within 10 percentage points of the limit.

Table 3 presents major categories of expenditures and receipts. As also noted in the previous table, current expenditures make up the bulk of total expenditures. While municipalities above and below the personnel expenditure limit allocate their current expenditures between personnel and non-personnel quite differently (with those above the limit spending more on personnel and those below the limit spending more on non-personnel), current and total expenditures are not significantly different across the two groups. While capital expenditures are significantly lower in municipalities above the limit, capital expenditures make up a small enough share of total expenditure that the difference is not large enough to make total expenditures differ significantly. Significance of differences in per capita capital expenditures disappears once the sample is restricted to those within 10 percentage points of the limit.

By far the most important source of municipal receipts is transfers, primarily from the federal and state governments. Transfers make up 87% to 90% of current revenues and just over 80% of total receipts. Transfers are significantly lower in municipalities above the personnel expenditure limit compared to those below the limit in all samples except that of municipalities within 10 percentage points of the limit. Because transfers contribute so much to total current receipts, differences in transfers result in significant differences in total current receipts in all but the most restricted sample. While differences in transfers and current receipts are significant in the two less restricted samples, the differences are not very large; municipalities above the limit receive roughly 3% less than do municipalities below the limit. While current receipts are lower in municipalities above the limit, capital receipts are significantly higher in all samples. Differences in capital receipts are also driven by differences in transfers, which make up the bulk of capital receipts and are significantly higher in municipalities above the expenditure limits.

Several other important differences between those below and above the limit in terms are also worth noting. The first is that municipalities above the limit collect 20% to 30% less in revenue (taxes and fees) than do municipalities below the limit. Differences are significant only once the sample is restricted to those within 20 and 10 percentage points of the limit. Second, municipalities above the limit also receive 15% to 20% less in municipality-generated income, which includes income from agricultural and industrial activities, income for services performed (excluding fees), and income from investments (e.g. rental of land or buildings). Although both revenue generation and municipal income make up a small share of current receipts (roughly 5% and 1%, respectively), they represent the only sources of revenue that are within the control of municipalities. Third, municipalities above the expenditure limit receive more in federal income tax that is collected on municipal salaries paid and transferred back to the municipalities that paid the salary. This is to be expected, since municipalities above the personnel expenditure limit are likely paying more in salaries in the first place. Federal income

tax on municipal salaries is a very small share (less than 1%) of total receipts, however. Finally, while capital transfers are higher in municipalities above the limit than those below, municipalities below the limit receive roughly 200% to 240% times more capital receipts from credit (differences significant across all samples) than do those above the limit. This may be a reflection of the creditworthiness of municipalities spending larger shares of their budget on personnel, but it may also be a reflection of municipal preferences for expenditures on items such as capital expenditures for which loans are more readily available. Despite the substantial differences in capital receipts from credit, credit generally made up such a small share of total receipts and total capital receipts prior to the introduction of the Law of Fiscal Responsibility that it was of little consequence in most municipalities' budgets.

Table 4 shows no significant differences in population between those below and above the expenditure limit and no significant difference in GDP level in the restricted samples. However, there are some differences in the composition of municipal GDP. In Panel A, those above the limit tend to have roughly 5% larger GDP per capita than those below the limit and get more of their income from industry and services and less from agriculture. Differences in total GDP and in GDP from industry and from services are no longer significant once the sample is restricted (Panels B and C). However, two differences remain significant or marginally significant in Panels B and C. First, those above the expenditure limit have significantly higher GDP from public administration services than do those below the limit. This should come as no surprise, since municipalities above the limit are spending more on public administration services. Second, those below the limit have lower GDP from agriculture than those below the limit, which likely explains why they may spend slightly less on agriculture than do those above the limit in Table 2.

All in all, Table 2 through Table 4 demonstrate that there are some significant differences between those below and above the 60% personnel expenditure limit, but restricting the sample to municipalities close to the 60% personnel expenditure limit yields treatment and control municipalities that are much more similar. Many of the remaining differences are likely a direct result of the fact that municipalities above the expenditure limit spend more of their budget on personnel: those above the limit spend more on personnel and spend less on non-personnel, a larger share of their spending goes toward bureaucracy-related expenditures and a smaller share goes toward expenditures aimed at increasing productivity, they receive more in federal income tax that is collected on municipal salaries and transferred back to municipalities since they pay more in salary and their GDP from public administration is significantly higher compared to municipalities below the limit.

However, some important differences not directly attributable to the fact that municipalities spend more on personnel also remain even after the samples have been restricted. Municipalities above the limit receive less in municipality-controlled sources of income (local taxes and fees and income from productive activities and assets), receive more in both current and capital transfers and receive less credit. Finally, less of their GDP comes from agricultural activities. Differences between those above and below the limit in sources of

income and distribution of expenditures are not translating into differences in total values; municipalities above and below the limit do not exhibit significant difference in total expenditures, total receipts or overall GDP.

7.2 CHANGES IN KEY OUTCOMES ACROSS MUNICIPALITIES ABOVE AND BELOW THE SPENDING LIMITS

In this section, I give a general picture of how municipalities seem to be adjusting key outcomes before and after the policy change before turning to the regression results. I first present a basic picture of the number of municipalities above the 60% personnel expenditure limit over time between 1998 and 2010 (Figure 20). There is a large drop in the number of municipalities above the 60% personnel expenditure share limit in the years just after the Law of Fiscal Responsibility was introduced. While this is not robust causal evidence that the personnel expenditure limits enforced in the Law of Fiscal Responsibility caused a drop in personnel expenditure share, it is consistent with evidence to that effect. The drop was sustained through 2008, after which personnel expenditure shares shot back up. The substantial increases in expenditure shares in 2009 and 2010 are most likely explained primarily by substantial drops in taxes collected and transferred by the federal governments during the worldwide economic slowdown beginning in 2008 and simultaneous increases in the minimum wage. During this period, federal government tax collection dropped considerably due both to reduction in the revenue base and reductions in some tax rates in an effort to stimulate the economy. Since municipalities receive a fixed share of these national taxes and are highly dependent on transfers for their current receipts, municipal revenues suffered considerably beginning in 2009.

I next present some basic histograms of personnel expenditures as a share of current liquid receipts before and after the Fiscal Responsibility Law (LRF) was in effect, split by whether municipalities were above or below the three limits. These figures are primarily intended to give the reader a global picture of how municipalities are reacting to the limits. Panel A of each figure presents histograms for those above the 60% limit before the new law, and Panel B presents histograms for those that were already below the limits before the new law. Figure 21 presents these pictures for the sample of all municipalities above and below the limit (excluding the four municipalities with personnel expenditures greater than 100% for ease of visualization). Figure 22 presents the same histograms but for the restricted sample of those within 20 percentage points of the 60% personnel expenditure limit, and Figure 23 does the same for the further restricted sample of those within 10 percentage points of the limit.

For those above the limit prior to the LRF, there is a clear shift to the left of the 60% mark after the law is introduced compared to before, with the mean before the LRF centered squarely on 60% and the after mean centered right around 50%. For those below the limit, on the other hand, there is a clear shift to the right, towards a mean of roughly 50%. These histograms confirm visually findings from other studies: the LRF may have served to decrease personnel expenditure shares among those that were above the limit but it also encouraged

municipalities below the limit to increase the share of liquid current receipts spent on personnel. That municipalities below the 60% expenditure limit could be reacting to the spending limits by increasing personnel expenditures is potentially cause for concern, since estimated changes in the “treatment” group (those above the limit) compared to changes in the “control” group will be biased and overestimate the extent to which municipalities above the limit reduce their personnel expenditures. Fortunately, restricting the sample to those near the personnel expenditure limit seems to solve the problem. When the sample is restricted to only those within 20 percentage points of the limit, there is no discernible movement in personnel expenditure shares between the before and after periods in municipalities below the limit. Once the sample is restricted to municipalities within 10 percentage points of the expenditure limit the distribution of expenditure shares actually also shifts to the left among municipalities below the limit. Results for all samples are presented in regression equations, but results from the non-restricted sample should be interpreted with particular caution.

While it is possible that these adjustments toward a central value are nothing more than a process of mean reversion, in which municipalities deviate from their normal personnel expenditure share values and simply move back toward their normal expenditure share levels, the large drops in the actual number of municipalities above the expenditure share limits following the implementation of the Fiscal Responsibility Law seen in Figure 20 make this an unlikely story. In Figure 24, I present a series of histograms of personnel expenditures year-by-year between 1998 and 2006. These histograms show a notable reduction in the dispersion of expenditure shares in the years following 2001, when the LRF went into effect, and a gradual small shift upward. Again, while this is not causal evidence that the expenditure limits enforced in the LRF actually served to increase rather than decrease personnel expenditure shares, it does present evidence that the decreases in personnel spending shares among those above the limit and the increases in personnel spending shares among those below the limit are unlikely to be explained by a story of mean reversion alone.

To get a visual sense of whether the expenditure limits seem to have an impact on personnel spending, non-personnel spending, total spending and municipal revenue generation, Figures 25 through 28, present fitted lines for these outcomes in constant per capita values before and after the Law of Fiscal Responsibility is in place, split by whether or not the municipalities are above the expenditure limits in the years before the Law goes into effect. Figure 25 presents the graph for personnel expenditures. While per capita personnel expenditures maintain a smooth upward trend among those below the expenditure limit in pre-LRF years, there is a notable drop in both the value and the growth of expenditures among those above the limit in years after the Law of Fiscal Responsibility is introduced. In Figure 26, which presents the graph for non-personnel expenditures, the pattern is somewhat the opposite. Those below the limit in pre-LRF years again see a relatively smooth pattern in non-personnel expenditures in years before and after the Law of Fiscal Responsibility was implemented, but those above the limit see a large jump upward in both the value and the growth of non-personnel expenditures. Figure 27 presents the graph for total expenditures to examine whether these adjustments to personnel and non-personnel spending change total

spending. The lines for those above and below the limit are entirely overlapping both before and after the Law of Fiscal Responsibility in Figure 27—evidence suggesting that the expenditure limits did little to change total expenditures. Figure 28 presents the graph for municipal revenue collection through taxes and fees and presents some preliminary evidence that municipalities may be collecting more local revenue as a result of the personnel spending share limits. Before the Law of Fiscal Responsibility, lines for those above and below the expenditure limits are indistinguishable from one another. However, while both groups increase revenue generation in the post-LRF period, those municipalities that were initially above the limit increase revenue generation more than those below the limit.

I next present raw differences-in-differences for key outcomes variables. Table 5 presents key current expenditures (personnel, non-personnel and total current expenditures) as a share of liquid current receipts before and after the implementation of the Fiscal Responsibility Law, by “treatment” status (i.e. whether above or below the spending limit). Statistics are presented for the sample of all municipalities for which I have data, the restricted sample of municipalities within 20 percentage points of the 60% limit and the further-restricted sample of municipalities within 10 percentage points of the 60% limit. There are clear reductions in expenditure shares among municipalities that were above the limit prior to the new law, regardless of whether or not the sample is restricted, both in absolute terms and relative to those that were below the limit prior to the new law. However, the reductions are largest when the whole sample of all municipalities above the cutoff is included. This would be consistent with what one would expect to see if municipalities were in fact working to respect the limits detailed in the law: those furthest away from the limit must reduce more in order to be within the spending limits. When looking across the whole sample of municipalities below the limits, we again see an increase in spending shares among municipalities below the limit. However, once the sample is limited just to municipalities within 20 and 10 percentage points of the limit, personnel spending shares also go down in the “control” group, though the reduction is very small (just under 1 percentage point) among all municipalities with pre-LRF expenditures shares between 40% and 60%. The reduction in expenditure shares among the “control” group become substantially larger when the sample is limited to those within 10 percentage points of the limit.

In Table 6 through Table 8, I present simple differences-in-differences for key outcome variables for the whole sample and for the restricted sample of municipalities within 10 percentage points of the expenditure limit, respectively. I use log values in my regression analyses in order to deal with the extreme variation that exists across municipalities in both raw and per capita values of most public finances variables, and log values are also presented in these tables for the same reason.

Personnel expenditures increase less and non-personnel expenditures (non-personnel current expenditures and capital expenditures) increase more among those above the expenditure limit relative to those below, though differences are only marginally significant in the raw difference-in-differences. Municipalities were initially further apart in terms of

personnel and non-personnel current expenditures and tend to converge to more similar values and slopes of change along both dimensions of current expenditures after the expenditures limits are imposed in the Law of Fiscal Responsibility. Patterns for capital expenditures are not as clear-cut and outcomes seem to be driven by a couple of years in which those below the expenditure limits had lower capital expenditures than those above the limit on average rather than by a consistent trend. Changes in expenditure allocations seem to be primarily re-allocations and do not seem to be translating into changes in total expenditures or even in total current expenditures in the raw difference-in-differences.

Total revenues and current revenues do not appear to react much in the raw difference-in-differences either for the sample of all municipalities or for the sample of municipalities within 20 and 10 percentage points of the limit. However, two notable changes do seem to be occurring. First, there is some indication that municipalities are increasing their revenues from taxes and fees as well as from income-generation activities to cope with the new restrictions, as both increase more in the municipalities for which the expenditure limit was binding than they do for those that were already below the limit (though differences for taxes and fees are only marginally significant for the most restricted sample).

Second, changes in capital receipts exhibit substantially different patterns across “treatment” and “control” groups. Generally capital receipts increase less among municipalities that were directly affected by the expenditure limits. This is driven primarily by lower growth in capital transfers, which account for the majority of municipalities’ capital receipts. On the other hand, municipalities above the limit see an increase in loans while those below the limit see a decrease. As with capital expenditures, patterns for capital receipts are far less smooth than those for current receipts. Different patterns do not seem to emerge until the year 2005, the year that the debt limits laws associated with the Law of Fiscal Responsibility finally went into effect after being passed in 2003.

8 RESULTS

I refine the basic difference-in-difference estimates presented in the preceding section by running regressions for Equation (13). I first examine formally the first-order question of whether the personnel expenditure limits reduce personnel spending. I then move on to look more deeply into how municipalities are achieving these reductions by examining other spending as well as receipts, disaggregated by key sub-categories of each. In Section 8.1, I examine responses of spending shares; in Section 8.2 I examine impacts on spending; in Section 8.3, I examine impacts on municipal receipts and in Section 8.4, I examine impact on deficit spending and debt.

8.1 IMPACTS ON EXPENDITURE SHARES

I first confirm that the personnel expenditure limits imposed on municipalities are achieving their first-order objectives of limiting personnel spending as a share of liquid current

receipts. Table 9 presents results for Equation (13), with personnel expenditures as a share of liquid current receipts as the outcome of interest. Columns (1) through (3) present results using the full sample of all municipalities above and below the 60% spending limit for comparison purposes, since estimates are likely to be biased for this sample; columns (4) through (6) present results for the restricted sample of municipalities within 20 percentage points of the limit; and columns (7) through (9) present results for the further-restricted sample of municipalities within 10 percentage points of the 60% limit. The coefficient estimate on “Treatment” represents the impact of the expenditure limits on outcomes. For each sample, the first columns (columns (1), (4) and (7)) present results for regressions that include municipality fixed effects and state-year dummies without any additional controls. The second columns (columns (2), (5) and (8)) add the natural log of population as a control variable. The third columns (columns (3), (6) and (9)) add the natural log of municipal GDP as an additional control.

Regardless of the specification, the personnel expenditure limits do appear to succeed in reducing the share of liquid current receipts spent on personnel. Municipalities that were bound by the expenditure limits see smaller increases in personnel expenditure shares relative to municipalities that were not bound by the limits (those below the limit initially). Whether all municipalities or just those near the 60% limit are included in the analysis matters a great deal for the magnitude of the estimated effect. Estimates for the unrestricted sample would indicate that the expenditure limits result in a reduction of 15 to 17 percentage points in the speed of growth, but this is very likely to be an over-estimate of the impact of the expenditure limits, since, as previously discussed, municipalities far below the expenditure limit may be reacting to the law by increasing personnel expenditures shares. Estimates for the two restricted samples of municipalities within 20 and 10 percentage points of the 60% limit are far more likely to be accurate. It is worth noting, however, that the more restricted sample may yield an under-estimate of the impact of the limits, since municipalities very near the cutoff may actually also react to the limits by reducing personnel expenditures preventively. Estimates for the two restricted samples indicate that municipalities reduce the growth of personnel expenditure shares by between roughly 6 and 12 percentage points in response to the personnel expenditure limits. The negative coefficient on population implies that a 1% increase in population is associated with very slightly smaller personnel expenditure shares, on the order of .0002 to .0003 percentage points.

In columns (4), (8) and (12), the reader may notice that sample size estimates drop by roughly 15% when the log of GDP is included as a control variable. This is because GDP data are only available from 1999 through 2009 as opposed to other data, which run from 1996 through 2010. I test whether changes in coefficient estimates when GDP is added as a control are driven by the inclusion of the variable as a control by comparing three variations on the regressions from columns (4), (8) and (12): 1) including all years of data (1996-2010) and excluding GDP data, 2) including only observations for which GDP data are also available (essentially the same as excluding 1996, 1997, 1998 and 2010) but excluding GDP as a control variable and 3)

including GDP as a control variable. (Table 10) Columns (1), (4) and (7) serve as the “base case” and are the same as columns (3), (7) and (11) from Table 9.

In columns (2), (5) and (8), I restrict the observations included in the regression to those for which GDP information is also available, but I exclude GDP in order to see how changing the sample changes coefficient estimates. There is a substantial change in coefficient estimates even before I actually include GDP as a control variable. In columns (3), (6) and (9), I include GDP as a control variable. Doing so has no discernible effect on treatment coefficient estimates. Essentially, this tells the reader that adding GDP as a control variable is not what drives changes in results when it is added; rather it is loss of one of my two years of pre-intervention data that is driving the change in coefficient estimates. All in all, this series of tests indicates that adding GDP as a control variable is of little value in generating more accurate results and comes at substantial cost. Thus, I choose to eliminate. Although not presented, I conduct the same set of verification exercises for all other key outcome variables to confirm that the benefit of excluding GDP from regressions far outweighs the cost of doing so.

8.2 IMPACTS ON SPENDING

I first examine the personnel expenditure limits’ impacts of the spending limits on spending. Of importance, however, is not only how personnel spending changes but also how other expenditures change as a result of the expenditure limits. Thus I look not only at impacts on personnel expenditures but also on non-personnel current expenditures, total current expenditures, capital expenditures and total expenditures in an effort to understand more broadly how municipalities are adjusting their expenditures to comply with the expenditure limits. Table 11 presents estimates of the impact of the personnel expenditure limit on the natural log of personnel expenditures (as opposed to expenditure shares presented in the previous section). Estimates from the restricted samples indicate that municipalities are reducing the growth of personnel expenditures by approximately 10% to 16% in response to the new expenditure limits. In order to present key coefficient estimates in an economical fashion, Table 12 presents all log expenditure outcomes in a single table. Excluded from the table is the sample of all municipalities above and below the limit. Results for the full sample are, in all cases, tend toward estimates for the sample of municipalities within 20 percentage points but are more extreme.

While municipalities that are constrained by the expenditures limits reduce personnel expenditures, they may be substituting toward non-personnel current expenditures; the personnel expenditure limit results in roughly an 11% increase in current non-personnel spending among the sample of municipalities within 20 percentage points of the limit. However, results are not significantly different from zero among the more restricted sample. The net effect of the expenditure limits on current expenditures is still a slight reduction of roughly 3% to 4% in the growth of total current expenditures, though results are only marginally significant among the more restricted sample. However, the personnel expenditure limits have no significant discernible impact on total expenditures (column (7) and (8));

although coefficient estimates for the impact of the limits on total expenditures are negative, they are not statistically significant.

The reason that total expenditures do not change despite the fact that total current expenditures go down is that municipalities seem to be shifting expenditures from personnel not only toward current non-personnel but also toward capital expenditures. In columns (9) and (10) of Table 12, the positive coefficients on treatment indicate that capital spending increases by 7.6% to 9.6% in municipalities bound by the personnel expenditure limits. Again, results are only marginally significant for the more restricted sample. All in all, these results indicate that, while municipalities do respond to the personnel expenditure limits by reducing personnel expenditures, they do not reduce total expenditures in any measurable way.

Not surprisingly, larger populations are generally associated with higher expenditures. A 1% increase in populations is associated with roughly a 0.4% to 0.5% increase in current and capital expenditures. While the mayor's share of the vote has no discernible relationship to current expenditures, mayors with a larger share of the vote have significantly higher capital expenditures and, as a result, spend more overall.

A concern with tax and expenditure limitations that is often raised is that they will negatively affect the provision of public goods, particularly in the areas of education, health and social assistance. Table 13 examines whether the personnel expenditure limits have any effect on spending in public services with primarily social functions: education, health, social assistance, and housing and urban development. Results present no significant evidence that municipalities decrease spending on these public goods.

Columns 1 through 4 of Table 14 examine impacts on public spending related to municipal bureaucracy (legislative spending, spending on administration and planning). Columns 5 through 10 of Table 14 examine impacts on public spending related to economic development spending: spending on agriculture (e.g. agricultural extension programs, irrigation infrastructure, etc.), spending on industry (promoting industry, offering of incentives, etc.), services, energy and mining and spending on transportation. There are no significant reactions in any type of "bureaucracy"-related spending. The only category of spending that sees a significant change is transportation spending, which goes down considerably (60% to 74%) in response to the personnel spending limits. This may seem at odds with the increases in capital expenditures seen in previous tables. However, it may be the case that transportation is more discretionary in nature than other spending categories (making it easier to cut) or employs more contract (rather than permanent) workers, who are the first to be cut from payrolls.

All in all, there is little consistent evidence that expenditure reductions are concentrated in particular public functions, with the exception of transportation spending. Results suggest that municipalities are not reducing spending on social spending, may be reducing legislative spending and seem to be concentrating expenditure reductions in the transportation sector.

8.3 IMPACTS ON CURRENT RECEIPTS

Municipalities have three options for reducing personnel expenditures as a share of liquid current revenue: (1) they can reduce the numerator (personnel expenditures) or (2) they can increase the denominator (liquid current receipts) or (3) they do both (1) and (2). It is clear from the previous section that they reduce personnel expenditures. In this section, I see whether there is evidence that municipalities are also reacting to the expenditure limits by also increasing liquid current receipts. Table 15 presents general results on whether municipalities respond to the personnel expenditure limits by increasing current revenues and indicates weak evidence, at best, that municipalities affected by the expenditure limits are increasing current revenues; in the sample of municipalities within 20 percentage points of the limit, there is a marginally significant increase in of 1% in revenues, but coefficient estimates are small in magnitude and not significant among the more restricted sample of municipalities within 10 percentage points of the limit.

I next look more closely at sub-categories of current receipts. If municipalities are responding to the personnel expenditure limits by increasing their receipts, one would expect to see this show up in revenue sources over which municipalities have control. The key components that make up current receipts are transfers, local revenue collected, national income tax collected on salaries paid by the municipality, several sources of municipally-generated income, including income from municipal agricultural activities, income from municipal industrial activities and income from productive assets (for example, rental fees paid to the municipality). The bulk of municipalities' revenues come transfers from other levels of government, which are distributed based on formulas determined by the state or federal government. While there is little room for municipalities to influence the amount of transfers they receive, it is certainly possible for municipalities to lobby the state or federal government for more discretionary funding. Local revenue collection and municipally-generated income, on the other hand, make up a much smaller component of revenues but are mostly within municipalities' control. To a lesser extent, municipalities can influence the amount of income tax received on salaries paid by adjusting salaries (though this has a direct effect on their expenditures as well), but they cannot control the federal income tax rate or the federal government's diligence in collecting income taxes. Table 16 presents results for total current receipts and major sub-categories of total current receipts: total transfers from other levels of government, locally generated revenues (taxes and fees), federal income tax on salaries paid by the municipality, and municipal income. All outcomes are in natural logs.

Evidence from the United States indicates that state governments often end up compensating for tax and expenditure limits by increasing transfers to local governments (Shabegian 2003). Columns (3) and (4) of Table 16 test whether this is the case in Brazil and find no evidence that transfers increase more in those bound by the policy. Columns (5) and (6) of Table 16 present impacts of the expenditure limits on federal income tax collected on salaries paid by the municipality, which is transferred back to the municipality. Since municipalities do

not have direct control over this amount, except inasmuch as they change the amount of money they pay out in salaries, the only plausible mechanism through which the expenditure limits might impact these receipts is through the reductions in the growth of personnel expenditures exhibited in Table 11. Despite the fact that there are decreases in personnel expenditure growth as a result of the expenditure limits, there are no discernible impacts on the amount of federal income tax coming back to municipalities from salaries paid by the municipality.

The revenue categories for which there is evidence of increases in response to the expenditure limits are precisely those revenue sources over which municipalities have the most control: local revenue generation from taxes and fees and municipally-generated income. Columns (7) and (8) present results for local revenue generation, and columns (9) and (10) present results for municipally-generated income. Coefficient estimates provide weak evidence that municipalities may be responding to limits on personnel expenditure shares by increasing local revenue generated from taxes and fees. Results are only marginally significant among the sample of municipalities within 20 percentage points of the limit and insignificant among the more restricted sample. There is stronger evidence that municipalities are increasing municipally-generated income by around 30% more than those below the limit. It is not particularly surprising that there is little evidence of movement in current receipts despite any increases in local revenues, since local revenues make up a very small share of total revenues.

8.4 IMPACTS ON DEFICIT SPENDING

One of the express goals of the Fiscal Responsibility Law was to improve fiscal balance at all levels of government, including municipalities. In this section, I look at how effective Brazil's personnel expenditure limits have been at reducing deficit spending. To look at deficit spending impacts, I use the outcome of spending surplus or deficit as a share of total revenues and the probability of being in spending deficit using a dummy variable equal to one when municipality expenditures are greater than receipts and equal to zero if not spending is less than or equal to receipts.

Table 17 presents results for impacts on surplus/deficit spending as a share of total revenue. The surplus/deficit variable is a continuous variable that takes on negative values when a municipality is in deficit and a positive value when a municipality is in surplus. Thus, a positive coefficient on "treatment" indicates that the expenditure limits increase spending surpluses or reduce deficits. Table 19 uses Equation (13) in a linear probability model to predict the expenditure limit's impacts on the probability that a municipality has a spending deficit.

Tables 17 and 18 provide some evidence that the limits may have been successful at promoting larger spending surpluses or smaller deficits and reducing the probability of being in deficit. Among the sample of municipalities within 20 percentage points, those municipalities for which the expenditure limits were binding reduce deficit spending by a small but significant 1.4% of total receipts. The probability of being in deficit goes down across both samples (those

within 20 and 10 percentage points of the limit) by between 3.1 and 5.2 percentage points. However, estimates are only marginally significant among the sample of municipalities within 10 percentage points of the expenditure limits.

9 ROBUSTNESS CHECKS: EVIDENCE NEGATING SIMPLE MEAN REVERSION

It is important to note that simple reversion to the mean could produce findings similar to what is found in this paper. If municipalities above the limit experienced some shock and were temporarily spending more as a share of liquid current receipts than they normally would on personnel, then one would expect to see them gradually reduce the growth of personnel expenditures until they return to their steady-state optimum. On the flip side of the coin, if those below the limit are below their steady-state levels, then one would expect them to increase personnel expenditures at a higher rate. As a result, it is possible that changes in some outcomes could be explained by this process of mean reversion rather than by the effects of the personnel expenditure limits. This is of particular concern for the major sources of spending and receipts that determine personnel expenditure shares because expenditure shares are used to determine treatment status and are less of a concern for expenditures and receipts that do not directly determine treatment status.

In Figure 20, I present a picture of the number of municipalities above and below the expenditure share limits over time. The sharp drop in the number of municipalities above the expenditure limit in years just after the introduction of the Law of Fiscal Responsibility is inconsistent with a story of mean reversion and is unlikely to be a simple coincidence. If the policy did not affect personnel expenditure shares and mean reversion alone explained the results, one would instead expect to see a relatively stable number of municipalities finding themselves above the limit in any given year. Further, in a series of histograms of personnel expenditures year-by-year between 1998 and 2006 (Figure 24), there is a notable reduction in the dispersion of expenditure shares that does not appear until after the LRF went into effect and a gradual small increase in expenditure shares across the whole sample— evidence that is inconsistent with an explanation that personnel expenditure shares are adjusting due to nothing other than mean reversion. Nonetheless, I conduct two tests to further verify that my results are not simply a story of mean reversion: (1) I conduct a placebo test using data from the pre-LRF period only and verify that effects do not appear prior to the introduction of the Law of Fiscal Responsibility, (2) I verify that effects appear immediately rather than gradually appearing over time.

I find that mean reversion may explain part of the reduction in growth of personnel spending, but it is unlikely to explain all of it. I also find that mean reversion could explain most or all of the growth in capital spending, but this does little to change findings that municipalities tend to react to the personnel expenditure limits by substituting away from personnel expenditures and toward non-personnel expenditures with a null impact on total spending. There is no evidence that mean reversion can explain impacts on non-personnel current expenditures, local revenue generation or locally-generated income.

9.1 PLACEBO TREATMENT YEAR

If reversion to the mean were driving my results, one would expect to see results begin to appear even before the Law of Fiscal Responsibility is in place. To check whether this is the case, I run regressions for key outcomes (the natural log of personnel expenditures, log non-personnel current expenditures, log capital expenditures, log revenue generation, log income revenues and surplus/deficit spending as a share of total receipts) on data using only pre-treatment years (1996 to 2000) on my placebo treatment variable, with treatment defined as beginning in 2000 rather than in 2001. Table 19 presents results from these regressions. Columns (1) and (2) present placebo treatment results for log personnel expenditures, columns (3) and (4) present results for log non-personnel current expenditures, columns (5) and (6) present results for total current expenditures, columns (7) and (8) present results for log capital expenditures, columns (9) and (10) present results for log local revenue generation, columns (11) and (12) present results for log revenues from municipal income, columns (13) and (14) present results for surplus/deficit spending as a share of total receipts, and columns (15) and (16) present results for the probability of being in deficit. At the bottom of the tables, coefficient estimates on treatment from the actual (non-placebo) regression model are presented for comparison purposes.

There is no evidence of a placebo effect for total current expenditures, revenue generation, municipal income, surplus/deficit as a share of total receipts or the probability of being in deficit. This should assuage concerns that results for these outcomes are driven by mean reversion.

Coefficient estimates on placebo treatment for personnel expenditures in column (1) are, however, significant among the sample of municipalities within 20 percentage points of the limit. Placebo coefficient estimates indicate a possible 3 to 4% reduction in the growth of personnel expenditures even before the introduction of the personnel expenditure limits under the Law of Fiscal Responsibility. At the same time, the magnitudes of the placebo coefficient estimates are much smaller than the coefficient estimates on actual treatment. In the sample of municipalities within 20 percentage points of the limit, the placebo estimate yields a significant 4.4% reduction compared to a 16% reduction estimated on actual treatment; and in the sample of municipalities within 10 percentage points of the limit, the placebo estimate yields a 3.4% (insignificant) reduction compared to a 10% reduction estimated on actual treatment. Thus, while it is possible (and even likely) that mean reversion explains a portion of the reductions in the growth of personnel spending found in previous estimates, it is unlikely to explain everything. In the next section, I confirm that the magnitude of coefficient estimates on actual treatment shoot up immediately after the Law of Fiscal Responsibility is effective, indicating that the larger reductions seen after 2001 are unlikely to be resulting from a simple mean reversion adjustment process, and in Section 9.3 I estimate the impact of the personnel expenditure limits above and beyond the potential mean reversion effect by differencing placebo estimates from treatment estimates.

While coefficient estimates on placebo treatment for capital expenditures in columns (7) and (8) are not significant, they are of similar size, particularly among the sample within 10 percentage points of the limit. As such, results for capital expenditures and non-personnel may not be distinguishable from a story of mean reversion and should be interpreted with caution. It may be that typically municipalities put money into capital expenditures when not spending it on personnel. If this is the case, mean reversion would show up as reduction in personnel expenditures and increases in capital expenditures. The lack of robustness of capital expenditure results does not, however, change the overall picture. It simply means that the substitution effect of the personnel expenditure limits may be concentrated only in substitution toward non-personnel current expenditures rather than toward both non-personnel current expenditures and capital expenditures.

While the coefficient on non-personnel current expenditures is similar across placebo and treatment estimates in the more restricted sample in column (4), the less restricted sample of municipalities within 20 percentage points of the limit does not exhibit any evidence of a placebo effect.

9.2 POLICY DISCONTINUITY APPROACH

In the previous section I confirmed that results generally do not appear in years prior to 2001, when the personnel expenditure limits go into effect, with the exception of personnel expenditures. The substantially smaller magnitude of the coefficient on placebo treatment makes it unlikely that mean reversion alone explains the personnel expenditure reductions found in Section 8. If mean reversion were driving my results, one would also expect to observe a gradual process of adjustment back to one's steady-state expenditure levels rather than a sudden jump immediately following treatment. In this section I test whether this is the case by running multiple sets of regressions and gradually add in all years of data. Looking only at the years just after the policy is introduced essentially turns my analysis into a policy discontinuity analysis.

Table 20 presents results from this exercise. As in the previous tables, columns (1) and (2) present results for log personnel expenditures, columns (3) and (4) present results for log non-personnel current expenditures, columns (5) and (6) present results for log total current expenditures, columns (7) and (8) present results for log capital expenditures, columns (9) and (10) present results for log local revenue generation, columns (11) and (12) present results for log revenues from municipal income, columns (13) and (14) present results for surplus/deficit spending as a share of total receipts, and columns (15) and (16) present results for the probability of being in spending deficit. For purposes of comparison, the top rows of each column present the placebo coefficient estimates from Table 19, and the bottom row presents my main results including all data-years.

Columns (1) and (2) demonstrate a sharp and significant drop in the growth of personnel expenditures in the years immediately following the introduction of the Law of Fiscal Responsibility. Thus, while it is possible (and even probable) that mean reversion could account for some of the effects found in Section 8.2, it is unlikely that it accounts for all of it. Much of the reduction in growth of personnel expenditure is more likely explained by the personnel expenditure limits. In the next section, I difference the placebo estimates from the impact estimates to arrive at a more moderate estimate of the impact of the personnel expenditure limits on personnel spending. Drops in current expenditures (columns (5) and (6)), also show up immediately after the Law of Fiscal Responsibility is introduced.

Among the sample of municipalities within 20 percentage points of the limit, both non-personnel current expenditures and capital expenditures exhibit sharp and significant increases immediately after the Law of Fiscal Responsibility is introduced, and the changes are largely sustained. Thus, results for these variables may not in fact be driven by mean reversion alone. Among the more restricted sample, results are not distinguishable from placebo estimates for the most part. The one exception is that capital expenditures rise substantially immediately following the introduction of the new law. However, these changes are not sustained in the more restricted sample.

Columns (7) and (8) demonstrate that revenue generation effects do not show up until the final years for which I have data. This evidence by itself might lead the reader to believe that mean reversion is to blame. However, this is unlikely to be the case. Mean reversion is of particular concern for personnel expenditures and variables that directly determine current receipts (the denominator for expenditure shares, which is used to determine treatment status). As a reminder to the reader, current receipts are made up of transfers, local revenues and local income and several other small miscellaneous sources revenues, but transfers make up the vast majority of current revenues (around 87% to 88%). Local revenue and local income are each such a small part of total current receipts (between 4.7% and 5.5% and between 0.7% and 1.7%, respectively) that changes in local revenues alone do little to impact expenditure share levels. As a result, changes in local revenue generation alone would be unlikely to do much to throw municipalities off their long-run personnel expenditure share equilibrium or push them over the personnel expenditure limit. Mean reversion is thus far less of a concern for local revenue generation as it would be for personnel expenditures or for transfers. Further, it is to be expected that local revenue generation would take a while to respond to the personnel expenditure limits. For the most part, the biggest problem facing municipalities in increasing revenues is not the tax rate, which could be adjusted quickly and easily. Rather, it is low tax collection and enforcement capacity (out-of-date property valuations, poor record-keeping systems and poorly developed operational plans for annual collection and enforcement). All in all, however, the evidence does not point to a strong relationship between local revenue the personnel expenditure limits and revenue generation.

Columns (11) and (12) provide additional evidence that municipalities respond immediately to personnel expenditure limits where they can. Treatment effects for revenues

from local income-generating activities appear immediately after the Law of Fiscal Responsibility is implemented. Similarly, columns (13) and (15) show that increases in surplus/reductions in deficit spending as a share of total receipts and decreases in the probability of being in deficit appear immediately after the introduction of the Law of Fiscal Responsibility in the sample of municipalities within 20 percentage points of the 60% personnel expenditure share limit. These results, combined with the lack of placebo effect, make it highly unlikely that mean reversion is driving the results for revenues from local income-generating activities and for surplus/deficit spending.

9.3 TAKING MEAN REVERSION INTO ACCOUNT IN IMPACT ESTIMATES FOR PERSONNEL EXPENDITURES

The previous sections indicate that it is likely that mean reversion can explain part of the reductions in personnel spending found in Table 11, though it is unlikely to fully explain the results for current expenditures. Table 21 aims to distinguish the effect of mean reversion from the impact of the personnel expenditure limit by differencing placebo estimates from estimates of the limit's impact using only municipalities for which no data are missing in any of the years included in the analysis. Columns (1) through (3) present results for the sample of municipalities within 20 percentage points of the expenditure limit, and columns (4) through (6) present results for municipalities within 10 percentage points of the limit non-personnel current expenditures. Panel A of each table presents placebo estimates, which measures the “mean reversion” effect, and panel B presents coefficient estimates on actual treatment. In Panel B, columns (1) and (4) present treatment using estimates only data through 2002 (the second year after the Law of Fiscal Responsibility was implemented), columns (3) and (6) use the whole sample of data, and columns (2) and (5) use an intermediate sample through 2006. Panel C estimates of the impact of the expenditure limits on personnel, taking into account potential mean reversion.

Adjusted estimates of the impact of the personnel spending limits for the sample of municipalities within 20 percentage points of the limit now indicate a reduction of 10% to 11% in personnel spending rather than the roughly 16% reduction found in the raw treatment estimates in Table 11. While estimates from the more restricted sample are not statistically difference from placebo estimates when treatment estimates are run on data only through 2002, adjusted estimates for all data-years and the intermediate sample of data-years indicate a personnel expenditure reduction of 5% to 6% as opposed to the roughly 10% reductions given by the raw treatment estimates in Table 11.

10 CHAPTER DISCUSSION AND CONCLUSION

This chapter measured the impact of Brazil's personnel expenditure limitation imposed as a component of its Law of Fiscal Responsibility, implemented in 2001. Personnel expenditure limitations required that municipalities spend no more than 60% of liquid current receipts on

personnel. I measure the expenditure limit's impacts on a series of public finance outcomes by comparing changes in outcomes among those bound by the limits (those who were initially above the limit) to those just below the limit using a difference-in-difference regression framework with municipality fixed effects and controlling for state-specific flexible time trends. It is one of the few studies to examine the impacts of TELs outside of the US context.

Evidence suggests that the personnel expenditure share limits do work to reduce personnel expenditures; municipalities reduced personnel expenditure growth by between 6% and 11% in response to the limits. While mean reversion may explain part of the reduction in growth of personnel spending, it does not explain all of it.

All in all, there is some limited evidence that municipalities are substituting toward non-personnel expenditures rather than reducing expenditures. There is evidence among the less restricted sample that municipalities tend to substitute toward non-personnel current expenditures (which increase 6% to 13% among municipalities within 20 percentage points of the limit). Results seem to indicate that capital expenditures also grow faster, but these results cannot be distinguished from a story of mean reversion. The net effect of the personnel expenditure limits on total spending is negligible (though coefficient estimates are negative). This finding is quite similar to evidence from other studies that tax and expenditure limitations (TELs) are often unsuccessful at reducing the size of government; rather, they tend to force local governments to find alternative ways to raise revenues or spend money.

In the US, it was sometimes found that states would step in to help local governments compensate for budgetary shortfalls when TELs were imposed. (e.g. Shadbegian 2003) In the Brazilian context, there is little evidence that the same phenomenon is occurring. This is likely because US TELs tended to take the form of tax limitations rather than expenditure limitations and local governments in the US rely much more heavily on local taxes and revenues than do Brazilian municipalities, which rely primarily on transfers from the federal and state governments. As a result, US TELs tended to result in massive short-run budget shortfalls, which is not true in the case of expenditure limitations imposed in the Law of Fiscal Responsibility.

Municipalities do, however, seem to work to ease the constraints they face under the personnel expenditure limits by expanding their current revenues where they can do so. Efforts at increasing own-source revenues are concentrated in municipal income-generating activities (charging rent for buildings owned, municipally-owned agricultural activities, etc.). There is weak evidence, at best, that municipalities respond to the limits by increasing own revenues, but these effects do not appear until 2009. Anecdotal evidence suggests that municipalities near the 60% limit have recently begun to improve their tax collection efforts as transfers from the central governments diminished in 2009 and 2010 due to the worldwide economic slump (Globo 2012). However, there is no evidence of increased tax and fee collection in the initial years of the Fiscal Responsibility Law.

Overall, there is some evidence that Brazil's expenditure limitation may be successful at reducing spending deficits in municipalities, particularly when looking across the less restricted sample of municipalities within 20 percentage points of the limit. In the less restricted sample, deficit spending as a share of total receipts went down by 1.4% and the likelihood of being in deficit went down by 5.2 percentage points (just over a 10% drop). Among the more restricted sample, the direction of results is similar but smaller in magnitude, but results are not significant for surplus/deficit spending as a share of total receipts and only marginally significant for the probability of being in deficit. Brazil's personnel expenditure limitations can thus be viewed as a potential tool in working toward one of the primary goals of the Law of Fiscal Responsibility: improving fiscal balance. However, it is unlikely that expenditure limitations succeed in reducing deficit spending as efficiently as direct deficit limits would.

An oft-raised concern with respect to Brazil's Law of Fiscal Responsibility and in the US TEL literature is that fiscal limitations will cause municipalities to deprive socially beneficial public services such as education, health and social welfare of sufficient revenue and that these public services will suffer as a result of the limitations. There is no evidence that municipalities are reducing expenditures in any public service other than transportation. It may be that this is an area where municipal have more leeway to cut personnel spending. Contrary to what one might expect, there is no evidence that the personnel expenditure limits do anything to reduce the growth of expenditures related to municipalities' bureaucracies that do not have explicit limits.

This paper adds to the large body of literature examining the impacts of Tax and Expenditure Laws (TELs) but is one of the few to do so outside of the US context. It is also one of the few to study expenditure limitations rather than tax limitations, as most of the US TELs are focused on limiting taxation rather than spending. While Brazil's personnel expenditure limits are generally successful in reducing personnel expenditures, municipalities seem to be substituting personnel expenditures with other types of expenditures rather than slowing the growth of expenditures as a whole. At the same time, the expenditure share limits seem to encourage municipalities to ease their spending constraints by increasing revenues where they can. The net effect is a small but significant reduction in deficit spending.

11 CHAPTER III FIGURES AND TABLES

FIGURE 1: SPENDING ALLOCATION DECISION WITHOUT PERSONNEL EXPENDITURE LIMITS

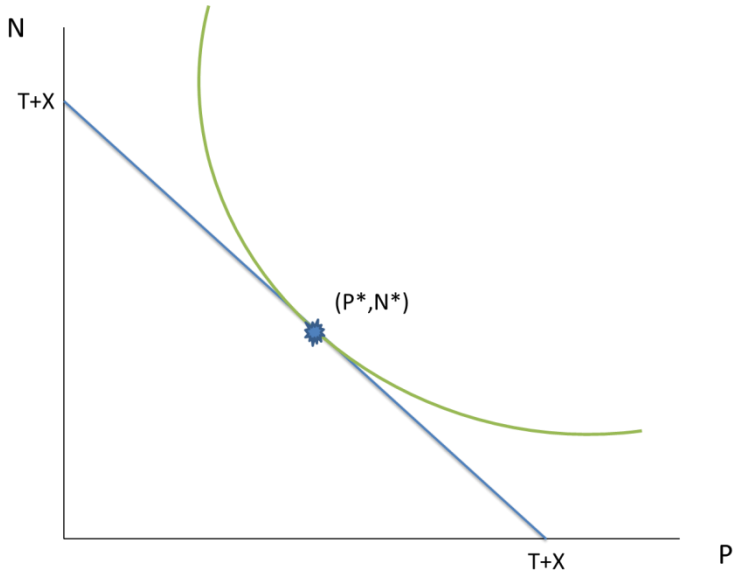


FIGURE 2: TAX COLLECTION DECISION WITHOUT PERSONNEL EXPENDITURE LIMITS

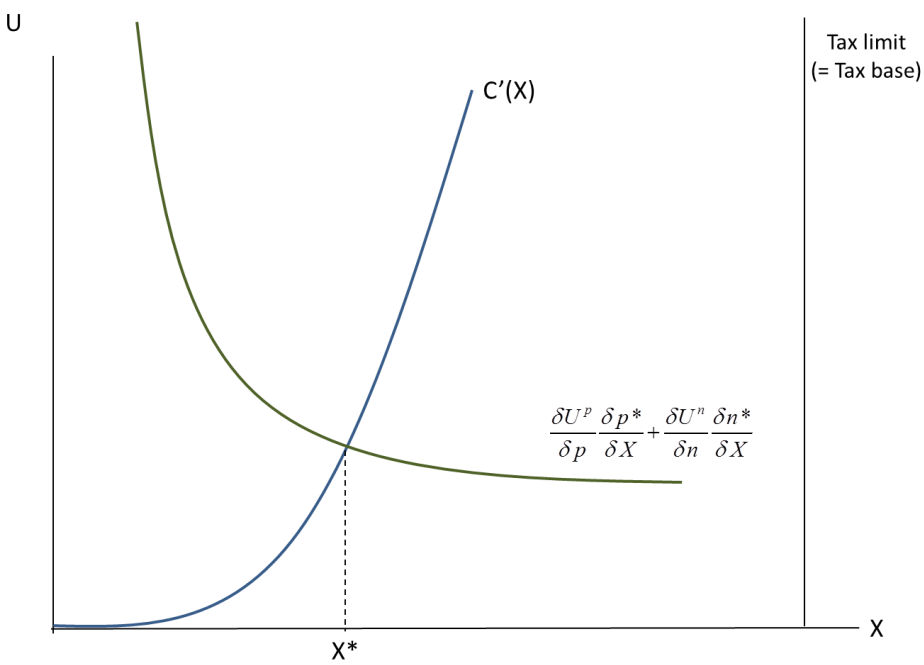


FIGURE 3: SPENDING ALLOCATION DECISION WITH PERSONNEL EXPENDITURE LIMITS AND WITHOUT TAX ADJUSTMENT

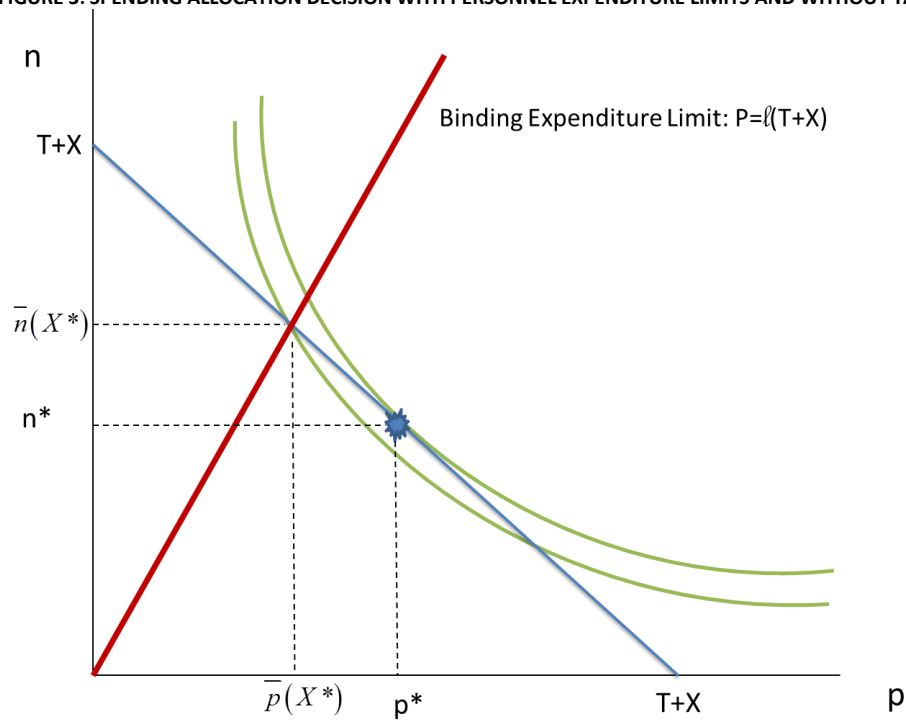


FIGURE 4: SPENDING ALLOCATION DECISION WITH PERSONNEL EXPENDITURE LIMITS

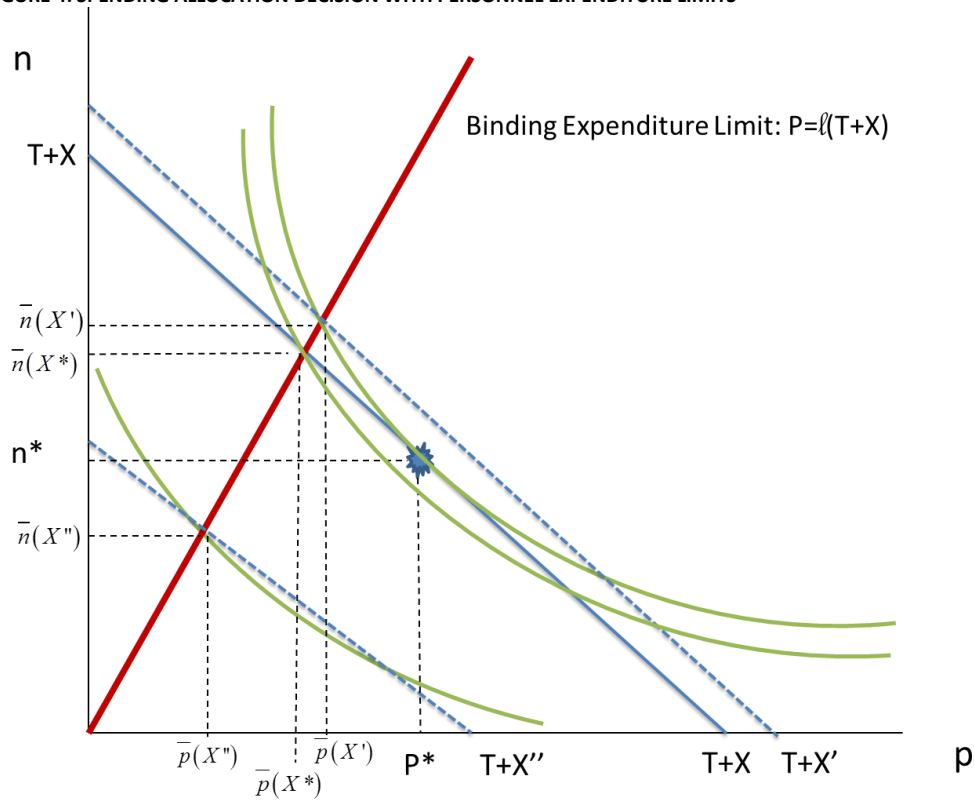


FIGURE 5: TAX COLLECTION DECISIONS WITH PERSONNEL EXPENDITURE LIMITS

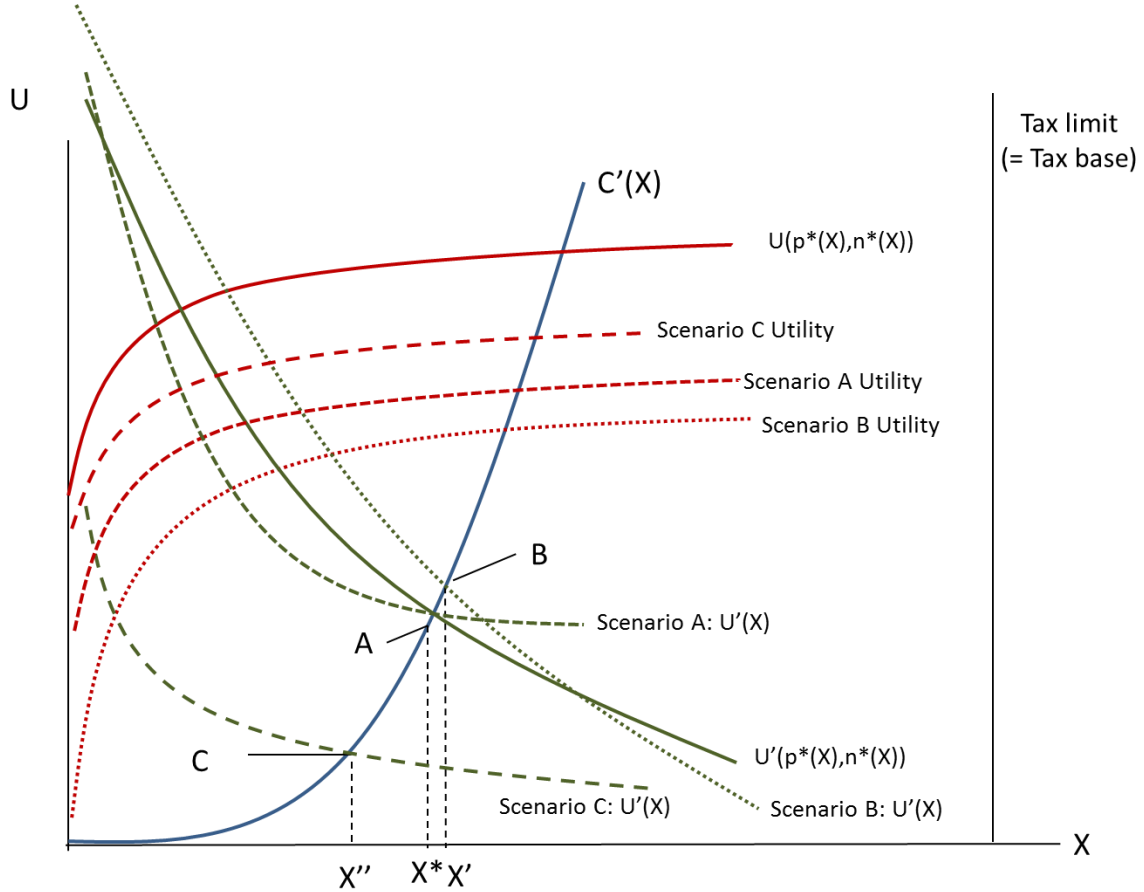


FIGURE 6: REGIONAL BREAKDOWN OF MUNICIPALITIES THAT WERE ABOVE THE 60% LIMIT BEFORE THE LAW OF FISCAL RESPONSIBILITY

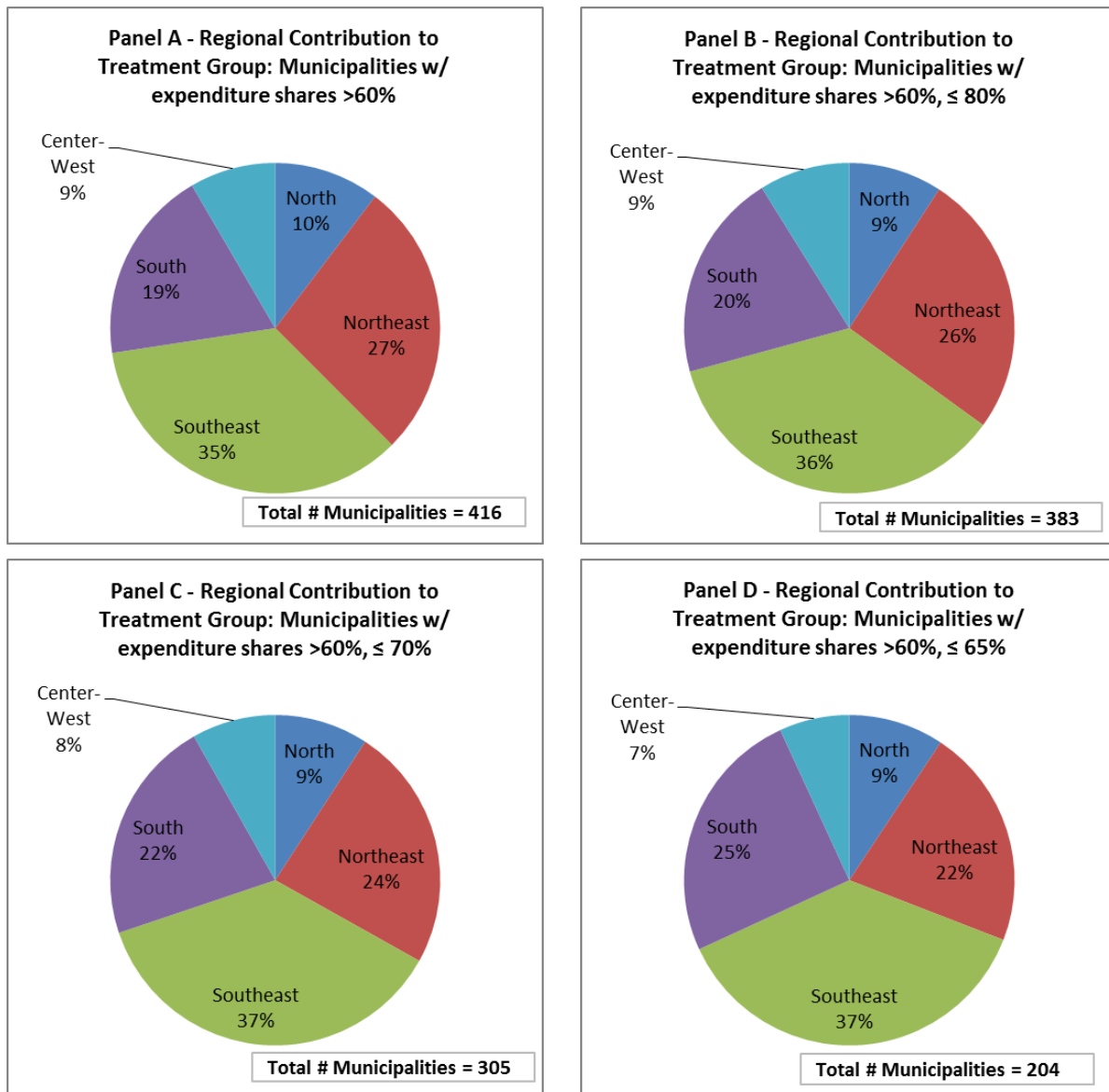


FIGURE 7: REGIONAL SHARE OF MUNICIPALITIES IN SAMPLE AS SAMPLE SHRINKS TO THOSE NEAR THE 60% PERSONNEL SPENDING LIMIT

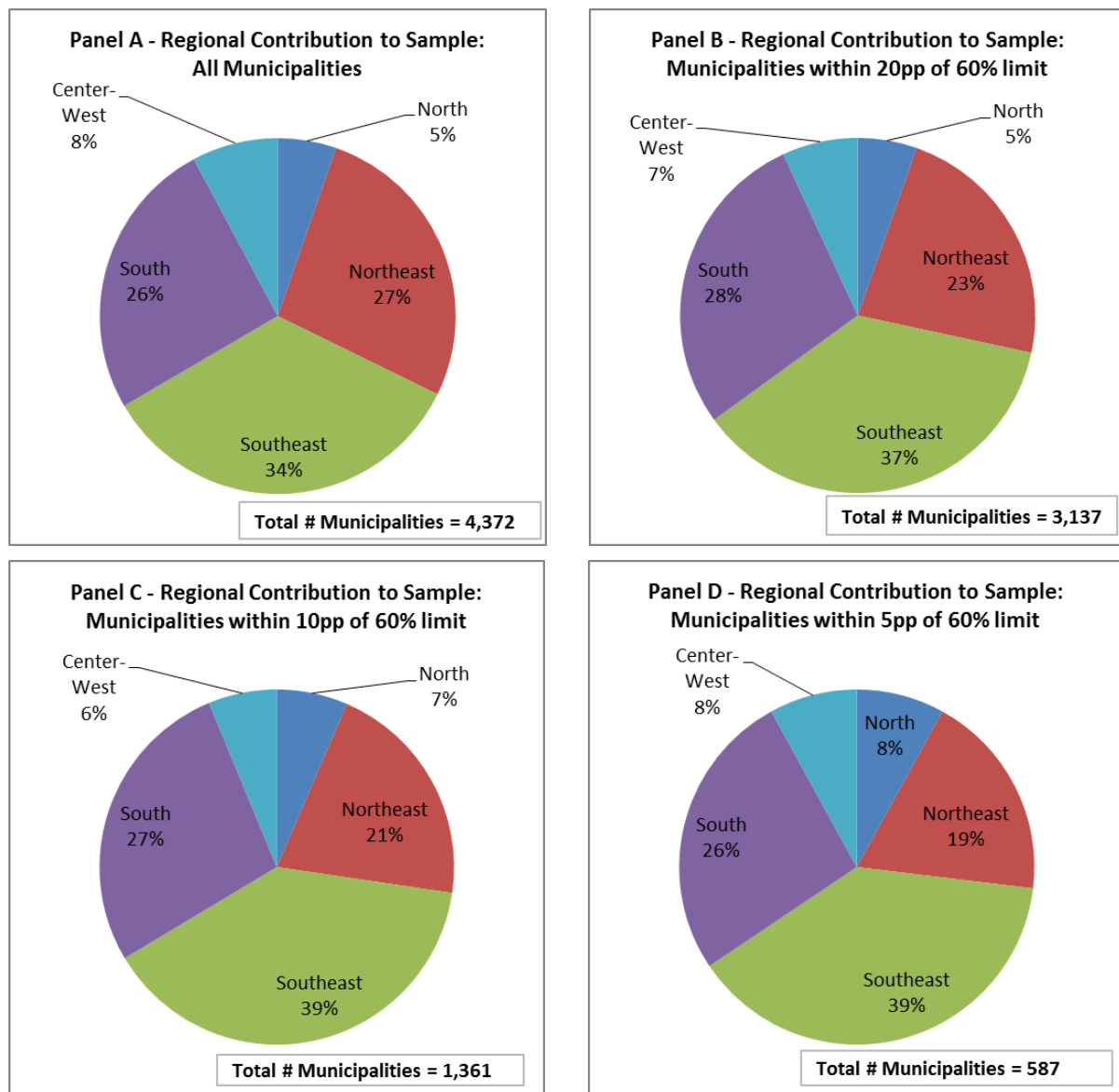


TABLE 1: STATE AND REGIONAL BREAKDOWN OF MUNICIPALITIES ABOVE AND BELOW THE LIMIT

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Sample:	All Municipalities					Municipalities within 10pp of 60% Limit				
	Total	Above	% Above	Below	% Below	Total	Above	% Above	Below	% Below
North	232	43	18.5%	189	81.5%	88	28	31.8%	60	68.2%
Rondônia	34	9	26.5%	25	73.5%	26	7	26.9%	19	73.1%
Acre	21	6	28.6%	15	71.4%	11	5	45.5%	6	54.5%
Amazonas	39	11	28.2%	28	71.8%	17	6	35.3%	11	64.7%
Roraima	4	0	0.0%	4	100.0%	1	0	0.0%	1	100.0%
Pará	31	6	19.4%	25	80.6%	8	5	62.5%	3	37.5%
Amapá	3	1	33.3%	2	66.7%	3	1	33.3%	2	66.7%
Tocantins	100	10	10.0%	90	90.0%	22	4	18.2%	18	81.8%
Northeast	1,178	113	9.6%	1,065	90.4%	284	73	25.7%	211	74.3%
Maranhão	73	5	6.8%	68	93.2%	5	1	20.0%	4	80.0%
Piauí	139	8	5.8%	131	94.2%	24	6	25.0%	18	75.0%
Ceará	119	6	5.0%	113	95.0%	30	4	13.3%	26	86.7%
Rio Grande do Norte	95	3	3.2%	92	96.8%	15	2	13.3%	13	86.7%
Paraíba	146	11	7.5%	135	92.5%	32	7	21.9%	25	78.1%
Pernambuco	146	36	24.7%	110	75.3%	72	25	34.7%	47	65.3%
Alagoas	65	3	4.6%	62	95.4%	11	3	27.3%	8	72.7%
Sergipe	70	12	17.1%	58	82.9%	22	8	36.4%	14	63.6%
Bahia	325	29	8.9%	296	91.1%	73	17	23.3%	56	76.7%
Southeast	1,501	146	9.7%	1,355	90.3%	532	112	21.1%	420	78.9%
Minas Gerais	765	33	4.3%	732	95.7%	167	28	16.8%	139	83.2%
Espírito Santo	65	7	10.8%	58	89.2%	41	6	14.6%	35	85.4%
Rio de Janeiro	78	33	42.3%	45	57.7%	45	23	51.1%	22	48.9%
São Paulo	593	73	12.3%	520	87.7%	279	55	19.7%	224	80.3%
South	1,119	79	7.1%	1,040	92.9%	372	67	18.0%	305	82.0%
Paraná	388	20	5.2%	368	94.8%	104	16	15.4%	88	84.6%
Santa Catarina	282	17	6.0%	265	94.0%	86	13	15.1%	73	84.9%
Rio Grande do Sul	449	42	9.4%	407	90.6%	182	38	20.9%	144	79.1%
Center-West	342	35	10.2%	307	89.8%	85	25	29.4%	60	70.6%
Mato Grosso do Sul	57	3	5.3%	54	94.7%	11	3	27.3%	8	72.7%
Mato Grosso	97	6	6.2%	91	93.8%	24	6	25.0%	18	75.0%
Goiás	188	26	13.8%	162	86.2%	50	16	32.0%	34	68.0%
TOTAL	4,372	416	9.5%	3,956	90.5%	1,361	305	22.4%	1,056	77.6%

FIGURE 8: SCATTERPLOT OF PERSONNEL EXPENDITURES OVER PERSONNEL EXPENDITURE SHARES – ALL MUNICIPALITIES

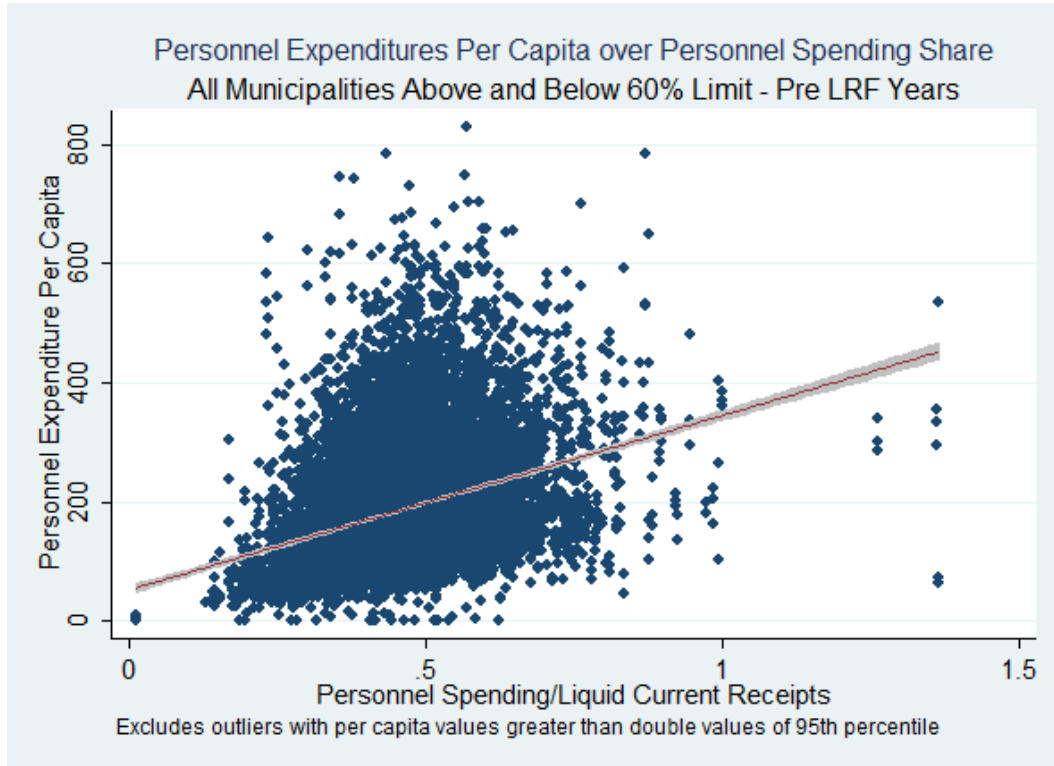


FIGURE 9: SCATTERPLOT OF PERSONNEL EXPENDITURES OVER PERSONNEL EXPENDITURE SHARES - MUNICIPALITIES WITHIN 20 PERCENTAGE POINTS OF 60% LIMIT

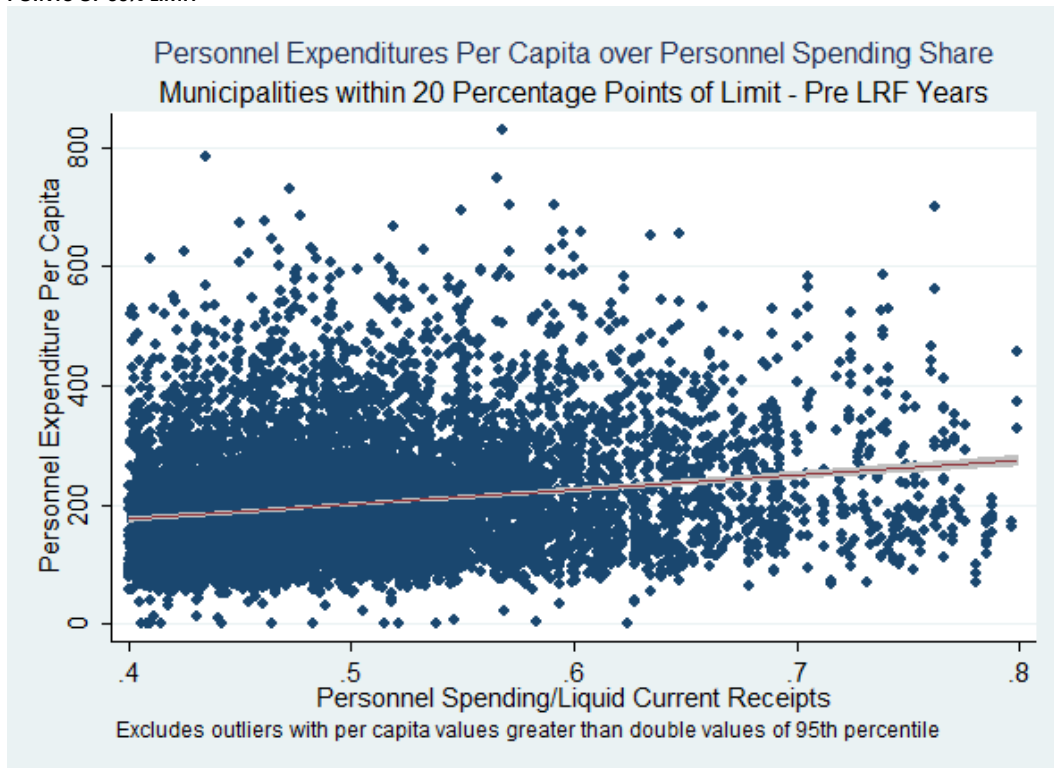


FIGURE 10: SCATTERPLOT OF PERSONNEL EXPENDITURES OVER PERSONNEL EXPENDITURE SHARES - MUNICIPALITIES WITHIN 10 PERCENTAGE POINTS OF 60% LIMIT

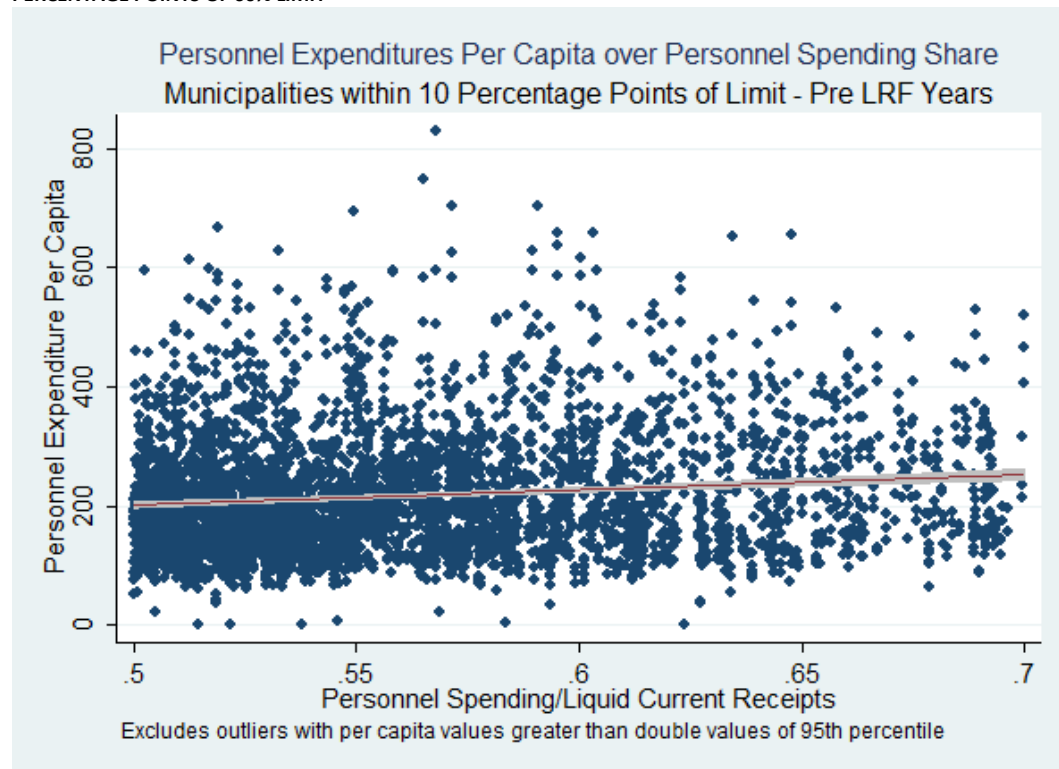


FIGURE 11: SCATTERPLOT OF NON-PERSONNEL EXPENDITURES OVER PERSONNEL EXPENDITURE SHARES – ALL MUNICIPALITIES

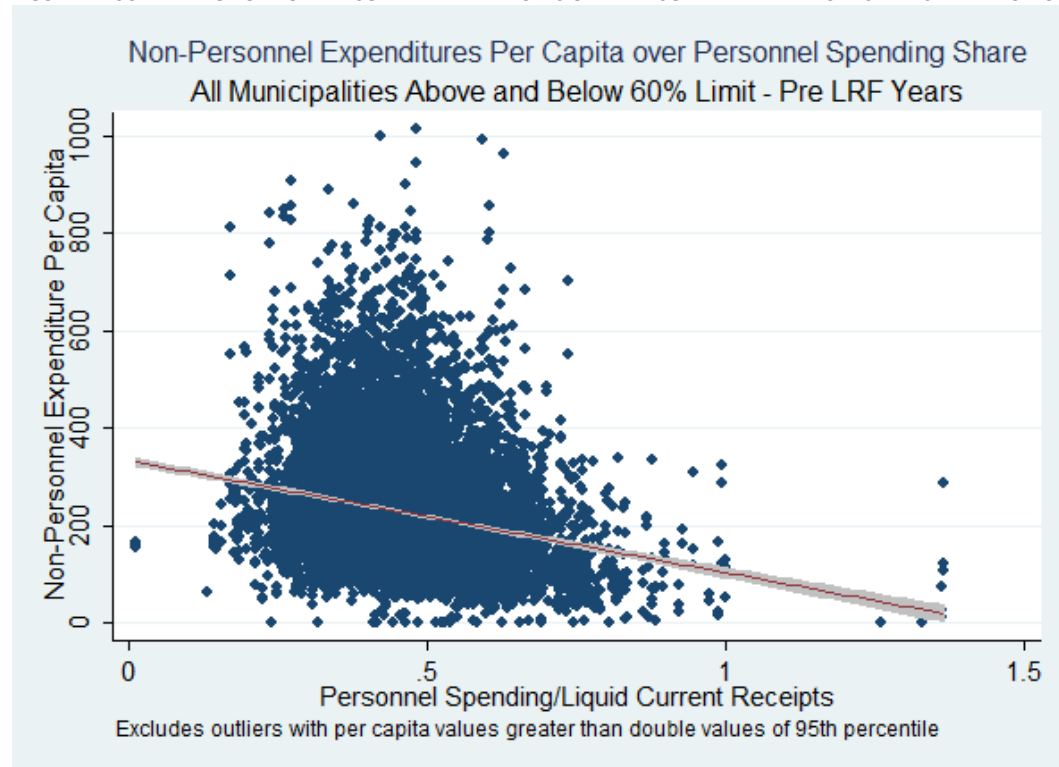


FIGURE 12: SCATTERPLOT OF NON-PERSONNEL EXPENDITURES OVER PERSONNEL EXPENDITURE SHARES - MUNICIPALITIES WITHIN 20 PERCENTAGE POINTS OF 60% LIMIT

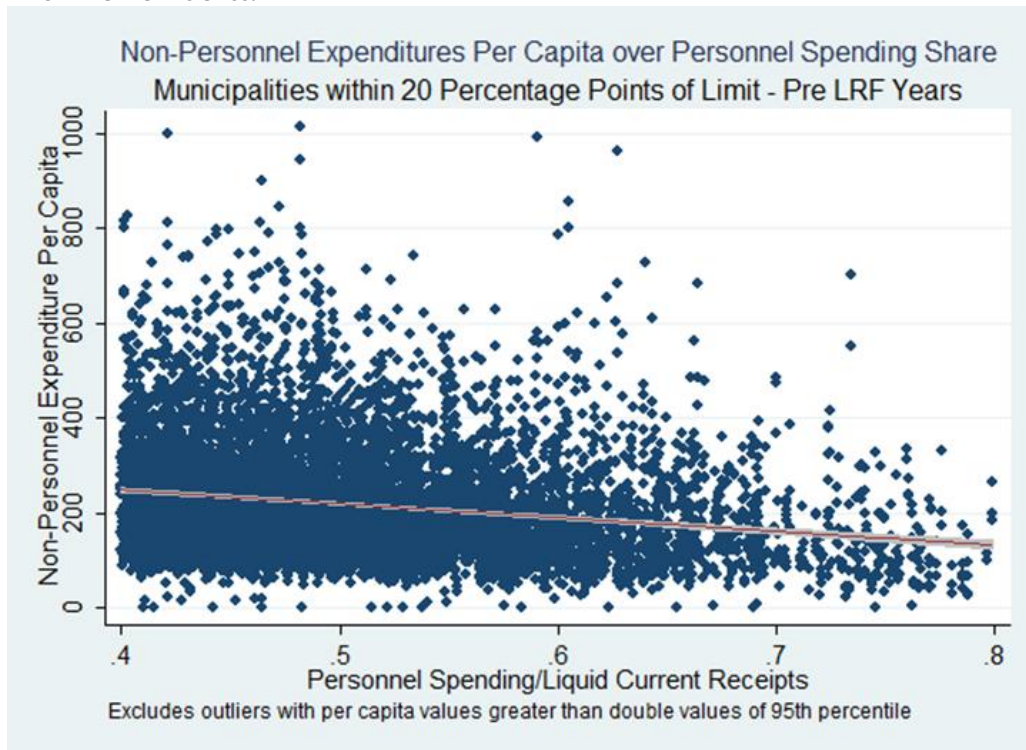


FIGURE 13: SCATTERPLOT OF NON-PERSONNEL EXPENDITURES OVER PERSONNEL EXPENDITURE SHARES - MUNICIPALITIES WITHIN 10 PERCENTAGE POINTS OF 60% LIMIT

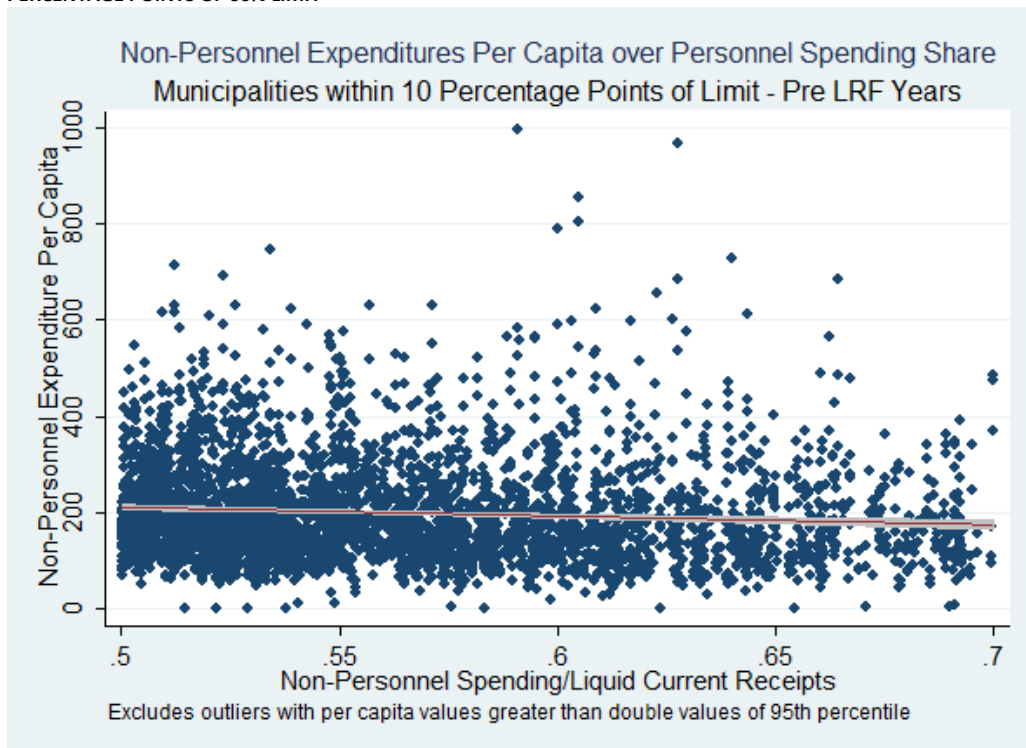


FIGURE 14: SCATTERPLOT OF TOTAL EXPENDITURES OVER PERSONNEL EXPENDITURE SHARES – ALL MUNICIPALITIES

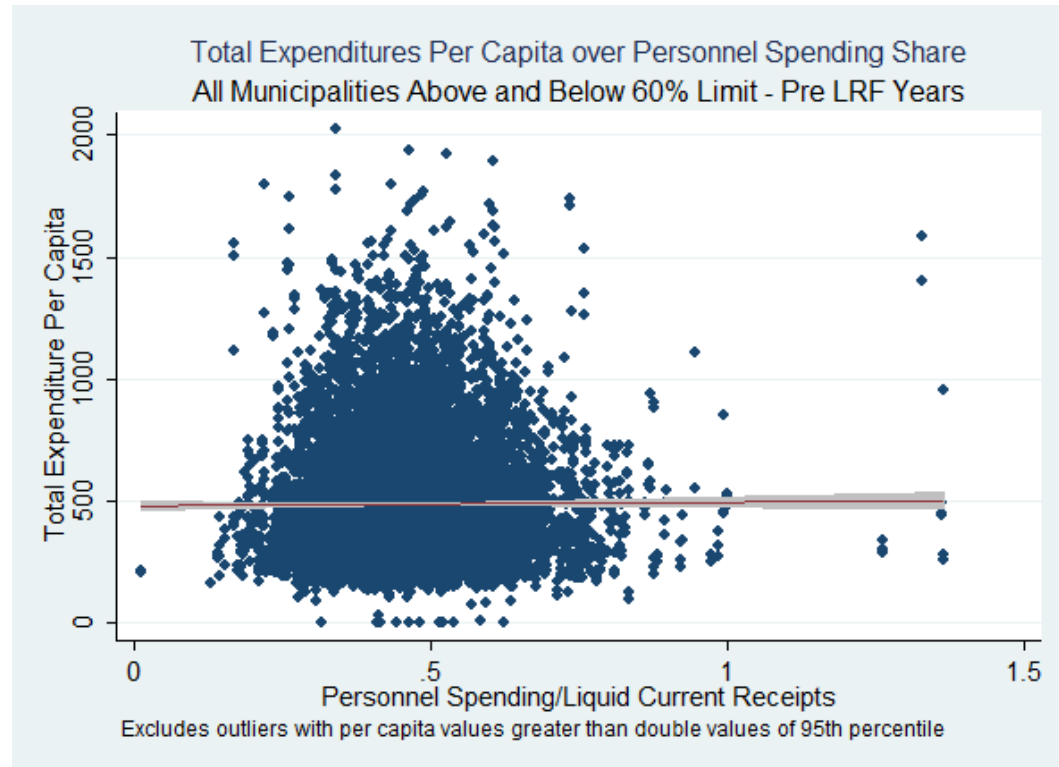


FIGURE 15: SCATTERPLOT OF TOTAL EXPENDITURES OVER PERSONNEL EXPENDITURE SHARES - MUNICIPALITIES WITHIN 20 PERCENTAGE POINTS OF 60% LIMIT

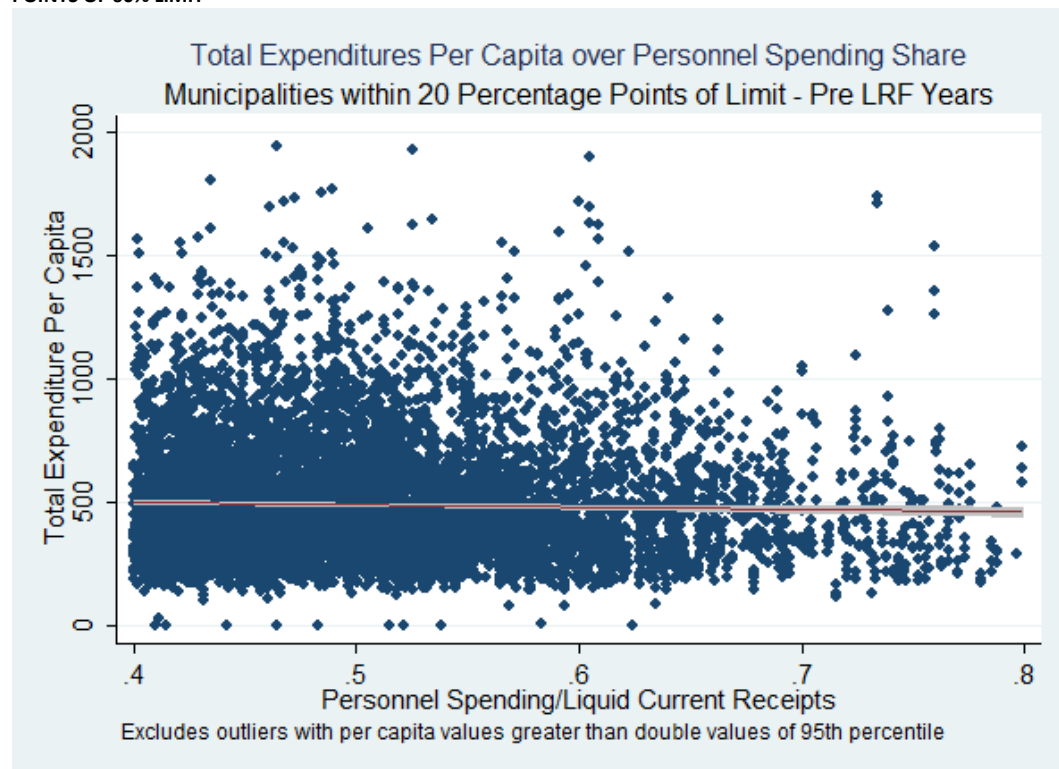


FIGURE 16: SCATTERPLOT OF TOTAL EXPENDITURES OVER PERSONNEL EXPENDITURE SHARES - MUNICIPALITIES WITHIN 10 PERCENTAGE POINTS OF 60% LIMIT

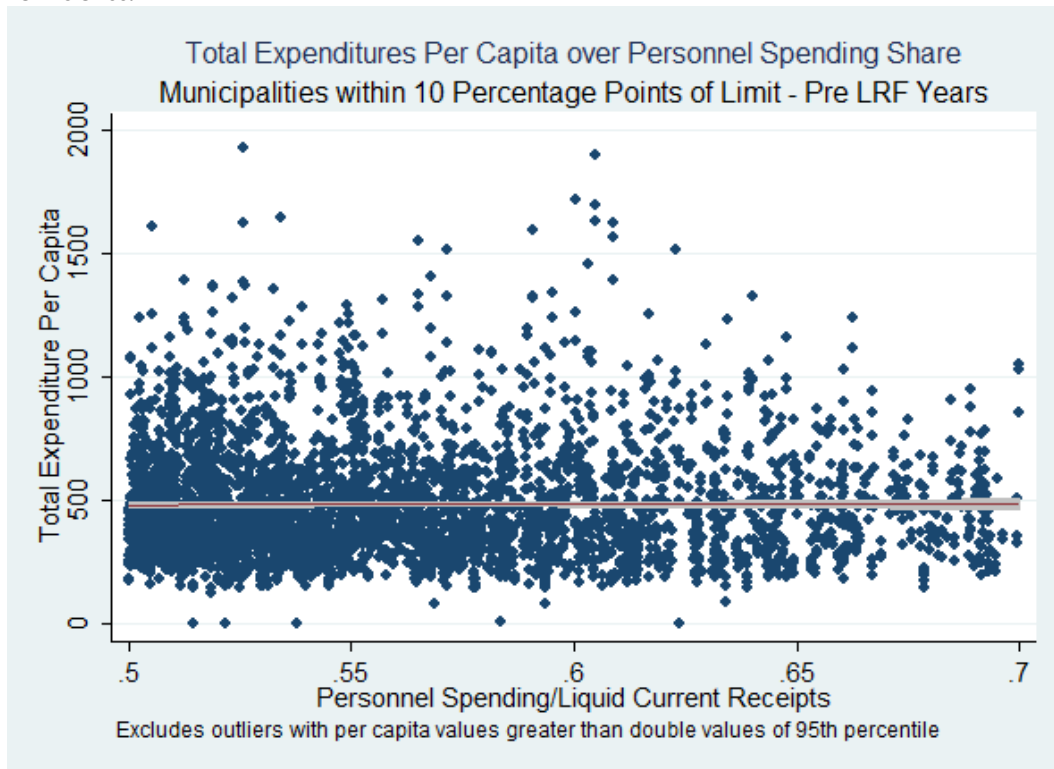


FIGURE 17: SCATTERPLOT OF TOTAL RECEIPTS OVER PERSONNEL EXPENDITURE SHARES – ALL MUNICIPALITIES

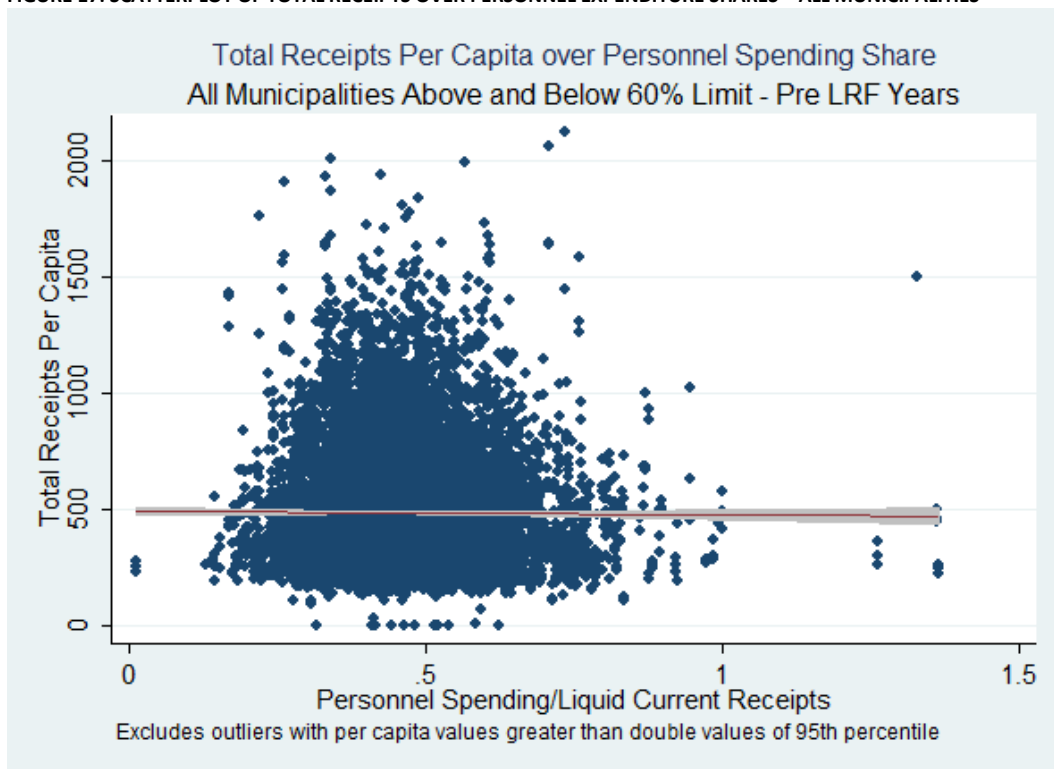


FIGURE 18: SCATTERPLOT OF TOTAL RECEIPTS OVER PERSONNEL EXPENDITURE SHARES - MUNICIPALITIES WITHIN 20 PERCENTAGE POINTS OF 60% LIMIT

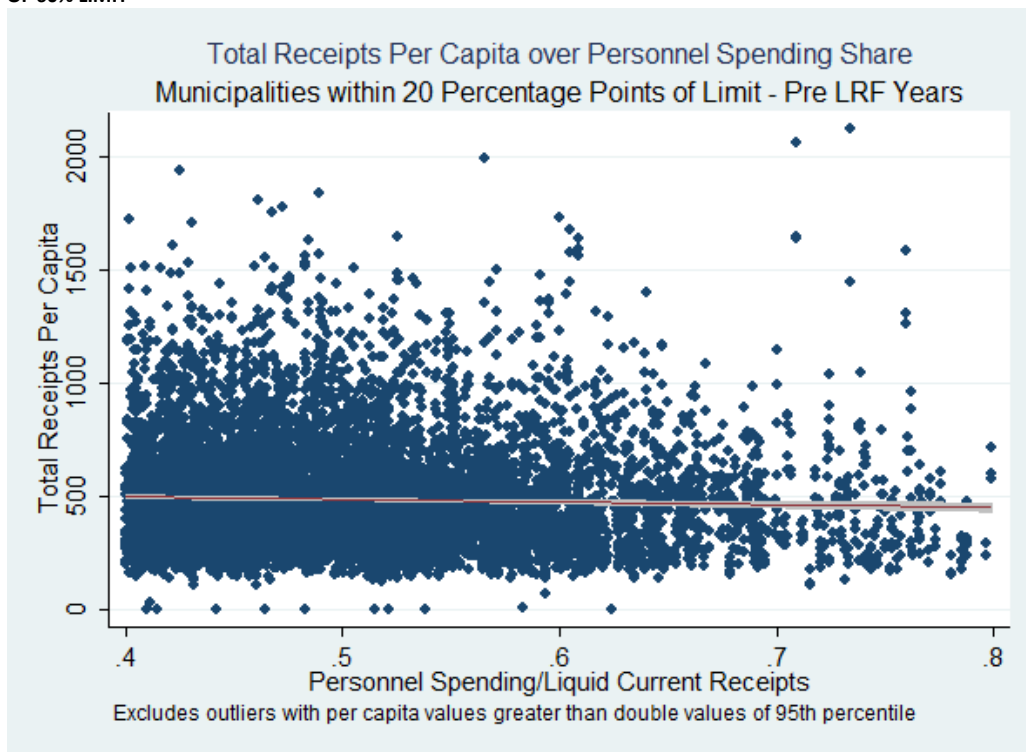


FIGURE 19: SCATTERPLOT OF TOTAL RECEIPTS OVER PERSONNEL EXPENDITURE SHARES - MUNICIPALITIES WITHIN 10 PERCENTAGE POINTS OF 60% LIMIT

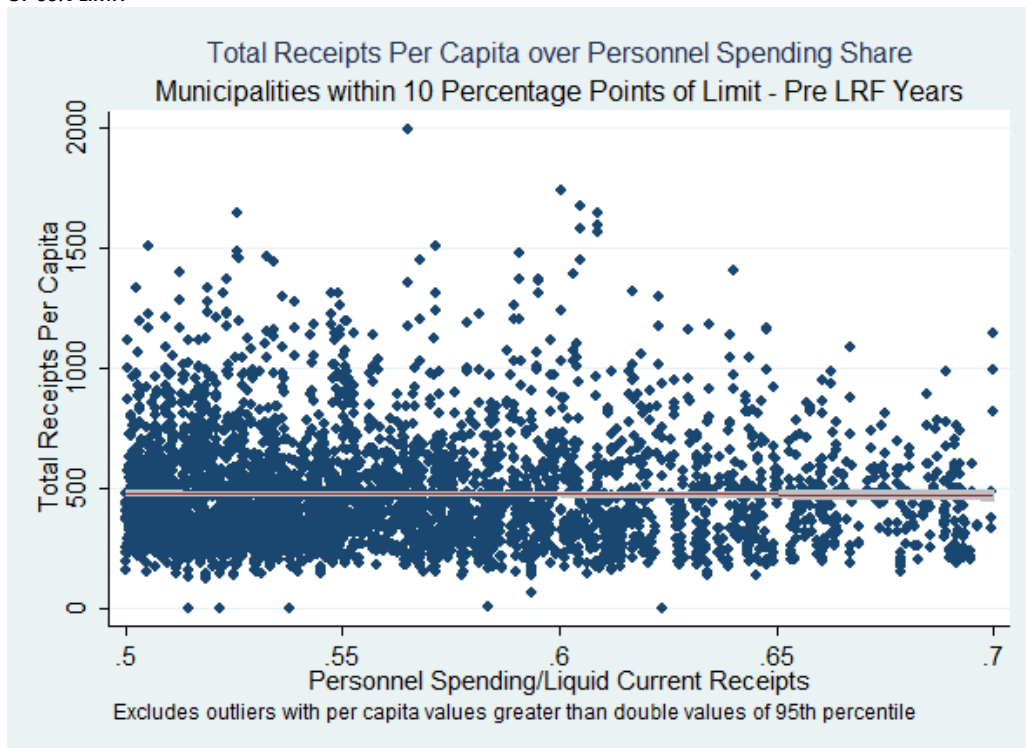


TABLE 2: EXPENDITURE SHARES OF MUNICIPALITIES ABOVE AND BELOW THE 60% LIMIT BEFORE THE LRF										
Sample:	Panel A: All Municipalities			Panel B: Municipalities w/in 20pp of 60% Limit (≥40%, ≤80%)			Panel C: Municipalities w/in 10pp of 60% Limit (≥50%, ≤70%)			
	Below 60% Limit Mean SD	Above 60% Limit Mean SD	Difference (Below- Above)	Below 60% Limit Mean SD	Above 60% Limit Mean SD	Difference Diff SE	Below 60% Limit Mean SD	Above 60% Limit Mean SD	Difference Diff SE	
Expenditure Shares										
Personnel Expenditures as share of Liquid Expenditures as share of total by type	0.445 (0.099)	0.647 (0.142)	0.202 (0.003)**	0.485 (0.078)	0.631 (0.108)	0.146 (0.003)**	0.534 (0.072)	0.612 (0.096)	0.078 (0.003)**	
Current	0.851 (0.080)	0.876 (0.075)	0.026 (0.002)**	0.405 (0.072)	0.513 (0.095)	0.106 (0.002)**	0.868 (0.069)	0.874 (0.075)	0.006 (0.003)*	
Personnel	0.373 (0.086)	0.524 (0.109)	0.150 (0.003)**	0.454 (0.078)	0.362 (0.095)	0.108 (0.002)**	0.445 (0.068)	0.499 (0.085)	0.054 (0.003)**	
Non-Personnel	0.477 (0.090)	0.353 (0.105)	-0.124 (0.003)**	0.859 (0.073)	0.876 (0.075)	-0.092 (0.003)**	0.423 (0.073)	0.376 (0.089)	-0.047 (0.003)**	
Capital	0.149 (0.080)	0.124 (0.075)	-0.026 (0.002)**	0.141 (0.073)	0.124 (0.075)	-0.016 (0.002)**	0.132 (0.069)	0.126 (0.075)	-0.006 (0.003)*	
total by public good category ^(a)										
Administration	0.189 (0.076)	0.202 (0.087)	0.014 (0.002)**	0.192 (0.077)	0.202 (0.085)	0.010 (0.002)**	0.196 (0.079)	0.204 (0.084)	0.007 (0.003)*	
Legislative	0.042 (0.022)	0.052 (0.024)	0.010 (0.001)**	0.043 (0.020)	0.052 (0.024)	0.009 (0.001)**	0.046 (0.020)	0.052 (0.024)	0.006 (0.001)**	
Agriculture	0.025 (0.033)	0.021 (0.030)	-0.003 (0.001)**	0.024 (0.032)	0.022 (0.030)	-0.002 (0.001)*	0.023 (0.029)	0.023 (0.031)	0.001 (0.001)	
Education and Culture	0.329 (0.073)	0.323 (0.071)	-0.006 (0.002)**	0.326 (0.069)	0.323 (0.070)	-0.003 (0.002)	0.323 (0.066)	0.322 (0.068)	-0.001 (0.003)	
Development	0.093 (0.064)	0.092 (0.065)	-0.001 (0.002)	0.090 (0.062)	0.091 (0.064)	0.001 (0.002)	0.088 (0.061)	0.090 (0.063)	0.002 (0.002)	
Health & Sanitation	0.166 (0.067)	0.164 (0.071)	-0.002 (0.002)	0.165 (0.065)	0.164 (0.071)	-0.001 (0.002)	0.168 (0.067)	0.163 (0.071)	-0.005 (0.003)+	
Social Assistance	0.063 (0.041)	0.065 (0.044)	0.002 (0.001)+	0.065 (0.040)	0.066 (0.044)	0.002 (0.001)	0.065 (0.040)	0.067 (0.045)	0.002 (0.002)	
Transportation	0.073 (0.065)	0.058 (0.056)	-0.015 (0.002)**	0.074 (0.065)	0.059 (0.057)	-0.015 (0.002)**	0.070 (0.064)	0.058 (0.055)	-0.012 (0.002)**	
Industry, Commerce, Energy & Mining	0.009 (0.023)	0.007 (0.018)	-0.002 (0.001)**	0.009 (0.021)	0.006 (0.016)	-0.002 (0.001)**	0.008 (0.021)	0.006 (0.017)	-0.002 (0.001)*	
Other	0.005 (0.031)	0.010 (0.053)	0.005 (0.001)**	0.006 (0.033)	0.010 (0.052)	0.004 (0.001)**	0.008 (0.040)	0.011 (0.057)	0.003 (0.002)+	
Surplus or Deficit Spending										
Deficit	0.498 (0.500)	0.576 (0.494)	0.078 (0.015)**	0.511 (0.500)	0.577 (0.494)	0.066 (0.016)**	0.529 (0.499)	0.571 (0.495)	0.043 (0.019)*	
Surplus or Deficit / Total Receipts	-0.006 (0.088)	-0.026 (0.123)	-0.019 (0.003)**	-0.009 (0.088)	-0.022 (0.088)	-0.012 (0.003)**	-0.015 (0.093)	-0.021 (0.089)	-0.006 (0.003)+	

(a) Judicial expenditures, communication expenditures nad public and national security expenditures (which are each < 0.2% of total expenditures) are not shown.

Standard errors in parentheses

+ significant at 10%; * significant at 5%; ** significant at 1%

Sample:	Panel A: All Municipalities			Panel B: Municipalitiesw/in 20pp of 60% Limit (≥40%, ≤80%)			Panel C: Municipalitiesw/in 10pp of 60% Limit (≥50%, ≤70%)		
	Below 60% Limit Mean SE	Above 60% Limit Mean SE	Difference Diff SE	Below 60% Limit Mean SE	Above 60% Limit Mean SE	Difference Diff SE	Below 60% Limit Mean SE	Above 60% Limit Mean SE	Difference Diff SE
Per Capita Expenditures and Receipts									
Expenditures per capita									
Total	488.9 (238.2)	482.3 (246.8)	-6.574 (7.218)	492.00 (234.5)	482.21 (247.3)	-9.80 (7.536)	482.0 (222.72)	488.6 (245.4)	6.65 (8.653)
Current	414.9 (202.6)	415.1 (201.0)	0.163 (6.131)	422.22 (203.0)	415.79 (203.9)	-6.44 (6.496)	417.1 (192.33)	419.2 (199.2)	2.10 (7.377)
Personnel	182.3 (96.9)	242.3 (114.2)	59.995 (2.993)**	197.89 (97.4)	238.07 (111.4)	-44.00 (3.682)**	212.7 (99.79)	235.9 (109.1)	23.20 (3.879)**
Non-Personnel	232.3 (119.6)	174.5 (114.8)	-57.787 (3.591)**	223.81 (115.6)	179.81 (115.5)	40.17 (3.178)**	203.4 (99.95)	189.2 (118.5)	14.13 (3.952)**
Capital	72.4 (55.0)	60.9 (51.0)	-11.520 (1.644)**	69.03 (51.0)	61.52 (51.3)	-7.51 (1.624)**	63.6 (47.58)	62.9 (51.57)	-0.69 (1.838)
Receipts per capita									
Total	488.2 (240.8)	476.1 (251.8)	-12.137 (7.296)+	489.80 (236.9)	477.32 (253.0)	-12.48 (7.616)	477.8 (224.48)	479.8 (240.0)	1.99 (8.655)
Current	457.3 (227.9)	438.9 (234.1)	-18.332 (6.897)**	459.21 (225.4)	440.30 (234.7)	-18.91 (7.228)**	447.7 (211.29)	444.1 (227.4)	-3.66 (8.160)
Transfers	400.2 (202.7)	385.1 (201.0)	-15.103 (6.108)*	399.02 (200.9)	385.63 (200.8)	-13.39 (6.402)*	388.7 (188.55)	387.7 (194.2)	-0.95 (7.193)
Taxes and Fees	21.6 (25.3)	21.2 (25.1)	-0.483 (0.765)	23.61 (25.9)	21.68 (25.4)	-1.93 (0.827)*	24.8 (25.24)	22.59 (25.5)	-2.17 (0.963)*
Municipal Income	3.37 (3.1)	3.94 (3.76)	-1.230 (0.381)**	7.90 (13.0)	6.32 (11.4)	-1.59 (0.408)**	7.8 (12.67)	6.64 (11.9)	-1.21 (0.476)*
Federal Income Tax on Muni Salaries	7.45 (12.7)	6.22 (11.6)	0.571 (0.096)**	3.37 (3.06)	3.87 (3.75)	0.50 (0.101)**	3.4 (2.93)	4.0 (3.86)	0.53 (0.121)**
Capital	28.8 (35.2)	31.2 (36.9)	2.347 (1.075)*	29.15 (35.0)	31.54 (37.3)	2.40 (1.133)*	28.2 (35.45)	32.2 (38.4)	3.99 (1.379)**
Credit	2.11 (6.4)	0.86 (4.06)	-1.247 (0.190)**	2.18 (6.44)	0.91 (4.18)	-1.27 (0.199)**	1.9 (5.99)	0.9 (4.25)	-0.92 (0.216)**
Capital Transfers	22.2 (30.9)	25.7 (33.4)	3.509 (0.947)**	22.65 (31.2)	25.98 (33.8)	3.34 (1.011)**	22.1 (31.66)	26.1 (34.3)	4.02 (1.232)**

Standard errors in parentheses

+ significant at 10%; * significant at 5%; ** significant at 1%

Sample:	Panel A: All Municipalities			Panel B: Municipalitiesw/in 20pp of 60% Limit (≥40%, ≤80%)			Panel C: Municipalitiesw/in 10pp of 60% Limit (≥50%, ≤70%)		
	Below 60% Limit Mean SD	Above 60% Limit Mean SD	Difference Diff SE	Below 60% Limit Mean SD	Above 60% Limit Mean SD	Difference Diff SE	Below 60% Limit Mean SD	Above 60% Limit Mean SD	Difference Diff SE
Population and Per Capita GDP									
Population	33052 (209920)	24281 (41201)	-8771 (5954)	27685 (83064)	25016 (42557)	-2670 (2495)	26231 (61757)	25420 (42399)	-811 (2176)
GDP Per Capita	4013.7 (2739.2)	4215.9 (2896.5)	202.2 (101.881)*	4289.8 (2760.4)	4273.8 (2892.0)	-15.9 (108.0)	4432.1 (2680.7)	4406.7 (2949.2)	-25.3 (127.0)
GDP from Services	2067.6 (1246.2)	2253.1 (1257.1)	185.5 (45.834)**	2207.2 (1224.8)	2270.0 (1246.7)	62.8 (47.8)	2313.8 (1206.6)	2330.5 (1287.0)	16.7 (56.7)
GDP from Public Admin. Services	738.3 (219.1)	878.0 (331.5)	139.7 (8.529)**	766.3 (216.2)	870.6 (311.5)	104.3 (8.943)**	801.2 (238.9)	876.4 (312.4)	75.2 (11.906)**
GDP from Industry	744.6 (1210.7)	877.3 (1381.7)	132.7 (45.121)**	832.6 (1298.3)	902.6 (1396.4)	70.1 (51.0)	894.2 (1328.9)	932.7 (1408.7)	38.5 (62.4)
GDP from Agriculture	862.2 (1041.9)	724.9 (815.9)	-137.3 (44.634)**	895.0 (1040.0)	725.1 (787.8)	-169.9 (46.868)**	849.8 (957.9)	759.0 (837.2)	-90.8 (51.660)+

Standard errors in parentheses

+ significant at 10%; * significant at 5%; ** significant at 1%

FIGURE 20: MUNICIPALITIES WITH PERSONNEL EXPENDITURE SHARES >60%, OVER TIME

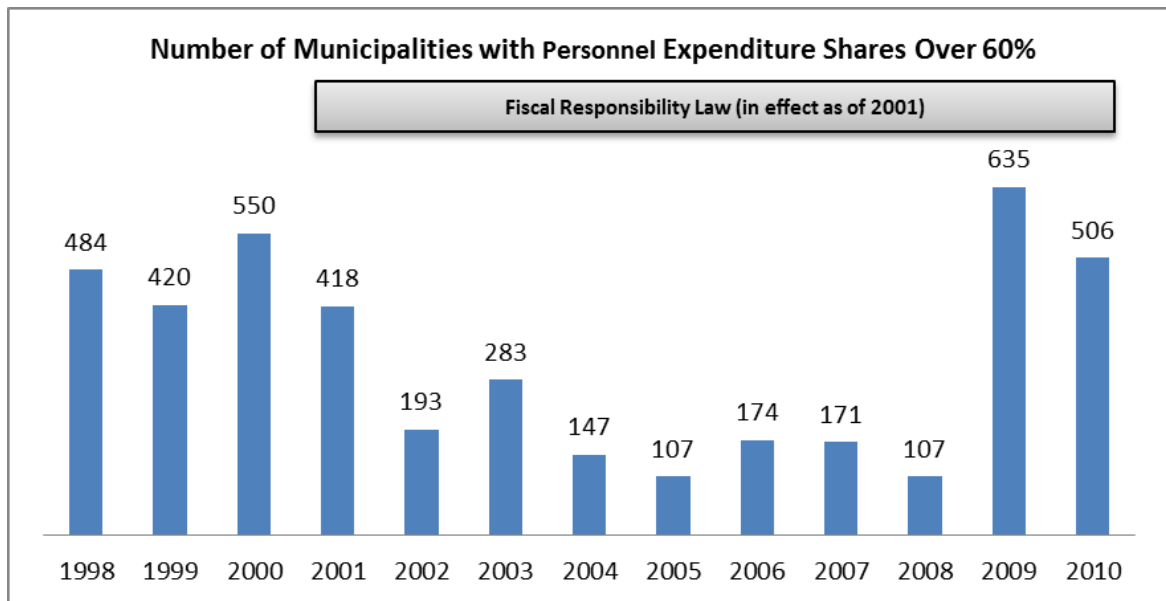


FIGURE 21: HISTOGRAMS OF PERSONNEL EXPENDITURE SHARES AMONG ALL MUNICIPALITIES ABOVE AND BELOW THE 60% PERSONNEL EXPENDITURE LIMIT BEFORE THE NEW LAW

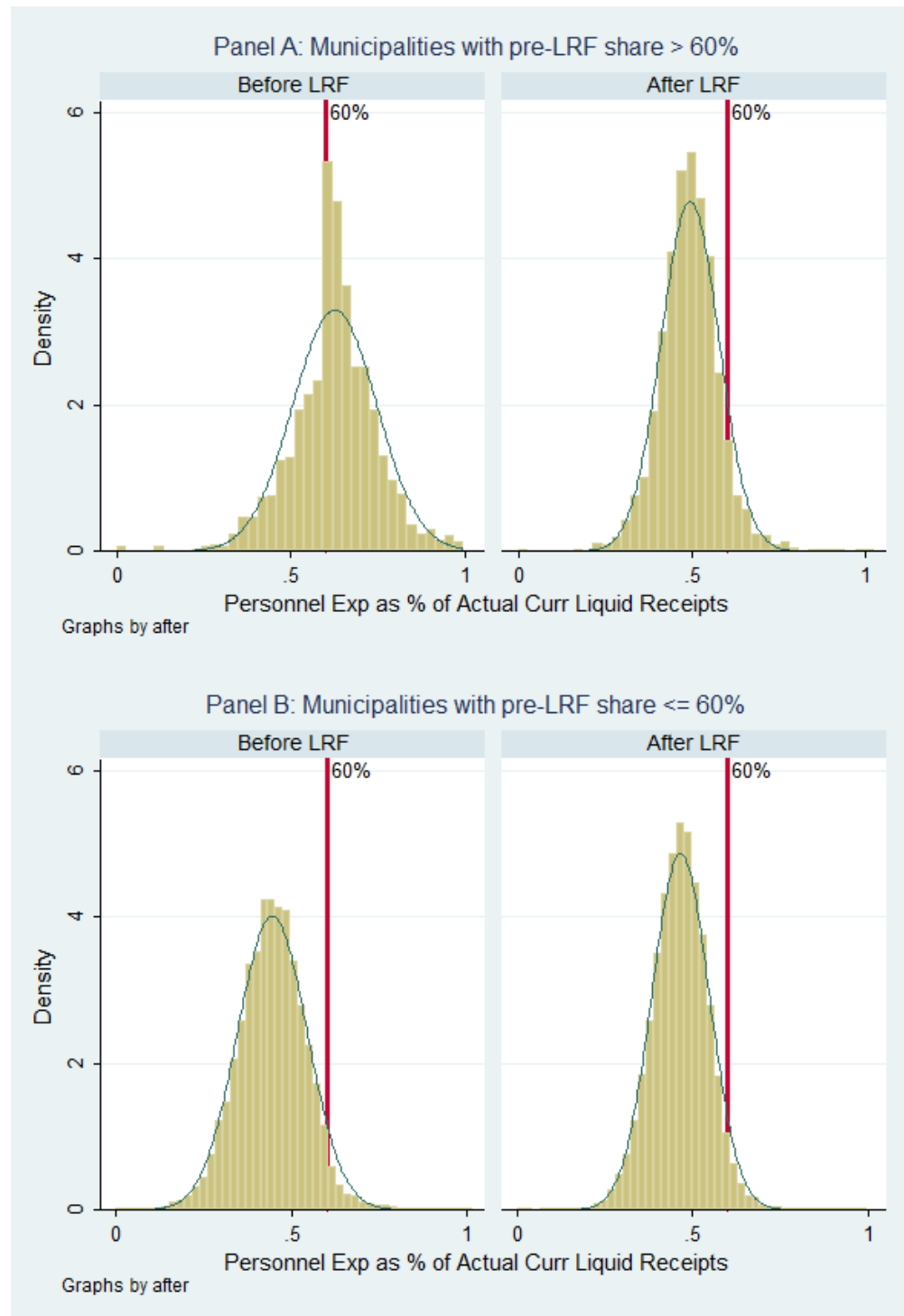


FIGURE 22: HISTOGRAM OF PERSONNEL EXPENDITURE SHARES AMONG MUNICIPALITIES WITHIN 20 PERCENTAGE POINTS OF 60% PERSONNEL EXPENDITURE LIMIT BEFORE THE NEW LAW

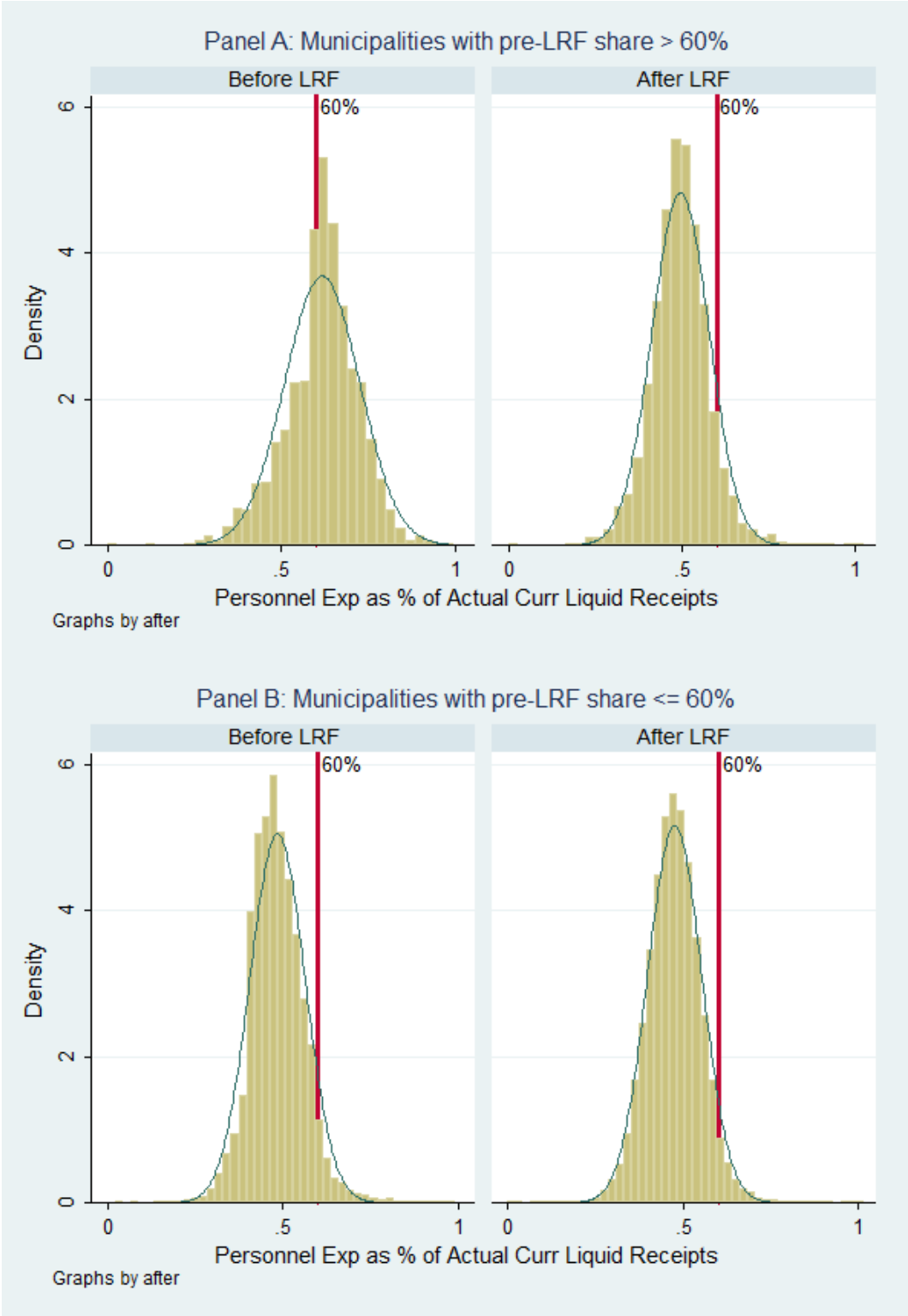


FIGURE 23: HISTOGRAM OF PERSONNEL EXPENDITURE SHARES AMONG MUNICIPALITIES WITHIN 10 PERCENTAGE POINTS OF 60% PERSONNEL EXPENDITURE LIMIT BEFORE THE NEW LAW

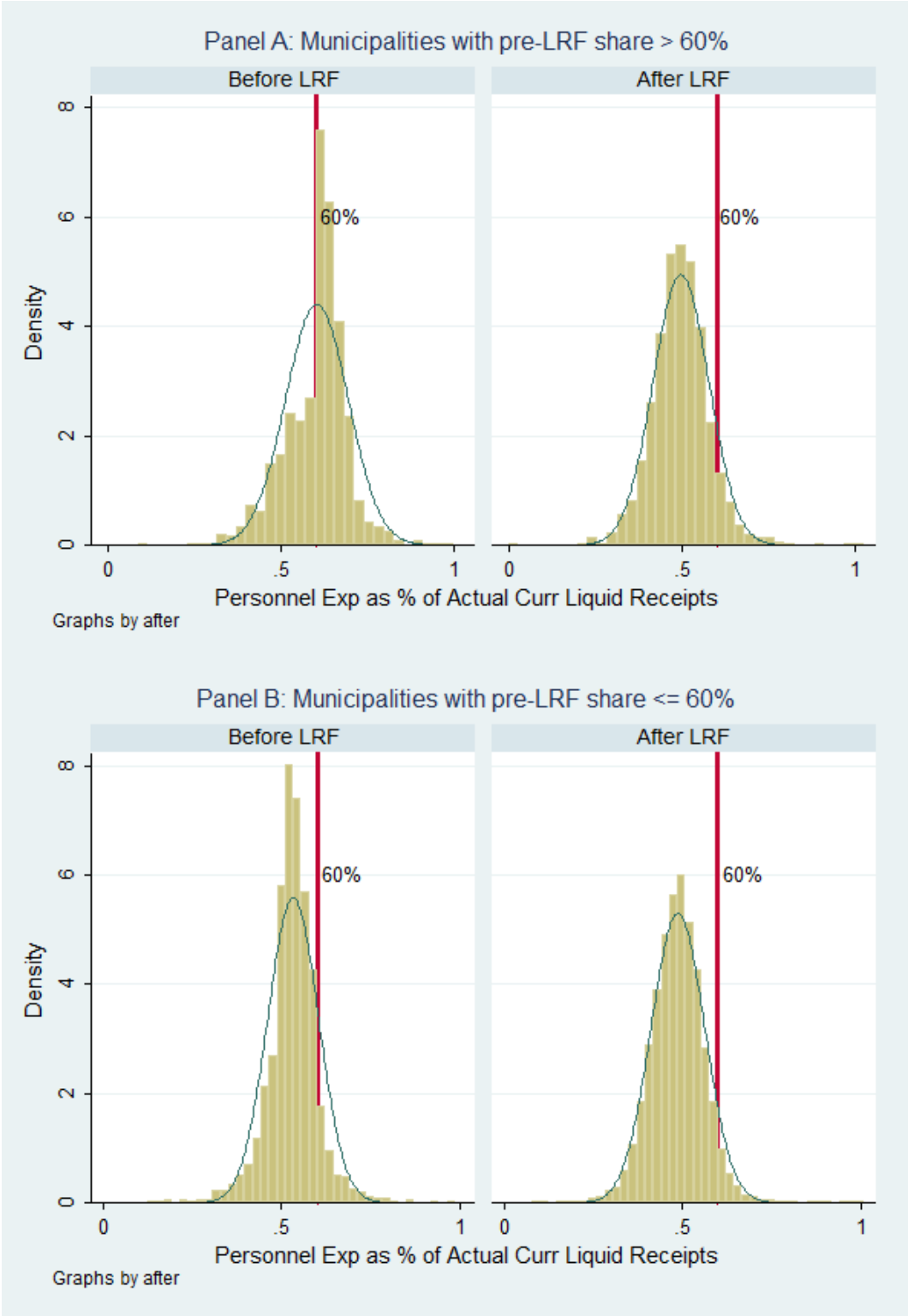


FIGURE 24: PERSONNEL EXPENDITURE SHARE HISTOGRAMS OVER TIME

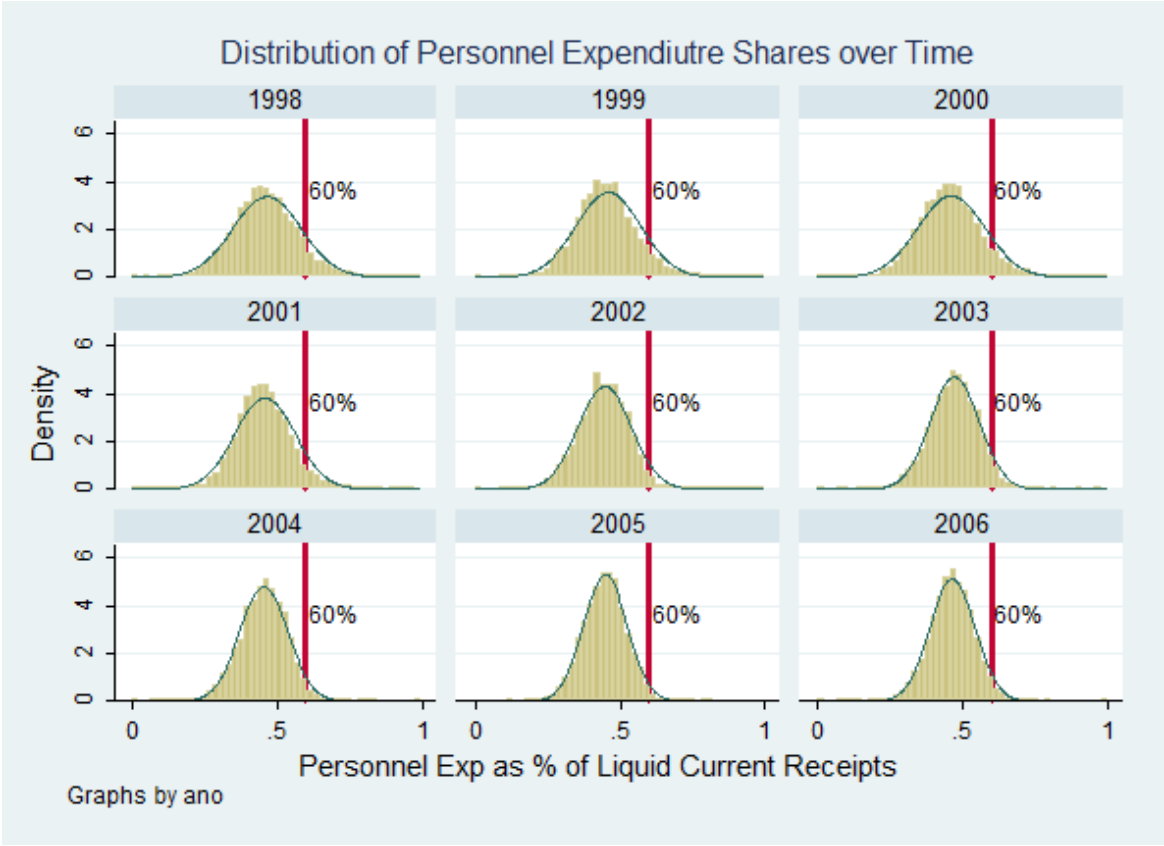


FIGURE 25: PERSONNEL EXPENDITURES OVER TIME, BY “TREATMENT” STATUS

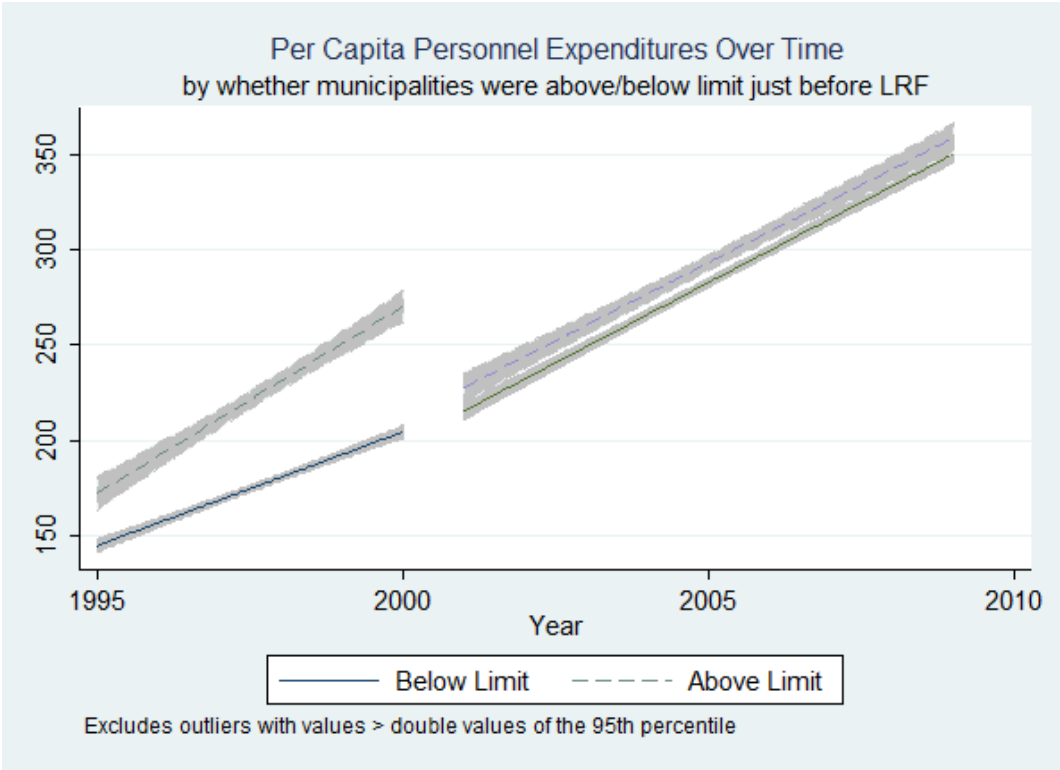


FIGURE 26: NON-PERSONNEL EXPENDITURES OVER TIME, BY "TREATMENT" STATUS

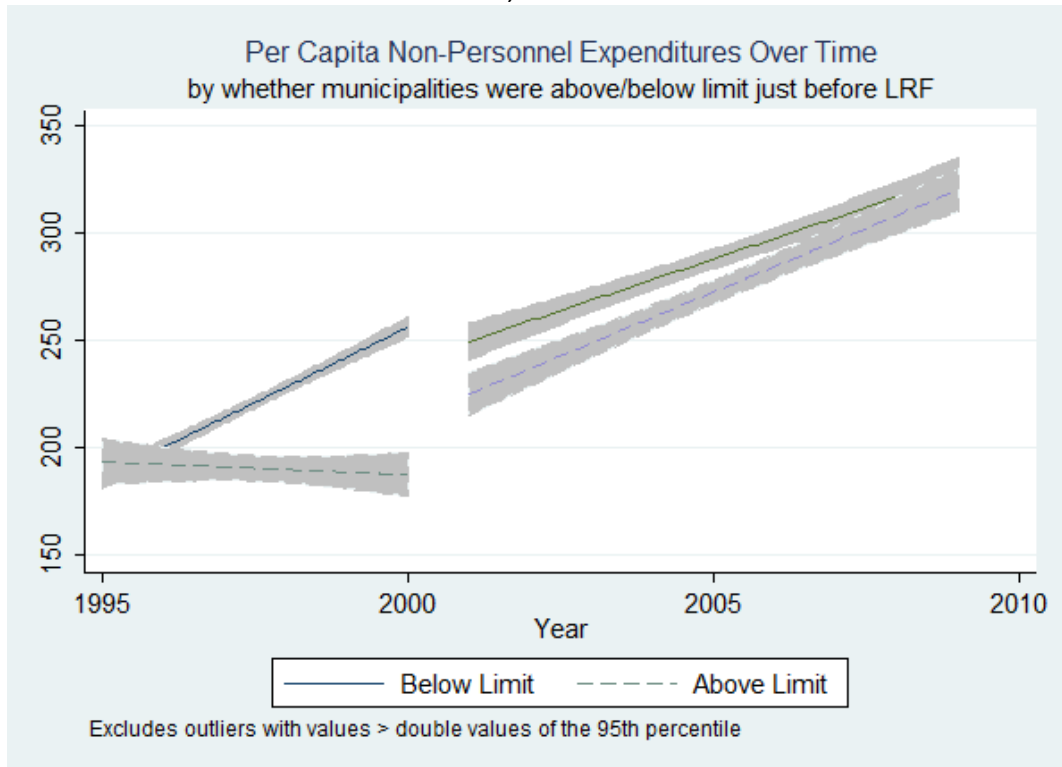


FIGURE 27: TOTAL EXPENDITURES OVER TIME, BY "TREATMENT" STATUS

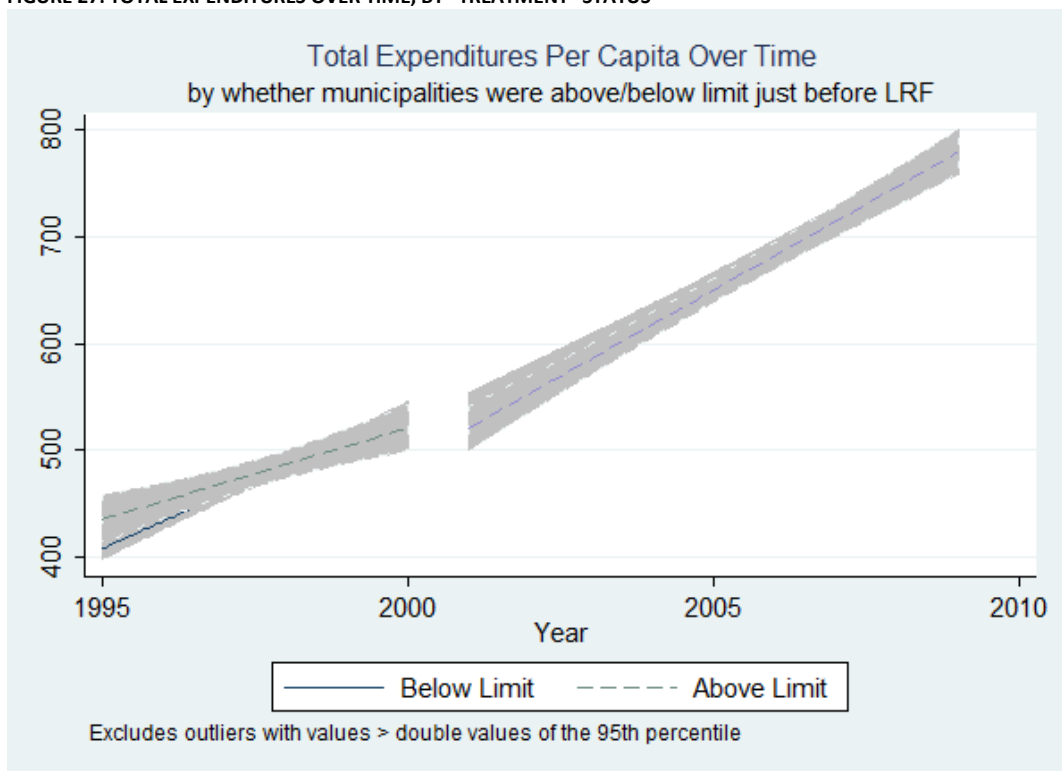


FIGURE 28: REVENUE GENERATION OVER TIME, BY “TREATMENT” STATUS

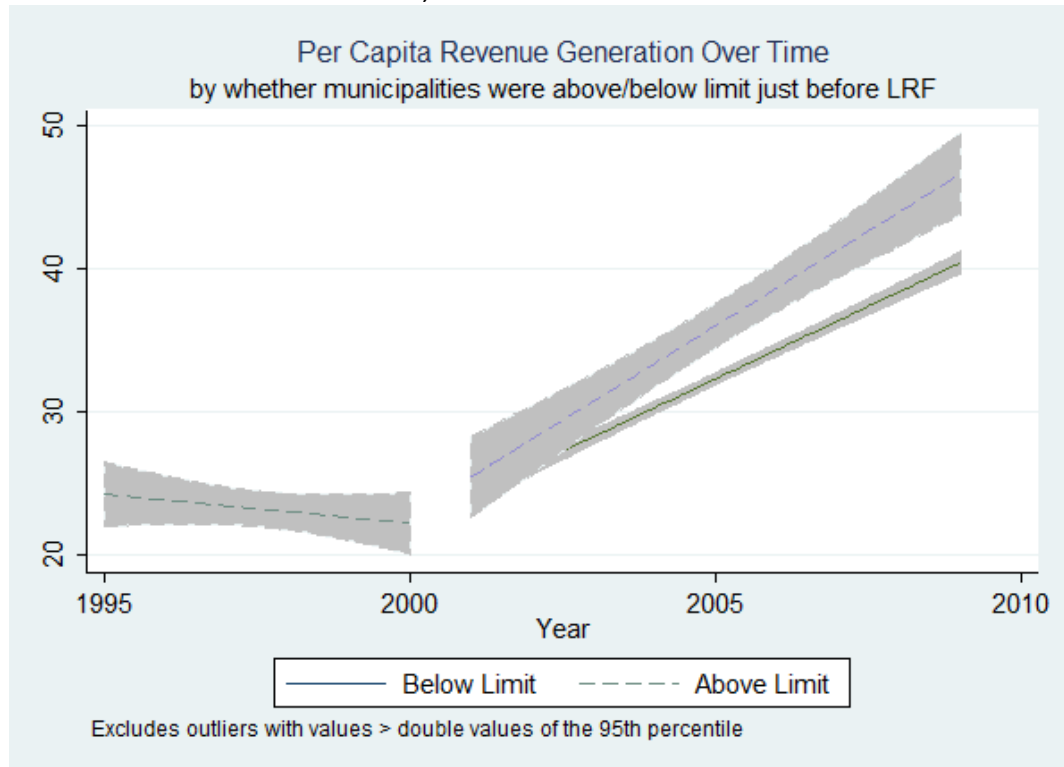


TABLE 5: DIFFERENCE IN CHANGES IN EXPENDITURE SHARES BEFORE AND AFTER LRF, BY "TREATMENT" STATUS												
Expenditure Shares over Liquid Current Receipts (LCR)	Under Limit						Over Limit			Diff-in-Diff (Above-Below)		
	Before LRF		After LRF		Change	Before LRF		After LRF		Change	D-D	SE
	Mean	SE	Mean	SE		Mean	SE	Mean	SE			
Sample: All Municipalities												
Personnel Expenditures / LCR	0.445	(0.099)	0.466	(0.086)	0.021	0.647	(0.142)	0.498	(0.088)	-0.149	-0.170	(0.003)**
Non-Personnel Expenditures / LCR	0.572	(0.121)	0.460	(0.091)	-0.113	0.442	(0.154)	0.434	(0.092)	-0.008	0.105	(0.003)**
Total Current Expenditures / LCR	1.017	(0.115)	0.926	(0.089)	-0.091	1.089	(0.162)	0.932	(0.094)	-0.157	-0.066	(0.003)**
Sample: Municipalities within 20pp of 60% limit (<40%, >80%)												
Personnel Expenditures / LCR	0.485	(0.079)	0.476	(0.079)	-0.009	0.631	(0.108)	0.500	(0.087)	-0.130	-0.121	(0.003)**
Non-Personnel Expenditures / LCR	0.547	(0.110)	0.450	(0.085)	-0.097	0.451	(0.139)	0.431	(0.091)	-0.019	0.078	(0.003)**
Total Current Expenditures / LCR	1.032	(0.108)	0.926	(0.085)	-0.106	1.081	(0.132)	0.931	(0.093)	-0.150	-0.043	(0.003)**
Sample: Municipalities within 10pp of 60% limit (>50%, <70%)												
Personnel Expenditures / LCR	0.534	(0.073)	0.488	(0.078)	-0.046	0.612	(0.096)	0.501	(0.086)	-0.111	-0.065	(0.003)**
Non-Personnel Expenditures / LCR	0.512	(0.108)	0.440	(0.084)	-0.073	0.467	(0.135)	0.430	(0.090)	-0.036	0.036	(0.004)**
Total Current Expenditures / LCR	1.047	(0.109)	0.928	(0.087)	-0.119	1.079	(0.136)	0.931	(0.092)	-0.148	-0.029	(0.004)**

Standard errors in parentheses

+ significant at 10%; * significant at 5%; ** significant at 1%

TABLE 6: DIFFERENCE IN CHANGES IN LN EXPENDITURES AND RECEIPTS BEFORE AND AFTER LRF, BY "TREATMENT" STATUS – ALL MUNICIPALITIES														
Sample: All Municipalities	Under Limit						Over Limit						Diff-in-Diff (Above-Below) D-D SE	
	Before LRF			After LRF			Before LRF			After LRF				
	Mean	SE		Mean	SE		Mean	SE		Mean	SE			
Total Expenditures	15.407	(1.054)		16.265	(1.108)	0.857	15.525	(0.977)		16.404	(1.028)	0.879	0.021	(0.037)
Current Expenditures	15.241	(1.062)		16.122	(1.111)	0.882	15.389	(0.983)		16.268	(1.057)	0.879	-0.003	(0.038)
Personnel	14.386	(1.156)		15.419	(1.182)	1.033	14.856	(1.003)		15.628	(1.122)	0.772	-0.262	(0.040)**
Non-Personnel	14.647	(1.067)		15.388	(1.233)	0.741	14.350	(1.530)		15.463	(1.208)	1.113	0.372	(0.041)**
Capital Expenditures	13.339	(1.297)		14.056	(1.402)	0.718	13.159	(1.666)		14.105	(1.407)	0.947	0.229	(0.048)**
Total Receipts	15.405	(1.053)		16.348	(1.125)	0.943	15.505	(0.974)		16.489	(1.051)	0.984	0.041	(0.038)
Current	15.337	(1.064)		16.383	(1.123)	1.047	15.422	(0.993)		16.525	(1.053)	1.103	0.056	(0.038)
Transfers	15.200	(0.975)		16.242	(1.043)	1.041	15.293	(0.924)		16.382	(1.021)	1.089	0.047	(0.035)
Local Revenue (Taxes & Fees)	11.763	(2.137)		12.957	(1.908)	1.194	11.834	(2.088)		13.155	(1.790)	1.321	0.127	(0.066)+
Municipal Income	9.097	(3.773)		11.570	(2.834)	2.472	8.668	(4.059)		11.590	(2.972)	2.922	0.45	(0.105)**
Federal Income Tax on Salaries Paid by Municipality	9.733	(2.734)		11.514	(1.768)	1.781	9.958	(2.859)		11.628	(1.800)	1.670	-0.111	(0.069)
Capital	10.817	(4.018)		11.648	(4.038)	0.832	11.005	(4.056)		11.323	(4.406)	0.318	-0.513	(0.138)**
Credit	2.325	(4.730)		1.914	(4.597)	-0.411	1.167	(3.459)		1.213	(3.715)	0.046	0.457	(0.155)**
Capital Transfers	9.219	(5.260)		10.570	(5.062)	1.351	9.630	(5.241)		10.315	(5.316)	0.685	-0.666	(0.174)**

Standard errors in parentheses

+ significant at 10%; * significant at 5%; ** significant at 1%

Sample : Municipalities within 20pp of 60% limit (240%, 580%)	Ln Expenditures	Under Limit					Over Limit					Diff-in-Diff (Above-Below)	
		Before LRF		After LRF		Change	Before LRF		After LRF		Change	D-D	SE
		Mean	SE	Mean	SE		Mean	SE	Mean	SE			
Total Expenditures		15.443	(1.036)	16.299	(1.082)	0.856	15.549	(0.981)	16.430	(1.032)	0.881	0.025	(0.039)
Current Expenditures		15.287	(1.040)	16.159	(1.086)	0.872	15.412	(0.989)	16.295	(1.063)	0.882	0.010	(0.039)
Personnel		14.520	(1.098)	15.480	(1.142)	0.960	14.865	(1.010)	15.659	(1.129)	0.794	-0.166	(0.041)**
Non-Personnel		14.633	(1.050)	15.408	(1.182)	0.775	14.473	(1.138)	15.483	(1.228)	1.010	0.235	(0.042)**
Capital Expenditures		13.327	(1.250)	14.084	(1.358)	0.757	13.251	(1.342)	14.133	(1.382)	0.882	0.125	(0.049)*
Total Receipts		15.437	(1.035)	16.384	(1.100)	0.948	15.531	(0.977)	16.515	(1.053)	0.983	0.036	(0.039)
Current		15.368	(1.046)	16.420	(1.097)	1.052	15.450	(0.997)	16.552	(1.054)	1.101	0.049	(0.039)
Transfers		15.223	(0.958)	16.270	(1.020)	1.047	15.319	(0.927)	16.405	(1.024)	1.085	0.038	(0.036)
Local Revenue (Taxes & Fees)		11.949	(2.021)	13.087	(1.862)	1.138	11.894	(2.085)	13.205	(1.789)	1.311	0.173	(0.068)*
Municipal Income		9.365	(3.586)	11.763	(2.684)	2.398	8.794	(4.003)	11.701	(2.893)	2.907	0.509	(0.106)**
Federal Income Tax on Salaries Paid by Municipality		9.840	(2.595)	11.524	(1.732)	1.684	9.951	(2.893)	11.640	(1.818)	1.689	0.005	(0.071)
Capital		10.985	(3.848)	11.764	(3.889)	0.778	11.058	(4.001)	11.397	(4.350)	0.338	-0.44	(0.141)**
Credit		2.429	(4.769)	1.970	(4.627)	-0.459	1.234	(3.544)	1.294	(3.824)	0.060	0.519	(0.164)**
Capital Transfers		9.394	(5.174)	10.674	(4.976)	1.280	9.697	(5.194)	10.372	(5.289)	0.675	-0.605	(0.182)**

Standard errors in parentheses

+ significant at 10%; * significant at 5%; ** significant at 1%

TABLE 8 : DIFFERENCE IN CHANGES IN LN EXPENDITURES AND RECEIPTS BEFORE AND AFTER LRF, BY "TREATMENT" STATUS –MUNICIPALITIES WITHIN 10PP OF 60% LIMIT

Sample : Municipalities within 10pp of 60% limit (≥50%, ≤70%)	Under Limit						Over Limit						Diff-in-Diff (Above-Below)	
	Before LRF		After LRF		Change	Before LRF		After LRF		Change	D-D	SE		
	Mean	SE	Mean	SE		Mean	SE	Mean	SE					
Total Expenditures	15.503	(1.007)	16.360	(1.054)	0.857	15.579	(1.011)	16.449	(1.041)	0.870	0.013	(0.045)		
Current Expenditures	15.358	(1.012)	16.224	(1.052)	0.866	15.441	(1.020)	16.313	(1.080)	0.872	0.007	(0.045)		
Personnel	14.681	(1.041)	15.573	(1.079)	0.892	14.867	(1.050)	15.683	(1.117)	0.816	-0.077	(0.047)+		
Non-Personnel	14.620	(1.047)	15.444	(1.177)	0.825	14.549	(1.147)	15.501	(1.242)	0.952	0.127	(0.050)*		
Capital Expenditures	13.326	(1.206)	14.130	(1.325)	0.803	13.288	(1.385)	14.157	(1.367)	0.869	0.065	(0.057)		
Total Receipts	15.492	(1.008)	16.446	(1.070)	0.954	15.562	(1.007)	16.534	(1.063)	0.972	0.018	(0.045)		
Current	15.425	(1.020)	16.482	(1.070)	1.056	15.480	(1.029)	16.571	(1.064)	1.091	0.034	(0.045)		
Transfers	15.277	(0.944)	16.327	(1.010)	1.049	15.343	(0.955)	16.417	(1.037)	1.074	0.024	(0.043)		
Local Revenue (Taxes & Fees)	12.128	(1.896)	13.235	(1.782)	1.108	12.016	(2.027)	13.269	(1.804)	1.253	0.145	(0.078)+		
Municipal Income	9.570	(3.381)	11.941	(2.593)	2.371	8.878	(4.038)	11.789	(2.866)	2.911	0.541	(0.123)**		
Federal Income Tax on Salaries Paid by Municipality	9.984	(2.534)	11.570	(1.697)	1.586	9.993	(2.891)	11.664	(1.848)	1.671	0.085	(0.084)		
Capital	11.027	(3.760)	11.850	(3.780)	0.822	11.163	(3.912)	11.503	(4.254)	0.340	-0.482	(0.165)**		
Credit	2.165	(4.532)	1.863	(4.500)	-0.302	1.284	(3.610)	1.330	(3.861)	0.047	0.349	(0.186)+		
Capital Transfers	9.402	(5.154)	10.719	(4.969)	1.318	9.796	(5.108)	10.482	(5.216)	0.685	-0.632	(0.216)**		

Standard errors in parentheses

+ significant at 10%; * significant at 5%; ** significant at 1%

TABLE 9: IMPACTS ON PERSONNEL EXPENDITURES SHARES (AS A SHARE OF LIQUID CURRENT RECEIPTS)

Outcome: Personnel Expenditures as a Share of Liquid Current Receipts												
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	All Municipalities				Municipalities within 20pp of 60% limit				Municipalities within 10pp of 60% limit			
Treatment: Personnel expenditure share over 60% before LRF*After	-0.167 (0.006)**	-0.167 (0.006)**	-0.166 (0.006)**	-0.146 (0.006)**	-0.122 (0.004)**	-0.122 (0.004)**	-0.122 (0.004)**	-0.107 (0.005)**	-0.069 (0.004)**	-0.069 (0.004)**	-0.069 (0.004)**	-0.058 (0.005)**
Ln Population		-0.013 (0.006)*	-0.014 (0.006)*	-0.019 (0.007)**		-0.013 (0.006)*	-0.014 (0.006)*	-0.015 (0.008)*		-0.027 (0.010)**	-0.027 (0.010)*	-0.029 (0.013)*
Mayor's Vote Share			-0.002 (0.004)	-0.004 (0.004)			-0.003 (0.004)	-0.008 (0.004)+			0.002 (0.006)	-0.004 (0.006)
Ln Municipal GDP				0.015 (0.005)**				0.004 (0.005)				-0.007 (0.008)
Observations	55,214	55,202	55,035	46,663	39,694	39,682	39,588	33,545	17,254	17,242	17,214	14,590
Number of Municipalities	4,368	4,367	4,367	4,367	3,134	3,133	3,133	3,133	1,358	1,357	1,357	1,357
R-squared	0.21	0.21	0.21	0.19	0.22	0.22	0.21	0.19	0.28	0.29	0.28	0.24
Outcome Mean	46.8%	46.8%	46.8%	46.8%	48.4%	48.4%	48.4%	48.4%	50.5%	50.5%	50.5%	50.5%

All regression include municipality fixed effect and state-year dummies.

Standard errors (in parentheses) are clustered at the municipality level

* significant at 5%, ** significant at 1%

TABLE 10: TESTING TRADE-OFF OF INCLUDING GDP AS A CONTROL VS. INCLUDING MORE YEARS OF DATA

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Outcome: Personnel Expenditures as a Share of Liquid Current Receipts	All Municipalities			Municipalities within 20pp of 60% limit			Municipalities within 10pp of 60% limit		
Data-year included in regression:	All Years (1998-2010)	GDP Data Available (1999-2010)	All Years (1998-2010)	GDP Data Available (1999-2010)	All Years (1998-2010)	GDP Data Available (1999-2010)	All Years (1998-2010)	GDP Data Available (1999-2010)	All Years (1998-2010)
Treatment: Personnel expenditure share over 60% before LRF*After	-0.166 (0.006)**	-0.146 (0.006)**	-0.146 (0.006)**	-0.122 (0.004)**	-0.107 (0.005)**	-0.107 (0.005)**	-0.069 (0.004)**	-0.058 (0.005)**	-0.058 (0.005)**
Ln Population	-0.014 (0.006)*	-0.013 (0.007)+	-0.019 (0.007)**	-0.014 (0.006)*	-0.014 (0.007)+	-0.015 (0.008)*	-0.027 (0.010)*	-0.032 (0.013)*	-0.029 (0.013)*
Mayor's Vote Share	-0.002 (0.004)	-0.004 (0.004)	-0.004 (0.004)	-0.003 (0.004)	-0.008 (0.004)+	-0.008 (0.004)+	0.002 (0.006)	-0.004 (0.006)	-0.004 (0.006)
Ln Municipal GDP			0.015 (0.005)**			0.004 (0.005)			-0.007 (0.008)
Observations	55,035	46,663	46,663	39,588	33,545	33,545	17,214	14,590	14,590
Number of Municipalities	4,367	4,367	4,367	3,133	3,133	3,133	1,357	1,357	1,357
R-squared	0.21	0.19	0.19	0.21	0.19	0.19	0.28	0.24	0.24
Outcome Mean	46.8%	46.8%	46.8%	48.4%	48.4%	48.4%	50.5%	50.5%	50.5%

All regression include municipality fixed effect and state-year dummies.

Standard errors (in parentheses) are clustered at the municipality level

* significant at 5% ** significant at 1%

TABLE 11: IMPACTS ON LN PERSONNEL EXPENDITURES

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Outcome: Ln Personnel Expenditures	All Municipalities			Municipalities within 20pp of 60% limit			Municipalities within 10pp of 60% limit		
Treatment: Personnel expenditure share over 60% before LRF*After	-0.222 (0.015)**	-0.221 (0.015)**	-0.220 (0.015)**	-0.162 (0.016)**	-0.160 (0.015)**	-0.159 (0.016)**	-0.097 (0.020)**	-0.097 (0.019)**	-0.096 (0.019)**
Ln Population		0.389 (0.026)**	0.387 (0.026)**		0.439 (0.030)**	0.440 (0.031)**		0.409 (0.054)**	0.410 (0.055)**
Mayor's share of vote			-0.013 (0.014)			-0.020 (0.019)			-0.004 (0.029)
Observations	63,248	63,234	63,023	45,567	45,553	45,439	19,814	19,800	19,770
Number of Municipalities	4,368	4,367	4,367	3,134	3,133	3,133	1,358	1,357	1,357
R-squared	0.78	0.78	0.78	0.79	0.79	0.79	0.83	0.83	0.83
Outcome Mean (ln)	15.056	15.056	15.056	15.137	15.137	15.137	15.253	15.253	15.253
Outcome Mean in R\$100,000	34.572	34.572	34.572	37.508	37.508	37.508	42.107	42.107	42.107

All regressions includes municipality fixed effects and state-specific year dummies

Standard errors (in parentheses) are clustered at the municipality level

+ significant at 10%; * significant at 5%; ** significant at 1%

TABLE 12: IMPACTS ON KEY TYPES OF EXPENDITURES

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Outcome: Ln Personnel Expenditures	Ln Personnel Expenditures	Ln Non-Personnel Expenditures	Ln Current Expenditures (Personnel + Non-Personnel)	Ln Total Expenditures (Current + Capital)	Ln Capital Expenditures					
<i>Sample:</i>	<i>W/in 20pp of limit</i>	<i>W/in 10pp of limit</i>	<i>W/in 20pp of limit</i>	<i>W/in 10pp of limit</i>	<i>W/in 20pp of limit</i>	<i>W/in 10pp of limit</i>	<i>W/in 20pp of limit</i>	<i>W/in 10pp of limit</i>	<i>W/in 20pp of limit</i>	<i>W/in 10pp of limit</i>
Treatment: Personnel expenditure share over 60% before LRF*After	-0.159 (0.016)**	-0.096 (0.019)**	0.109 (0.023)**	0.044 (0.027)	-0.038 (0.014)**	-0.032 (0.017)+	-0.017 (0.013)	-0.018 (0.016)	0.096 (0.035)**	0.076 (0.042)+
Ln Population	0.440 (0.031)**	0.410 (0.055)**	0.471 (0.044)**	0.545 (0.088)**	0.474 (0.026)**	0.510 (0.051)**	0.472 (0.026)**	0.518 (0.050)**	0.460 (0.062)**	0.504 (0.111)**
Mayor's share of vote	-0.020 (0.019)	-0.004 (0.029)	0.014 (0.027)	0.023 (0.047)	0.001 (0.014)	-0.003 (0.023)	0.037 (0.014)**	0.042 (0.023)+	0.219 (0.044)**	0.239 (0.064)**
Observations	45,439	19,770	45,439	19,770	45,439	19,770	45,439	19,770	45,439	19,770
Number of Municipalities	3,133	1,357	3,133	1,357	3,133	1,357	3,133	1,357	3,133	1,357
R-squared	0.79	0.83	0.56	0.54	0.90	0.90	0.90	0.92	0.43	0.45
Outcome Mean (ln)	15.137	15.253	15.105	15.133	15.838	15.910	15.982	16.048	13.778	13.810
Outcome Mean in R\$100,000	37.508	42.107	36.319	37.330	75.552	81.181	87.258	93.246	9.637	9.944

All regressions includes municipality fixed effects and state-specific year dummies

Standard errors (in parentheses) are clustered at the municipality level

+ significant at 10%; * significant at 5%; ** significant at 1%

TABLE 13: IMPACT ON SOCIETAL PUBLIC GOODS SPENDING

Outcome: Ln Expenditure on Specific Public Service Function	(1)		(2)		(3)		(4)		(5)		(6)		(7)		(8)	
	Education and Culture		Health & Sanitation		Social Assistance & Social Insurance		Housing & Urban Development									
Sample:	W/in 20pp of limit	W/in 10pp of limit	W/in 20pp of limit	W/in 10pp of limit	W/in 20pp of limit	W/in 10pp of limit	W/in 20pp of limit	W/in 10pp of limit	W/in 20pp of limit	W/in 10pp of limit	W/in 20pp of limit	W/in 10pp of limit	W/in 20pp of limit	W/in 10pp of limit	W/in 20pp of limit	W/in 10pp of limit
Treatment: Personnel expenditure share over 60% before LRF*After	-0.016 (0.035)	-0.054 (0.044)	-0.005 (0.049)	-0.055 (0.057)	-0.064 (0.087)	-0.067 (0.101)	0.049 (0.101)	-0.071 (0.123)								
Ln Population	0.675 (0.067)**	0.820 (0.114)**	0.609 (0.069)**	0.692 (0.121)**	0.614 (0.162)**	0.458 (0.235)+	1.011 (0.176)**	1.123 (0.313)**								
Mayor's Vote Share	0.043 (0.058)	0.041 (0.092)	0.126 (0.060)*	0.218 (0.098)*	-0.053 (0.119)	-0.145 (0.165)	0.215 (0.122)+	0.301 (0.223)								
Observations	45,286	19,692	45,286	19,692	45,286	19,692	45,286	19,692								
Number of Municipalities	3,133	1,357	3,133	1,357	3,133	1,357	3,133	1,357								
R-squared	0.36	0.38	0.42	0.42	0.25	0.27	0.17	0.19								
Outcome Mean (ln)	14.684	14.750	14.240	14.298	12.805	12.886	13.021	13.039								
Outcome Mean in R\$100,000	23.825	25.462	15.289	16.206	3.642	3.946	4.516	4.598								

Note: Data on disaggregated expenditures only available as of 1996.

All regressions includes municipality fixed effects and state-specific year dummies

Standard errors (in parentheses) are clustered at the municipality level

+ significant at 10%; * significant at 5%; ** significant at 1%

TABLE 14: IMPACTS ON ADMINISTRATIVE, OPERATIONAL, AND ECONOMIC DEVELOPMENT-RELATED SPENDING

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Outcome: Ln Expenditure on Specific Public Service Function	Legislative	Planning and Administration	Agriculture	Industry, Commerce, Energy & Mining	Transportation					
	W/in 20pp of limit	W/in 10pp of limit	W/in 20pp of limit	W/in 10pp of limit	W/in 20pp of limit	W/in 10pp of limit	W/in 20pp of limit	W/in 10pp of limit	W/in 20pp of limit	W/in 10pp of limit
Treatment: Personnel expenditure share over 60% before LRF*After	-0.174 (0.124)	0.001 (0.145)	0.021 (0.058)	-0.017 (0.069)	0.048 (0.163)	-0.031 (0.186)	-0.097 (0.234)	-0.238 (0.276)	-0.564 (0.210)**	-0.740 (0.241)**
Ln Population	0.128 (0.211)	-0.093 (0.330)	0.517 (0.069)**	0.710 (0.127)**	0.241 (0.267)	0.342 (0.432)	-0.194 (0.399)	-0.151 (0.658)	-2.082 (0.335)**	-2.943 (0.569)**
Mayor's Vote Share	-0.100 (0.172)	0.445 (0.248)+	0.113 (0.066)+	0.104 (0.115)	0.103 (0.180)	0.335 (0.297)	0.460 (0.272)+	0.154 (0.445)	-0.150 (0.225)	-0.602 (0.369)
Observations	45,286	19,692	45,286	19,692	45,286	19,692	42,500	18,477	45,286	19,692
Number of Municipalities	3,133	1,357	3,133	1,357	3,133	1,357	3,133	1,357	3,133	1,357
R-squared	0.21	0.22	0.21	0.20	0.11	0.12	0.08	0.09	0.04	0.06
Outcome Mean (ln)	11.829	12.009	14.107	14.170	10.268	10.251	6.942	6.757	11.192	11.040
Outcome Mean in R\$100,000	1.371	1.642	13.384	14.261	0.288	0.283	0.010	0.009	0.726	0.623

Note: Data on disaggregated expenditures only available as of 1996.

All regressions includes municipality fixed effects and state-specific year dummies

Standard errors (in parentheses) are clustered at the municipality level

*+ significant at 10%; * significant at 5%; ** significant at 1%*

TABLE 15: IMPACT ON CURRENT RECEIPTS

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Outcome: Ln Liquid Current Receipts	All Municipalities			Municipalities within 20pp of 60% limit			Municipalities within 10pp of 60% limit		
Treatment: Personnel expenditure share over 60% before LRF** After (2001 and later)	0.018 (0.005)**	0.016 (0.005)**	0.016 (0.005)**	0.011 (0.005)*	0.010 (0.005)+	0.010 (0.005)+	0.004 (0.006)	0.003 (0.006)	0.004 (0.006)
	2.141 (0.019)**	2.062 (0.018)**	1.735 (0.011)**	2.157 (0.023)**	2.068 (0.022)**	1.738 (0.014)**	2.179 (0.032)**	2.081 (0.032)**	1.883 (0.031)**
Ln Population		0.420 (0.008)**	0.421 (0.008)**		0.447 (0.010)**	0.450 (0.010)**		0.492 (0.016)**	0.492 (0.016)**
Mayor's Vote Share	14.863 (0.003)**	10.941 (0.073)**	11.010 (0.073)**	14.793 (0.013)**	10.638 (0.093)**	10.783 (0.094)**	14.917 (0.017)**	10.317 (0.152)**	10.005 (0.156)**
Observations	63,247	63,233	63,022	45,566	45,552	45,438	19,814	19,800	19,770
Number of Municipalities	4,368	4,367	4,367	3,134	3,133	3,133	1,358	1,357	1,357
R-squared	0.94	0.94	0.94	0.94	0.94	0.94	0.93	0.94	0.94
Outcome Mean (Ln)	15.955	15.955	15.955	15.991	15.991	15.991	16.057	16.057	16.057
Outcome Mean in R\$100,000	84.909	84.909	84.909	88.084	88.084	88.084	94.029	94.029	94.029

All regressions includes municipality fixed effects and state-specific year dummies

Standard errors (in parentheses) are clustered at the municipality level

+ significant at 10%; * significant at 5%; ** significant at 1%

TABLE 16: IMPACT ON CURRENT RECEIPTS, DISAGGREGATED INTO MAJOR SUB-CATEGORY

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Outcome: Ln Receipts	Ln Total Current Receipts		Ln Transfers		Ln Federal Income Tax on Municipal Salaries		Ln Revenue Generation (Taxes and Fees)		Ln Municipal Income	
<i>Sample:</i>	W/in 20pp of limit	W/in 10pp of limit	W/in 20pp of limit	W/in 10pp of limit	W/in 20pp of limit	W/in 10pp of limit	W/in 20pp of limit	W/in 10pp of limit	W/in 20pp of limit	W/in 10pp of limit
Treatment: Personnel expenditure share >60% before LRF*After	0.002 (0.013)	-0.006 (0.016)	-0.010 (0.014)	-0.017 (0.017)	0.019 (0.107)	0.049 (0.132)	0.062 (0.035)+	0.038 (0.040)	0.288 (0.145)*	0.336 (0.163)*
Ln Population	0.453 (0.024)**	0.502 (0.049)**	0.491 (0.026)**	0.559 (0.049)**	0.021 (0.175)	-0.107 (0.284)	0.252 (0.061)**	0.258 (0.088)**	0.755 (0.208)**	0.460 (0.316)
Mayor's Vote Share	0.014 (0.013)	0.002 (0.022)	0.010 (0.014)	0.002 (0.022)	-0.111 (0.105)	0.212 (0.163)	0.082 (0.041)*	0.055 (0.057)	0.058 (0.114)	0.258 (0.177)
Observations	45,438	19,770	45,438	19,770	39,588	17,214	45,438	19,770	39,586	17,213
# Municipalities	3,133	1,357	3,133	1,357	3,133	1,357	3,133	1,357	3,133	1,357
R-squared	0.94	0.94	0.93	0.91	0.36	0.34	0.67	0.70	0.38	0.41
Outcome Mean (ln)	15.991	16.057	15.844	15.906	11.088	11.158	12.629	12.777	11.088	11.234
Outcome Mean in R\$100,000	88.084	94.029	76.057	80.875	0.654	0.701	3.054	3.540	0.654	0.757

All regressions includes municipality fixed effects and state-specific year dummies

Standard errors (in parentheses) are clustered at the municipality level

+ significant at 10%; * significant at 5%; ** significant at 1%

TABLE 17: IMPACT OF EXPENDITURE LIMIT ON SURPLUS/DEFICIT AS A SHARE OF TOTAL RECEIPTS								
Outcome: Spending Surplus/Deficit as share of Total Receipts	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(9)
	All Municipalities			Municipalities within 20pp of 60% limit			Municipalities within 10pp of 60% limit	
Treatment: Personnel expenditure share over 60% before LRF*After	0.019 (0.003)**	0.019 (0.003)**	0.019 (0.003)**	0.013 (0.003)**	0.013 (0.003)**	0.014 (0.003)**	0.005 (0.005)	0.005 (0.005)
Ln Population		0.017 (0.005)**	0.017 (0.005)**		0.018 (0.006)**	0.016 (0.007)*	0.015 (0.011)	0.011 (0.013)
Mayor's Vote Share			-0.006 (0.007)			-0.011 (0.014)		-0.036 (0.032)
Observations	63,247	63,233	63,022	45,566	45,552	45,438	19,814	19,800
Number of Municipalities	4,368	4,367	4,367	3,134	3,133	3,133	1,358	1,357
R-squared	0.14	0.14	0.14	0.14	0.14	0.14	0.13	0.13
Outcome Mean	0.17%	0.17%	0.17%	0.25%	0.25%	0.25%	0.11%	0.11%

All regression include municipality fixed effect and state-year dummies.

Standard errors (in parentheses) are clustered at the municipality level

* significant at 5%, ** significant at 1%

TABLE 18: IMPACT OF EXPENDITURE LIMIT ON PROBABILITY OF BEING IN SPENDING DEFICIT

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Outcome: Municipality in spending deficit (dummy variable)	All Municipalities			Municipalities within 20pp of 60% limit			Municipalities within 10pp of 60% limit		
Treatment: Personnel expenditure share over 60% before LRF* After	-0.063 (0.014)**	-0.063 (0.014)**	-0.064 (0.014)**	-0.052 (0.015)**	-0.053 (0.015)**	-0.052 (0.015)**	-0.031 (0.018)+	-0.031 (0.018)+	-0.031 (0.018)+
Ln Population		-0.060 (0.022)**	-0.063 (0.022)**		-0.074 (0.026)**	-0.076 (0.026)**	-0.123 (0.041)**	-0.119 (0.041)**	-0.119 (0.041)**
Mayor's Vote Share			-0.014 (0.021)			-0.029 (0.025)		0.027 (0.038)	
Observations	63,247	63,233	63,022	45,566	45,552	45,438	19,814	19,800	19,770
Number of Municipalities	4,368	4,367	4,367	3,134	3,133	3,133	1,358	1,357	1,357
R-squared	0.15	0.15	0.15	0.16	0.16	0.16	0.18	0.18	0.18
Outcome Mean	44.8%	44.8%	44.8%	44.3%	44.3%	44.3%	44.8%	44.8%	44.8%

All regression include municipality fixed effect and state-year dummies.

Standard errors (in parentheses) are clustered at the municipality level

** significant at 5%; ** significant at 1%*

TABLE 19: CHECKING FOR MEAN REVERSION - PLACEBO TREATMENT IN PRE-LRF PERIOD (EXPENDITURES)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
	Ln Personnel Expenditures		Ln Non-Personnel Expenditures		Ln Current Expenditures		Ln Capital Expenditures		Ln Revenue Generation (Taxes and Fees)		Ln Revenue from Income		Spending Surplus/Deficit as share of Total Receipts		Portability of Being in Deficit	
Sample:	W/in 20pp of limit	W/in 10pp of limit	W/in 20pp of limit	W/in 10pp of limit	W/in 20pp of limit	W/in 10pp of limit	W/in 20pp of limit	W/in 10pp of limit	W/in 20pp of limit	W/in 10pp of limit	W/in 20pp of limit	W/in 10pp of limit	W/in 20pp of limit	W/in 10pp of limit	W/in 20pp of limit	W/in 10pp of limit
Treatment: Personnel expenditure share >60% before LRF-Placebo After	-0.042 (0.020)*	-0.034 (0.021)	-0.006 (0.041)	0.030 (0.051)	-0.016 (0.013)	0.004 (0.016)	0.069 (0.057)	0.070 (0.063)	-0.005 (0.046)	0.034 (0.037)	-0.016 (0.132)	0.030 (0.157)	0.002 (0.006)	-0.003 (0.007)	-0.026 (0.030)	0.001 (0.036)
Ln Population	0.203 (0.057)**	0.144 (0.074)+	0.181 (0.076)*	0.145 (0.145)	0.248 (0.031)**	0.209 (0.047)**	0.330 (0.114)**	0.215 (0.150)	0.201 (0.118)+	0.042 (0.135)	0.099 (0.570)	-0.048 (0.859)	0.011 (0.015)	-0.009 (0.027)	0.011 (0.071)	-0.043 (0.106)
Mayor's Vote Share	0.016 (0.032)	0.063 (0.043)	0.075 (0.067)	0.163 (0.156)	0.024 (0.019)	0.04 (0.027)	0.273 (0.084)**	0.237 (0.116)*	0.139 (0.065)*	0.203 (0.081)*	0.073 (0.230)	0.229 (0.328)	-0.023 (0.028)	-0.066 (0.062)	0.014 (0.066)	0.113 (0.097)
Observations	15,099	6,573	15,099	6,573	15,099	6,573	15,099	6,573	15,098	6,573	9,248	4,017	15,098	6,573	15,098	6,573
# Municipalities	3,132	1,357	3,132	1,357	3,132	1,357	3,132	1,357	3,132	1,357	3,132	1,357	3,132	1,357	3,132	1,357
R-squared	0.32	0.32	0.29	0.24	0.55	0.51	0.16	0.17	0.17	0.19	0.03	0.04	0.10	0.08	0.15	0.16
Comparison: Coefficient on actual (non-placebo) treatment	-0.159 (0.016)**	-0.096 (0.019)**	0.109 (0.023)**	0.044 (0.027)	-0.038 (0.014)**	-0.032 (0.017)+	0.096 (0.035)**	0.076 (0.042)+	0.062 (0.035)+	0.038 (0.040)	0.288 (0.145)*	0.336 (0.163)*	0.014 (0.003)**	0.005 (0.005)	-0.052 (0.015)**	-0.031 (0.018)+

All regressions includes municipality fixed effects and region-specific year dummies

Standard errors in parentheses

+ significant at 10%; * significant at 5%; ** significant at 1%

TABLE 20: CHECKING FOR MEAN REVERSION – VERIFYING RESULTS APPEAR IN YEARS IMMEDIATELY AFTER INTRODUCTION OF LRF (EXPENDITURES)																
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Outcome:	Ln Personnel Expenditures		Ln Non-Personnel Expenditures		Ln Current Expenditures		Ln Capital Expenditures		Ln Revenue Generation (Taxes and Fees)		Ln Revenue from Income		Spending Surplus/Deficit as share of Total Receipts		Portability of Being in Deficit	
Sample:	W/in 20pp of limit	W/in 10pp of limit	W/in 20pp of limit	W/in 10pp of limit	W/in 20pp of limit	W/in 10pp of limit	W/in 20pp of limit	W/in 10pp of limit	W/in 20pp of limit	W/in 10pp of limit	W/in 20pp of limit	W/in 10pp of limit	W/in 20pp of limit	W/in 10pp of limit	W/in 20pp of limit	W/in 10pp of limit
Comparison: Placebo Treat (1996-2000)	-0.042 (0.020)*	-0.034 (0.021)	-0.006 (0.041)	0.030 (0.051)	-0.016 (0.013)	0.004 (0.016)	0.069 (0.057)	0.070 (0.063)	-0.005 (0.046)	0.034 (0.037)	-0.016 (0.132)	0.030 (0.157)	0.002 (0.006)	-0.003 (0.007)	-0.026 (0.030)	0.001 (0.036)
1996-2001	-0.109 (0.014)**	-0.072 (0.017)**	0.056 (0.020)**	0.031 (0.020)	-0.040 (0.009)**	-0.032 (0.012)**	0.105 (0.036)**	0.131 (0.042)**	0.035 (0.036)	0.036 (0.039)	0.259 (0.143)+	0.439 (0.157)**	0.013 (0.004)**	0.002 (0.006)	-0.053 (0.027)*	-0.030 (0.031)
1996-2002	-0.141 (0.019)**	-0.076 (0.016)**	0.055 (0.029)+	0.031 (0.021)	-0.039 (0.010)**	-0.029 (0.013)*	0.057 (0.046)	0.070 (0.052)	0.013 (0.034)	0.019 (0.038)	0.227 (0.139)	0.340 (0.154)*	0.013 (0.004)**	0.005 (0.005)	-0.045 (0.021)*	-0.027 (0.026)
1996-2003	-0.148 (0.016)**	-0.085 (0.016)**	0.079 (0.025)**	0.041 (0.021)*	-0.038 (0.011)**	-0.030 (0.014)*	0.079 (0.041)+	0.080 (0.048)+	0.018 (0.035)	0.014 (0.039)	0.197 (0.144)	0.256 (0.158)	0.014 (0.004)**	0.005 (0.005)	-0.047 (0.019)*	-0.022 (0.023)
1996-2004	-0.153 (0.015)**	-0.090 (0.017)**	0.093 (0.022)**	0.050 (0.021)*	-0.038 (0.012)**	-0.030 (0.015)*	0.094 (0.038)*	0.093 (0.046)*	0.029 (0.034)	0.024 (0.037)	0.241 (0.146)+	0.281 (0.161)+	0.013 (0.004)**	0.004 (0.005)	-0.049 (0.018)**	-0.027 (0.021)
1996-2005	-0.155 (0.015)**	-0.090 (0.017)**	0.103 (0.020)**	0.052 (0.021)*	-0.037 (0.012)**	-0.029 (0.015)+	0.096 (0.037)**	0.091 (0.044)*	0.038 (0.034)	0.028 (0.038)	0.228 (0.145)	0.267 (0.162)+	0.013 (0.003)**	0.004 (0.005)	-0.045 (0.017)**	-0.023 (0.020)
1996-2006	-0.157 (0.015)**	-0.091 (0.018)**	0.103 (0.021)**	0.048 (0.024)*	-0.036 (0.012)**	-0.028 (0.016)+	0.105 (0.036)**	0.093 (0.042)*	0.050 (0.034)	0.040 (0.038)	0.239 (0.145)+	0.278 (0.163)+	0.014 (0.003)**	0.006 (0.005)	-0.051 (0.017)**	-0.032 (0.020)
1996-2007	-0.160 (0.015)**	-0.092 (0.018)**	0.109 (0.020)**	0.053 (0.023)*	-0.036 (0.013)**	-0.028 (0.016)+	0.099 (0.035)**	0.083 (0.042)*	0.056 (0.034)	0.044 (0.039)	0.258 (0.146)+	0.303 (0.163)+	0.014 (0.003)**	0.006 (0.005)	-0.059 (0.016)**	-0.040 (0.019)*
1996-2008	-0.159 (0.015)**	-0.092 (0.018)**	0.108 (0.021)**	0.048 (0.024)*	-0.036 (0.013)**	-0.029 (0.016)+	0.098 (0.035)**	0.077 (0.042)*	0.054 (0.035)	0.038 (0.040)	0.279 (0.145)+	0.323 (0.163)*	0.014 (0.003)**	0.006 (0.005)	-0.058 (0.015)**	-0.038 (0.018)*
1996-2009	-0.157 (0.015)**	-0.092 (0.018)**	0.116 (0.021)**	0.056 (0.025)*	-0.035 (0.013)**	-0.029 (0.016)+	0.101 (0.035)**	0.084 (0.042)*	0.059 (0.035)+	0.038 (0.040)	0.284 (0.145)*	0.331 (0.163)*	0.014 (0.003)**	0.006 (0.005)	-0.055 (0.015)**	-0.034 (0.018)+
Comparison: All Data-years (1996-2010)	-0.159 (0.016)**	-0.096 (0.019)**	0.109 (0.023)**	0.044 (0.027)	-0.038 (0.014)**	-0.032 (0.017)+	0.096 (0.035)**	0.076 (0.042)+	0.062 (0.035)+	0.038 (0.040)	0.288 (0.145)*	0.336 (0.163)*	0.014 (0.003)**	0.005 (0.005)	-0.052 (0.015)**	-0.031 (0.018)+

All regressions includes municipality fixed effects and region-specific year dummies

Standard errors in parentheses

+ significant at 10%; * significant at 5%; ** significant at 1%

TABLE 21: REMOVING MEAN REVERSION FROM TREATMENT IMPACT OF PERSONNEL EXPENDITURE LIMITS

		(1)	(2)	(3)	(4)	(5)	(6)
Outcome:		Ln Personnel Spending					
Sample:	<i>Municipalities w/in 20pp of limit</i>	<i>Municipalities w/in 10pp of limit</i>					
PANEL A: Mean Reversion Estimates							
Placebo Treatment: Personnel expenditure share >60% before LRF*Placebo After	-0.043 (0.019) *	-0.048 (0.020) *	-0.049 (0.020) *	-0.048 (0.018) **	-0.046 (0.018) *	-0.043 (0.019) *	
Observations	13,106	12,286	11,151	5,791	5,456	4,971	
# Municipalities	2,620	2,456	2,229	1,157	1,090	993	
R-squared	0.33	0.32	0.30	0.35	0.34	0.32	
PANEL B: Actual Treatment Estimates							
Coefficient on actual (non-placebo)	<u>1996-2002</u> -0.139 (0.019) **	<u>1996-2006</u> -0.158 (0.013) **	<u>1996-2010</u> -0.162 (0.015) **	<u>1996-2002</u> -0.075 (0.013) **	<u>1996-2006</u> -0.095 (0.014) **	<u>1996-2010</u> -0.101 (0.017) **	
Observations	18,350	27,032	33,451	8,109	12,006	14,911	
# Municipalities	2,620	2,456	2,229	1,157	1,090	993	
R-squared	0.46	0.68	0.78	0.51	0.75	0.83	
PANEL C: Estimate of Expenditure Limit Impact							
Actual Treatment - Placebo Estimate	-0.096 (0.027) **	-0.110 (0.024) **	-0.113 (0.025) **	-0.027 (0.022)	-0.049 (0.023) *	-0.058 (0.025) *	

All regressions include municipality fixed effects and region-specific year dummies, as well as the full set of control variables (log population and the current mayor's share of the vote).

Standard errors (in parentheses) clustered at the municipality level

*+ significant at 10%; * significant at 5%; ** significant at 1%*

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