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Fiscal Decentralization in the Context of Transition: The Case of Russia

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Dissertation

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ABSTRACT

Decentralization of economic activities and decentralization of public administration are two integral parts of transition from a command economy to a free market that cannot be viewed in isolation from one another. In my dissertation, which comprises three essays, I use data from Russian regions to study the impact of fiscal decentralization on government subsidies and the market for subnational debt.

In the first essay, I document inter-regional variation in fiscal powers of local government and explain it with differences in regions' characteristics. By testing the explanatory power of characteristics suggested in the normative theory, I assess whether the observed regional-local decentralization is likely to enhance welfare.

In my second essay, I establish a link between fiscal decentralization in Russian regions and the propensity of local governments to subsidize enterprises. The model predicts that higher rates of tax revenue retention provide local governments with incentives to reallocate public funds to more productive uses. This hypothesis finds empirical support in a panel-data analysis of 72 Russian regions.

Finally, in the third essay, I study how fiscal discipline imposed by credit markets on regional governments is affected by intergovernmental arrangements. In a theoretical model, I show that expectations of a bailout from the federal government results in slower responsiveness of risk premia to rising indebtedness. This effect is estimated through an analysis of the market yield on regional securities. The results show that even if the intergovernmental factors had some effect on the formation of risk premia, it was too weak to override the low creditworthiness of poorer regions.

1. Determinants of Decentralization within Russian Regions

1.1. Introduction

Fiscal decentralization has been an important topic among public finance theorists for nearly fifty years. Recently, there has been strong rhetoric on the issue from applied economists and policy-makers. Although the original catalysts for debate were American policies such as the Heller-Pechman proposal for general revenue sharing, the debate is not confined to the United States. The European Union is currently concerned with harmonization of policies by member countries to avoid misallocation of resources that become even more mobile as the Union inches ever closer to a true common market (see Kirchgassner and Pommerehne, 1996; and Eichengreen, 1996). Less developed countries, prompted by international aid organizations, rely on fiscal decentralization as a way to efficiently manage the public component of their growth process (Bahl, 1999). Finally, one of the key components of transition from a command economy to a free market is the decentralization of the government sector (see Bird et al. 1995).

Among countries in transition, the Russian Federation has the largest territory and population and is also extremely diverse in terms of ethno-linguistic, religious and cultural differences across constituent regions. This diversity — combined with an uneven distribution of mineral resources — resulting in fiscal disparities across jurisdictions makes sound intergovernmental fiscal relations crucial for effective governance. In Russia, the decentralization of power has been occurring in both the federal-regional and regional-local sectors. While fiscal relations between the federal government and the regions are defined more or less clearly in the constitution, the relations between regional governments and constituent localities are left to the discretion of regional authorities. Hence, the division of authority between the two subnational

levels of government considerably differs from region to region. Throughout this paper, the term "subnational" refers to all levels below the federal or central level. For Russia, I will distinguish between the "regional level," referring to the 89 subjects of the Russian Federation (ethnic republics, *krais*, *okrugs*, *oblasts*, and autonomous areas), and the "local level," referring to cities and *rayons* (local government districts similar to US counties) and smaller entities.

The purpose of this essay is to empirically explore the extent and variation of intraregional decentralization in Russia and to explain this variation in terms of regional characteristics. This paper documents significant variation in the relative roles of regional and local governments both across regions and over time. In 2001, for example, local government spending in the Republic of Sakha accounted only for 0.2 percent of total regional-local expenditures, in contrast to the Krasnoyarsk Krai, where local government spending was 80 percent. On average, local governments carry out 49 percent of subnational expenditures. At the same time 39 percent of subnational tax collections are directly allocated to local governments. The gap is filled with intergovernmental fiscal transfers. Moreover, allocation of consolidated regional collections between the levels of government in correspondence with their expenditure responsibilities does not guarantee fiscal balance at the local level, as a considerable portion of consolidated regional expenditures is funded by federal grants. There is a significant variation among regions to the extent of financial dependence on federal transfers.

This cross-regional variation provides a unique opportunity for studying the outcomes of fiscal decentralization while controlling common factors of an institutional, cultural and, to some extent, macroeconomic background. In other countries several studies have found a negative relationship between fiscal decentralization and economic

growth (see Davoodi and Zou, 1998, for a cross-country analysis of 46 developing countries; Woller and Phillips, 1998, for a panel analysis of 23 developing countries; Zhang and Zou, 1998, for a panel analysis of 28 Chinese provinces). However, these studies treat the observed decentralization as exogenously given. If factors that determine the actual degree of decentralization also influence economic development, then the estimated impact of decentralization is very likely to be biased.

The potential endogeneity can have strong implications for applied research on economic outcomes of Russian decentralization. For example, Freinkman and Yossifov's (2001) panel data analysis of 85 Russian regions over 1994–1997 finds that regions with more decentralized revenue systems tend to have larger budget deficits. However, the authors treat their measure of revenue decentralization as exogenous, arguing that it is "determined by the administrative types of regions, their geographic location, and poverty level at the start of the transition" (p. 126). Conversely, our study suggests that intra-regional decentralization is also positively related to the initial level of fiscal imbalance in a region at the start of transition. If this initial imbalance partially determines the current fiscal position of a region, then the relationship between revenue decentralization and fiscal balance noted by Freinkman and Yossifov may well be spurious.

By linking regional characteristics to the observed degree of intraregional decentralization, this paper highlights the endogenous nature of intergovernmental fiscal relations at the subnational level and identifies potential instruments that can be utilized to study the impact of fiscal decentralization in Russia. Such valid instruments are variables that are correlated with fiscal decentralization but do not change economic outcomes in any way other than through their effects on fiscal decentralization. This

study attempts to explain the variation in intraregional decentralization with potential determinants quoted in the literature on fiscal federalism. Unfortunately, there are only few studies developing the positive theory of fiscal decentralization. Those studies explain the existing vertical structure of government with the extent of potential gains from the decentralized provision of public goods. The latter depends on the extent of differences in tastes and costs across different localities. Other potential determinants, such as the initial level of centralization and the level of development, were proposed in policy-work studies.

The remainder of the essay is organized as follows: In Section 1.2, I provide a historical overview of the trends in intergovernmental fiscal relations during the Russian transition. Section 1.3 surveys literature on the potential determinants of fiscal decentralization. Section 1.4 formulates specific testable hypotheses concerning the determinants of the observed decentralization. In Section 1.5, I present the findings of my econometric analysis. My conclusions and policy implications close the essay.

1.2. Evolution of Intergovernmental Fiscal Relations

The present system of Russian government takes its roots in the *Perestroika* initiatives launched by Mikhail Gorbachev in the mid-1980s. By the late 1980s, the former rubber-stamping councils (Soviets of Deputies) had transformed into representative forums in which members were elected at all levels of government in multi-candidate polls. This introduced some horizontal accountability (of local officials to their constituencies) in the subnational tiers of government in an otherwise still highly centralized administrative hierarchy. In fact, *Perestroika* attempted to revive the old Bolshevik slogan: "All powers to the Soviets!" Thus, popularly elected Deputies of

Soviets began appointing the executive branch at all levels of government. Russia maintained this system of government after the dissolution of the Soviet Union until the adoption of the new Constitution in 1993. After the 1993 standoff between the President and the Supreme Soviet followed by a popular adoption of a new Constitution, executive heads started to be elected directly, and thus they gained some autonomy from the legislature.

Table 1.1. Evolution of Intergovernmental Fiscal Relations in Russia

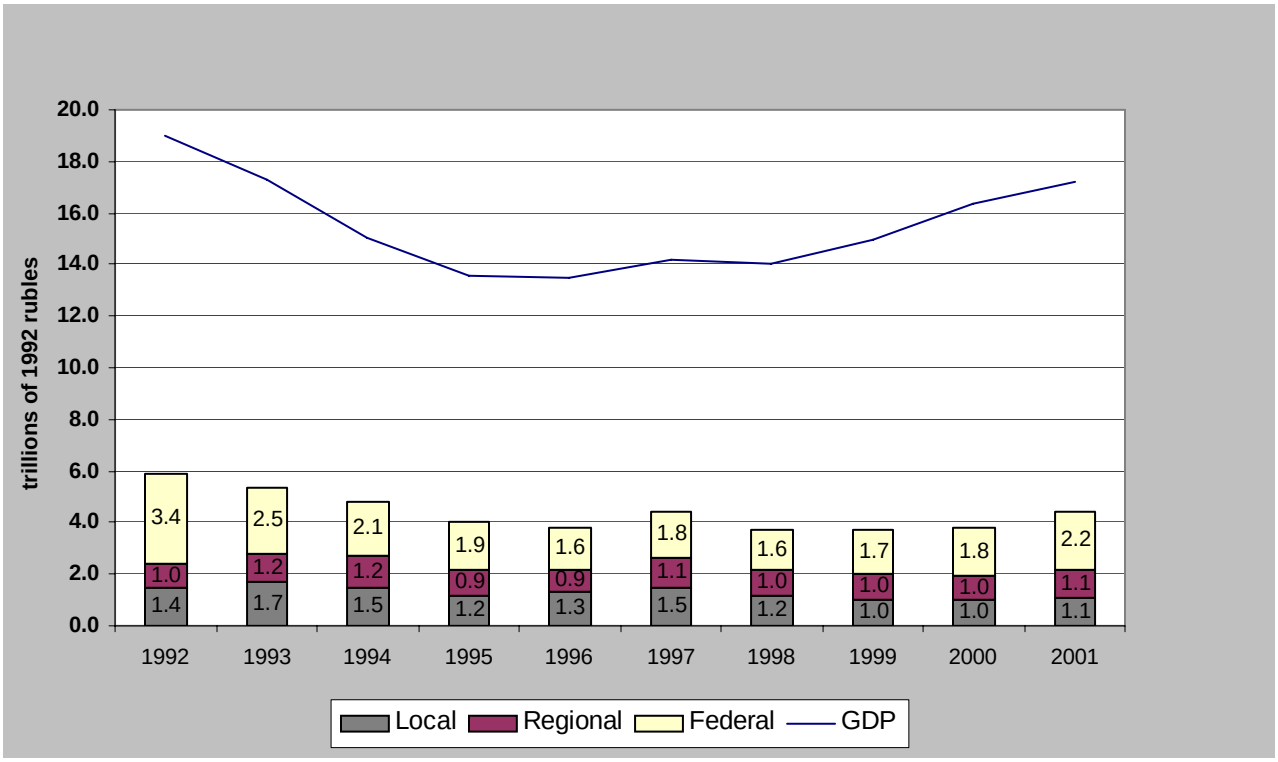
Period	Development
March 1990	First competitive subnational elections
July 1991	Introduction of political and fiscal autonomy of local government (Federal Law N 1550-1 of July 6, 1991)
November 1991	Establishment of independent budgeting by all levels of government (Federal Law N 1734-1 of Oct. 10, 1991)
December 1991	Dissolution of the USSR and establishment of the sovereign Russian Federation
1992–1993	"Off-loading" of major expenditure responsibilities from the federal center to regional and local governments
1994	Unification of rates for sharing tax revenue between the federal and regional governments and introduction of formula-driven federal transfers
1994–1996	Federal government gave subnational governments *carte blanche* to introduce their own taxes
May 1995	Imposition of the "Child Benefits" mandate on regional governments
November 1995	Imposition of the "Disabled Persons" mandate on regional governments
October 1997	Introduction of the requirement that regional governments should, on average, meet some minimum sharing rates for the major taxes with local governments (Federal Law N 126-FZ of Sept. 10, 1997)
July 1998	Legislation of a regional sales tax of up to 5 percent, requiring an elimination of a regional education tax and fifteen minor taxes at the local level (Federal Law N 150-FZ of Jul. 31, 1997)
July 1998	Legislation of a regional tax of up to 20 percent on presumptive income, replacing existing federal and subnational taxes for businesses with largest compliance problems (Federal Law N 1548-FZ of Jul. 31, 1997)
2000	Enactment of the *Budget Code*
2000–2001	Replacement of the subnational share in VAT collections with transfers earmarked for the fulfillment of federal mandates
2001	Replacement of a local tax of up to 1.5 percent of enterprise turnover with a "piggy-back" corporate income tax up to 5 percent

Overall, Russian reforms of intergovernmental fiscal relations have lacked consistency owing to an ongoing compromise between intended changes and various stakeholders' opposition.[1] Three main phases are distinguished in the literature: 1992–93,

[1] For a thorough overview see Martinez and Boex, 2001; Wallich, 1994; and Zhuravskaya, 2000.

1994–1997, and the recent set of reforms unfolding since 1998 (for chronology, see Table 1.1).

Figure 1.1. Government Expenditures



1.2.1. Ad hoc Decentralization of 1992–1993

The 1992–1993 period was basically a continuation of the Soviet fiscal system with a few minor changes. The most important change was offloading of major expenditure responsibilities from the federal to regional and local governments accompanied by negotiations over upward sharing of tax collections from local territories. Figure 1.1 shows the real expenditures of the three levels of government in constant 1992 rubles (1992 average, USD=221.2 rubles). There is an evident shift of about 10 percent of total expenditures from the federal to subnational levels in 1993. According to Table 1.2, the shift of expenditures was recorded in all categories of the

functional classification except for Administration and Justice, Defense and Health Care. The "off-loading" mostly affected the National Economy (transfers to enterprises) and Social Protection (transfers to individuals). These expenditures included public investments in many areas and price subsidies for social goods such as food, medicine, local transportation and public utilities.[2] However, in each functional category, regional and local expenditures increased proportionally so that the relative roles of the two levels did not change.

The new legislation granted local councils autonomy in formulating local budgets while requiring them to secure the minimum expenditure budget at the previous year's level of expenditures, adjusted for new expenditure responsibilities imposed by higher-level governments. [3] At the same time subnational governments were given little revenue-raising authority. Local revenues were expected to be fine-tuned by the regional government in order to provide sufficient resources to finance the minimum expenditure budget. In turn, regional governments' revenues were drawn primarily from shared taxes and federal transfers in the form of negotiated "subventions." The federal government argued that, due to fiscal pressures, it could not cede control over any of the major tax bases to subnational governments (Bahl and Wallich, 1995, p.346). Federal tax

[2] This "off-loading" was closely linked to privatization. In the Soviet system, centrally planned enterprises were responsible for the provision of many basic goods and services. Hence, before being privatized such enterprises maintained huge social assets: housing, kindergartens, hospitals, and recreation facilities. Privatization was accompanied by the process of divestiture, meaning a transfer of social assets and the responsibility for their financing to municipalities. (Alm and Sjoquist, 1995; Commander and Schankerman, 1997).

[3] Federal Law No. 1550-1 on Local Self-Government in the RSFSR (July 6, 1991). Formally, fiscal autonomy of subnational governments is constrained by a growing number of federal mandates. However, in practice, subnational governments have had discretion whether to adhere to these federal norms, which are not enforceable given their combined costs exceed total revenues of subnational governments. Also, formally the unified pay scale was optional in 1994-97 but mandatory in 1992-93 and after 1998. However, in practice, throughout these years average public wage has been varying from one jurisdiction to another owing to the discretion in awarding supplements and bonuses, which can amount to 40 percent of the basic wage.

legislation did not allow subnational governments to introduce taxes on any significant revenue base. The only exception was the property tax, which however carries substantial administration costs in order to generate adequate tax revenue.

Table 1.2. Distribution of Expenditures by Function between the Levels of Government, 1992–2001

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Administration and Justice	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**
Federal Budget	80.5	79.6	81.4	63.1	63.7	62.0	57.8	60.1	65.1	65.9
Consolidated Subnational Budget	19.5	20.4	18.6	36.9	36.3	38.0	42.2	39.9	34.9	34.1
Regional Budgets	*5.5*	*6.1*	*6.2*	--	*19.0*	--	*11.7*	*20.5*	*18.4*	*19.1*
Local Budgets	*14.0*	*14.3*	*12.4*	--	*17.3*	--	*30.5*	*19.4*	*16.5*	*15.0*
Defense	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**
Federal Budget	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Consolidated Subnational Budget	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Regional Budgets	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*
Local Budgets	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*
National Economy	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**
Federal Budget	80.8	48.6	30.4	26.3	27.5	24.0	4.7	12.6	14.6	19.2
Consolidated Subnational Budget	19.2	51.4	69.6	73.7	72.5	76.0	95.3	87.4	85.4	80.8
Regional Budgets	*8.7*	*24.6*	*34.8*	*35.4*	*32.4*	--	*17.7*	*36.6*	*39.0*	*43.8*
Local Budgets	*10.5*	*26.8*	*34.9*	*38.2*	*40.1*	--	*77.6*	*50.8*	*46.3*	*37.0*
Education	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**
Federal Budget	33.8	19.5	19.9	15.9	14.5	13.2	13.4	14.4	18.0	19.4
Consolidated Subnational Budget	66.2	80.5	80.1	84.1	85.5	86.8	86.6	85.6	82.0	80.6
Regional Budgets	14.5	18.9	19.1	19.7	18.0	--	21.0	21.0	21.0	23.0
Local Budgets	51.8	61.6	61.0	64.4	67.5	--	65.6	64.6	61.0	57.6
Culture and Mass Media	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**
Federal Budget	51.2	34.8	39.6	31.6	34.7	16.5	16.5	21.2	28.3	28.3
Consolidated Subnational Budget	48.8	65.2	60.4	68.4	65.3	83.5	83.5	78.8	71.7	71.7
Regional Budgets	*21.2*	*30.2*	*28.9*	*30.8*	*29.3*	--	*38.9*	*38.8*	*36.2*	*38.4*
Local Budgets	*27.6*	*35.0*	*31.5*	*37.6*	*36.0*	--	*44.6*	*40.0*	*35.5*	*33.3*
Health and Phys. Ed.	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**
Federal Budget	11.3	10.5	11.8	9.9	10.2	11.8	8.8	9.9	11.2	12.4
Consolidated Subnational Budget	88.7	89.5	88.2	90.1	89.8	88.2	91.2	90.1	88.8	87.6
Regional Budgets	*28.5*	*30.2*	*33.4*	*33.4*	*33.1*	--	*39.0*	*38.9*	*40.0*	*41.7*
Local Budgets	*60.2*	*59.3*	*54.8*	*56.7*	*56.8*	--	*52.2*	*51.2*	*48.8*	*45.9*
Social Protection	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**
Federal Budget	71.8	52.0	50.3	18.5	31.2	41.3	56.6	53.5	53.1	52.0
Consolidated Subnational Budget	28.2	48.0	49.7	81.5	68.8	58.7	43.4	46.5	46.9	48.0
Regional Budgets	*20.4*	*34.9*	*34.9*	*31.1*	*26.8*	--	*23.4*	*26.7*	*29.5*	*30.7*
Local Budgets	*7.8*	*13.2*	*14.8*	*50.3*	*42.0*	--	*20.1*	*19.8*	*17.3*	*17.3*

Source: Freinkman et al. (1998) and Ministry of Finance

Initially, the 1991 Law on the Basic Principles of Taxation decreed federal personal and corporate income taxes to be shared with subnational budgets and the revenue from the value-added tax to be entirely allocated to the federal budget.[4] However, as the tax administration was very weak institutionally and often dominated by local authorities, stable proceeds from VAT immediately became subject to sharing. As a result, subnational governments gained access to productive and elastic revenue bases but had little say in determining tax rates or tax bases. Thus, the bulk of subnational revenues came from federal taxes, either through tax revenue retention at the point of collection or through redistribution via intergovernmental fiscal flows.

1.2.2. Bringing Some Structure to the System in 1994–1997

In 1994 important reforms were undertaken in the system of fiscal relations between the federal government and regions. The budgetary autonomy of subnational governments had been strengthened with the introduction of the 1993 Constitution. Tax revenue sharing between the federal government and regions was reformed. Rather than being negotiated with each region, sharing rates for each tax were set uniformly across regions. In addition, a regional government's share of revenue from the federal tax on enterprise profits turned into a regional "piggy-back" tax with a rate of up to 22 percent. The unification of tax-sharing rates was offset with the introduction of a formula-driven mechanism of equalization grants. On top, the federal government maintained the ad hoc mechanism of "mutual settlements."[5]

[4] Federal Law No. 2118-1of December 27, 1991.

[5] These are non-budgeted and primarily negotiated funds, which are made public after budget execution. A great deal of these take the form of tax exemptions from the federal budget to regional energy suppliers. Regional administrations trade these exemptions for bills of exchange issued by regional utility suppliers. The bills of exchange are transferred to local governments under the mutual settlements account so that localities can cover overdue payables to the energy suppliers.

In 1994, the federal government gave subnational governments carte blanche to introduce their own taxes. This freedom resulted in a plethora of minor taxes and nuisance charges; most were subsequently abolished from January 1997 with the restoration of the federal list of permitted taxes. Also, in 1994, the federal government stopped the ad hoc shifting of expenditure responsibilities down to subnational governments. However, the federal center started introducing new programs and making subnational governments responsible for their funding (e.g., child allowances). This led to another increase in the subnational share of total government expenditures as can be seen from Figure 1.1.

By 1994 the federal and local governments managed to cut the real volume of their expenses by 11 percent. However, throughout 1992–94, the annual reduction of total government expenditure was well below the rate of GDP contraction (9–13%).[6] Fiscal adjustment came only in 1995 when government expenditures dropped, on average, by 16 percent at all levels of government (regional expenditures fell the most). This was primarily owing to financial stabilization when inflation fell from 1490% in 1992 to 180% in 1995. Governments could no longer reduce their costs by simply postponing the payment of their bills and waiting until inflation depreciated the real value of the payables.

In 1996, federal expenditures declined by 16 percent and local expenditures grew by eight percent while regional expenditures remained at the 1995 level. According to Table 1.2, this represents a lagged redistribution of resources in response to the reshuffling of functional responsibility that occurred in the previous year. Indeed, in 1995

[6] The real GDP shown in Figure 1 is computed by dividing the nominal GDP with the GDP deflator. However, the growth rate exhibited by this indicator of GDP differs from the one reported by the Goskomstat based on physical production. Nevertheless, despite the differences in magnitude, both growth rates have the same sign.

there was a significant decrease in the federal government's share in expenditures on Administration and Justice and Social Protection. This reflects the fact that responsibility for financing law enforcement was partially transferred to regional governments after 1994 (Titov, 1997). The sharp increase in the subnational share in the expenditures on Social Protection should be attributed to the issuance of two major federal mandates: payment of monthly child benefits (May 1995) and subsidies for payment on various goods and services by disabled persons (November 1995). It is interesting to note that the increase in subnational expenditures on Social Protection occurred mostly at the local level as the regional governments passed on these federal mandates to local governments.

Table 1.3. Distribution of Subnational Expenditures between Levels of Government, 1992–2001 (% of GDP)

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Regional Budgets	5.2%	6.7%	8.0%	7.0%	6.7%	8.1%	7.0%	6.5%	5.9%	6.5%
Local Budgets	7.6%	9.6%	10.0%	8.9%	9.5%	10.5%	8.4%	6.8%	6.0%	6.3%
Total Subnational	12.8%	16.3%	18.0%	15.8%	16.2%	18.6%	15.4%	13.2%	12.0%	12.8%

Source: Calculated from Russian Ministry of Finance data

In 1997, the first year of contemporary economic recovery in Russia, public expenditures started to grow at all levels of government. The public sector expanded more intensively than GDP, and subnational government expenditures as a percentage of GDP reached an all-time high of 18.6 percent for the decade (Table 1.3). However this failed to become a new trend, as the financial crisis hit the following year. Although the 1998 drop in GDP was followed by years of growth with annual rates of over 5 percent, government expenditures continued to drop until 2000. However, it did not necessarily translate into a proportional reduction of public sector output. Depreciation of the ruble

reduced the real costs of domestic inputs thus making some government programs cheaper.

1.2.3. Re-centralization since 1998 to Present

In 1998–2001 significant fiscal reforms unfolded in connection with the implementation of the new federal legislation and several programs aimed at developing fiscal federalism in Russia. The Federal Law on Financial Foundations of Local Self-governments of 1997 attempted to bring some structure to the regional-local sector by introducing a requirement that regional governments should, on average, meet some minimum sharing rates for the major taxes with local governments. After the August 1998 financial crisis, the necessity to boost government revenues prompted a piecemeal introduction of the long-debated Budget and Tax Codes. The Tax Code provided regional governments with new tax instruments, but at the same time eliminated most of the local governments' own taxes.

The introduction of a regional sales tax of up to 5 percent, the proceeds of which were to be shared between the regional and local governments 40:60, required an elimination of the regional Education Tax (of up to 1 percent of the payroll, generating about 1 percent of subnational revenues in 1997) and fifteen minor taxes at the local level. In addition, regional governments were allowed to introduce a tax of up to 20 percent on presumptive income defined according to physical indicators (commercial area, employees, productive capacity, etc.).[7] Proceeds from this tax are shared in a fixed proportion between the federal and regional governments, while the latter can allocate part of their share to local budgets.

[7] This tax replaces existing federal and subnational taxes for businesses with lowest tax compliance – medium and small enterprises with sole proprietors, informal suppliers, and no fixed location" (Mikesell, 2000).

In 2001, trying to eliminate the most distorting taxes, the federal government repealed local governments' right to levy the Housing Maintenance Tax (up to 1.5 percent of enterprise turnover, accounting for 14 percent of local pre-transfer revenues in 1999). As compensation, local governments gained the right to introduce a "piggy-back" corporate income tax of up to a maximum of 5 percent. Because shared taxes account for more than two thirds of subnational revenues, subnational budgets were also hit by changes to the federal taxes. Thus, the reduction of the subnational share in VAT collections from 25 percent in 1998 to 15 percent in 1999–2000 to zero in 2001 resulted in a significant loss to subnational pre-transfer revenues, of which about fifteen percent was accounted for by VAT in 1998.

Table 1.4. Ratio of Federal Grants to Consolidated Regional Expenditures

	1992	1993	994	1995	1996	1997	1998	1999	2000	2001
Mean	11%	14%	30%	22%	26%	23%	26%	25%	27%	33%
Median	7%	12%	24%	14%	23%	22%	21%	17%	20%	29%
Max	68%	58%	97%	81%	68%	66%	93%	98%	92%	90%
Min	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
Coefficient of Variation	1.20	0.79	0.75	0.92	0.64	0.68	0.86	0.93	0.90	0.70

Source: Calculated from Russian Ministry of Finance data

This reshuffling is a part of the fundamental reforms in the system of revenue sharing aimed at making it more transparent and targeted. Although the centralized share of VAT collections is transferred back to regions in the form of subventions earmarked for the fulfillment of three major federal mandates, this reshuffling significantly worsened the revenue autonomy of subnational governments (see Table 1.4).

Overall, since 1999 the federal government's share in total expenditures has been expanding at the expense of subnational expenditures. In 2001, for the first time since 1993, central government expenditures exceeded subnational expenditures. Moreover,

after the federal mandates started receiving earmarked funding, many regional governments took over the responsibility for their fulfillment from constituent localities. Therefore, the contraction of the subnational share in total expenditures mostly occurred at the local level. Thus, in 2001, for the first time in the last ten years, government expenditures at the local level fell below expenditures at the regional level.

1.2.4. Types and Indicators of Decentralization

Before proceeding to the descriptive evidence on fiscal decentralization within Russian regions, I would like to summarize numerous discussions on the definition and empirical measurements of this subject. Public finance economists define decentralization as the process of empowering subnational tiers of government with some autonomy in decision-making. Three forms of this process have been distinguished: deconcentration, delegation and devolution (See Bird, 1993; Bird and Vaillancourt, 1998; and Martinez-Vazquez and McNab, 1998). Through deconcentration the central government gives some autonomy to its local offices that are appointed by, and are accountable to, the higher hierarchy. Under delegation, locally elected government bodies assume new responsibilities subject to strict regulations by the upper-level government. The process of devolution establishes complete autonomy of locally elected government bodies in their exclusive spheres of responsibility.

According to the classification of decentralization forms, the evolution of intergovernmental relations in Russia presents a mix of delegation and devolution. Devolution is more prominent in the federal-regional sector. For instance, subnational governments became solely responsible for financing public transportation and fire fighting (Martinez-Vazquez and Boex, 2001). However, in the regional-local sector many functions are shared between the two levels of government without a clear division of

responsibilities. While the inter-budgetary relationships between the federal government and regions are defined more or less clearly in the constitution, the relationships between the regional governments and constituent localities are left to the discretion of regional authorities.[8] Hence, the division of responsibilities for the functions shared between the two subnational levels of government considerably differs from region to region.

For the purpose of this study, the variation in regional-local decentralization requires a quantitative indicator in order to perform statistical analysis. The definition of decentralization suggests that it is a multifaceted process. As explained above, at least three different characteristics jointly constitute this concept: authority, autonomy and accountability. Thus, no single-dimensional measure can capture the true degree of decentralization. Approaches to measuring the extent of fiscal decentralization have been long debated in theoretical works and, more recently, in empirical studies on the link between fiscal federalism and economic development.[9] The bottom line is that there is no best measure of decentralization. The choice of an appropriate measure has to be determined with the particular aspect of decentralization that is being studied. The suggested measures capture three essential aspects of decentralization: participatory allocation, fiscal incentives and fragmentation.

The first aspect concerns the share of general public spending that falls under the authority of local governments, and is therefore subject to the merits and dangers of decentralized decision-making. This aspect can be measured as a ratio of local

[8] Article 72 assigns most functions, including education, health care, and social protection, jointly to the federal and regional levels. This ambiguity was tried to be resolved through subsequent federal laws and bilateral fiscal treaties between the federal government and individual regions. As for the local government, the Constitution, although establishing autonomy in governing local affairs, does not enumerate any direct responsibilities except for public order protection.

[9] For a thorough discussion see Riker (1964, p. 51-84), Oates (1972, p. 196-99), and Bahl and Linn (1992, p. 390-91). Econometric applications can be found in Oates (1972), Davoodi and Zou (1998); Huther and Shah (1998); Jin *et al.* (1999); Panizza (1999), Woller and Phillips (1998); and Zhang and Zou (1998).

government spending to general government spending. However, such a ratio can be misleading if local governments simply act as spending agents of the upper-level governments and are constrained by regulations imposed on them. Moreover, observed local expenditures result from an interaction of the scope of responsibilities devolved to local governments, on the one hand, and local demand for these services and efficiency of their provision, on the other hand.

The second aspect of decentralization relates to the link between local governments' revenue and the outcomes of their policies.[10] This can be measured as the elasticity of a local government's revenue with respect to the local economic base. Alternatively, it could be measured as the share of the local revenues drawn from the local economic base (as opposed to intergovernmental transfers). This measure should capture the incentives of a local government to promote development or to cap spending. An inter-temporal generalization of this measure captures the ratchet effect that is offsetting an increase in localities' own revenues with a decrease in grants.[11]

The third aspect of decentralization concerns the number of parties involved in the decision-making process. All other things being equal, more local governments (more fragmentation) would imply higher fiscal decentralization. This can have several interpretations: degrees of freedom for tailoring public goods to heterogeneous preferences; intensity of competition among jurisdictions; concentration of bargaining

[10] In the context of emerging democracies, this aspect of decentralization is often referred to as "enabling markets and fiscal instruments to hold local officials accountable" (e.g., Ahmad, 1997, p. 146). In the public choice context, this would capture the difference between actual and perceived tax prices stemming from the separation of spending and taxing decisions (for a discussion and empirical evidence see Winer, 1983).

[11] In many Russian regions, the amount of regional grants to localities is set to fill the gap between minimum expenditure budgets and revenue targets projected by the regional government for each locality. Alexeev and Kourliandskaia (2003) found the effect of the difference between the planned and actual local revenues on the next year's revenue target to be negative and statistically significant for the localities of the Rostov Oblast in 1997-98.

power, etc. This aspect is also connected to economies of scale, inter-jurisdictional disparities and moral hazards on the part of localities.

Below I will employ some modifications of the empirical measures described above in order to illustrate the variation in fiscal decentralization in Russian regions in 1992–2001. I will attempt to focus on the first two measures of fiscal decentralization without detracting from the consequence of local government fragmentation. Participatory allocation and fiscal incentives are the two indicators most frequently used for studying the impact of fiscal decentralization. Thus, I propose the use of the share of local government expenditures in the consolidated regional-local expenditures to measure the scope of authority devolved to the local unit At the same time, I will use the share of local government tax revenue in the total regional-local tax collections to assess fiscal incentives faced by local governments. In both measures, local government revenue and expenditures account for revenue and expenditures of all government units below the regional level, including deconcentrated arms of the regional government at the *rayon* level. Unfortunately, Russian budgetary data do not distinguish between these deconcentrated bodies and genuine units of local self-government.

The second measure of fiscal decentralization complements the first in a sense that it shows whether taxation powers allow local governments to discharge their functions independently. If restricted in their ability to derive revenue from the local economic base, local governments would depend on the revenue decisions of the regional government. (In many regions, localities receive funding which is just enough to cover expenditures approved by the upper-level government.) This limits the autonomy of local governments and thus undermines their accountability to the constituency.

Table 1.5. Distribution of Pre-Transfer Revenues between Levels of Government, 1992–2001 (% of GDP)

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Regional Budgets	7.0%	9.0%	7.7%	7.3%	6.5%	7.8%	7.1%	6.9%	6.5%	6.4%
Local Budgets	6.2%	6.9%	7.0%	6.3%	6.4%	6.9%	6.0%	5.0%	4.3%	4.1%
Total Subnational	13.1%	15.9%	14.7%	13.6%	12.9%	14.7%	13.1%	12.0%	10.8%	10.5%

Source: Calculated from Russian Ministry of Finance data

On average, while local government expenditures accounted for more than a half of subnational expenditures throughout 1992–2000, local government revenue from their own and assigned sources were considerably less than half of the pre-transfer subnational revenue throughout most of these years (Table 1.5). The measure of pre-transfer revenue includes revenue from shared (assigned) taxes, which do not fully represent local taxation power as local governments can neither define bases nor set rates for such taxes. However, because this revenue is linked to the local economic base, it is more similar to a piggyback tax than to grants of cash assistance. In particular, tax revenue sharing on the derivation basis establishes some link between local governments' revenue and the outcomes of their policies.

1.2.5. Descriptive Evidence on Cross-Regional Variation

Although the aggregated data presented above provide some insights into the evolution of relative roles of regional and local levels of government, they do not convey the whole variety of intraregional decentralization observed throughout Russia. The complete centralization in the City of Moscow, the largest and richest region of the Russian Federation, and centralization in the City of St. Petersburg until 1998, pushes the average degree of decentralization downward. Indeed, according to Table 1.6, the regional-local sector has exhibited significant variation in the relative roles of regional

and local governments across regions. In 2001, for example, local government spending in the Republic of Sakha accounted for only 0.2 percent of total regional-local expenditures in contrast to Krasnoyarsk Krai, where local government spending was 80 percent. However, similar to the aggregate trend, the mean/median share of local government expenditures in consolidated regional expenditures increased slightly between 1992 and 1996 and significantly decreased between 1997 and 2001.

Table 1.6. Local Government Share in Consolidated Regional-Local Expenditures, 1992–2001

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Mean	64%	65%	64%	65%	67%	65%	65%	62%	61%	58%
Median	65%	66%	64%	68%	69%	68%	67%	65%	64%	61%
Max	100%	100%	100%	84%	87%	85%	88%	83%	86%	80%
Min	15%	19%	27%	10%	16%	29%	21%	21%	18%	0.2%
Coefficient of Variation	0.20	0.21	0.18	0.17	0.18	0.19	0.19	0.22	0.20	0.23

Source: Calculated from Russian Ministry of Finance data
Note: The sample excludes the Cities of Moscow and St. Petersburg. The maximum of 100% is observed in the Ingush Republic and Ust-Orda Buriat Autonomous Okrug as a result of no expenditures by the newly established regional governments.

Table 1.7 reveals that the local government share in consolidated regional tax receipts has been more volatile than its share in consolidated expenditures. Two jumps in the mean/median share of local government stand out in the table. In 1994 the median local government share in consolidated regional collections rose to 59 percent from 47 percent. That year the share of local collections in GDP also reached its decade maximum of 7 percent (Table 1.5). However, in 2001 the median local government share in consolidated regional collections dropped to 55 percent from 61 percent in 2000. With this drop the share of local collections in GDP reached its decade minimum of 4.1

percent. Similar to the division of expenditures, I can identify trends in the division of revenue towards decentralization until 1996 and towards centralization thereafter.

The accordance between the local government share in consolidated revenues and its share in consolidated expenditures does not in itself relate to vertical fiscal balance at the local level. A significant portion of consolidated regional expenditures is funded with federal grants (see Table 1.4). Thus, even if the local government share in consolidated regional collections were close to its share in consolidated expenditures, its fiscal accounts could still be unbalanced unless an adequate share of federal grants were passed on by the regional government to localities. Table 1.4 shows that, on average, a quarter of subnational expenditures are funded by federal grants. There is a great variation among regions in the extent of financial dependence on the federal level.

Table 1.7. Local Share in Consolidated Regional-Local Revenues from Own and Assigned Sources, 1992–2001

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Mean	49%	46%	61%	61%	64%	63%	61%	57%	58%	54%
Median	52%	47%	59%	60%	64%	63%	61%	59%	61%	55%
Max	79%	100%	100%	94%	94%	93%	94%	89%	83%	83%
Min	9%	7%	31%	24%	28%	22%	18%	20%	5%	0.2%
Coefficient of Variation	0.29	0.36	0.23	0.21	0.21	0.21	0.22	0.24	0.24	0.25

Source: Calculated from Russian Ministry of Finance data
Note: The sample excludes the Cities of Moscow and St. Petersburg. The maximum of 100% is observed in the Ust-Orda Buriat Autonomous Okrug as a result of no collections by the newly established regional governments.

Presented indicators of fiscal decentralization show that, as of 2001, local governments carry out 49 percent of subnational expenditures. At the same time 39 percent of subnational revenue is directly allocated to local governments. [12] The gap is

[12] In the United States, in 1995, local government share in state-local expenditures was 55.8 percent while its share in state-local revenues from own sources was 41.9 percent (Tax Foundation Inc., *Facts and Figures on Government Finance*, 33rd Edition).

filled with intergovernmental fiscal transfers. Moreover, across regions, there is substantial variation in both aspects of intra-regional decentralization. The next section surveys available conjectures regarding potential determinants of such a variation.

1.3. Determinants of Fiscal Decentralization

Currently available economic research presents only a limited number of studies on the positive theory of decentralization. Several approaches have been suggested to explore this issue. One area of research attempts to explain the observed variation in the vertical structure of government with the magnitude of potential gains from fiscal decentralization as predicted by the normative theory (Oates, 1972; Wallis and Oates, 1991). Another approach is to model a choice of decentralization by the central government whose utility is effected both by the size of its budget and satisfaction of the median voter (Panizza, 1999). In a public choice framework, a state legislature's choice of decentralization is modeled based on the distribution of preferences across localities and associated vote-trading (Strumpf and Oberholzer-Gee, 2001). Another approach is to make inferences on the determinants of decentralization by looking at the historical experience of different countries (Bahl and Linn, 1992). In this study I shall draw on all the above approaches in an attempt to explain the actual decentralization in Russian regions.

1.3.1. Theoretical Predictions

The traditional theory of fiscal federalism prescribes what functions and revenue instruments should be assigned to what level of government in order to maximize social welfare (Musgrave, 1959; Oates, 1972). It has been argued that macroeconomic

stabilization and income redistribution should be the responsibility of the higher-level government.[13] This argument is based on high mobility of economic units across local boundaries and the fact that local governments cannot control macroeconomic instruments such as monetary and exchange-rate policies. Thus, a greater need for stabilization and redistribution efforts (stemming from unemployment, poverty, etc.) would result in higher centralization in the public sector. In addition, as the propensity to engage in income redistribution has a relatively high income-elasticity (Oates and Wallis, 1991), based on normative grounds, I might expect higher income regions to have more centralized public sectors.

By contrast, government functions that have no cross-border spillovers are prescribed for provision at the local level. As Musgrave (1959) argued, "since the benefit incidence of various social goods is subject to spatial limitations, each service should be decided upon and paid for within the confines of the jurisdiction in which the benefits accrue." By moving decision-making closer to people we can achieve welfare gains from tailoring public goods to heterogeneous preferences prevailing in different localities. This normative preposition is known as Oates' (1972) Decentralization Theorem; it states that in the absence of economies of scale and inter-jurisdictional spillovers, decentralized provision of public goods is far superior to any uniform level of provision.

The magnitude of potential gains from decentralized provision of public goods depends on the extent of variation in preferences and costs across localities.[14] Thus, if the

[13] In the literature there are theoretical cases for both decentralized macroeconomic policies and income redistribution at the local level (Oates, 1999). Moreover, there is some empirical evidence on effective redistributive activity undertaken by regional and local governments (e.g., Kirchgassner and Pommerehne, 1996).

[14] For the same extent of heterogeneity in preferences (differences in costs), potential gains from decentralized provision of pubic goods increase (decrease) with the price elasticity of demand for these public goods (see Oates, 1998).

magnitude of welfare gains has any explanatory power, we would observe a greater role for local government in regions with greater population diversity as shown by socioeconomic indicators (provided that the variance in tastes is larger between jurisdictions than within them). This prediction is reinforced by, but by no means wholly dependent on, a population with a high degree of mobility. Moreover, social history shows us that we can expect people with similar preferences to live in close proximity.

Panizza (1999) turns these normative predictions into a positive theory by linking the size of the public sector to taxpayers' satisfaction with the type of public goods provided. Thus, a revenue-maximizing central government faces a trade-off between its share in the public sector and the total size of the public sector. A gain in the total size of the public sector can result from moving decision-making on the type of public goods closer to the taxpayers, thus making them demand more of the public good whose type better matches their preferences. Moreover, with an increasing level of democracy, the central government is hypothesized to be more dependent on the residents' satisfaction with the public good. The author shows that the equilibrium level of decentralization is positively correlated with differentiation in tastes for the public good among residents, with the country size, and the level of democracy. In addition, for the chosen form of the residents' utility function, the equilibrium level of decentralization is also positively correlated with the income level.

On the revenue side the normative theory prescribes the design of the vertical structure of taxes in accordance with the relative roles of different levels of government in the public sector. Apart from balancing expenditure responsibilities, the optimal assignment of specific tax instruments is determined by the relative extent of economic distortions induced by taxes when the latter are levied by different levels of government.

The implication of the normative theory is that decentralized governments should tax mobile economic units with benefit levies (Oates and Schwab, 1991; Oates, 1999). In Russia the bulk of subnational revenues are generated by non-benefit source-based taxes. Thus, on the efficiency grounds, we should expect higher centralization of revenues in those regions that have less reliance on revenues coming from less mobile tax bases (e.g., property).

In a multi-tier government, a portion of expenditures of one level of government can be funded with revenues generated at and transferred from another level. Besides closing disparities between different levels of government in their expenditure responsibilities and revenue-raising authority, grants can serve for internalization of cross-jurisdictional spillover benefits to other jurisdictions and for fiscal equalization across localities. Thus, in regions with greater fiscal disparities among local jurisdictions, I might observe a higher share of tax revenues allocated to the regional budget and redistributed via intergovernmental transfers.

1.3.2. Policy Wisdom

The policy debate contributes two more potential determinants of fiscal decentralization. It is argued that decentralization can reduce planning and administrative costs due to the abundance of overlapping functions. These costs are expected to be higher in regions with larger land areas (Oates, 1972, p.201) and lower population densities. At the same time, the extent of concentration of the population in urban areas has ambiguous implications for the vertical structure of government. On the one hand, if population is concentrated in a few localities, it is less costly to govern the whole region from a single center. On the other hand, the concentration of population in urban areas

makes it economically desirable for the local sector to provide a wider range of services that involve significant indivisibilities (museums, zoos, theaters, etc). Another policy-debate argument is that the gains from decentralization depend on the availability of qualified government personnel at the local level. Thus, I might expect higher decentralization in those regions that have more people with college degrees living outside regional capitals.

Bahl and Linn (1992) quote two more determinants of the decentralization of expenditures: the stage of development and the "crisis effect." As they put it, "Decentralization more likely comes with the achievement of a higher stage of economic development" (p. 371). They claim that there is a relatively high threshold level of economic development below which fiscal decentralization is ineffective. A similar hypothesis was articulated by Wheare (1956) in his seminal study of four federal governments (Australia, Canada, Switzerland and USA). He argued that decentralization is a costly enterprise and thus a country should be affluent enough to succeed in such a reform. However, Oates (1993) points out that industrialized countries have seen trends towards more centralization. Thus, what we observe is a more complicated interplay of centralizing and decentralizing forces at work. According to Conyers (1986), other things being equal, the level of decentralization across developing countries should vary directly with the time period they have been independent and with some proxy of how centralized the colonial administration systems were. The "crisis effect" hypothesis suggested by Bahl and Linn is based on the observation that during periods of distress (wars, natural catastrophes, etc.) countries tend to centralize all available resources. This accords with the historical study by Wheare (1956, p. 259), who quotes four forces that caused the

federal governments to increase at the expense of the regions: "power politics, depression politics, welfare politics and the internal combustion engine."

In the context of Russian transition, initial fiscal imbalances were identified as a possible determinant of the decentralization of expenditures. As Bahl and Wallich (1995, p. 346) stated, "The central government's strategy has been to push the deficit down by shifting unfunded expenditure responsibilities, hoping that [subnational governments] will cut costs." Regional-local decentralization in Russia is also significantly effected by changes in federal tax legislation. Tax rates and bases are fixed by the federal legislation and cannot be adjusted by subnational governments. Some minor taxes and charges are assigned exclusively to the local level. For instance, until 2002 the Law *On Payment for Natural Resources* mandated a significant share of these revenues to be allocated to the municipality where extraction took place. Also, the distribution of the tax base across localities is determined by federal regulation on filing tax returns.[15]

Finally, in the Russian system, regional governments provide liaison between the central government and localities. Thus, although the responsibilities for social services were transferred directly from state enterprises to local governments, federal compensation for the "off-loaded" expenditures has been channeled through regional budgets. Also, when negotiating a transfer from the federal budget, regional governments present normative expenditure needs collected from constituent local governments. Thus, federal-regional relations can affect regional-local arrangements.

Potential determinants of intra-regional decentralization presented in this section are summarized in Table 1.8. In the next section I shall employ these variables to explain cross-regional variation in regional-local decentralization in Russia.

[15] This especially concerns the taxation of property and profits of multi-jurisdictional businesses.

Table 1.8. Potential Determinants of Decentralization within Russian Regions

Determinant/Factors	Decentralization of Expenditures	Decentralization of Revenues
Inequality factors		
1. Unemployment Level	—	
2. Poverty Headcount	—	
Heterogeneity factors		
3. Ethnic Fractionalization	+	
4. Rural/Urban Homogeneity	—	
Urban and Development Factors		
5. Urban Concentration	?	
6. Population Density	—	
7. Land Area	+	
8. Property Tax Share		+
9. Economic Development	+	
10. Education Level	+	
11. Natural Resources Extraction		+
Other factors		
12. Initial Centralization	?	?
13. Initial Fiscal Imbalance	+	—
14. Transfer Dependence	?	?

1.3.3. International Experience

The explanatory power of the normative theory has been empirically tested in several studies. In a cross-sectional analysis of 58 countries in 1965, Oates (1972, p. 207–8) found an inverse relationship between the fiscal share of the central government (either in revenues or expenditures) and the extent to which the population of geographic sub-areas identify "self-consciously and distinctively with that area." In addition, he found that population size, land area, and per capita income have a significant inverse relationship with the degree of fiscal centralization. Oates also attempted to employ

measures of linguistic, racial and religious differentiation as proxies for the diversity in demands for public services. However, the homogeneity dummies (assuming a value of one for homogeneous countries and zero for heterogeneous countries) turned out to have negative, although insignificant, coefficients in a cross-country analysis of the degree of fiscal centralization. Yet, Panizza (2001) obtained the opposite results by using a continuous measure of ethnic fractionalization in an empirical analysis of a dataset covering 55 countries in 1975, 1980 and 1985. At the same time, similar to Oates (1972, p. 204–5), he found that country size and income per capita are negatively correlated with the degree of fiscal centralization.

In a panel analysis of data from 1902–1982 for 48 US states in, Wallis and Oates (1991) found that the extent of state-local centralization of expenditures varies inversely and significantly with population size and percentage of urban population. In addition, they noted that the extent of rural homogeneity is negatively associated with centralization in the state-local sector. Using US data pooled for 1935, 1940, 1950, 1960 and 1970, Strumpf and Oberholzer-Gee (2002) tested their hypothesis that the willingness of minority representatives in the state legislature to buy votes for the decentralization of liquor depends on the magnitude of their constituency's distaste of the policy preferred by the majority. They found that states with higher diversity of tastes among the population were more likely to decentralize liquor control.

1.4. Empirical Specification

According to Section 1.2, the evolution of the Russian policies on intergovernmental relations caused decentralizing trends in the regional-local sector from 1992–1996 and centralization since 1997. Moreover, there has been significant variation

across regions in the extent of intraregional decentralization. I will examine whether the determinants of decentralization surveyed in Section 3 can explain this variation. I will test these hypotheses by regressing the decentralization measures on the values of the potential determinants for two points of time: 1) at the end of the decentralization phase (1996); and 2) at the last available year for the centralization phase (2001). As ten years since the start of transition might not be enough to achieve the optimal level of decentralization, I will include the initial levels of centralization into the set of explanatory variables to control for the residual effects.

Alternatively, I could have pooled the data over years and performed panel-data analysis. Yet, this approach assumes time invariant slopes, which does not accord with varying estimates obtained from cross-regional analysis for the separate years. Moreover, analysis of variance (reported in Appendix 1.A), shows that most of the variation in explanatory variables is cross-sectional (except for property tax yield). Hence, using region dummies would remove all the true variation, leaving mainly variation in measurement errors, and resulting in statistically insignificant estimates (Griliches and Hausman, 1986).

Using the Ordinary Least Squares (OLS) estimator, the general approach to the testing of the stated hypotheses takes the form:[16]

$$D_i = a + bX_i + \varepsilon_i,$$

where D_i is my measure of decentralization (i.e., the local government share of consolidated regional expenditures or revenues), X_i is a vector of variables representing

[16] Decentralization of both the revenue and expenditure is determined in the same environment and thus the disturbance terms can be correlated between the two equations. However, because both equations have the same set of explanatory variables and no linear constraints are imposed, SURE would produce the same estimates as equation-by-equation OLS.

potential determinants of decentralization, a is a constant term, and ε_i is a white-noise disturbance term with zero expected mean.

Descriptive statistics for all employed variables are presented the Appendix 1.A. I measure ethnic fractionalization (factor 3) as a probability that two randomly selected residents of the region belong to different ethnic groups (according to the 1989 census of population).[17] This probability is equal to $1-\sum_i \frac{n_i(n_i-1)}{N(N-1)}$, which converges to $1-\sum_i p_i^2$ as N$\to\infty$, where $p_i = \lim\frac{n_i}{N}$, n_i is the size of ethnic group i, and N is the total population of the region.

My "rural homogeneity" measure (factor 4) is simply $4*(\% - 0.5)^2$, where % is the share of rural population. This variable takes on its maximum value of 1 for a completely rural or completely urban region and declines to a minimum value of zero for a population that is evenly distributed between rural and urban localities.

Urban concentration (factor 5) is measured with the Herfindahl Index of the three major cities in a region.[18] The Herfindahl Index takes into account the relative size and distribution of the units and approaches zero when a region consists of a large number of jurisdictions of relatively equal size. The Herfindahl Index increases both as the number of jurisdictions in a region decreases and as the disparity in size between those jurisdictions increases.

[17] Following Oates (1972) and Panizza (1999), I use ethnic fractionalization as a proxy for differences in tastes for public goods. Alesina *et al* (1997) argue that preferences and conflicts over public services are more strongly correlated with ethnic as opposed to income differences.

[18] The Herfindahl Index is a commonly accepted measure of concentration. It is calculated by squaring the share of each unit and then summing the resulting numbers. For example, for a region comprised of four local jurisdictions with shares of thirty, thirty, twenty and twenty percent, the Herfindahl Index is 0.26 ($0.3^2 + 0.3^2 + 0.2^2 + 0.2^2 = 0.26$).

The level of economic development (factor 10) is measured as the Gross Regional Product (GRP) per capita, which has been reported by the region since 1994. The severity of structural fiscal imbalances (factor 13) is gauged as the excess of consolidated regional expenditures over consolidated regional revenues in 1992. The initial level of decentralization (factor 12) is measured as the local government share in consolidated regional expenditures and revenues in 1992. These initial levels should be interpreted as decentralization of accounting rather than decentralization of control over public finance. Under the command system, local budgets were centrally planned and local finance departments were merely executing central instructions. However, after subnational governments had gained some autonomy, these accounting levels were used as a benchmark for the regional-local negotiations over the revenue base and expenditure responsibilities.

1.4.1. Estimation Results

The OLS estimates for statistically significant variables appear in Table 1.9.[19] I estimate the same equations separately on data for 1996 and 2001. In both years, I control for the initial level of decentralization by including the 1992 levels of decentralization into the set of explanatory variables. The first column indicates the results using the local government share of consolidated regional expenditures as the dependent variable, and the second column reports the estimated equation with the local government share of consolidated regional revenues as the dependent variable.

[19] A complete set of estimates is provided in Appendix 1.B.

Table 1.9. Empirical Estimates: Parameters and Robust Standard Errors

	1996		2001	
Independent variable	Expenditure decentralization	Revenue decentralization	Expenditure decentralization	Revenue decentralization
Expenditure decentralization in 1992	0.347**	0.296	-0.084	-0.196
	(0.166)	(0.176)	(0.139)	(0.145)
Unemployment level	0.148	0.533	-0.554**	-0.466*
	(0.363)	(0.512)	(0.220)	(0.246)
Ethnic fractionalization	-0.166**	-0.176*	-0.066	-0.091
	(0.073)	(0.092)	(0.079)	(0.086)
Rural/urban homogeneity	0.179**	0.003	0.192**	0.155
	(0.068)	(0.120)	(0.074)	(0.104)
Land area	0.001	-0.061	-0.191***	-0.168*
	(0.037)	(0.051)	(0.023)	(0.030)
Urban concentration	-0.564***	-0.390*	0.030	0.218
	(0.172)	(0.208)	(0.196)	(0.211)
Population density	-0.825*	-0.874	-1.065**	-1.041**
	(0.424)	(0.584)	(0.494)	(0.414)
Property tax share	0.202	0.536**	-0.585	-1.302**
	(0.182)	(0.236)	(0.409)	(0.526)
Gas extraction	0.006*	0.004	0.009**	0.012***
	(0.003)	(0.004)	(0.004)	(0.004)
Coal extraction	-0.0003	0.001	0.042***	-0.001
	(0.001)	(0.003)	(0.014)	(0.001)
Federal grants	-0.250***	0.300***	-0.013	0.199
	(0.092)	(0.104)	(0.083)	(0.125)
Initial fiscal imbalance	0.229***	0.133	-0.061	-0.075
	(0.069)	(0.105)	(0.092)	(0.079)
Constant	0.404	0.036	0.668***	0.526*
	(0.290)	(0.256)	(0.229)	(0.305)
Sample size	66	66	69	69
Adjusted R^2	0.34	0.28	0.52	0.44

Notes: The sample excludes the Cities of Moscow and St. Petersburg.
Regressors not shown in the table are revenue decentralization in 1992, poverty headcount, GRP, oil extraction, secondary education, higher education;
* statistically significant at 10% level; ** statistically significant at 5% level; *** statistically significant at 1% level.

1.4.2. Inequality Factors

Until 2001, a greater need for redistribution programs, borne out of rising unemployment (factor 1) and poverty headcount (factor 2), did not lead to centralization of expenditures, which is counter to the normative theory. The coefficients on the poverty headcount turned out to be insignificant in all regressions, similar to those on the unemployment level in 1996. However, in 2001, the unemployment level became negatively and statistically significantly correlated to decentralization of both expenditures and revenues. Thus, the reverse trend toward regional-local centralization after 1996 might have been driven by redistribution considerations.

1.4.3. Heterogeneity Factors

A striking result of this analysis is that regions that have a more heterogeneous population tend to have more centralized fiscal systems. The measure of ethnic fractionalization (factor 3) is negatively related to both aspects of fiscal decentralization. However, the relation loses statistical significance by 2001. Also, in 1996 and 2001, rural/urban homogeneity (factor 4) has a positive effect on both aspects of the decentralization, and for the decentralization of expenditures this effect is statistically significant. Both findings run counter to the normative prescriptions. Thus, at least until 2001, I seem to observe more decentralization in those regions where decentralized outcomes are likely to replicate the centralized choice. This suggests that subnational decentralization in Russia is driven by considerations other than the desire to tailor public service provision closer to heterogeneous preferences.

These results are similar to Oates' (1972, p. 205–7) findings that diversity in demand for public services has negative, although insignificant, coefficients in a cross-

country analysis of the degree of fiscal centralization. Besides pointing out that heterogeneity of population does not necessary mean cross-jurisdictional variations, Oates also suggests that the center might be unresponsive to local demands for decentralization. He argued, "In some societies, a high degree of cultural heterogeneity may generate divisive tendencies that public authorities find it advisable to suppress through an increased centralization of decision-making authority. In such cases, a substantial centralization of the public sector may be viewed as necessary to provide social and political cohesion, although at the expense of the economic gains from decentralization."

Low decentralization in regions with high ethnic fractionalization is also consistent with Kourliandskaia et al.'s (2002) finding on the development of local self-government in Russian regions. The authors found that self-government does not exist or is deprived of any legal status in most regions with the title ethnicity other than Russian. Although the right to self-government is enshrined in Russia's Constitution, the implementation of this constitutional right is assigned to the joint responsibility of the federal and regional governments. According to Kourliandskaia et al (2002, p. 176), leaders of ethnic regions "… avoid publicly refusing to comply with the Constitution, instead emphasizing the need to maintain control over territories or arguing that the population lacks managerial personnel and is generally unprepared for new forms of government organization."

More to the point, in 2001, regional size measured by land area (factor 7) is negatively related to both measures of decentralization. However, this relation is not statistically significant in 1996. This negative relationship contradicts the hypothesis that costs of decentralization decrease with the size of the region due to economies of scale.

Moreover, these findings would also contradict the previously stated argument on heterogeneity of tastes. One possible interpretation of this result is that large regions are trying to keep a grip on their vast territories by centralizing the public sector.

1.4.4. Urbanization and Development Factors

Urban concentration (factor 5) measured with the Herfindahl Index has a negative effect on both aspects of decentralization in 1996. This seems to support the conjecture that, if population is concentrated in a few localities, then it is less costly to govern the whole region from a single center. Moreover, both the measures of fiscal decentralization are negatively related to population density (factor 6) in 2001 (and for the expenditure decentralization also in 1996). Given that I control for the land area, population density should capture the effect of the population size. This contradicts the results obtained by Oates (1972) and Panizza (1999) on cross-country data.

The obtained estimates shed little light on the causality line from development (factor 9) to decentralization. The coefficients of the per capita levels of the gross regional product and levels of education (factor 10) turn out to be insignificant in all regressions.

The potential determinants specifically suggested for the decentralization of revenue show limited explanatory power. Capacity to tax an immobile base (factor 8), measured as a share of property tax in consolidated regional revenue, has a positive effect on revenue decentralization in 1996, which is in accordance with the normative theory. However, this relationship reverses in 2001. Reliance on proceeds from extraction of natural resources (factor 11) seems to be a more consistent predictor of revenue decentralization. Gas extraction is positively related to both measures of decentralization,

yet this relation has higher statistical significance for the decentralization of expenditures. In 2001 the decentralization of expenditures is also positively effected by coal extraction.

1.4.5. Other Factors

The results of the regressions are in agreement with the policy-work conjectures on the determinants of fiscal decentralization in Russian regions. Table 1.9 reveals that regions that inherited more centralized fiscal systems (factor 12) in 1992 undertook some adjustment by decentralizing expenditure and revenue. Indeed, the coefficients on the initial levels of decentralization are significantly less than unity. However, the positive and statistically significant coefficient on the initial decentralization of expenditures in the 1996 expenditure indicates that regional governments were less swift to adjust local expenditures than local revenues. Moreover, in 1996 the initial fiscal imbalance (factor 13) had a positive effect on the local government share in consolidated regional expenditures but not revenue. This supports the idea that regional governments were tackling fiscal imbalance by shifting the most onerous expenditures down to local governments without providing adequate fiscal resources.

The dependence on federal grants (factor 14) is negatively related to the decentralization of expenditures although this effect is not statistically significant in 2001. At the same time the effect of federal grants on the decentralization of the revenue-raising authority is positive and significant in 1996. Thus, there is some evidence that federal grants "stick" at the regional level. Moreover, while the regional government share in consolidated regional expenditures increases with the dependence on federal grants, its share in consolidated revenue collections decreases. One might suspect that

transfer-dependent regional governments give up their own revenue base (which presumably has little capacity in such regions) to localities.

1.4.6. Robustness

Adjusted R^2 indicates that the employed regressors explain more variation in the decentralization of the expenditures than in the decentralization of revenues. Moreover, the share of explained variation increased between 1996 and 2001. This suggests that in 2001 decentralization policies of Russian regions began displaying more features of the normative rationale than in 1996. As a robustness check, I re-estimated the revenue and expenditure equations on the same variables averaged over two periods: 1992–96 and 1997–2001. These regressions yielded estimates close to those obtained from cross-regional analysis of data at the end of corresponding periods. However, the averaged regressions produced slightly different robust errors. Thus, natural resources variables lost explanatory power in all regressions except for the 1996 expenditure equation. Similarly the share of property tax lost statistical significance in all regressions. Conversely, the positive coefficient on secondary education became statistically significant for the expenditure decentralization in 1996 and revenue decentralization in 2001.

In summary, my econometric results provide partial support for several of the hypotheses (factors 1, 5, 6). I have found that changes in fiscal decentralization are positively related to the initial level of centralization (factor 12) and the initial fiscal imbalance (factor 13). In addition, mandatory allocation of a fixed share of payments for natural resources (factor 11) to local budgets produces higher levels of decentralization in gas-rich regions. Counter to the normative prescriptions, I find that regions with higher

heterogeneity of population (factors 3 and 4) tend to have more centralized public sectors. Finally, my analysis suggests the presence of a "fly-paper effect" which is manifested in greater centralization observed in regions with higher dependence on federal transfers (factor 14).

1.5. Conclusions and Policy Implications

The purpose of this paper was to empirically explore the extent of subnational decentralization in Russia and to explain the variation in intraregional decentralization with determinants proposed in studies on fiscal federalism. Presented empirical evidence demonstrates significant variation in subnational decentralization across regions and some fluctuations over time. Both the aggregate figures and cross-regional descriptive statistics show a decentralization trend after 1992, and conversely, centralization after 1996. However, the wide variations among regions in the extent of regional-local decentralization remained throughout the period.

The estimation results show that the initial split of expenditures between the levels of government remained a significant determinant of decentralization of expenditures until 1996. However, the initial assignment of revenue did not show such persistency. Moreover, the initial fiscal imbalance in a region seems to have lead to off-loading expenditure responsibilities to the local level. Nevertheless, the initial factors lose explanatory power for intra-regional decentralization by 2001. Thus, modern systems of regional-local fiscal relations are more of a product of post-Soviet development than a legacy of the old system.

Counter to normative prescriptions, this study finds that the degree of intra-regional decentralization is inversely related to the extent of heterogeneity of the region's population. Thus, rather than tailoring public goods to heterogeneous preferences, regional authorities seem to address diversity with a uniform level of public provision. This is no wonder, as fiscal decentralization established in a given region inevitably reflects more the outcome of political bargaining and historical background than any of the normative principles. Thus, similar to the findings for state-local decentralization in the US, it can be argued that Russian regional authorities pursue political goals (such as social cohesion of large and diverse populations) at the expense of economic gains from decentralization.

A positive finding of this study is that regional governments can make economically efficient decisions if they face proper incentives. Thus, in 1995–1996, the federal government imposed a number of social-welfare mandates on the subnational level without providing financial resources. Most regions passed on this unfunded mandate to the local level. Hence, counter to the normative prescriptions, I do not find a greater role of the regional government in regions with higher needs for welfare programs in 1996. However, when the federal government started earmarked funding for these social mandates, many regions took over these expenditures from constituent localities. Thus, in 2001 I observe a negative relationship between regional-local decentralization and regions' unemployment levels.

In particular, regional-local decentralization seems to be responsive to federal grants. The empirical results indicate that federal transfers tend to "stick" at the regional level thus leading to higher centralization of the regional-local sector. This is related to the "fly-paper" discussion, which is based on the proposed equivalence between a grant

to a jurisdiction and a set of grants to the residents of that jurisdiction. In our case one can argue that a grant to the region is equivalent to a set of grants to each locality within that region. That is, the regional-local decentralization is an outcome of the regional government decision on what portion of the tax base and cash grants (provided by the federal center to the region) to be passed on to localities within that region.

However, this study suggests a presence of a fiscal veil; the proportion of federal grants passed on to localities is less than the proportion of the regional tax base assigned to localities. A policy implication is that the federal government might have to introduce a requirement that a certain percentage of federal transfers has to be passed on to localities similar to the current requirement for sharing revenue from assigned federal taxes.

The results of this paper highlight the importance of explicit accounting for reverse causality in empirical studies on the impact of fiscal decentralization. Evaluation of the impact of fiscal decentralization merely by linking the observed decentralization to economic outcomes might produce spurious results owing to the self-selection bias. As suggested in this paper, regions that choose to decentralize might be the ones that have little to gain from the decentralized provision of public goods. This might explain the inconclusive results of the attempted assessments of the impact of fiscal decentralization on economic outcomes both in Russia and elsewhere. Variables that were found significant in determining regional-local decentralization can be employed as instruments in order to study the effect of decentralization on those economic variables that are not directly affected by these determinants.

Appendix 1.A. Structure and Sources of the Data

Factor #	Variable	Mean	Max	Min	Std. Dev.		
					Total	Within	Between
	Local share of expenditures, 1992 – 2001	0.637	1.000	0.018	0.127	0.081	0.098
	Local share of revenues, 1992 – 2001	0.574	0.984	0.000	0.150	0.121	0.088
14	Federal grants, a proportion of consolidated regional expenditures, 1992 – 2001	0.241	0.984	0.000	0.206	0.122	0.166
8	Property tax share, 1992 – 2001	0.087	0.344	0.006	0.054	0.049	0.022
6	Population density, thou. Persons/km^2, 1992–2000	0.026	0.146	0.000 02	0.026	0.002	0.025
4	Rural/urban homogeneity, 4*(% - 0.5)^2, 1992–2000	0.203	1.000	0.001	0.184	0.028	0.181
1	Unemployment level, 1992–1999	0.111	0.582	0.020	0.064	0.040	0.049
2	Poverty headcount, 1994–1999	0.329	0.968	0.129	0.152	0.078	0.131
9	GRP, mill. 1999 RUR per capita, 1994–1998	0.069	0.199	0.017	0.031	0.008	0.030
11	Oil extraction, tones per capita, 1995–1999	3.393	127.6	0	15.957	1.312	15.903
11	Gas extraction, thou. M^3 per capita, 1995–1999	12.94	1097	0	114.06	3.142	114.012
11	Coal extraction, tons per capita, 1995–1999	1.594	36.28	0	4.541	0.418	4.521
5	Urban concentration, Herfindahl index, 1999	0.116	0.400	0	0.072	—	—
3	Ethnic fractionalization in 1989, probability	0.329	0.857	0.051	0.202	—	—
7	Land area, mill. Km^2	0.200	3.103	0.004	0.382	—	—
10	Population with secondary education, 1994 share	0.643	0.855	0.427	0.070	—	—
10	Population with higher education, 19994 share	0.115	0.184	0.054	0.023	—	—
12	Local share of expenditures in 1992	0.645	1.000	0.149	0.126	—	—
12	Local share of revenues in 1992	0.490	0.786	0.089	0.145	—	—
13	Initial fiscal imbalance in 1992	0.027	0.519	-0576	0.184	—	—

All data are annual from 1992 to 2001.

The budgetary data were obtained from Russian Ministry of Finance sources. In Russia all levels of government use the same centrally introduced budget classification of

revenues and expenditures and submit reports on budget execution to the upper level government on a regular basis. Expenditures are reported by function, by economic character, and by spending agency. For every spending agency, expenditures are also classified by object. The revenue section of the budget reports shows receipts from each tax allowed by the federal legislation and also gives some information on non-tax revenues. Receipts from user charges for public services are not included in budget reports as they are earmarked for and collected by enterprises under contract for the delivery of these services.

Information on educational attainment of the population by region was obtained from Canning et al. (1999). All information on other non-fiscal indicators derives from *The Statistical Yearbook of Russia* (2000) and *Regions of Russia* (1999) — the official publications of State Committee of the Russian Federation on Statistics (Goskomstat).

I have 1992–2001 budget data for all eighty-eight subjects of the Russian Federation excluding Chechnya. However, for some non-fiscal variables, data are not available for certain (sometimes most) years in this range. Moreover, several indicators cannot be computed for nine autonomous areas and seven *oblasts* within whose boundaries these autonomous areas are located. The reason is that the official statistics report these indicators for a whole *oblast* thus making it impossible to split the figures between independent regions located one inside another. In addition, due to limitations of my data on non-fiscal indicators, I have missing values for up to 20 regions for some variables. Furthermore, I exclude from my sample the City of Moscow and the City of St. Petersburg as they are invariantly centralized.[20] Therefore my regressions can be

[20] These two units are clearly outliers as for these two cities the values of potential determinants like land area, population density, and income levels are extremely high while the level of decentralization is zero.

performed on a sample covering 64–69 regions and using the nearest-year values for some variables.

Appendix 1.B. Complete Set of Estimates

	1996		2001	
Dependent variable	Expenditure decentralization	Revenue decentralization	Expenditure decentralization	Revenue decentralization
Expenditure decentralization in 1992	0.347**	0.296	-0.084	-0.196
	(0.166)	(0.176)	(0.139)	(0.145)
Revenue decentralization in 1992	-0.040	0.003	0.121	0.152
	(0.100)	(0.138)	(0.143)	(0.151)
Unemployment level	0.148	0.533	-0.554**	-0.466*
	(0.363)	(0.512)	(0.220)	(0.246)
Poverty headcount	0.174	0.001	-0.002	-0.016
	(0.128)	(0.131)	(0.088)	(0.113)
Ethnic fractionalization	-0.166**	-0.176*	-0.066	-0.091
	(0.073)	(0.092)	(0.079)	(0.086)
Rural/urban homogeneity	0.179**	0.003	0.192**	0.155
	(0.068)	(0.120)	(0.074)	(0.104)
Land area	0.001	-0.061	-0.191***	-0.168*
	(0.037)	(0.051)	(0.023)	(0.030)
Urban concentration	-0.564***	-0.390*	0.030	0.218
	(0.172)	(0.208)	(0.196)	(0.211)
Population density	-0.825*	-0.874	-1.065**	-1.041**
	(0.424)	(0.584)	(0.494)	(0.414)
GRP	-0.829	-0.107	-0.810	-1.325
	(1.298)	(1.449)	(0.762)	(1.023)
Property tax share	0.202	0.536**	-0.585	-1.302**
	(0.182)	(0.236)	(0.409)	(0.526)
Oil extraction	0.002	0.002	-0.010	-0.004
	(0.005)	(0.010)	(0.008)	(0.008)
Gas extraction	0.006*	0.004	0.009**	0.012***
	(0.003)	(0.004)	(0.004)	(0.004)
Coal extraction	-0.0003	0.001	0.042***	-0.001
	(0.001)	(0.003)	(0.014)	(0.001)
Federal grants	-0.250***	0.300***	-0.013	0.199
	(0.092)	(0.104)	(0.083)	(0.125)
Secondary education	0.468	0.646	0.154	0.291
	(0.523)	(0.548)	(0.534)	(0.668)
Higher education	-0.899	-0.646	0.478	1.054
	(0.822)	(0.894)	(0.922)	(0.951)
Initial fiscal imbalance	0.229***	0.133	-0.061	-0.075
	(0.069)	(0.105)	(0.092)	(0.079)
Constant	0.404	0.036	0.668***	0.526*
	(0.290)	(0.256)	(0.229)	(0.305)
Sample size	66	66	69	69
Adjusted R^2	0.34	0.28	0.52	0.44

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2. Fiscal Decentralization and Government Subsidies

2.1. Introduction

Transition from socialism to capitalism has involved decentralization of both the economy and the government. Under the socialist system, the key role in linking discrepancies between centrally set prices and enterprise-specific costs was played by budgetary subsidies and turnover taxes. Liberalization polices allowed prices to rise toward market clearing levels, which was accompanied by a mass reduction of central subsidies. However, in some sectors of the economy price controls have remained due to "social" and "political" factors (Schaffer, 1995). Moreover in multi-tier governments, subnational levels seem to be more sensitive to these factors because of their proximity to the constituency. [21] Hence, devolution of powers to the subnational level can hamper the elimination of the remaining subsidies.

A striking example of how decentralization of the government can interfere with market reforms is presented in the Russian transition experience. Tremendous regulatory and fiscal powers have been devolved to the regional and local governments in Russia (Shleifer, 1997). By the mid-1990s, regional and local government had been given a fair amount of discretion over the mix of their expenditures. Thus, subnational legislatures were granted formal autonomy in formulating their budgets. [22] Moreover, major

[21] Some evidence on Russia is provided by Mau and Stupin (1997) and the McKinsey Global Institute (1999). Mau and Stupin point out that subnational governments might be more dependent on their enterprises, especially on those providing regional employment, budget revenues, hard currency receipts, and social safety nets, and hence have less political resources to revise the practices of subsidizing the regional economy. The McKinsey Global Institute Report finds that restrictions on labor mobility combined with the fact that upper-level governments are not paying enough unemployment benefits prompt local governments to oppose restructuring and to subsidize their local firms.

[22] The term "subnational" refers to all levels below the federal or central level. For Russia, the distinction is made between the "regional level," referring to the 89 subjects of the Russian Federation (ethnic republics,

expenditure responsibilities had been shifted down from the federal to subnational governments. These expenditures included public investments in many areas and price subsidies for social goods such as food, medicine, local transportation and public utilities.[23] In turn, regional governments had complete discretion in downloading these responsibilities further to the local level.

At the same time, the devolution of taxing powers lagged behind. The federal government argued that due to fiscal pressures, it could not cede control over any of the major tax bases to subnational governments (Bahl and Wallich, 1995, p.346). In order to balance subnational expenditure responsibilities, the federal government decreed revenue from the federal personal and corporate income taxes to be shared with subnational budgets. As a result, subnational governments gained access to productive and elastic revenue bases but had little say in determining tax rates or tax bases. Because of the limited revenue discretion, subnational governments could hardly affect the total level of their expenditures.[24]

The spontaneous devolution of expenditure responsibilities to the subnational level has left the federal government with limited leverage on subnational decision-making, which in turn resulted in a variety of economic policies pursued by different

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krais, okrugs, oblasts, and autonomous areas) and the "local level," referring to cities and *rayons* and smaller entities.

[23] This "off-loading" was closely linked to privatization. In the Soviet system, centrally planned enterprises were responsible for the provision of many basic goods and services. Hence, before being privatized such enterprises maintained huge social assets: housing, kindergartens, hospitals, and recreation facilities. Privatization was accompanied by the process of divestiture, meaning a transfer of social assets and the responsibility for their financing to municipalities. In fact, enterprises faced a choice either to maintain the infrastructure and partially off-set liabilities from the Housing Maintenance Tax, which is 1.5% of enterprise turnover, by the amount of expenses incurred or divest and pay the turnover tax in full (Alm and Sjoquist, 1995; Commander and Schankerman, 1997).

[24] Some scholars believe that in fact subnational governments had certain *informal* powers to affect their revenue (Bahl and Wallich, 1995, p. 347 and Shleifer and Treisman, 2000). Nevertheless, these informal powers do not allow subnational governments to increase tax liabilities beyond the level prescribed in the federal legislation. Thus, it is more of a subsidy tool than of revenue mobilization.

regions. Thus, in 1997 there was a tenfold difference between regions in the degree of subsidization via budget transfers to enterprises. At the same time, regional authorities have had full discretion in determining their fiscal relationships with constituent localities. Hence, the division of responsibilities for the functions shared between the two subnational levels of government differed considerably across regions.

The lack of counterfactual experience at the federal level does not allow one to directly test the hypothesis that Russia would have been more successful in eliminating subsidies had the central government preserved control over the entire public sector. However, investigating the relationship between fiscal decentralization within Russian regions and the extent of subsidization from subnational budgets can give us some insights into this issue. The regional experience is highly relevant for answering this question because regional governments, in their relationship with constituent localities, often mimic the federal government's relationship with the regions.

The remainder of the essay is organized as follows. Section 2.2 demonstrates the scale and incidence of government support to enterprises at the subnational level in Russia. Section 2.3 develops a stylized model of local government budget allocation and examines the link between tax revenue retention by local governments and their propensity to give away subsidies. Section 2.4 describes the data, specifies an empirical strategy, and presents empirical evidence. My conclusions and policy implications follow.

2.2. Subnational Subsidies

In general terms a subsidy can be defined as a government intervention that reduces the price paid by a consumer below what it would be otherwise or increases the

price received by a producer above the market level (Schwartz and Clements, 1999). In socialist economies, government transfers to enterprises constituted a key element of the price administration system, bridging centrally set prices and enterprise-specific costs. However, these interventions might not fit the definition provided above. There were no market prices in socialist economies, and thus financial transfers to enterprises were only altering artificially set prices. However, after the economy had been liberalized, residual transfers from the government became an obstacle to the efficient allocation of resources as determined by market forces.

In 1992, total government support to enterprises amounted to 30 percent of Russia's GDP (Alfandari *et al*., 1996). According to this representative survey of enterprises, in 1992–94 the share of explicit budgetary subsidies and investment grants in total subsidies (15–25%) was below that of directed credits provided by the central bank to enterprises (over one third) and the share of tax benefits (16–34%). In 1993, the central bank was instructed to phase out the directed credits to enterprises. At the same time individual tax benefits to enterprises were revised. However, the reduction of explicit transfers to enterprises was accompanied with the growth of implicit subsidies to over 6 percent of GDP in 1998 from below 4 percent in 1994 (Pinto *et al.*, 2000). About 70 percent of this amount was accounted for by tax arrears and 30 percent by inflated prices in tax offsets and government procurements. At the subnational level, inflated prices used in government procurement accounted for more than 50 percent of all implicit subsidies.

The 1992 price liberalization let prices rise to market-clearing levels resulting in dramatic cuts in subsidies. Although price subsidies were significantly reduced at the federal level, the right to maintain subsidies was delegated to subnational governments.

Thus, as prices rose and central subsidies decreased, subnational governments often intervened for "social" or "political" reasons. Political decentralization left the federal government with limited leverage on subnational decision-making, which in turn resulted in differing economic policies pursued by different regions. In particular, many regions resumed price controls and regulations. As a result, the extent of enterprise subsidization from subnational budgets varied significantly among regions (Freinkman *et al.*, 1998).

Empirically, the degree of subsidization can be measured as a ratio of budgetary outlays on subsidies to regional economic product (see Table 2.1).[25] As of 1997 there was a tenfold difference between regions in the degree of subsidization via direct budgetary transfers to enterprises. Subsidization via tolerated tax arrears varied even more substantially.[26] Unfortunately, this study leaves out subsidization via inflated procurement prices as it remains hardly documented.

At the subnational level, the explicit budgetary subsidies are for the most part very sector specific. Sectors that continue to receive substantial subsidies are residential utilities (in particular, central heating), transportation, and agriculture. Thus, the bulk of the direct budgetary subsidies can be characterized as the result of remaining price controls and social/political factors. Although the range of price controls and regulations might be comparable to those observed in Western Europe, the scale of subsidization (over six percent of GDP or thirty percent of subnational budget expenditures) is enormous. Subnational tax arrears have different sectoral distribution with about two

[25] In this paper, data on explicit budgetary subsidies are taken from reports on the execution of subnational budgets, which are filled out according to the budget classification introduced by the federal Ministry of Finance. The classification follows the United Nations' System of National Accounts (SNA) that defines subsidies as "current unrequited government payments to enterprises."

[26] Due to the lack of data, this study considers only overdue tax arrears thus ignoring tax liabilities that have been rescheduled, written off or offset.

thirds of the total amount originating in manufacturing and construction. However, this must be reflecting the prevalence of these two sectors in the total tax base.

Table 2.1. Summary of Subnational Subsidization Indicators, 1995–1997

	1995	1996	1997
Subnational budgetary subsidies as a share of Regional Economic Product			
Mean	2.0%	4.1%	6.8%
Median	1.4%	3.8%	6.4%
Max	15.3%	17.8%	22.1%
Min	0.0%	0.0%	2.1%
Coefficient of Variation	1.19	0.70	0.45
Flow of tax arrears to subnational budgets as a share of Regional Economic Product			
Mean	1.15%	0.71%	1.41%
Median	0.94%	0.57%	1.24%
Max	3.09%	2.57%	5.99%
Min	0.28%	-0.65%	0.19%
Coefficient of Variation	0.60	0.76	0.66

Source: Calculated from Russian Ministry of Finance and Ministry of Taxation data
Notes: 1) These descriptive statistics are calculated over a sample excluding sixteen out of eighty-eight regions (see Appendix 2.B); 2) Here tax arrears exclude rescheduled payables to subnational budgets.

In Russia, the amount of subsidies is determined ex-post, after enterprises incurred operating losses attributed to price controls. Needless to say, under these arrangements, enterprises are discouraged from either cost containment or revenue mobilization. A typical residential building in FSU countries "suffers high energy losses and inefficiencies compared to buildings in Western countries with similar climates" (Martinot, 1997, p. 2). It takes proper incentives for housing and utility companies to adopt energy-saving technologies. Thus, in order to phase out subsidies, local officials would have to introduce effective utility regulations, which require some administrative efforts.

The presented data demonstrate substantial variation among regions in the degree of subsidization both via explicit subsidies and tolerated tax arrears. Explicit subsidies, on

average at 6% of the Regional Economic Product, are mostly sector specific and relate primarily to remaining price regulations, e.g., residential utilities. By contrast, tax arrears with the annual flow on the order of 1% or so of the Regional Economic Product are dominated by manufacturing and construction. Different channels of subsidization can have different justifications and consequences, yet the extent of subsidization can be an informative measure of the structural reforms in the region.

2.3. Theoretical Framework

In this section, a model is developed to capture the following stylized facts about intergovernmental fiscal relation in Russian regions: Local governments have no discretion over the level of taxation imposed on the local economy, as it is entirely determined with the industry mix and the list of taxes prescribed in federal legislation. Moreover, localities cannot determine autonomously the aggregate size of their budgets, which is a sum of the retained share of tax collections in the locality and lump-sum transfers from the regional government. However, as illustrated in Section 2, localities have some discretion in allocating the available funds between subsidies to enterprises and more productive uses like local infrastructure. The analysis of the model aims at establishing the link between the rate of retention of tax revenues that local governments face and their propensity to give away subsidies.

In order to keep the model tractable, a number of simplifying assumptions are introduced. Based on the low mobility of the Russian population, the number of local residents is assumed to be fixed. Hence, all variables are measured per capita. The local economic product Y is produced with two inputs: private capital K and local infrastructure I. Furthermore, capital is assumed to be perfectly mobile across local

boundaries. This implies that, in equilibrium, $Y_K(K,I)=\bar{r}$ (investments are made up to the point where returns to private capital diminish to some exogenously given level $\bar{r}$ representing the opportunity cost of capital). The local production function *Y(K,I)* is assumed to have the following properties: $Y_I(K,I)>0$, $Y_K(K,I)>0$, $Y_{KK}(K,I)<0$, $Y_{II}(K,I)<0$, and $Y_{KI}(K,I)>0$. The last property implies that investment in local infrastructure raises returns to private capital in the locality.

The local government receives transfers (*T)* from the regional government and retains a portion (*λ)* of the taxes collected from economic agents operating in the locality (both businesses and residents). The revenues are spent on making productive investments in public infrastructure *I* or giving away unproductive subsidies S. Thus, the local government faces the following budget constraint:

$$\lambda\tau Y(K,I)+T=S+I \qquad (2.1)$$

In (2.1), τ expresses the general tax burden as a share of the value added produced in the locality, λ stands for the rate of allocation of total tax revenues collected in the locality to the local budget, *T* denotes budgetary transfers from the regional government to the local budget.

2.1.1. Baseline Model

First, let us consider a baseline model where subsidies take the form of per-capita grants to local residents. A benevolent local government is set to maximize local residents' income, which is the after-tax non-capital income plus subsidies. In other words, the local government's objective function can be expressed as

$$(1-\tau)\{Y(K,I)-\bar{r}K\}+S \ . \qquad (2.2)$$

There is a trade-off between increasing residents' income via plain transfers or by enhancing their earned income with productive investments. Thus, the monetary value of the grants to population has to be weighed against the opportunity costs, in part determined by intergovernmental fiscal arrangements.[27]

The intergovernmental fiscal scheme (T, λ) is exogenous to the local government decisions as it is set by the regional government.[28] Given (T, λ), the interior solution for I to the local government's optimization problem subject to (2.1) and $Y_K(K, I) = \bar{r}$ is characterized by the following equation:

$$(1-\tau)Y_I = (1-\lambda\tau)\Pi, \tag{2.3}$$

where Π stands for the marginal increase in local economic product resulting from the marginal increase in local infrastructure provision and is equal to $Y_I - \bar{r}\frac{Y_{KI}}{Y_{KK}}$. It is a sum of the direct impact Y_I and the indirect effect of capital inflow. Thus, in the optimum, the private return to the marginal increase in the public infrastructure provision should be equal to the marginal decrease in subsidies necessary to fund these investments. The marginal decrease in subsidies associated with a unitary increase in the public infrastructure is less than one due to additional gains from the inflow of capital. Implicitly differentiating the first-order condition results in

[27] This model was motivated by the seminal paper by Qian and Roland (1998), who showed that due to fiscal competition among local governments, opportunity costs of subsidization by localities are higher under fiscal decentralization than in the case of fiscal centralization.

[28] In the empirical literature there is a discussion on the rationality of regional governments in Russia. For instance, Zhuravskaya (2000) found that regional governments offset completely changes in localities' own revenues with changes in transfers. However, Alexeev and Kourlyandskaya (2003) argue that a rational regional government that is averse to transfers would never want to compensate a locality completely for a fall in local revenues as long as local authorities' efforts affect local revenues. Using data for localities of one *oblast,* they find no evidence that regional transfers tend to completely offset changes in local revenues. They do find, however, evidence of the ratchet principle in the region-local relationship.

$$dI^* = \frac{-\tau\Pi}{\Phi} d\lambda \ , \qquad \textbf{(2.4)}$$

where Φ is the second derivative of the objective functions and therefore is of negative sign. Taking the total differential of the local government's budget constraint yields $dS^* = (\lambda\tau\Pi - 1)dI^* + \{\tau Y\, d\lambda + dT\}$. Substituting (2.4) for dI^* and rearranging terms gives

$$dS^* = \frac{\tau\Pi}{\Phi}(1 - \lambda\tau\Pi)d\lambda + \{\tau Y d\lambda + dT\}.$$

Note that the coefficient at $d\lambda$ is negative as $\Phi<0,\ \Pi > 0$, and $1 - \lambda\tau\Pi > 0$ from (2.3). This result is an analogue of the so-called "Slutsky equation," which decomposes the comparative-static derivatives into two components: an income effect and a substitution effect. Generally, the sign of the substitution effect is derived from the second-order conditions while the income effect is indeterminate in sign and depends on the curvature of the objective function. In our case the tax revenue retention rate determines the opportunity cost of subsidization and thus affects its rate of substitution for local infrastructure expenditures. The income effect determines the allocation of extra budgetary revenues when the relative merits of different allocations are not affected. In this baseline model we happen to have a unitary income effect so that every additional dollar in lump-sump transfers from the regional government is entirely passed on by the local government to the residents. However, due to the substitution effect, an increase in the revenue-retention leads to less than one for one increase in subsidies.

2.1.2. Elaborated Model

Now we elaborate the model to make it closer to the Russian reality by assuming that subsidies in fact complement price controls by covering operating losses incurred by

regulated enterprises. That is, $S=(c-p)M$, where c stands for the unit cost of the monopoly good (produced by the subsidized sector), and p is the regulated price of the monopoly good. Local governments can affect the amount of the losses/subsidies either by adjusting the price cap or introducing regulations that stimulate cost reduction (performance measures, contestability, etc). Either measure is politically costly and therefore has to be weighed against the opportunity costs of subsidization.

The representative resident of the locality is assumed to derive utility over consumption of (X, M), where X denotes the consumption level of a private good (the numéraire) and M stands for the consumption level of the monopoly good. In the interest of simplicity, the resident's utility function is assumed to be quasi-linear in X, i.e., $u(X,M) = X + u(M)$, where $u(\cdot)$ is increasing and strictly concave. The quasi-linear form of the utility function implies that income effects are captured solely by the consumption of the private good. Hence, demand for the monopoly good is described by $p = u_M(M)$ and does not depend on the income level.[29] This feature stems from the quasi-linear specification rather than the nature of the subsidized good. A more general specification would make the model intractable to the extent that the validity of the results obtained here could not be verified.

The local government's efforts to restructure local monopolies affect the average costs of the monopoly good production, i.e., $c = c(e) \in [\underline{c}, \bar{c}]$, where e denotes the level of cost reducing effort, and $c' < 0$. Thus, local authorities face a trade-off between social welfare and disutility from undertaking restructuring efforts. Social welfare is comprised of the after-tax non-capital income less the resident's outlays on the monopoly good plus

[29] This is true for income greater than the threshold level below which all income is spent on the monopoly good thus determining its consumption level.

the social value of the monopoly good. In other words, the local government's objective function can be expressed as

$$(1-\tau)\{Y(K,I)-\bar{r}K\}-pM+u(M)-v(e) \tag{2.5}$$

Here, *u(M)* measures public utility derived from the consumption of the monopoly good, and *v(e)* stands for the local government's disutility from undertaking restructuring efforts.

Given (T,λ), the interior solution for *p*, *e* and *I* to the local government's optimization problem subject to (2.1), $Y_K(K,I)=\bar{r}$, and $p=u_M(M)$ is characterized by the following equations:

$$\mu=-\frac{v'}{Mc'}, \tag{2.6}$$

$$\frac{1}{\mu}=1-\frac{c-p^*}{Mu_{MM}}, \tag{2.7}$$

$$\frac{(1-\tau)Y_I}{\left(-\frac{v'}{Mc'}\right)}=(1-\lambda\pi\Pi). \tag{2.8}$$

Equation (2.6), states that in the optimum, μ — the Lagrange multiplier capturing the shadow price of budget resources, has to be equal to the marginal disutility of the local government from the marginal reduction of subsidies. Equation (2.7) shows that the Marginal Rate of Substitution (MRS) of a price increase for restructuring efforts should be equal to the Technical Rate of Transformation (TRS) of cost reduction into cost sharing. Here, the MRS is derived from the local government's objective function and the TRS is determined with the budget constraint (a unit of cost reduction is equivalent in fiscal terms to less than a unit of a price increase due to the adjustment of demand).

Equation (2.8) sets the MRS of subsidies for local infrastructure equal to the TRS of infrastructure investment into subsidy allocation. The TRS is less than one because of the losses due to the outflow of capital. As in the baseline model, Π stands for the marginal increase in local economic product resulting from the marginal increase in local infrastructure provision

Similar to the baseline model, we can derive comparative statics predictions for the local government's reaction to alterations in intergovernmental fiscal arrangements. Let (p^*, e^*, I^*) denote the local government's optimal solution and $S^* = \{c(e^*)-p^*\}M(p^*)$ be the resulting amount of subsidies. Then, the following results can be obtained:[30]

Proposition: $dS^* = \gamma\, d\lambda + \delta\,\{\tau Y\, d\lambda + dT\}$ *and* $\gamma<0$.

To interpret the proposition, consider various intergovernmental fiscal arrangements (T,λ) representing the same *ex ante* level of expenditure decentralization: $\lambda\tau Y + T = const$. Then, higher rates of tax revenue retention λ result in lower propensities to subsidize due to higher opportunity costs of underinvesting in local infrastructure. Indeed, let us consider two alternatives: a transfer from the regional government and a share of tax collections that is *ex ante* equivalent to the transfer amount (that is, the equivalence is based on a current fiscal capacity τY, which might change e*x post* in part due to government activities). Then the marginal propensity to spend on subsidies out of transfers is δ while the marginal propensity to spend on subsidies out of an equivalent amount of shared taxes is $\delta + \frac{\gamma}{\tau Y} < \delta$. Unlike in the baseline model, here δ is not necessary equal to one. Thus, when the cost of the subsidized good depends on the local

[30] Proofs, going along the same lines as in the baseline model, can be found in Appendix 2.A.

government's efforts, we observe a "fly-paper effect" so that intergovernmental grants are not entirely passed on to the residents but are partially used to allow more slack for the government.

The proposition emphasizes that the outcome of fiscal decentralization depends on how the decentralized expenditures are financed. Thus, a switch from intergovernmental grants to the fixed retention rate of tax revenue results in a smaller amount of subsidies allocated from the same size of the local budget. This is because, unlike lump-sum grants, entitlement to a share of tax revenue brings about a substitution effect in addition to the income effect.

2.4. Empirical Support

2.4.1. Empirical Framework

The stylized model presented in Section 2.3 predicts that the amount of local subsidies is affected by fiscal incentives introduced with tax revenue retention and the amount of budgetary resources available to the local government. Let *i* index regions, and let *j* index individual localities within those regions. Then, a discrete time version of the Proposition can be written as

$$\Delta \frac{S_{ijt}}{N_{ij}} = \gamma \Delta \lambda_{ijt} + \delta \left\{ \frac{\tau_{ij0} Y_{ij0}}{N_{ij}} \Delta \lambda_{ijt} + \Delta \frac{T_{ijt}}{N_{ij}} \right\} + \varepsilon_{ijt}, \qquad (2.9)$$

In (2.9), $\Delta \frac{S_{ijt}}{N_{ij}} = \frac{S_{ijt}}{N_{ij}} - \frac{S_{ij0}}{N_{ij}}$ is the change in the per capita subsidies in locality *j* since period 0; $\Delta \lambda_{ijt} = \lambda_{ijt} - \lambda_{ij0}$ is the change in the tax revenue retention rate for locality *j* since period 0; $\frac{\tau_{ij0} Y_{ij0}}{N_{ij}}$ denotes the total tax collections per capita in locality *j* in period 0;

$\Delta\frac{T_{ijt}}{N_{ij}} = \frac{T_{ijt}}{N_{ij}} - \frac{T_{ij0}}{N_{ij}}$ is the change in the per capita transfers to locality *j* since period 0; ε_{ijt} is the error due to approximation.

The Proposition from Section 2.3 leads us to the hypothesis that $\gamma<0$. Unfortunately, available data do not allow me to estimate equation (2.9) at the level of individual localities. Available figures for local budgets are aggregated at the regional level. Thus, the data do not report tax revenue retention rates for individual localities but the aggregated share of local governments in consolidated regional tax collections, that is

$$\lambda_{it} = \frac{\sum_j \lambda_{ijt}\tau_{ijt}Y_{ijt}}{\sum_j \tau_{ijt}Y_{ijt}}.$$

Hence, I use region-level data as proxies for equation (2.9) variables aggregated across localities. The equation to be estimated has the following form:

$$\bar{s}_{it} - \bar{s}_{i0} = \gamma\left(\lambda_{it} - \lambda_{i0}\right) + \delta\left(\bar{d}_{it} - \bar{d}_{i0}\right) + X_{it}\chi + \alpha_i + \beta_t + \bar{\bar{\varepsilon}}_{it}. \qquad (2.10)$$

Here, $\bar{s}_{it}$ is the per capita amount of subsidies in region *i* in period *t*;[31] λ_{it} is the aggregated share of local governments in consolidated tax collections in region *i* in period *t*; $\bar{d}_{it}$ is the period 0 projection of local per capita revenues for period *t* in region *i*, that is, the total per capita tax collections in period 0 times the tax revenue retention rate set for period *t* plus the amount of lump-sum grants set for period *t*; X_{it} is a vector of variables controlling for other determinants of subsidization; α_i and β_t are region- and year-specific effects; $\bar{\bar{\varepsilon}}_{it}$ is a random error term.

[31]Region-level data include subsidies allocated by the regional government in addition to those allocated by local governments. This is because separate figures on local subsidies are not available. On the positive side, the consolidated figure, while changing with the extent of subsidization, is invariant to the division of responsibility for subsidized services between the levels of government. On average, regional governments' subsidies are concentrated in agriculture, manufacturing, and inter-city transportation; while localities mostly subsidize housing, public utilities, and city transportation. Because, subsidies to the latter three sectors are by far the largest, regional governments on average account for less than 20 percent of total subnational subsidies.

Data aggregation requires certain caution with the interpretation of results. First, note that the subsidization variable is aggregated by weighting in proportion to local population while individual tax retention rates are weighted proportional to per capita tax base. Also, the aggregation can disguise changes in the values of individual localities' variables off-setting each other on the average. In the case of localities identical in per capita terms, mutually offsetting changes in individual tax retention rates would result in mutually offsetting changes in individual localities' outlays on subsidies. Hence, the only problem would be insufficient variation in the aggregated variables, which is not our case according to the descriptive statistics. However, if localities differ in characteristics other than population, then parameters of the aggregated equation become non-linear functions of the parameters of individual localities' equations. In this case, the specification of the aggregated equation can be argued to be motivated rather than directly derived from the underlying locality-level model.

2.4.2. Measuring Decentralization

The definition of decentralization suggests that it is a multi-faceted process. Thus, no single-dimensional measure can capture the true degree of decentralization.[32] A ratio of subnational government spending to general government spending can capture the share of general government functions that falls under the authority of subnational governments. However, such a ratio can be misleading if subnational governments act simply as spending agents of the higher authorities. The share of subnational revenues that is drawn from the local economic base (as opposed to intergovernmental transfers) can measure revenue autonomy and fiscal accountability. However, the bearing of this

[32] For a thorough discussion see Riker (1964, p. 51-84), Oates (1972, p. 196-99), and Bahl and Linn (1992, p. 390-91).

measure depends on the extent of discretion that subnational governments have over the rates and bases of the taxes that they collect.

Based on my stylized model, I measure fiscal accountability by using the retention rate of total tax collections in the locality by the local government.[33] On the one hand, this measure indirectly indicates how local spending is tied to the local revenue base as opposed to intergovernmental transfers. On the other hand, this measure captures the magnitude of opportunity costs incurred by local governments as a result of interventionist policies that retard growth. This is a core feature of this paper and thus should be emphasized. Any non-zero tax revenue retention rate implies strictly positive elasticity of local revenues with respect to the local economic base (provided that an increase in the tax base is not entirely offset by a decrease in grants). However, higher rates of tax revenue retention imply higher losses to local governments resulting from the same loss in economic activity.

These complementary measures are employed in Table 2.2 to illustrate the evolution of fiscal decentralization in Russian regions from 1992–97. The top panel shows the local governments' share in consolidated regional-local expenditures. Throughout these years, the mean share of local governments' expenditures was stable at the level of about 65 percent. However, there were wide variations among regions that persisted throughout these years. In 1997, for example, local government spending in the Nenets Autonomous Area accounted for only 29 percent of regional-local expenditures in contrast to the Perm Oblast, where local spending was 85 percent.

[33] This measurement of regional-local sharing excludes tax collections remitted to the federal budget.

Table 2.2. Local Government Share in Consolidated Regional-Local Expenditures, 1992–1997

	1992	1993	1994	1995	1996	1997
Local Government Share in Consolidated Regional-Local Expenditures						
Mean	64%	65%	64%	65%	67%	65%
Median	65%	66%	64%	68%	69%	68%
Max	100%	100%	100%	84%	87%	85%
Min	15%	19%	27%	10%	16%	29%
Coefficient of Variation	0.20	0.21	0.18	0.17	0.18	0.19
Local Government Share in Consolidated Regional-Local Pre-Transfer Revenues						
Mean	49%	46%	61%	61%	64%	63%
Median	52%	47%	59%	60%	64%	63%
Max	79%	100%	100%	94%	94%	93%
Min	9%	7%	31%	24%	28%	22%
Coefficient of Variation	0.29	0.36	0.23	0.21	0.21	0.21

Source: Calculated from Russian Ministry of Finance data
Note: The sample excludes the Cities of Moscow and St.-Petersburg. The maximum expenditure share of 100% is observed in the Ingush Republic and Ust-Orda Buriat Autonomous Okrug as a result of no regional expenditures. The maximum revenue of 100% is observed in the Ust-Orda Buriat Autonomous Okrug as a result of no regional collections.

The bottom panel of Table 2.2 reveals that the local government share in the regional-local revenue receipts showed more dynamics than its share in consolidated regional expenditures. The mean share of local governments' collections in consolidated regional-local collections increased from 45 percent in 1992 to 60 percent in 1994 to 63 percent in 1996. Throughout these years the cross-regional variation in revenue decentralization was even wider than for expenditure decentralization.

2.4.3. Control Variables

The stylized model can be expected to omit some region- and time-specific factors that affect local governments' budget allocations. Existing empirical studies on budgetary

subsidies in Russia identify supply- and demand-side factors.[34] Supply-side variables characterize the availability of budgetary resources and the presence of competing fiscal pressures (i.e., for allocations other than subsidies). Demand-side variables express the need for subsidies on the part of enterprises.

On the demand side, it is possible to control for exogenously determined industry-wide shocks. For every region, an index of structural advantage is computed as a weighted sum of national indexes of sectoral production with each sector weighted proportionally to its share in the regional economy. On the supply side, one can control for the initial level of regional product (in 1994) and for competing fiscal pressures as determined by the share of population requiring more spending on healthcare and education. To control for fundamental cost differentials across regions, the region-level index of the housing and utilities sector production costs is employed.

2.4.4. Econometric Specification

Equation (2.10) is estimated on a panel of 72 regions over the period of three years: 1995–97. Period 0 is set to be 1992. All specifications include time effects while region effects are included only in the specifications excluding time-invariant control variables. The Hausman test favors fixed effects for the two-way specification (with both year and region effects) and random effects for the one-way specification (year effects only). Hence, the results are reported only for the favored specifications.

I attempt to treat for the possible bias from endogeneity of fiscal decentralization. Indeed, factors that affect local governments' demand for budgetary resources can also

[34] See Alfandari *et al*., 1996; Freinkman and Haney, 1997; and Martinez-Vazquez and Boex, 2001.

have a direct effect on the extent of subsidization. For instance, localities that inherited more wasteful enterprises can make a stronger claim for budgetary resources. The best response to this problem is a set of valid instruments — that is, variables that affect intra-regional decentralization but are uncorrelated with the factors that affect subsidization.

Instruments are derived from Timofeev (2003), where cross-regional variation in both the aspects of decentralization is explained with a set of regional characteristics. Both the aspects of decentralization are statistically significantly related to the five variables excluded from the subsidization equation: the 1992 rate of tax revenue retention, inherited fiscal imbalance, urban concentration, ethnic fractionalization, and rural/urban homogeneity of population. The omnibus test for overidentification does not reject the null hypothesis that the excluded instruments affect subsidization only via their effects on intra-regional decentralization. In addition, the null hypothesis of joint exogeneity of these variables cannot be rejected using a Hausman test. Note that it is not possible to apply this treatment to the specification with two-way effects because these instruments are mostly time-invariant.

2.4.5. Descriptive Statistics and Correlations

The description of variables and sources of data is provided in Appendix B. Table 2.3 provides descriptive statistics calculated over the sample of observations pooled across regions and years. There is a wide variation in both the variables measuring the extent of fiscal decentralization that occurred since 1992. Change in the tax revenue retention rate has a mean of 11.9 percentage points and a standard deviation of 18.2 percentage points. Change in total budgetary resources of local governments has a mean of -156 constant 1992 rubles per capita and a standard deviation of 430.

Table 2.3. Descriptive Statistics

Variable	Mean	Std. Dev.	Max	Min
Change in tax revenue retention rate since 1992, 1995–1997	0.119	0.182	0.807	-0.199
Decentralization of resources, thou. RUR per capita since 1992, 1995–1997	-0.156	3.430	14.246	-23.632
Tax revenue retention rate in 1992	0.484	0.156	0.786	0.000
Initial fiscal imbalance in 1992	0.008	0.169	0.519	-0.576
Urban concentration, 1989	0.140	0.152	1.000	0.002
Ethnic fractionalization in 1989	0.304	0.202	0.857	0.051
Rural/urban homogeneity, 1995–1997	0.205	0.208	1.000	0.001
Sectoral advantage, 1995–1997	0.861	0.050	1.026	0.735
Housing & utilities costs index, 2000	1.122	0.507	2.845	0.754
GRP, millions RUR per capita in 1994	3.140	1.361	8.080	0.752
Population under working age (%), 1995–1997	23.239	3.559	35.800	17.700
Population over working age (%), 1995–1997	19.774	4.734	27.300	5.300
Change in subsidies (thou. RUR per capita), 1995–1997	-3.237	5.221	12.795	-42.420
Change in tax arrears (thou. RUR per capita), 1995–1997	0.798	0.908	6.231	-0.758
Change in a sum of subsidies and tax arrears (thou. RUR per capita), 1995–1997	-2.440	5.317	17.939	-41.357

Notes: These descriptive statistics are calculated over a sample pooling observations for 72 regions over the three years except for variables that are not available for all the three years.

Table 2.4 provides coefficients of pair-wise correlation for selected variables. The correlation between the two measures of decentralization is -0.07. The lack of correlation is important for distinguishing between the substitution and income effects of tax sharing as predicted in the theoretical model.

Table 2.4. Pair-wise correlation coefficients

Change in tax revenue retention rate	Decentralization of resources	-0.070
Change in the amount of subsidies	Change in tax revenue retention rate	-0.101
Change in per capita amount of tax arrears	Change in tax revenue retention rate	-0.200
Change in the sum of per capita amounts of subsidies and tax arrears	Change in tax revenue retention rate	-0.133
Change in the amount of subsidies	Decentralization of resources	0.426
Change in per capita amount of tax arrears	Decentralization of resources	-0.230
Change in the sum of per capita amounts of subsidies and tax arrears	Decentralization of resources	0.379

2.4.6. The Effect of Fiscal Decentralization on Explicit Budgetary Subsidies

First column of Table 2.5 shows the results of the two-way-fixed-effect estimation of equation (2.10) with the change in per capita explicit subsidies in constant 1992 rubles as the dependent variable.[35] In this specification, the effect of a change in the tax revenue retention rate on the change in the amount of subsidies is negative and significant at the 1%-level. A one-ruble equivalent switch from lump-sum grants to tax revenue retention results in $\frac{\gamma}{\tau Y} = \frac{-8.29}{13.30} = -0.62$ rubles of reduction in subsidies. The effect of decentralization of budget resources is positive and significant at the 1%-level. An extra ruble made available to a local government either via shared taxes or lump sum grants results in a 0.42 ruble increase in subsidies. Thus, a marginal propensity to subsidize out of retained taxes is 0.42-0.62= -0.20. This implies that, the price effect of tax revenue retention on the extent of subsidization offsets the income effect thus resulting in a negative net effect.

For the random year effects estimation, reported in the second column of Table 2.5, the impact of a change in the tax revenue retention rate turns out to be much smaller and hardly exceeding the estimate's standard error. At the same time the effect of decentralization of budget resources is estimated to be larger than in the two-way specification. All this can be attributed to the endogeneity bias. This bias can be more severe than in the two-way specification because region-specific factors affecting both subsidization and decentralization are not accounted for.

[35] The 'two way' means that the model includes both region- and time-effects.

Table 2.5. Effects of Decentralization on Budgetary Subsidies

Dependent variable	Change in per capita amount of subsidies		
Specification	Two-way fixed effects	One-way random effects: years	2SLS: year dummies
Change in tax revenue retention rate	-8.290*** (2.079)	-2.150 (1.923)	-5.953 (4.548)
Decentralization of resources	0.482*** (0.133)	0.565*** (0.076)	0.780*** (0.213)
Population under working age (%)	-1.764 (1.158)	-1.567*** (0.179)	-0.766** (0.381)
Population over working age (%)	2.604** (1.259)	-1.298*** (0.152)	-0.503 (0.337)
Sectoral Advantage Index	16.326 (17.973)	22.160*** (7.174)	-16.158 (14.508)
GRP, millions RUR per capita in 1994	—	-2.374*** (0.281)	-3.168*** (0.454)
Housing & Utilities Costs Index	—	-3.868*** (0.980)	5.976* (3.315)
Test statistic, omnibus overidentification test: $216*R^2$ (distributed $\chi^2_{\text{d.f.}=2}$)			2.688
Sample size	216	216	216
Adjusted R^2	0.89		

Notes: All specifications include year effects;
Standard errors are provided in parenthesis;
* statistically significant at the 10% level;
** statistically significant at the 5% level;
*** statistically significant at the 1% level.

The 2SLS estimation of the one-way specification, reported in the last column of Table 2.5, produces larger absolute values for coefficients on the three instrumented variables: the change in the tax revenue retention rate, decentralization of budget resources, and the housing and utilities costs index. Although the explicit treatment for endogeneity improves the statistical significance of the estimates, the resulting 20%-significance of the coefficients on the change in the tax revenue retention rate is still below the level that would allow me to make rigorous conclusions. Nevertheless, to compare with the magnitude of the net effect on the extent of subsidization obtained for

the two-way specification, the calculations are repeated: $\delta + \frac{\gamma}{\tau Y} = 0.78 + \frac{-5.95}{13.30} = 0.33$.

Thus, the net effect, even if below the income effect due to the offsetting influence of the price effect, might be still positive.

Overall, estimates presented in Table 2.5 do not reject the hypothesis that a switch from lump sum grants to tax revenue retention has a negative effect on the amount of budgetary subsidies. However, the statistical significance of the impact of the retention rate on subsidization is rather weak in some specifications. Moreover, assuming intra-regional decentralization to be exogenous is likely to produce biased estimates of its impact on subsidization. The initial rate of tax revenue retention, the share of the largest ethnic minority, density of population, and land area appear to be valid instruments.

2.4.7. Alternative Measures of Subsidization

As indicated in Section 2.2, explicit budgetary subsidies do not account for the entire subsidization. There are more implicit forms like preferential credits, tax benefits, tax exemptions, tax offsets, and tolerated tax arrears. I have data on the stock of tax arrears in 1994–97. Thus, I can calculate the annual flow of tax arrears in 1995–97. Unfortunately, data on the flow of tax arrears before 1992 are not available. However, knowing that the development of implicit subsidization mostly occurred after 1993, one can assume the flow of tax arrears to be zero in 1992.

I re-estimated the equation (2.10) with the dependent variable measured as the change in the sum of per capita amounts of explicit subsidies and tax arrears. All coefficients turned out to be very close to those obtained for the explicit budgetary subsidies.

2.5. Conclusions and Policy Implications

The main objective of this research was to provide some theory and evidence on the relationship between fiscal decentralization and the propensity of subnational governments to subsidize enterprises. In a stylized model, I showed that intergovernmental fiscal arrangements can affect local governments' propensity to give away subsidies. The model predicts that higher rates of tax revenue retention by local governments raise their opportunity costs of subsidizing enterprises. Thus, such higher rates make local governments reallocate public funds to infrastructure provision instead. At the same time, the effect of decentralizing budgetary resources solely depends on the curvature of residents' and local governments' utility functions. These theoretic predictions are in agreement with the results of the empirical analysis of a panel of 72 Russian regions over the period 1995–1997.

The presented results are highly relevant for the current policy debate on the subnational revenue assignment and delineation of expenditure responsibilities between the two subnational levels of government. The findings of this study suggest that decentralization of expenditures can result in more efficient budget allocations only if funded with locally-raised revenue. This contributes to the literature showing that the outcomes of decentralized spending authority depend on the form of financing these expenditures (e.g., Ter-Minassian, 1997).

Appendix 2.A.

The Proof of the Proposition

Proposition: $dS^* = \gamma\, d\lambda + \delta\, \{\tau Y\, d\lambda + dT\}$ *and* $\gamma<0$.

Proof:

Implicitly differentiating the first-order condition for each choice variable and solving simultaneously, one obtains

$$\frac{\left|\overline{H}\right|}{\left|\overline{H}^{44}\right|}dI^{*} = \frac{v'}{Mc'}\tau\Pi d\lambda + \frac{\left|\overline{H}^{41}\right|}{\left|\overline{H}^{44}\right|}\{\tau Y d\lambda + dT\}, \tag{2.11}$$

In (2.11), $\left|\overline{H}\right|$ denotes the bordered Hessian determinant, $\left|\overline{H}^{44}\right|$ stands for the upper-left minor of the bordered Hessian matrix, $\left|\overline{H}^{41}\right|$ stands for the upper-right minor of the bordered Hessian matrix, Π stands for the marginal increase in local economic product resulting from the marginal increase in local infrastructure provision and is equal to $Y_I - \bar{r}\frac{Y_{KI}}{Y_{KK}}$.

Taking the total differential of the local government's budget constraint (2.1), yields $dS^* = (\lambda\tau\Pi - 1)dI^* + \{\tau Y\, d\lambda + dT\}$. Substituting (2.11) for dI^* and rearranging gives

$$dS^* = \left(\lambda\tau\Pi - 1\right)\frac{\left|\overline{H}^{44}\right|}{\left|\overline{H}\right|}\frac{v'}{Mc'}\tau\Pi d\lambda + \left[1 - \left(\lambda\tau\Pi - 1\right)\frac{\left|\overline{H}^{41}\right|}{\left|\overline{H}\right|}\right]\{\tau Y d\lambda + dT\}.$$

The second order conditions imply that $\left|\overline{H}\right| < 0$ and $\left|\overline{H}^{44}\right| > 0$. In addition from (2.8) it follows that $(\lambda\tau\Pi - 1) < 0$.[36] Hence, $\gamma = \left(\lambda\tau\Pi - 1\right)\frac{\left|\overline{H}^{44}\right|}{\left|\overline{H}\right|}\frac{v'}{Mc'}\tau\Pi < 0$.

Appendix 2.B

Sources of data

All data are annual from 1995 to 1997. The budgetary data were obtained from subnational governments' reports to the Russian Ministry of Finance. Information on tax collections is taken from Russian Ministry of Taxation sources. All information on non-

[36] This is valid only in the case of a regular maximum, that is if the Hessian matrix is negative *definite* subject to the constraint, which is a common assumption.

fiscal indicators derives from the 1998 Russian Statistical Yearbook. Information on the costs in housing and utilities (which accounts for climate, landscape, etc.) is taken from the 2001 calculations of federal grants. Out of 89 subjects of the Russian Federation, in addition to Chechnya, the sample also excludes nine autonomous areas and seven *oblasts* within whose boundaries these autonomous areas are located. The reason is that official statistics report economic variables for a whole *oblast* thus making it impossible to distinguish between independent regions located one inside another.

The severity of structural fiscal imbalances is gauged as the excess of consolidated regional expenditures over consolidated regional revenues in 1992. Ethnic fractionalization is measured as a probability that two randomly selected residents of the region belong to different ethnic groups (according to the 1989 census of population). Urban concentration is measured with the Herfindahl index of the three major cities in a region. The "rural homogeneity" measure is simply $4*(\% - 0.5)^2$, where % is the share of rural population.

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3. Do Regional Governments Face Credit Market Discipline in Russia?

3.1. Introduction

At the beginning of transition Russia seemed to have too much faith in the virtues of free markets and hoped that the 'invisible hand' would solve most of its dire problems. Reliance on market forces justified the Russian Government strategy of reducing the budget deficit by shifting excessive expenditure responsibilities from the federal to subnational budgets (Bahl *et al*., 1995, p. 347). Having no money-printing authority and facing credit market discipline, subnational governments were expected to cut costs and undergo fiscal adjustment — something the federal government had failed to do. For many years, creditors' willingness to lend was the only constraint on subnational borrowing. However, the years of transition brought a lot of frustration for Russia and caused a reversal of many policies. Thus, over the last decade Russia has shifted from a permissive stance on subnational borrowing, which solely relied on market-based discipline, to administrative and rule-based controls on subnational borrowing (Martinez-Vazquez et al., forthcoming). This study attempts to shed some light on whether the switch in policy had been warranted in economic terms or whether it only reflects a change of political fashion.

Theoretically, credit markets can provide signals to the borrower that deter him from accumulating an unsustainable level of debt. Empirical studies support this hypothesis by finding a positive relationship between the level of local governments' indebtedness and their cost of borrowing (Bayoumi et al., 1995, for U.S. state bonds; Capeci, 1994, for New Jersey municipal bonds). However, the market-based discipline hypothesis requires several important conditions: independent markets for credits, availability of accurate information on the borrower's outstanding debt and revenue

capacity, responsiveness of governments to rising interest rates, and the expectation of no bailout from the higher-level government.

Apparently, Russia has had some problems with each of the aforementioned conditions, especially the credibility of the no-bailout policy (Martinez-Vazquez et al., forthcoming). The unclear division of responsibilities between the levels of government, both in the legislation and voters' minds, makes the central government partially responsible for local fiscal outcomes. Furthermore, the centralization of taxing authority at the federal level weakens the credibility of the central government's no-bailout commitment because the central government is both sensitive to local fiscal woes and possesses the means for rescuing troubled jurisdictions. Moreover, different regions seem to face different prospects of a federal bailout due to a wide variation in their characteristics that determine the availability of a federal bailout.

More to the point, the sensitivity of the federal government to local fiscal woes is limited to specific political concerns, such as wage arrears or disruption of vital services (e.g., central heating). The informal influence of subnational governments over the court system and weak enforcement of court judgments effectively means that defaults on private loans by regional governments can hardly lead to the disruption of public services. At the same time the fact that in the recent past the federal government itself defaulted on its domestic bonds reveals its low concern over reputational or financial spillovers, which often prompts a central government bailout in other countries. Thus, ex ante the prospects of a federal bailout are uncertain and to a large extent depend on certain characteristics of a particular region, which I attempt to identify in this study.

Given the permissive legislation before the introduction of the *Budget Code* of 2000, many authors had suspected a significant growth of subnational debt in Russia

(e.g., Lavrov *et al.*, 2000; Martinez-Vazquez and Boex, 2001; OECD, 2000). The official figures, which became available only after the *Budget Code* had required subnational governments to maintain debt ledgers, indicate that the accumulated stock of subnational debt is not high according to international standards (Martinez-Vazquez et al., forthcoming). The total amount of explicit subnational debt is around 5 percent of GDP, which is only slightly more than one third of the annual pre-transfer revenues of regional and local governments. Implicit debt, such as government guarantees and overdue payables, accounts for an additional 2–3 percent of GDP. Even after accounting for the fact that the current value of the domestic debt represents only one third of what it was before the ruble devaluation of 1998, it appears that overall the lack of constraints on subnational debt had not led to over-borrowing in the majority of the regions.

Although the low average debt of subnational governments might have resulted from the market-based fiscal discipline, I am unaware of any rigorous studies that would test this hypothesis. Moreover, it remains unexplained why, by contrast to the average, several Russian regions have accumulated a stock of debt exceeding the amount of their annual revenue. The major challenge to such an empirical analysis is obtaining a consistent measure of borrowing costs faced by different regions. Even though commercial lending accounts for the bulk of subnational borrowing in Russia, it is dominated by bank loans. Unlike for publicly traded securities, information on interest rates charged by banks is not publicly available. In this study, I have been able to identify one debt instrument that was utilized by a majority of regions under standard conditions. These securities, called a*grobonds*, were issued by sixty-nine regional governments in 1997–98 to convert their outstanding liabilities to the federal government, who eventually auctioned off these bonds to private investors.

By regressing the agrobond yield spread on the level of indebtedness of regional governments along with other factors, I assess the effectiveness of the supply side of market fiscal discipline. My results indicate that despite being predicted to enhance the chances of a receiving bailout, the lack of revenue autonomy in fact increases the risk premium charged by creditors. I also find a negative relation between a region's size and its borrowing costs, which while it can be indicative of the bailout prospect ("too big to fail"), it can also be explained by the fact that larger regions tend to be wealthier and thus have better ability to pay.

The rest of this paper is organized as follows. In the next section, I discuss the concept of market-based fiscal discipline and general conditions for its effectiveness. In Section 3.3, I look for the presence of these conditions in Russia's institutional arrangements. In Section 3.4, I outline a theoretical framework for testing the effectiveness of market-based fiscal discipline and formulate testable hypotheses. Section 3.5 reports the econometric tests of these hypotheses on Russian data. My conclusions follow.

3.2. Market Discipline

According to the hypothesis of market-based fiscal discipline, as the volume of outstanding debt approaches the level that cannot be serviced in unfavorable states of nature, lenders charge the borrower a higher risk premium and thus discourage further borrowing (Lane, 1993). At some level of indebtedness the borrower will not be offered further credit at any interest rate and thus will be denied access to credit markets. However, many scholars argue that a number of general conditions must be in place in order for the market to effectively discipline governments.

Firstly, market constraints might be ineffective if the government has access to a privileged source of credit. For example, the government might borrow at below-market interest rates from extra-budgetary funds or financial institutions under its control. Special tax treatments of government securities or liquidity requirements imposed on banks can turn the government into a privileged borrower even for independent private banks. Secondly, in order to assess the probability of a default and charge an adequate risk premium, market agents require good information on the government's outstanding debt and contingencies. Thirdly, responsiveness of local governments to increasing interest rates hinges on the efficiency of governance prevailing in a given jurisdiction. Finally, the crucial condition for market discipline is that the higher-level government would not provide additional funds had the local jurisdiction experienced difficulties in servicing its debt (Lane, 1993).

The no-bailout condition is not a matter of the central government declaration but the rational expectations of the borrower and lenders regarding the credibility of such a policy (Inman, 2003). The credibility of the no-bailout policy can suffer from the time-inconsistency problem: initially the central government would prefer sticking to the no-bailout policy in order to induce fiscal prudence on the part of localities. However, once a local fiscal crisis occurs, the central government might opt for a bailout to avoid costs associated with the debt default or disruption of local services.

The economic literature suggests that the credibility of the no-bailout policy is determined by a combination of factors related to either the central government's pay-off from bailing out a locality or the local government's costs of inflicting a fiscal crisis on itself. In a sequential interaction between a locality and the central government, the latter can try to build a reputation for fiscal discipline by denying a bailout even when it would

prefer to intervene. However, such a strategy might not be sustainable if the central government's costs from a local default are too high. In turn, the local government costs of inflicting a crisis would affect its desire to challenge the central government reputation.

Inman (2003) considers two categories of costs that the central government might bear from failing to bailout a troubled jurisdiction. Financial costs represent economic consequences of financial and banking crises trigged by a local default.[37] Distributional costs represent the differential costs to the central government of having the debt burden of the locality borne directly by local residents or by the creditors rather than by national taxpayers. Inman predicts that credibility will be lower when the local taxpayers or creditors (or both) are, on average, favored over national taxpayers even when there are no financial costs from a local default. Similarly, credibility will be lower when financial spillovers are of high concern for the central government even if local taxpayers or creditors are not specially favored. Although, these costs are jurisdiction-specific, they stem from the central government's preferences, which might be uncertain to local governments and their creditors.

One particular form of the distributional costs is considered by Wildasin (1997), who focuses on the extent of externalities from a local fiscal outcome to the residents of other jurisdictions. In fact, Inman (2003) himself cites such externalities in the case of the national capital being in default or when the local services denied under any subsequent debt repayment are important "good Samaritan" services such as healthcare, income maintenance, or personal safety. Wildasin predicts that availability of a bailout is

[37] The policy-work literature also quotes the "reputational spillover" from the defaulting jurisdiction to other governments. However, the anecdotal evidence of the 1840's defaults by U.S. states (and recent defaults by Russian regions) suggests that the credit market can well distinguish risks between different jurisdictions and levels of government (English, 1996).

negatively related to the fragmentation of local jurisdictions because externalities from discontinuation of local services are likely to be positively related to the locality's size.[38]

Wildasin's prediction is complemented in the model developed by Goodspeed (2002) examining the link between current borrowing of local governments and future grants provided by the central government. This study points out that bailouts in the form of larger grants reduce the perceived cost of subnational borrowing thus leading to inefficient levels of indebtedness. The net cost of borrowing is argued to be determined through the "problem of the commons," as the recipient jurisdiction bears only a fraction of the bailout costs proportional to its share in the national tax base. This model implies that larger localities are less willing to overborrow because their residents bear a larger share of the bailout's costs through their larger contributions to the central government's budget.

Policy studies suggest that political costs of a local fiscal crisis (both to the local and central governments) depend on the relative responsibility of each level of government stemming from the division of authority in the system of intergovernmental fiscal relations (Rodden and Eskeland, 2003). For a bailout to occur, political arrangements should be such that at some point the central government cannot resist the pressure to help out a locality while the local officials can still hold on to their offices. This can happen when the central government shares responsibility for the public goods provided at the local level because it provides the bulk of local government revenue or when local governments do not have enough autonomy to undertake fiscal adjustments in response to a fiscal crisis. Voters might hold the central government responsible, because

[38] Wildasin also shows that occurrence of a fiscal crisis is determined not only by availability of a bailout but also by its attractiveness to the locality weighed against the hardships of a fiscal crisis. If the forgone local public service cannot be substituted with private consumption, then, even when readily available, a bailout will not be induced by the locality.

it has the means to resolve the crisis, unlike the local government, which may have never be given sufficient tax autonomy or which may have diverted or wasted all resources by the time of the crisis. Given its ex post responsibility for local fiscal crises, the central government might try to introduce ex ante hierarchical oversight and explicit constraints on subnational fiscal accounts. However, this would only reinforce the belief that the central government is ultimately responsible for subnational fiscal outcomes.

Von Hagen and Eichengreen (1996, p. 135) argue that in countries where taxing authority is concentrated at the central level, subnational governments have no flexibility to undertake fiscal consolidation and thus even minor external shocks can result in a subnational fiscal crisis. When a crisis occurs, the central government can either let the subnational government go bankrupt or bail it out. Political considerations usually rule out the first option and the central government has to provide financial assistance. However, if the subnational governments had some taxing authority, the central government could suggest that the troubled jurisdiction would use it in order to mobilize additional revenues. Thus, this argument implies that the credibility of the central government policy of no bailout depends on the revenue autonomy of subnational governments. Von Hagen and Eichengreen support their conjecture by showing a negative relation between restrictions on local governments' borrowing and their revenue-raising authority in a sample of 45 federal and unitary countries.[39]

Capeci (1994) first tested market discipline hypothesis using data on new bond issues made by New Jersey municipalities from 1975–77. Employing the 2SLS method, he finds that real yield to maturity on the bond issue is positively and statistically

[39] However, they do not consider an alternative explanation that both the borrowing and revenue-raising powers can be two distinct indicators of the extent of autonomy devolved to the local level.

significantly related to the amount borrowed and outstanding debt, both measured per dollar property value. The results also suggest that failing to address the simultaneity of the amount borrowed results in a downward bias to the estimates of the effects of issue volume and the stock of outstanding debt on the borrowing costs. The study also reports that yield is negatively related to the property tax base and positively related to dependence on intergovernmental funding.

Bayoumi *et al*. (1995) analyze data on bond yields for thirty-eight U.S. states over the period 1981–1990. Non-linear 2SLS produces a positive and statistically significant estimate of the effect of indebtedness on yield spreads. Furthermore, their test rejects the hypothesis of a linear supply curve for credit thus implying a backward bend after a certain level (estimated at 8.7 percent of the gross state product). A Hausman test rejects exogeneity of the stock of debt. Overall, the evidence from the U.S. states and municipalities suggests that credit markets do provide incentives for subnational governments to restrain borrowing and may even stop supplying credit to heavily indebted jurisdictions.

Caselli *et al*. (1998) examine empirical relationship between borrowing costs and fiscal variables in a panel of nineteen OECD countries over the period of 1970–91. They measure borrowing costs as a ratio of the general government gross interest expenditures to the stock of debt outstanding at the end of the previous year. They find a positive effect of inflation and a negative effect of a primary surplus on the costs of borrowing. However, contrary to the market-discipline hypothesis, they find that the debt-to-GDP ratio is negatively and statistically significantly related to the average interest costs of public debt when year dummies are included (and significantly positive otherwise). The authors explain this negative relation with the division bias, as the dependent variable is

constructed by dividing interest expenditures by the stock of debt. The authors do not however test this conjecture against alternative explanations, such as simultaneity bias or a genuine failure of the market discipline.

Garcia-Mila *et al*. (2001) examine whether the "problem of the commons" can explain the rapid increase in borrowing by Spanish regions in 1984–1995. Using annual data on fifteen regions, they regress borrowing per capita on a set of variables including income per capita, grants per capita, and regions' shares in the national population (alternatively in the national income). The effect of the region's size on regional borrowing turns out to differ between high-responsibility regions and low- responsibility regions.[40] The effect of a region's size is not statistically significant in low-responsibility regions but is positive and statistically significant in high responsibility regions. Thus, the increase in borrowing cannot be unequivocally attributed to the "problem of the commons." Similarly, income per capita has a positive and significant effect on borrowing but only in high-responsibility regions. The authors attribute these results to a positive income-elasticity of the demand for local services leading to a mismatch in received grants and desired expenditure in high-income regions. These results are also consistent with the market-discipline hypothesis in the sense that high-income jurisdictions face lower borrowing costs than lower-income jurisdictions for any given volume of borrowing.

De Mello (2001) studies the impact of intergovernmental arrangements on local governments' costs of borrowing, using a panel of aggregated data for industrial and developing economies from 1970–1995. He finds a positive and statistically significant

[40] In Spain, expenditure responsibilities are devolved to regions in an asymmetrical manner depending on regions' capacities.

association between local governments' dependence on intergovernmental revenue and their costs of borrowing. He also attempts to identify the channels of causality. He finds that transfer-dependence of local governments is positively associated with their indebtedness and at the same time with their fiscal balance, and also with the benchmark (central government borrowing) yield. However, of the three intermediate factors, only the fiscal balance has a statistically significant impact on local government borrowing costs. Moreover, the sign of this impact is positive, indicating that achieving local fiscal balance with intergovernmental transfers hampers the creditworthiness of local governments. At the same time, local government borrowing costs are not statistically significantly related to the level of their indebtedness or the benchmark yield.

In summary, credit markets can potentially correct irresponsible fiscal behavior by charging adequate risk premia or excluding a profligate jurisdiction from further borrowing altogether. However, to be effective, market forces require several general conditions to be in place: free and open markets for credit; availability of information on the borrowers' accounts; the borrower's ability to promptly respond to market signals; and no expectations of a bailout. The latter condition "appears to be the Achilles' heel of market discipline" according to policy studies (Lane, 1993). In section 3.4, I show that in addition to weakening the responsiveness of the borrower to market signals, the low credibility of the no-bailout policy also makes lenders discount the expected losses, which results in a failure to charge an adequate risk premium.

Occurrence of a bailout is determined as an outcome of a strategic game played by the central and local governments according to the rules stemming from fiscal and political institutions in a particular country. A bailout is more likely when the central government's benefits from bailing out a jurisdiction are high or the local government's

losses from a debt crisis are low, both of which can vary among localities. Indeed, sustainability of the no-bailout condition is in part determined by intergovernmental arrangements that delineate competencies and taxing powers between the levels of government. In the next section, I examine the variation in intergovernmental arrangements faced by different regions in Russia. Finally, the size of a locality both in terms of population and economic product affects fiscal discipline. In a one-shot game, larger localities are more likely to receive a bailout because they are more important for the welfare of other regions and national politics. At the same time larger localities are less likely to induce a bailout because they bear a larger share of the national government costs. In a sequential interaction, the central government might choose to deny a bailout to a large locality in order to send a strong signal to other jurisdictions and thus build a reputation for fiscal discipline.

3.3. Fiscal Autonomy of Regional Governments in Russia

The Russian experience of fiscal reforms presents a typical example of incomplete and evolving decentralization. At the start of transition Russia inherited a huge public sector, responsible for the provision of major social services including housing, transportation, healthcare, and education.[41] Trying to balance its fiscal accounts, the central government shifted the most onerous expenditure responsibilities down to subnational governments. In turn, regional governments had complete discretion to download these responsibilities further to the local level. As subnational governments had

[41] In 1992, consolidated budget expenditures accounted for about 30 percent of GDP. In fact, the extent of public provision was even larger. In the Soviet system many basic goods and services were provided by state-owned enterprises as fringe benefits to their employees. Hence, before being privatized such enterprises maintained huge social assets: housing, kindergartens, hospitals, and recreation facilities. Privatization was accompanied by the process of divestiture, meaning a transfer of social assets and the responsibility for their financing to municipalities.

no direct access to the central bank, and thus could not monetize their deficits, they were expected to accomplish the politically costly job of fiscal adjustment.

Table 3.1. Average Structure of Regional Government Revenue

	1997	1998	1999
Own-Source Revenue	**21.26%**	**23.6%**	**31.0%**
out of which:	**(0.70)**	**(0.67)**	**(0.60)**
CIT	11.22%	11.66%	18.12%
	(0.80)	(0.84)	(0.79)
Sales Tax	—	0.16%	2.46%
	—	(2.89)	(0.91)
Enterprise assets tax	8.54%	9.74%	7.08%
	(0.84)	(0.80)	(0.69)
Non-tax	0.99%	1.04%	1.80%
	(1.61)	(1.02)	(1.31)
Assigned Revenue	**3.66%**	**3.26%**	**3.99%**
out of which:	**(2.19)**	**(2.48)**	**(2.40)**
Levies on subsoil users	2.65%	2.94%	3.64%
	(3.04)	(2.76)	(2.64)
Regulated Revenue	**20.76%**	**24.01%**	**20.67%**
out of which:	**(0.58)**	**(0.55)**	**(0.58)**
VAT	9.61%	n.a.	8.02%
	(0.78)	n.a.	(0.86)
PIT	4.57%	n.a.	6.20%
	(1.02)	n.a.	(0.74)
Excises	3.59%	n.a.	5.35%
	(1.06)	n.a.	(0.99)
Grants	**54.32%**	**49.12%**	**44.37%**
	(0.48)	**(0.57)**	**(0.62)**

Notes: Coefficients of Variation are provided in parentheses

At the same time regional and local governments have been given little revenue-raising authority. Subnational revenues are drawn primarily from shared taxes and intergovernmental fiscal transfers. Although, regional and local governments may collect revenues from some taxes authorized by the federal government, they must fit their bases to the federal law, and may levy rates only within federal limits. In an average region, about seventy percent of the regional government revenues come from federal taxes,

either through tax revenue retention at the point of collection or through redistribution via intergovernmental fiscal flows (see Table 3.1). Thus, on the margin, subnational governments have little capacity to raise revenues in response to a fiscal crisis. Therefore, as hypothesized by von Hagen and Eichengreen (1996), concentration of taxing authority at the central level can make the central government ultimately responsible for local fiscal outcomes.

Table 3.2. Revenue Autonomy of State/Regional Governments in Federal Countries (1995)

	Borrowing constraints	Percent of "own-source" revenue	Composition of "own source" revenue (percent)			
			Non-Tax	Income & Profits Taxes	Property Taxes	Consumption Taxes
Spain	rule based	8	4	2	0	2
Germany	coordination	13	13	0	0	0
Mexico	rule based	18	12	0	3	1
Austria	coordination	25	16	0	0	8
Belgium	coordination	43	2	31	5	5
Australia	coordination	61	26	0	10	16
Switzerland	no constraints	65	19	39	7	0
United States	no constraints	77	29	19	2	27
Canada	no constraints	80	15	33	4	25

Source: OECD (1999)

This being said, we nevertheless should not expect all regional governments to engage in irresponsible borrowing and eventually be bailed out by the federal authorities. Indeed, the coefficients of variation presented in Table 3.1 reveal significant differences among regions in the extent of revenue autonomy. The category of "own-source" revenue encompasses all revenue sources whose yield can be affected at the margin by regional governments, using their discretion to determine taxable bases or rates, or discretion to introduce the tax, or any combination of these three. By exercising this form of fiscal discretion, regional governments can respond to changes in the costs of service delivery

and economic fluctuations. With an average share of "own-source" revenue equal to 21 percent of total revenue in 1997, Russian regions had considerably less revenue autonomy than their counterparts in the United States, Switzerland and Belgium, but nevertheless more than in Spain, Germany, and Mexico (see Table 3.2). Moreover, by 1999, the average share of "own-source" revenue of Russian regions had risen to over thirty percent of their total revenue. Thus, in 16 out of total 88 regions, "own-source" revenue accounted for more than half of their 1999 total revenue.

Different forms of revenue sharing also have different implications for the creditworthiness of regional governments. The category of "assigned sources" of revenue refers to legislated long-term entitlements to (a share of) the regional yield from tax instruments over which regional officials have no discretion.[42] The category of "regulated revenue" has historically referred to tax revenue sharing determined by the higher-level government as part of its annual budget process. However, since 1994, tax-sharing rates have been *de facto* standardized across regions and thus the regulated tax revenue effectively became akin to assigned revenue. The only discretion that subnational governments have with respect to the assigned revenue sources is deferring tax payments or offsetting tax liabilities with government payables.

Although assigned revenue cannot be affected on the margin by regional governments, it possesses two useful properties: 1) inter-temporal predictability of revenue; and 2) revenue links to regional government policy outcomes. The former property, inter-temporal predictability of funds, helps regional governments to better

[42] These statements would need to be qualified if the local authorities can affect the behavior and diligence of federal tax agents, who are responsible for collecting revenues to all levels of government. Although tax policy and tax administration are highly centralized according to the formal system, local authorities could use their informal influence on federal tax agents to affect the rigor of tax enforcement towards local enterprises.

budget and plan for future obligations and projects. The latter property, revenue links, can be illustrated with the Personal Income Tax (PIT). Although regional governments have no discretion over the tax base and rates, job creation induced by regional policies rewards regional governments through their entitlement to the yield from the PIT.

The final category, grants, is comprised of all intergovernmental transfers to regional governments whether formula-based or completely discretionary. Of course, these sources of revenue bring the least revenue autonomy to regional governments.[43] While tax revenue shares are deposited into regional government accounts at the end of each day, intergovernmental grants are disbursed at best on a monthly basis. The formula-driven mechanism of equalization transfers was introduced to smooth fiscal disparities arising from uniform retention of the former "regulated" taxes established in 1994. At the same time, the federal government maintained the *ad hoc* mechanism of "mutual settlements," which represent non-budgeted and primarily negotiated funds that are reported only after budget execution (Martinez-Vazquez and Boex, 2001).[44] In addition, regional governments have been provided with intergovernmental loans for liquidity purposes. These loans can be considered as additional grants because they are often rescheduled and eventually offset or written off.

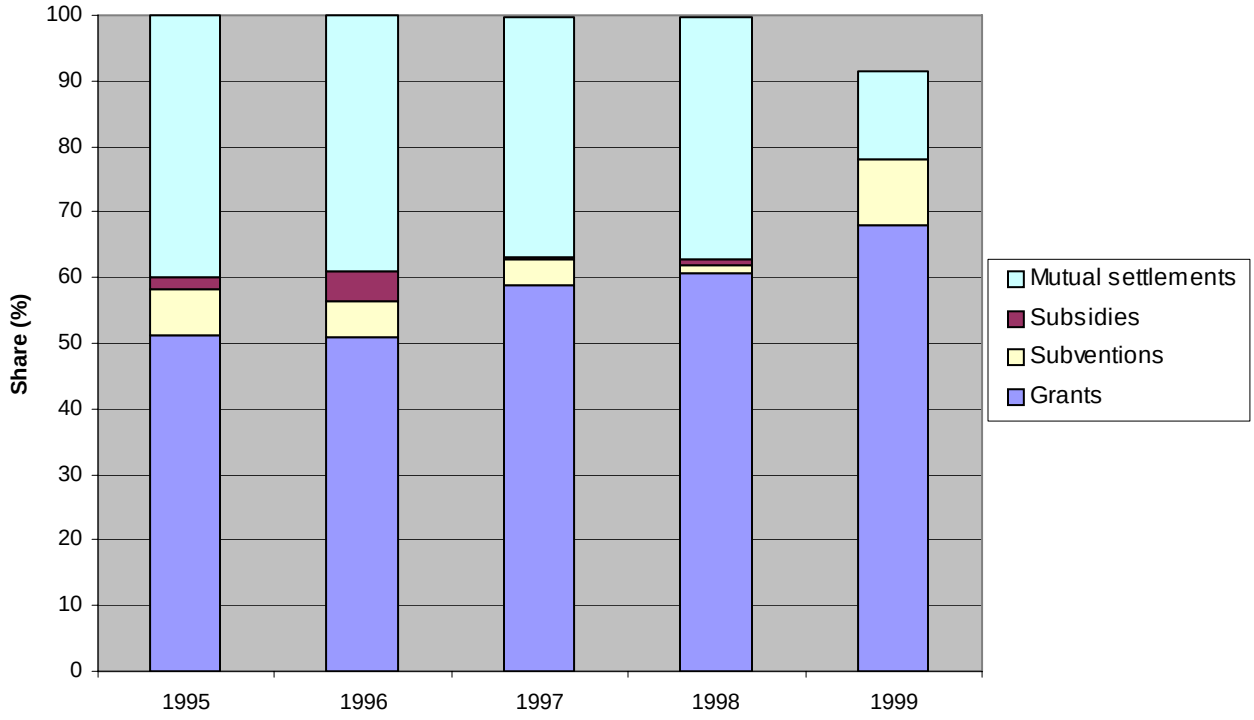
Figure 3.1 reports the composition of federal transfers by four major categories: equalization grants, subventions, subsidies, and mutual settlements. The distribution of equalization grants is set prior to the fiscal year in a federal budget law. Although the

[43] Strictly speaking not all grants should be considered as equally negative in terms of revenue autonomy. For example, an equalization grant based on stable formulas for both funding and distribution of the funds can bring much more stability and predictability to local budgets than ad hoc specific grants allocated every year.

[44] In the 1990s, a great deal of these were in the form of tax exemptions from federal taxes owed by regional energy suppliers. Regional governments offset these tax exemptions from their overdue payables to energy suppliers or traded the exemptions for the bills of exchange issued by regional utility suppliers to pay their arrears to other suppliers, who in turn could pay their energy bills with these bills of exchange.

shares of individual regions in the equalization fund are drafted based on the need/capacity formula, the legislated amounts might be considerably different as a result of political bargaining in the parliament. Moreover, actual shares of regions in the equalization fund might differ from the legislated ones because the total size of the fund falls below the planned amount and the Ministry of Finance adjusts the planned allocation unevenly across regions.

Figure 3.1. Composition of Federal Transfers to Regional Governments



As can be seen from Figure 3.1, the share of equalization grants in total federal transfers increased from fifty percent in 1995 to almost seventy percent in 1999.[45] The

[45] Until 1998, the "subventions" category reported compensation to the City of Moscow for the costs related to its status of a national capital. In 1999, the "subventions'' category accounted for the federal governments' aid to regions in stocking up the supplies of necessities in localities of the Far North (being a relic of the Soviet planners' decision on location, northern settlements have to be subsidized on humanitarian grounds before eventual retreat is carried out). The 1999 figures do not sum up to 100% due to the presence of unidentified "other" transfers.

remaining share is mostly accounted for by "mutual settlements," which are typically not budgeted *ex ante,* but rather result *ex post* from urgency situations and political lobbying. The relative decline of mutual settlements over time is an indication of improvements in the objectivity, stability and predictability of the federal-regional transfer system.

Many studies find that the allocation of federal transfers in Russia is influenced by political factors (Kirkow, 1996; Solnick, 1995; Treisman, 1996). To the extent that federal transfers reflect political lobbying, transfer-dependence of a region can indicate the federal government's willingness to bail out a given jurisdiction. Plainly, the discretionary component of transfers might in fact represent a bailout targeting distressed regions. However, even when the transfer size does not reflect the region's fiscal position but its bargaining power, the latter can be potentially utilized by the region to negotiate a bailout should a fiscal crisis occur. Assuming that the bargaining position of a region stems from its capabilities to generate externalities (including political ones), I can employ Wildasin's (1997) framework to analyze a stylized model of grant allocation (see the appendix for details). I show that externalities that prompt the central governments to bailout out a locality also can make the central governments favor this locality when distributing intergovernmental grants.

In my version of the model, a benevolent central government uses grants to induce the Pareto-efficient provision of public goods by local governments. I assume all residents to have identical preferences but differ in endowments and jurisdiction size. The crucial difference between regions is the amount of external benefits generated by a unit of the regional public good. The first order conditions indicate that the opportunity cost of an extra unit of the regional public good provision in the given jurisdiction must equal the joint benefit measured in terms of the amount of private consumption that the

residents of *all* jurisdictions would be willing to give up for an additional unit of the public good provided in this given jurisdiction. Hence, in regions generating larger external benefits to other jurisdictions, the central government would induce a higher level of the regional public good by making larger intergovernmental transfers. Therefore, within Wildasin's framework, a larger transfer to a jurisdiction can signal to creditors a higher willingness of the central government to bailout a given jurisdiction.

In summary, the Russian system of intergovernmental relations affects the credibility of the no-bailout policy. The lack of taxing authority limits the ability of subnational governments to adjust their fiscal accounts in response to a debt crisis. Moreover, different regions seem to face different prospects of a federal bailout. There is a wide variation among regions in the yield from "own-source" revenue and the incidence of ad hoc transfers from the federal government. The share of the formula-driven grants in total federal transfers increased from fifty percent in 1995 to almost seventy percent in 1999. The remaining part is mostly accounted for by ad hoc grants, which are not budgeted ex ante and result from urgent needs and political lobbying. It can be argued that regions with a smaller yield of their own sources of revenue are more likely to be bailed out because they lack flexibility for fiscal adjustment. In addition, regions receiving larger ad hoc transfers are more likely to be bailed out because the fiscal outcomes in these regions are presumably of higher concern for the federal government.

3.4. Testing the Market-Based Fiscal Discipline Hypothesis

The ultimate effectiveness of the market-based fiscal discipline in Russia would manifest itself in sustainable volumes of debt accumulated by regional governments. This

seems to be the case in most of Russian regions as being reported in various studies (for a survey of estimates, see Martinez-Vazquez *et al*, forthcoming). The official figures, which became available only after the *Budget Code* of 2000 had required subnational governments to maintain debt ledgers, indicate that the total amount of explicit subnational debt has been below 5 percent of GDP. This is around one third of the annual pre-transfer revenues of regional and local governments. Implicit debt, such as government guarantees and overdue payables, accounted for additional 2–3 percent of GDP (this should also include extra-budgetary borrowing guaranteed by the government). Thus, by all estimates, Russia's subnational debt falls below the levels observed in many other countries.[46] This is especially noticeable in comparison to the level of subnational debt in the four major federations: 57 percent of expenditures (11% of GDP) in Australia; 65 percent of expenditures (13% of GDP) in the United States; 91 percent of expenditures (21% of GDP) in Germany; and 100 percent of expenditures (25% of GDP) in Switzerland (Martinez-Vazquez and Boex, 2001).

The low average level of subnational government indebtedness can indicate the effectiveness of the sole reliance on the market-based discipline in the 1990s. Alternatively, the modest levels of subnational government indebtedness can be explained by the tightness of the credit market in Russia. Indeed, until the financial crisis of 1998, tight monetary policy combined with excessive borrowing by the federal government drove the real interest rate to two-digit values. However, if the low average level of debt were in fact caused by tight monetary policy (i.e. high cost of credit), then it would indicate that at least the demand-side component of the market-based fiscal

[46] This statement holds even after accounting for the fact that the ruble devaluation of 1998 significantly reduced the real value of subnational debt.

discipline worked and subnational governments indeed responded to high interest rates. Another piece of evidence in support of this hypothesis is the significant share of subnational total debt accounted for by overdue payables to employees and suppliers. It has been documented that private firms responded to tight credit markets with extended payment periods and, thus, receiving (involuntary) trade-credits from their suppliers (Alfandari and Schaffer, 1997; Commander et al, 2000). One can suspect that subnational governments at least tried to employ a similar strategy, that is, forced borrowing.

An alternative explanation for the low subnational debt is the high dependence of subnational governments on intergovernmental transfers. In theory, local governments borrow short term to smooth shocks to their revenue or expenditure.[47] From this angle, local governments have no need to borrow if all their shocks are smoothed by central government transfers.

While the average subnational debt has been rather low, several of Russia's regions have accumulated a stock of debt significantly exceeding the amount of their annual revenues. An extreme example is in the Republic of Tyva, where the stock of explicit debt exceeds pre-transfer revenue by a factor of five. Given that the maturity of debt that can be accommodated by the Russian credit markets is rather short, such debt-to-revenue ratios are hardly sustainable. For policy applications, it would be interesting to determine which component of the market mechanism failed in those regions. That is, it would be useful to see whether the markets failed to send corrective signals to the governments, or the governments failed to respond to these signals. Furthermore, it

[47] Borrowing longer term, for investments in capital infrastructure may also be interpreted as shocks caused by the lack of liquidity related to some level of ability to pay (service the debt) over the long run.

would be of practical interest to determine which of the institutional factors became critical for this failure.

My data allow me to test for the presence of the following causalities:

- From regional governments' indebtedness to their cost of borrowing,
- From regional governments' revenue autonomy to the perceived probability of a bailout (as captured in the risk premium charged by creditors),
- From regional governments' share in the national population and income to the perceived probability of a bailout.

3.4.1. Theoretical Framework

These above stated causalities can be formalized by extending Capeci's (1994) model of credit supply to accommodate the possibility of a central government bailout. The two-period model of interest rate determination under uncertainty gives predictions for the relationship between a regional government's cost of borrowing and its debt burden relative to its ability to repay.

In period 1, risk-neutral lenders provide credits of principal size B to the regional government. In period 2, the regional government repays to the lenders $(1+i)B$, where i is the promised interest rate on the debt. The payment is made out of period 2 fiscal surplus $S=Y-G$, which is the difference between the government's revenues and non-interest expenditures in period 2. A debt crisis will occur if $S<(1+i)B$.[48] The lenders have prior belief ρ of the probability that the central government intervenes and provides bailout of size $(1+i)B-S$ when the region becomes insolvent. This belief is based on observing

[48] Following earlier studies on the market-based fiscal discipline, I assume the occurrence of a debt default to be entirely determined by the borrower's ability to pay. While acknowledging that the borrower's willingness to pay can also play some role, I do not address it any way other than through the possible relation between the borrower's willingness to pay and its fiscal position. Fiscal strain brings willingness to pay to the fore as a government is forced to choose between debt service and other operating expenses (S&P 2003).

signal σ (intergovernmental relations) in period 1, that is $\rho=\rho(\sigma)$ and $\frac{d\rho}{d\sigma} > 0$. For simplicity, it is assumed that the lenders receive nothing if $S<0$, unless a bailout occurs.

The assumption of a competitive market for credits implies that expected payments on the debt must equal $(1+r)B$, where r is the interest rate on riskless investment. For cross-jurisdictional comparability, I normalize all variables labeled with capital letters by scaling them with period 1 recurrent revenues and use the corresponding small letters to denote the normalized variables. The future realization of the normalized surplus s is assumed to be a sum of two components: some function θ(X) of factors observed by investors in period 1, such as the growth potential and the level of irreversible expenditure commitments (e.g., payroll), and an unobservable component ε. That is $s= \theta(X) + \varepsilon$.

If $s \geq (1+i)b$, full repayment of debt occurs. If $s < (1+i)b$, the conditional expected value of the repaid amount equals to

$$\rho(1+i)b + (1-\rho) * \Pr ob[0 \leq s \mid s < s^*] * E[s \mid 0 \leq s < s^*],$$

where s^*, equal to $(1+i)b$, denotes the minimal realization of fiscal surplus s sufficient for the regional government to remain solvent.[49] Thus, the equilibrium value of the promised interest rate i should equate the expected return on the lending with the risk-free rate of return:

$$\Pr ob[s \geq s^*] * (1+i)b + \Pr ob[s < s^*] * \rho(1+i)b$$

$$+ \Pr ob[0 \leq s < s^*] * (1-\rho) * E[s \mid 0 \leq s < s^*] = (1+r)b.$$

[49] Here, we assume that the probability of a bailout does not depend on the realized level of fiscal surplus given that it is below the solvency level.

This equilibrium equation gives us an upper limit for the amount of credit that can be provided to the borrower. First of all, note that the expected repayment belongs to the interval $\left[\rho s^*, \Pr ob[0 \le s] * E[s|0 \le s] + \rho s^*\right]$.

Under zero probability of a bailout, i.e., $\rho=0$, for this expected payoff to give a return of at least $1+r$, the amount of principal should not exceed $\bar{b} = \frac{1}{1+r} \Pr ob[0 \le s] * E[s|0 \le s]$. Thus, if no bailout is expected, the borrower will be denied credit in excess of the collateral — expected (positive) fiscal surplus. However, with a non-zero probability of a bailout, the expected return exceeds $\rho s^*/b$, and thus can achieve the risk free return $1+r$ for a sufficiently large amount of the promised repayment s^*. Therefore with a non-zero probability of a bailout, a borrower can obtain any amount of credit by promising a sufficiently large interest rate.

Now I turn to the analysis of the equilibrium equation for the levels of debt below the threshold at which the borrower is denied further credit (which would be infinity in the case of $\rho>0$). Let F(.) denote the cumulative probability distribution of ε. Then substituting $\theta + \varepsilon$ for s and $F(s^* - \theta)$ for $\Pr ob[s < s^*]$ into the equilibrium equation above and rearranging terms gives

$$i - r = (1-\rho)\frac{1}{b}\left\{\int_{-\theta}^{s^*-\theta}(s^* - \theta - \varepsilon)dF(\varepsilon) + s^* F(-\theta)\right\} \qquad (3.1)$$

Thus, the risk premium $\pi=i-r$, which is the LHS of equation (3.1), is equal to the expected rate of loss in the promised repayment (RHS of equation 3.1). Taking the limit as $b \to \infty$ of both the sides of equation (3.1) and solving for the limit of π gives

$$\lim \pi = \frac{(r+1)(1-\rho)}{\rho}.$$

Therefore, under any non-zero probability of a bailout, that is $\rho>0$, the risk premium is capped by a finite limit, which is a function of r and of ρ. This latter result stems from the market equilibrium as competition among creditors drives the expected return down to the risk-free rate of return.

Note from equation 3.1 that in our setup the expected loss in the promised repayment is only a fraction 1-ρ of the amount derived in Capeci (1994). Thus, with the expectation of a bailout, the equilibrium risk premium is determined by the same equation as in the no-bailout setup but with the expected losses from a default discounted by a factor of *1- ρ*. Hence, all the predictions derived in Capeci (1994) hold in my setup:

$$\frac{d\pi}{db} = \frac{1-\rho}{b^2}\left[1-(1-\rho)F(s^*-\theta)\right]^{-1}\int_{-\theta}^{s^*-\theta}(\theta+\varepsilon)dF(\varepsilon) > 0,$$

$$\frac{d\pi}{d\theta} = \frac{1-\rho}{b}\left[1-(1-\rho)F(s^*-\theta)\right]^{-1}\left[F(s^*-\theta)-F(-\theta)\right] < 0, \text{ and}$$

$$\frac{d\pi}{dr} = \frac{1-\rho}{b}\left[1-(1-\rho)F(s^*-\theta)\right]^{-1} > 0.$$

Note, however, that if the probability of a bailout were increasing with the level of indebtedness, that is d ρ /db = ρ'>0, then

$$\frac{d\pi}{db} = \frac{1-\rho}{b^2}\left[1-(1-\rho)F(s^*-\theta)\right]^{-1}\left\{\int_{-\theta}^{s^*-\theta}(\theta+\varepsilon)dF(\varepsilon) - \frac{\rho'\pi}{1-\rho}\right\},$$

where the sign of d π /db is determined by the expression in brackets, which can be negative. Thus, in this latter case, creditors are even more willing to relax the credit discipline in order to induce a bailout.

Returning to our initial assumption of an exogenous probability of a bailout, I can derive comparative statics results for the impact of prior belief ρ:

$$\frac{d\pi}{d\rho} < \frac{-1}{b}\left[1-(1-\rho)F(\theta^*)\right]^{-1}\pi < 0; \tag{3.2}$$

$$\frac{d^2\pi}{d\rho db} < \frac{-1}{1-\rho}\left[1-(1-\rho)F(\theta^*)\right]^{-1}\frac{d\pi}{db} < 0. \tag{3.3}$$

Recalling that $\rho=\rho(\sigma)$ and $\frac{d\rho}{d\sigma} > 0$, we have $\frac{d\pi}{d\sigma} < 0$ and $\frac{d^2\pi}{d\sigma db} < 0$, that is, higher levels of bailout signal σ observed for the given jurisdiction in period 1 result in lower risk premia charged by lenders and slower responsiveness of risk premia to rising indebtedness.

3.5. Empirical Testing

In this section, I examine whether intergovernmental arrangements indeed interfere with the fiscal discipline imposed on regional governments by credit markets in Russia. According to the previous section, the risk premium on regional debt may be approximated with the following linear function:

$$\pi_i = \alpha_0 + \alpha_1 b_i + \alpha_2 \sigma_i + X_i'\beta + u_i, \tag{3.4}$$

where i indexes jurisdictions; b stands for the volume of outstanding debt normalized by the amount of recurrent revenues; σ is the intergovernmental parameter signaling the probability of the central government bailout in the case of local government insolvency; X_i is a vector of factors positively affecting the ratio of the fiscal surplus to the amount of recurrent revenues; and u_i is the error term. The predictions are that $\alpha_1 > 0$, while α_2, β_k <0.

The direct test of my hypothesis that $d\pi/d\,\sigma > 0$ would be through estimating the impact of the bailout probability on a regional government's borrowing costs, which should incorporate the risk premium charged by the lenders.

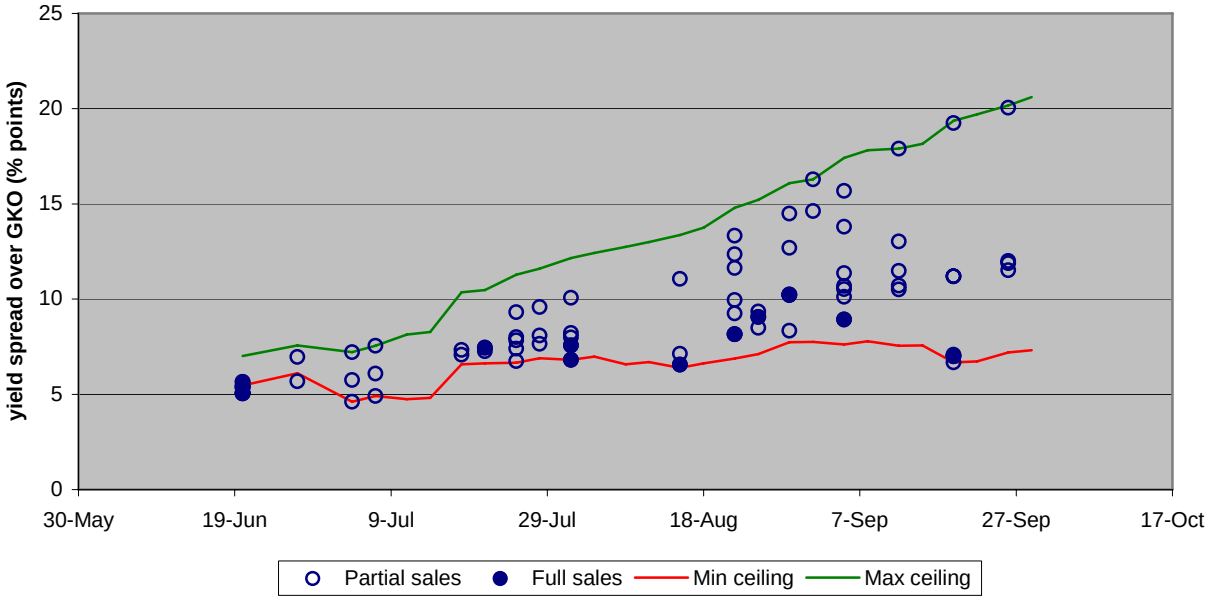
3.5.1. Measuring the Risk Premia

The major challenge to an empirical test of the market-based fiscal discipline is obtaining a consistent measure of market yields on the credit obligations of different jurisdictions. Although the bulk of regional debt in Russia is in the form of commercial lending, it is dominated by bank loans. Unlike for publicly traded securities, information on interest rates charged by banks is not publicly available. Fortunately, there is one debt instrument that was utilized by a majority of Russian regions under standard conditions. These securities, called agrobonds, were issued by sixty-nine regional governments in 1997–98 as a means to cover their guarantees on the commodity credits provided by the government to local agricultural producers in 1996. As Russian farmers conceived government credits as another form of subsidy, not many of them intended to repay the credits and thus regional government guarantees became due. Nine regions opted for paying off the guaranteed credit upfront, but the majority converted it into securities hoping that the federal government would not press too hard for repayment. However, the federal government auctioned off these bonds on the private market, which had had a four-year experience with trading federal bonds (GKOs) totaling USD 32 billion.

Each region made three agrobond issues of equal size: of one-, two-, and three-year maturity. All bonds had the same nominal value (RUR 10 thou.) and an annual coupon of ten percent. On June 20, 1997, the federal government started offering agrobonds of different regions along with the minimum prices during special auction

sessions at the Moscow Interbank Currency Exchange. As can be seen from Figure 3.2, at the beginning the minimum prices set by the federal government for agrobonds of different regions were very close so that the associated yield ceilings clustered around the value of 6 percentage points over the federal bonds' yield. [50] As a result, for the most creditworthy regions the entire issue was sold during one trading day while for others no bids exceeded the initial minimum prices. Figure 3.2 reveals how the federal government eventually had to lower the minimum prices (and thus raise yield ceilings) trying to sell some of the least demanded agrobonds.

Figure 3.2. One-year Agrobond Auctions (June–September 1997)



[50] For the benchmark federal bond (GKO076), the yield was fluctuating between 18.2% and 20.3% during June-September 1997.

The federal government followed the same pricing strategy for most of the regions — daily incrementing the yield ceiling until it hit the market valuation.[51] As can be seen from Appendix 3.A, it took on average 12 trading days for the yield ceiling to increase from the level of 6 to 10 percentage points over the GKO yield. The auction purchases stopped in the fall of 1997 as the world financial crisis hit the Russian market. This means that for those regions that issued their agrobonds late in August 1997, the federal government did not have enough time to complete the gradual incrementing of the yield ceilings to the clearing levels. [52] Moreover, 16 regions issued their agrobonds already after September 1997 and thus are not covered by our data on the auctions taking place June 20 – September 29, 1997.

At the end, agrobonds of twenty-six regions were completely sold out and those of additional thirty-one regions were partially sold at the auctions. Out of almost RUR 7 billion (USD 1.2 billion) in agrobonds, roughly one-third of the agrobonds ended up held by foreigners, with another one-third held by Russia's largest banks and investment firms, while the federal government held the remaining unsold agrobonds (S&P, 2003). Thus, for twelve regions, agrobonds were not demanded under the imposed yield ceilings (going as high as 18 percentage points over the federal bond yield).

My strategy is to use the information on the discount rates at which agrobonds of a particular region were sold in auctions to approximate the default premium that this regional government would face in the credit market. I argue that the yield spread over

[51] The auction was structured in terms of the agrobond price. However, my analysis (and presumably investors' decision) is based on the associated yield spread that is the difference between the yield to the maturity on the agrobond and the yield on a federal bond of a similar maturity taken on the day of the auction.

[52] For 7 out of the 19 unsold 1-year agrobonds the final ceilings were around 13 percentage points over the GKO yield. For the remaining 12 issues the final yield ceilings seem to be evenly spread from 9 to 18 percentage points over the GKO yield. At the same time, for one completely sold issue the final yield ceilings exceeded 13 percentage points premium: Republic of Khakasia - 14.55% over the GKO yield.

the federal bond yield reflects the creditors' assessment of the risk that the issuer would not be able (or willing) to honor the obligation of servicing its agrobonds (see box 3.1 on agrobond repayment). Thus, my dependent variable is the agrobond yield spread averaged across all trading days in proportion to the fraction of this agrobond issue sold on each day. For the issues that did not register a single trade I only know that the market yield was above the ceiling imposed by the federal government. For such regions I set the dependent variable equal to the maximum yield ceiling that creditors were offered.[53] Thus, my dependent variable is essentially censored from above. Moreover, the censoring limits vary by region.[54]

Box 3.1. Agrobond repayment

When the first payments of agrobonds fell due in June 1998, many regions refused to honor the coupons, complaining that the Ministry of Finance had imposed the debt of agricultural enterprises on them. Although the defaults reflected the worsening financial situation, the decision whether or not to pay did not always depend on the wealth of the region. Some relatively wealthy regions, such as Lipetsk, refused to pay, whereas some poorer ones, such as Chuvashia, did pay. In July 1998, agrobond holders complained to the federal authorities about the regional governments' delay in payments. However, the federal Ministry of Finance referred to the fiscal autonomy of regions. The only concession made by the federal government on the issue was easing regions' debt burden by restructuring regional liabilities on the portion of agrobonds that remained in federal ownership.
In August 1998, the federal government itself was hit by a severe economic, political, and financial crisis and had to defaud first on domestic debt and later also on unrated Soviet-era foreign-currency debt. The crisis resulted in a significant deterioration of the regions' fiscal and financial positions. However, not all regions defaulted on or even had to restructure their debt. Although some regions, such as the Samara Oblast, had little debt to default on, others took the difficult decision to repay their debt despite the difficulties. Out of eight Russian regions that were publicly rated by Standard & Poor's at the time, three defaulted on unrated debt (which included agrobonds).

None of the twelve regions (with the sole exception of the Karachayevo-Circassian Republic) whose agrobonds were not demanded at the auctions and thus remained completely in federal ownership have made a single payment on these liabilities. The Karachayevo-Circassian Republic presents an exception as the liabilities of its agrobonds were off-set against special federal budget appropriations for drought aid to the Republic in 1998.

Out of twenty-six regions whose securities were completely sold out at the auctions, only eighteen cleared them all by December 2001. Many regions whose agrobonds were partially sold in 1997 have cleared the securities held by private investors while refusing to service the portion held by the federal government. This can be explained in part by the fact that some law firms have been buying defaulted agrobonds for pennies on the secondary market and aggressively seeking settlement through courts with varying degrees of success. In addition, regional governments' debtors often buy agrobonds at a significant discount to pay off their debt to regions at the face value. It should be mentioned that the rouble devaluation of 1998 significantly reduced the real value of agrobonds.

Source: Martinez-Vazquez et al (forthcoming) and S&P (2003)

[53] Lower yield ceilings set for prior trading sessions for which no purchases took place do not convey any additional information.
[54] See footnote 52.

I perform our empirical analysis on the sample of one-year agrobonds — the largest sample (52 regions including 19 limit observation) out of the three maturities in my dataset. I have to acknowledge a sample selection problem due to several factors. First of all, ten regions did not have any liabilities on the federal credits to be converted into agrobonds (e.g., cities of Moscow and St. Petersburg). Second, nine regions opted for paying off the guaranteed credit upfront rather than converting it into securities. Finally, 16 regions issued their agrobonds after September 1997 and thus are not covered by my dataset of the auction results. These 16 cases include both wealthy regions such as Nizhny Novogord and poor ones such as Dagestan. Thus, for eight of these 16 regions agrobonds were completely sold out by May 1998, while for the other eight regions the leftovers remained in federal ownership. Overall, I cannot see any pattern in the selection of our sample, and do not expect the sample selection to bias my results one way or another.

The auction results imply that on average investors felt that a Tambov Region agrobond should have a market yield only 5.05 percentage points above the federal bond yield, while a Khakasia Republic agrobond should bear a yield 14.55 percentage points higher than the federal bond (see Appendix 3.B). For those regions whose agrobonds were demanded at the auctions, the mean spread over the federal bond yield was 8.39 percentage points, with a standard deviation of 2.35 percentage points.

3.5.2. Measures of Indebtedness

The other major data requirement for this study is a measure of regions' indebtedness. The first official figures on the volume of outstanding regional debt appeared in 2000 subnational budget reports prepared in accord with the new *Budget Code*. The reported debt stock is broken down into commercial loans and

intergovernmental loans. For the previous years, budgetary reports quote only the annual *flow* of deficit financing broken down into detailed subcategories. Therefore, I construct the January 1997 *stock* of outstanding debt by subtracting the *flows* of deficit financing accumulated in the past from the recent figures on outstanding debt stock.

To derive the measure of the relative size of debt, the nominal debt numbers are divided by the amount of a region's recurrent revenues (that is, total revenue excluding ad hoc grants). In my sample, the average relative debt is about 133 percent, half of which is accounted for by commercial lending. The standard deviation is 106 percent. The coefficient of correlation between commercial debt and intergovernmental loans is –0.25. The Republic of Sakha, with the largest explicit debt, had a market yield of 9.17 percentage points above the federal bond yield, which is 1 percentage point higher than the average for the regions whose agrobonds were (partially) sold at the auction. By contrast, Tambov Region, whose agrobonds were sold at the smallest yield spread, had relative debt of slightly above 50 percent, which is almost half of the average indebtedness. On the other hand, Khakasia Republic, whose agrobonds were sold at the largest yield spread, had relative debt around 36 percent of its recurrent revenues — only a quarter of the average indebtedness. Thus, the relation between indebtedness and interest rates is not straightforward and in fact can be part of multivariate relations. Nevertheless, we can note that the average indebtedness of those regions whose agrobonds were not demanded at the auctions was 30 percentage points higher than the average indebtedness of other regions.

In addition to explicit borrowings, regional government liabilities also include overdue payables to employees and suppliers. For 1997, I have only consolidated regional-local figures on overdue payables, which are broken down into salaries and

payroll charges, transfers to population, and utility bills. However, post-2000 data indicate that regional governments account for less than 20 percent of subnational budget arrears (Martinez-Vazquez et al., forthcoming). Nevertheless, consolidated regional-local budget arrears can serve as a proxy for regional government liabilities to the extent that they are used by local governments as a strategic tool for extracting regional assistance. [55] In terms of our theoretical framework, implicit liabilities can be interpreted either as part of the total indebtedness of a region or as future non-discretionary expenditures that will reduce the amount of fiscal surplus available for the repayment of the debt. In addition, overdue payables can signal fiscal strain and the unresponsiveness of the government.

Relative to the regional government recurrent revenues, the total amount of regional-local budget arrears is not high — about 31% (see Appendix 3.B). This ratio is somewhat higher in regions whose agrobonds were not demanded at the auctions — about 43%. Moreover budget arrears are weakly correlated with explicit debt: the coefficient of correlation is only 0.29. Among the different categories of budget arrears themselves, a high coefficient of correlation (0.6) is detected only between wages and transfers to population (stipends, social benefits, etc).

There is a danger that the official data on outstanding debt might be subject to underreporting by regional authorities. For example, in 2000, only 55 out of the 88 Russian regions (excluding the Chechen Republic) reported non-zero values for total indebtedness (explicit debt and guaranties on loans to other parties). I am more inclined to trust the figures reported for overdue payables, as those are used by subnational authorities as a bargaining tool to squeeze aid from the federal government and thus are

[55] The effectiveness of local governments' arrears as a tool to squeeze regional funds ranges from quite high for wages and social payments to rather low for utility bills.

less likely to be underreported. Conversely, subnational authorities have significant incentives to disguise the actual stock of the explicit borrowing and guarantees given the federal ceiling imposed on the level of the latter type of debt.[56]

A data validation exercise, comparing the 2000 figures on the outstanding debt with the annual flows of deficit financing reported by subnational governments in the past reveals some discrepancies (Martinez-Vazquez et al, forthcoming). According to these calculations, the accumulated amount of domestic borrowing is threefold the stock reported by subnational governments in 2000. Apart from intentional concealment, underreporting of debt stock could also be explained by the lack of proper records before the introduction of the debt ledgers. Indeed, the reported stock of explicit domestic debt increased from 0.50 percent of GDP in 2000 to 0.91 percent of GDP in 2001. At the same time, the flow of deficit financing suggests that in the course of 2001, the stock of domestic subnational debt rose by only 0.03 percent of GDP and actually decreased relative to GDP due to economic growth and inflation. Thus, the rest of the rise in the reported debt level could potentially be explained by better accounting for debt accumulated in the past. I believe that the accuracy of debt reporting has improved since then and therefore I use the latest available figures (January 2003) to construct the 1997 *stock* of outstanding debt.

Given the indirect way of measuring 1997 stock of outstanding debt, I also include an alternative measure of indebtedness: interest payments relative to the recurrent revenues in 1997. First of all, being part of the repayment, the relative size of interest expenditure liability is directly related to a government's debt burden. In addition, the

[56] For example, an audit by the Federal Chamber of Accounts revealed that the Government of Magadan Oblast concealed 63 percent of the actual stock of debt outstanding at the end of 2001. In fact, the actual stock of the region's debt exceeded the federal ceiling (the amount of pre-transfer revenues) by a factor of eight.

amount if interest payments can serve as a proxy for the total repayment liability. However, the accuracy of this proxy would be affected by governments' defaults. In addition, while representing past borrowings, the current interest payments can be affected by reverse causality from the current default premia in the case of autocorrelation exhibited by the latter. Thus, caution should be taken when interpreting the impact of this variable. The coefficient of correlation between commercial debt and interest payments is 0.35. As a ratio to the regional government recurrent revenues, the average interest burden is about 1.26 percent, with the standard deviation of 2.17 percent. The average interest burden of those regions whose agrobonds were not demanded at the auctions is only half of that for other regions. This could be indicative of either less borrowing or poorer payment discipline.

3.5.3. Bailout Signals

I use three complementary proxies for the probability that the central government would provide a bailout if a regional government becomes insolvent. As pointed out by von Hagen and Eichengreen (1996), the lack of revenue autonomy of subnational governments limits their ability to cope with a fiscal crisis on their own. They argue that, given the inability of regional governments to undertake fiscal adjustment, the federal government commitment to the no-bailout policy would not be rendered credible by lenders. Based on this argument, I use the share of "own-source" revenue in the total revenue of the regional government as a proxy for the probability that the central government would bail out this region. By "own-source" I mean all revenue sources whose yield can be affected at the margin by regional governments, using their discretion to determine taxable bases or rates, or discretion to introduce the tax, or any combination of these three.

Our second proxy is transfer dependence of regional governments. In the appendix, I present a theoretical argument for using such a proxy by showing that the amount of federal grants reflects the spillover-generating capabilities of a jurisdiction and thus the federal government's concern about the jurisdiction's fiscal outcome. However, in Russia not all grants are driven by the federal government's political concerns. As shown in Section 3.3, two thirds of federal grants are accounted for by equalization transfers, which are allocated based on the need/capacity formula. Indeed, the coefficient of correlation between the "own-source" revenue yield and transfer dependence is –0.88. However, the share of discretionary (ad hoc) grants in the total amount of federal transfers received by a region is likely to better capture political favors of the federal government. The coefficient of correlation between this latter variable and "own-source" revenue yield is 0.33.

For those regions whose agrobonds were not demanded at the auctions, the average share of "own-source" revenue in their total revenue was less than half of that observed in other regions. Also, in the regions with unsold agrobonds, the average share of discretionary grants in the total amount of federal transfers is only two thirds of the share observed in the other regions. The "own-source" revenue yield is negatively correlated with budget arrears on wages and social benefits (with the correlation coefficient of –0.3).

Finally, I use population size as my third proxy for the availability of a bailout to the jurisdiction. Wildasin (1997) predicts that availability of a bailout is negatively related to the fragmentation of local jurisdictions because externalities from discontinuation of local services are likely to be positively related to the locality's size. In our sample, the average share of a region in the national population is 0.95 percent, with

a standard deviation of 0.76 percent. For those regions whose agrobonds were not demanded at the auctions, the average population share is less than half of the other regions' average.

3.5.4. Econometric Issues

Given that the dependent variable is censored, OLS is an inappropriate technique for the estimation because it produces biased estimates. Compared to the most common alternative technique, MLE, OLS estimates are smaller in absolute value.[57] However, given that OLS coefficient estimates are not affected by other likely econometric issues, such as heteroskedasticity and non-normality, it can serve as a benchmark for evaluating estimates produced by alternative techniques. By contrast, for the Tobit model, a standard MLE technique to estimate equations with censored dependent variables, the consistency hinges on the assumption of normally distributed and homoskedastic errors. Moreover, some simulation evidence suggests that heteroskedasticity causes greater bias in maximum likelihood estimation than non-normality (e.g., Powell, 1986). To address this issue I estimate a Tobit model allowing multiplicative heteroskedasticity in the form of $\sigma^2_i = \sigma^2 exp(2\gamma z_i)$, where z_i is the region i's share in the federal tax base.

By regressing regional governments' costs of borrowing on their levels of indebtedness along with other regional characteristics, I assess the effectiveness of the supply side of the market mechanism. That is, I check whether credit markets indeed send corrective signals to borrowers. However, there is a reverse causality from the costs of borrowing to government demand for credit. In non-censored models, in order to eliminate the endogeneity bias, I would have to instrument regional governments'

[57] An empirical regularity is that the MLEs can be approximated by dividing the OLS estimates by the proportion of non-censored observations in the sample (Greene, p. 697).

demand for credit with some exogenous variables. That is, I would have to find variables that affect regional governments' costs of borrowing only through the default risk stemming from the level of indebtedness. Any discrepancy in estimates obtained with instrumented and non-instrumented regressions would indicate some responsiveness of subnational borrowing to rising interest rates.

Unfortunately, in limited dependent variables models, it is very difficult to deal with endogeneity. Unless strong assumptions are made on the exact relationship between the endogenous regressors and the instruments, it is generally not possible to apply instrumental variable techniques. Nevertheless, with the direction of the bias being known (downwards), our immediate strategy is to ignore the endogeneity. If the biased estimate turns out to be positive, then the true parameter α_1 is likely to be positive as well but larger in magnitude.

Apart from the endogeneity, the estimation procedure is further complicated with censoring limits varying by region. Indeed, I observe risk premia resulting from the auction only if they fit the maximum allowed yield spread as determined by the minimum price set by the federal government for a particular agrobond issue and the market level of the federal bond yield on that particular day. Unfortunately, many censored models (such as semiparametric censored models) assume a uniform censoring threshold. Theoretically, I can subtract these varying censoring limits from both sides of the regression equation and thus arrive to the uniform (zero) censoring limit. However, because the yield ceilings gradually approach the clearing levels, they are likely to be correlated with the same variables that determine the market risk premia (i.e., indebtedness and revenue autonomy). Thus, if the censoring limits were explicitly accounted for on the RHS of our equation, I would run into the multi-colinearity problem.

Therefore, our primary technique is Tobit with multiplicative heteroskedasticity, which allows for varying censoring limits.

3.6. Estimation Results

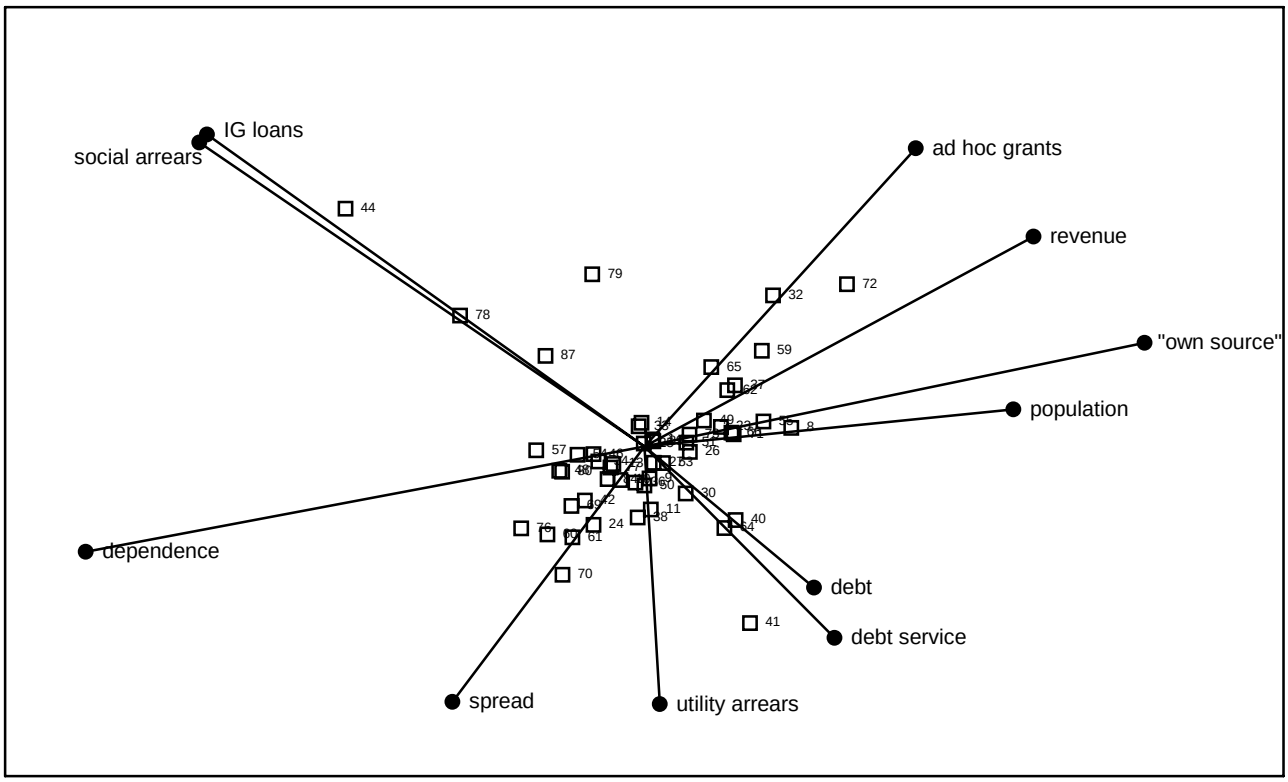
Because I do not have many observations, I have to be parsimonious about the number of regressors included. Many of our variables are correlated between each other, which results in insignificant coefficient estimates when these variables are jointly included in the regression. Figure 3.3 shows the statistical relations among our variables in the form of a principal component biplot chart.[58] The biplot display is a commonly used multivariate method for graphing row and column elements (in this case, regions and variables correspondingly) using a single display (Gabriel, 1971). The rays originating from the center of the graph are linear projections of my variables onto the two-dimensional space defined by the two principal components — two largest eigenvalues of my dataset. Thus, most variability in the original multidimensional dataset occurs in the chosen two-dimensional space. Variable rays representing uncorrelated variables are orthogonal. The smaller the inner angle between rays, the higher is the positive correlation between the values of the corresponding variables. For negatively correlated variables, the inner angle is greater than 90^{o}. Longer rays represent variables with larger standard deviations.

The goodness of fit of our two-dimensional projection, defined as the fraction of the sum of squares of singular values accounted for by the two largest singular values, is 0.476. Using the above stated rule of thumb for interpreting a biplot chart, I can conclude

[58] The biplot display is drawn using Excel macros from Lipkovich and Smith (2002).

that the share of "own-source" revenue, per capita revenue relative to the subsistence level, the share of ad hoc grants, and population size are positively correlated. In addition, transfer dependence of regions is almost perfectly correlated to the share of "own-source" revenue with a negative sign. Therefore, while including in the regression equation only those of related variables whose coefficient estimates have the highest statistical significance, we should remember that these estimates also capture the effect of other related variables.

Figure 3.3. Principal Component Biplot



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level, the share of ad hoc grants, and population size are positively correlated. In addition, transfer dependence of regions is almost perfectly correlated to the share of "own-source" revenue with a negative sign. Therefore, while including in the regression equation only those of related variables whose coefficient estimates have the highest statistical significance, we should remember that these estimates also capture the effect of other related variables.

Thus, the share of "own-source" revenue is not included in the final regression because of being statistically insignificant when included jointly with per capita revenues. Similarly, none of the different types of implicit liabilities are included in the presented regressions as they were not statistically significant in any of the employed specifications. Out of various control variables suggested in earlier studies (per capita revenue, unemployment, volume of the bond issue), my final regressions include only the per capita amount of pre-transfer revenues adjusted for the regional subsistence level.

The biplot chart also suggests that the yield spread has only little positive correlation with the stock of commercial debt and the burden of debt service. Also, the yield spread has only little negative correlation with intergovernmental loans and social arrears. Thus unless the statistical relations change in a multivariate setup, I can expect some of our proposed regressors to have little explanatory power for the yield spread. Later in this section II will use the biplot chart again to analyze clustering of observations.

The second column of Table 3.3 reports estimation of Equation (3.4) by means of OLS with White's standard errors. The impact of the commercial debt stock — measured relative to the annual recurrent revenue — is not statistically significant. Interest expenditures relative to the annual recurrent revenue are positively related to the yield

spread and this relation is statistically significant at the 10% level. Bailout signals —the share of the discretionary grants in the total grants received and the region's share in the national population— have no statistical impact on the yield spread. Adjusted per capita revenue has a negative coefficient, which is statistically significant at the 10% level.

Table 3.3. Estimation Results, Dependent Variable: Yield Spread (% points)

	OLS (robust errors)	Multiplicative Heteroskedastic Regression	Tobit	Heteroskedastic Tobit
Constant	11.72***	12.29***	14.31***	14.51***
	(10.06)	(0.85)	(1.40)	(1.53)
Commercial debt	-0.65	-1.07***	-0.68	-1.31*
	(0.48)	(0.34)	(0.85)	(0.71)
Interest expenditures	21.66*	50.6***	18.78	51.20
	(13.02)	(9.15)	(27.49)	(32.28)
Soft grants	-0.83	2.59***	-0.07	3.95*
	(1.50)	(0.89)	(2.82)	(2.34)
Population share	-49.73	-89.2***	-122.65*	-153.8**
	(46.61)	(28.5)	(76.16)	(65.35)
Real revenue	-5.74*	-12.46***	-10.34**	-16.88***
	(4.40)	(2.18)	(4.98)	(5.97)
R^2	0.14			
Heteroskedasticity term	—	-272.14***	—	-200.65***
		(42.18)		(41.12)
σ		0.047***	0.037***	0.092***
		(0.007)	(0.005)	(0.030)
# of observations	52	52	52	52
Out of which are censored	19	19	19	19

Notes: * statistically significant at the 10% level;
** statistically significant at the 5% level;
*** statistically significant at the 1% level.

The fourth column of Table 3.3 reports the results of estimating Equation (3.4) using the homoskedastic Tobit model. This estimation produces 10%-significant

coefficients only for population size and per capita revenue.[59] Both coefficients are negative, which is in accord with our predictions. The results of the heteroskedastic Tobit estimation are reported in the last column of Table 3.3. In addition to the negative coefficients for the population size and per capita revenue, the heteroskedastic Tobit also produces 10%-significant coefficients for the commercial debt and discretionary grants. However, the signs of these coefficients — negative and positive correspondingly— are counter to my predictions.

For the purpose of comparability, I also re-estimated the linear regression under the assumption of multiplicative heteroskedasticity $\sigma^2_i = \sigma^2 exp(2\gamma z_i)$ and presented the results in the third column of Table 3.3. The results are roughly consistent with those from the heteroskedastic Tobit except that the positive coefficient of the interest expenditures becomes statistically significant at the 1% level. Note that in accordance with common wisdom, the Tobit model produces larger estimates in absolute value than the linear regression.

Overall, the econometric results do not provide a clear-cut answer regarding the causalities between the indebtedness and interest costs. The negative coefficient on the commercial debt can be due to the reverse causality from lower interest rates to larger borrowing. In the censored data models it is technically difficult to address this endogeneity bias. It should be also noted that our independent variables explain only 14 percent of the variation in the yield spread. Some of the unexplained variation can be attributed to censoring. However, I cannot rule out lack of liquidity and non-observable information on the regions' creditworthiness, including the general quality of fiscal

[59] I am interested in the true market yield spread, which is the latent variable in the Tobit model. Thus, the marginal effects of my interest are the estimated Tobit coefficients.

management and acceptance of the agrobond liability. Also, recall that some of the principal variables are constructed indirectly and thus might suffer from measurement error. Moreover, I was able to construct these variables retrospectively using more recent data. It is quite possible that at that time creditors did not possess sufficient information on those variables.

There is however more clarity regarding the bailout signals, which is the focus of this study. According to my results, creditors do not see ad hoc grants as a reason to discount risk of possible default. Instead, creditors seem to favor large and affluent regions. This general pattern can be also seen from the biplot chart (Figure 3.3). The individual points in the chart are linear projections of my observations labeled with corresponding region codes. Because the variables are standardized by subtracting the mean and dividing by the standard deviation, data points located in the center of the graph represent regions with average values of the variables. Data points located away from the center in the direction of some variable ray represent regions with values of that variable that are distinct from the average. I can identify two clusters of observations. The first, larger cluster represents regions with higher dependence on federal transfers, larger amounts of overdue utility bills and larger yield spreads on agrobonds. The second, smaller cluster gathers regions with a larger share of own-source revenue, larger per capita revenue relative to the subsistence level, and also a larger share of discretionary grants in total federal transfers. These latter regions also appear to have larger population.

The biplot chart also supports my conjecture that the weak econometric results can be due to the noise in some of my variables. Indeed, after all the secondary variation is filtered by means of the principal component analysis, we see that the most

troublesome region (Republic of Tyva, code 70) protrudes the furthest from the average along the yield spread ray on the biplot graph.

In summary, I seem to detect that larger and wealthier regions receive more grants in the ad hoc form and undertake more borrowing at smaller interest rates and as a result incur more interest expenditures relative to their recurrent revenue. Moreover, after I control for the size and revenue capacity, I detect a positive impact of interest expenditures and ad hoc grants on the yield spread. This pattern is compatible with some of our predictions but runs counter to others. The results call for further testing when better data become available.

3.7. Conclusions

This study presents the first test of performance of the market-based fiscal discipline under the institutions of a transitional economy. Although some caution should be taken due to the limitations of the available data, certain conclusions can be drawn from the results.

The impact of intergovernmental factors on the formation of risk premia by the credit markets seems to go beyond the prospects of a bailout. In fact, a greater revenue sufficiency of regional governments appears to lower their costs of borrowing. This is consistent with other studies finding a positive relation of transfer dependence (Capeci, 1994) and negative relation of revenue base (Capeci, 1994) and also primary surplus (Caselli et al, 2001) to the borrowing costs. This is despite the fact that debt is measured relative to the revenue base and thus the latter should not matter for risk assessment. Thus, it appears that creditors favor wealthier jurisdictions notwithstanding their debt burden.

One can argue that larger revenue autonomy is interpreted by the lenders as the ability of the borrower to undertake a revenue-raising effort and generate fiscal surplus sufficient for the repayment of the debt. Thus, although relatively large revenue autonomy makes a federal bailout less likely for such a region, the lenders might still favor this borrower because he is less likely to become insolvent in the first place. While the negative relation between a region's size and its borrowing costs detected in this study can be indicative of the bailout prospect ("too big to fail"), it can also be explained with the fact that larger regions tend to be wealthier and thus have better ability to pay. Overall, I can conclude that even if the intergovernmental factors had some effect on the formation of risk premia, it was too weak to override the low creditworthiness of poorer regions.

The uncovered statistical relations also provide some support to the hypothesis that local governments have no need to borrow if all their shocks are smoothed by the central government transfers. Indeed, I found that commercial debt has almost perfect negative correlation with intergovernmental loans. Moreover, I uncover the strategy that allows regional governments to obtain intergovernmental loans. I see that intergovernmental loans are closely correlated with arrears on wages and social payments such as stipends.

Appendix 3.A

One-year Agrobond Auctions

Code	Region	# days offered	# days purchased	Fraction sold	Min ceiling (%)	Max ceiling (%)	Average spread (%)	std. dev. (%)
61	Altai Krai	24	0	0.00	4.76	17.99	n/a	n/a
76	Ust-Orda Buriat AO	20	0	0.00	6.91	15.27	n/a	n/a
13	Ivanovo Oblast	18	0	0.00	7.40	13.08	n/a	n/a
24	Republic of Mari El	20	0	0.00	6.67	12.96	n/a	n/a
57	Komi-Perm AO	18	0	0.00	6.99	12.46	n/a	n/a
70	Republic of Tyva	16	0	0.00	7.32	12.46	n/a	n/a
60	Republic of Altai	2	0	0.00	12.10	12.34	n/a	n/a
73	Tajmyr AO	18	0	0.00	6.90	12.34	n/a	n/a
48	Republic of North Osetia	16	0	0.00	6.57	11.39	n/a	n/a
46	Kabarda-Balkar Republic	12	0	0.00	7.45	10.72	n/a	n/a
42	Republic of Adygeya	12	0	0.00	7.29	10.51	n/a	n/a
44	Ingush Republic	12	0	0.00	7.04	10.19	n/a	n/a
54	Kurgan Oblast	12	0	0.00	7.04	10.19	n/a	n/a
10	Pskov Oblast	12	0	0.00	6.88	9.98	n/a	n/a
69	Republic of Buriatia	8	0	0.00	7.99	9.27	n/a	n/a
25	Republic of Mordovia	8	0	0.00	7.56	8.78	n/a	n/a
71	Republic of Khakasia	14	4	1.00	9.38	16.02	14.55	0.00
38	Penza Oblast	24	1	0.05	5.27	14.97	13.03	0.00
53	Udmurt Republic	16	3	0.75	6.59	14.08	12.77	0.71
11	Bryansk Oblast	14	2	0.08	7.23	12.34	11.70	0.55
41	Ulianovsk Oblast	16	2	0.97	6.83	11.61	11.48	0.04
77	Chita Oblast	27	7	1.00	7.22	20.60	11.27	0.00
64	Omsk Oblast	12	5	1.00	8.49	12.72	10.91	0.97
84	Amur Oblast	16	3	0.37	6.82	11.74	10.71	0.00
50	Stavropol Krai	18	2	0.53	6.82	12.22	10.57	0.24
87	Magadan Oblast	14	1	0.12	7.40	12.10	10.51	0.00
30	Voronezh Oblast	12	1	0.96	6.75	10.31	10.24	0.00
40	Saratov Oblast	12	3	1.00	6.75	10.31	10.08	0.59
9	Novgorod Oblast	12	2	0.90	7.23	11.29	9.94	0.66
26	Chuvash Republic	14	3	0.95	6.82	11.34	9.51	1.09
79	Republic of Sakha	12	2	0.88	6.59	10.25	9.17	0.00
59	Chelyabinsk Oblast	8	1	1.00	6.99	9.06	9.06	0.00
51	Rostov Oblast	2	1	1.00	9.09	9.29	8.93	0.00
27	Kirov Oblast	14	1	0.42	6.39	10.72	8.35	0.00
23	Yaroslavl Oblast	6	1	0.96	6.82	8.50	8.16	0.00
36	Astrakhan Oblast	6	2	1.00	5.35	8.26	7.87	0.30
32	Lipetsk Oblast	8	4	1.00	5.20	8.41	7.72	0.52
49	Krasnodar Krai	4	1	1.00	6.91	7.74	7.57	0.00
89	Kaliningrad Oblast	4	2	1.00	6.67	7.65	7.52	0.00
1	Republic of Karelia	4	1	1.00	5.50	7.47	7.46	0.00
62	Kemerovo Oblast	4	1	0.59	7.08	7.33	7.08	0.00
72	Krasnoyarsk Krai	2	1	1.00	7.00	7.05	7.00	0.00
66	Tumen Oblast	2	1	1.00	6.82	6.98	6.82	0.00
14	Kaluga Oblast	2	1	1.00	6.68	6.73	6.68	0.00

One-year Agrobond Auctions (continued).

Code	Region	# days offered	# days purchased	Fraction sold	Min ceiling (%)	Max ceiling (%)	Average spread (%)	std. dev. (%)
8	Leningrad Oblast	2	1	1.00	6.56	6.80	6.56	0.00
37	Volgograd Oblast	6	3	0.50	4.62	7.39	6.52	1.24
80	Jewish AO	25	3	0.72	5.77	17.57	5.70	0.00
65	Tomsk Oblast	1	1	0.90	7.02	7.02	5.66	0.00
78	Aginsk-Buriat AO	1	1	0.88	5.47	5.47	5.44	0.00
34	Republic of Kalmykia	1	1	0.89	5.80	5.80	5.35	0.00
55	Orenburg Oblast	1	1	0.89	5.97	5.97	5.07	0.00
33	Tambov Oblast	1	1	0.89	5.88	5.88	5.05	0.00

Appendix 3.B Descriptive Statistics

Region	Yield spread (ceiling)	IG debt stock	Debt service	Commercial debt stock	Overdue wages and payroll charges	Overdue social payments	Overdue utilities bills	Population share	Own-source revenue	Transfer dependence	Soft grants
Unsold Agrobonds											
Altai Krai	17.99%	59.20%	1.68%	37.44%	31.38%	5.93%	7.46%	1.83%	0.32%	80.91%	16.34%
Ust-Orda Buriat AO	15.27%	52.04%	0.00%	34.77%	20.16%	12.71%	4.32%	0.10%	2.31%	95.30%	0.00%
Penza Oblast	14.97%	38.99%	0.10%	82.76%	9.44%	4.30%	12.61%	1.06%	23.23%	48.19%	7.97%
Ivanovo Oblast	13.08%	25.43%	0.00%	48.19%	4.69%	1.17%	3.98%	0.86%	10.98%	77.06%	40.49%
Republic of Mari El	12.96%	12.08%	1.11%	30.44%	11.76%	7.15%	8.95%	0.52%	8.29%	73.29%	8.91%
Komi-Perm AO	12.46%	157.93%	0.00%	52.44%	70.06%	20.94%	20.33%	0.11%	11.26%	81.27%	40.32%
Republic of Tyva	12.46%	78.40%	5.91%	186.56%	44.23%	16.20%	17.26%	0.21%	1.89%	95.48%	25.49%
Bryansk Oblast	12.34%	12.47%	0.01%	20.82%	15.21%	17.61%	24.10%	1.00%	24.66%	53.49%	29.80%
Republic of Altai	12.34%	32.43%	0.00%	155.96%	27.08%	15.10%	7.82%	0.14%	1.12%	97.00%	18.40%
Tajmyr AO	12.34%	74.74%	0.00%	10.09%	4.38%	3.68%	27.61%	0.03%	31.68%	29.81%	26.69%
Magadan Oblast	12.10%	232.29%	0.00%	0.00%	12.32%	3.01%	10.02%	0.17%	6.32%	75.09%	12.54%
Republic of North Osetia	11.39%	130.60%	0.00%	180.53%	30.80%	2.00%	15.87%	0.45%	3.87%	89.50%	34.98%
Kabarda-Balkar Republic	10.72%	47.74%	0.13%	82.06%	3.97%	0.30%	6.03%	0.54%	5.79%	85.42%	44.75%
Republic of Adygeya	10.51%	22.28%	1.00%	6.20%	17.11%	6.94%	6.73%	0.31%	11.28%	78.62%	3.23%
Ingush Republic	10.19%	585.16%	0.00%	0.00%	26.38%	18.86%	4.55%	0.21%	0.97%	95.01%	24.26%
Kurgan Oblast	10.19%	164.84%	1.52%	36.24%	34.14%	4.92%	18.46%	0.75%	25.84%	69.95%	6.96%
Pskov Oblast	9.98%	12.46%	0.00%	165.31%	18.99%	9.88%	9.31%	0.56%	7.22%	80.00%	51.66%
Republic of Buriatia	9.27%	77.99%	1.87%	97.43%	47.37%	5.38%	11.20%	0.72%	2.81%	77.33%	5.28%
Republic of Mordovia	8.78%	28.73%	1.49%	63.41%	11.18%	5.63%	5.83%	0.65%	10.98%	67.14%	29.09%
(partially) Sold Agrobonds											
Mean	8.39%	42.41%	1.53%	72.68%	15.01%	5.77%	9.87%	1.19%	23%	49%	33.37%
Median	7.87%	25.31%	0.29%	49.63%	10.45%	4.87%	7.53%	0.93%	22%	52%	25.40%
CV	0.28	1.58	1.62	1.04	0.78	0.77	0.83	0.67	0.58	0.45	0.77
Max	14.55%	301.84%	9.30%	299.53%	50.44%	20.75%	49.60%	3.46%	62%	96%	100.00%
Min	5.05%	3.35%	0.00%	0.00%	0.00%	0.27%	3.22%	0.05%	1%	-8%	6.26%

Appendix 3.C: Externalities and Intergovernmental Transfers

In this appendix I employ the theoretical framework of Wildasin (1997) in order to show that transfer dependence of regions may reflect the extent of externalities in the provision of local public goods. I seek to derive Pareto-efficiency conditions for the case of decentralized taxing authority and intergovernmental grants set to induce the desirable allocation of resources by local governments. I show that the incidence of transfers is determined by the spillover-generating capabilities of jurisdictions.

Following Wildasin (1997), I assume that N households are distributed across J jurisdictions of size n_j. Each household h has a strictly quasi-concave utility function $u(x_h, z_h, Z, G)$, where $Z = \sum_j n_j \beta_j (\bar{z}_j)$, with $\beta'_j > 0$ and $\beta''_j < 0$. Here, x_h and z_h denote household h's consumption of private and local public goods, Z stands for the total amount of spillovers from local public goods provided in all jurisdictions, and G is the amount of public good provided by the central government. All households in all jurisdictions have identical preferences. Varying β_j reflect the differences in jurisdictions' capabilities to generate spillovers and w_j stand for the endowment with units of the private good varying across jurisdictions but uniform for all households within the same jurisdiction.

To determine the conditions for the Pareto-efficient allocation of resources, we have to maximize the utility of one household while holding constant the utilities of other households. The standard Lagrangian formulation of this maximization problem looks as follows:

$$L = u(\bar{x}_j, \bar{z}_j, Z, G) - \sum_{i \neq j} \lambda_i \left[u(\bar{x}_i, \bar{z}_i, Z, G) - u_i^0 \right] - \lambda \left[\sum_i n_i w_i - \sum_i n_i \bar{x}_i - \sum_i n_i \bar{z}_i - G \right]$$

The first-order conditions are:

$$\sum \frac{u_G(\bar{x}_i, \bar{z}_i, Z, G)}{u_x(\bar{x}_i, \bar{z}_i, Z, G)} = 1, \tag{3.5}$$

$$\frac{u_z(\bar{x}_j, \bar{z}_j, Z, G)}{u_x(\bar{x}_j, \bar{z}_j, Z, G)} + \beta'_j \sum_i \frac{n_i u_Z(\bar{x}_i, \bar{z}_i, Z, G)}{u_x(\bar{x}_i, \bar{z}_i, Z, G)} = 1, \tag{3.6}$$

$$\frac{u_z(\bar{x}_k, \bar{z}_k, Z, G)}{u_x(\bar{x}_k, \bar{z}_k, Z, G)} + \beta'_k \sum_i \frac{n_i u_Z(\bar{x}_i, \bar{z}_i, Z, G)}{u_x(\bar{x}_i, \bar{z}_i, Z, G)} = 1 \text{ for all } k \neq j. \tag{3.7}$$

Equation (3.5) shows that the sum of marginal rates of substitution of *G* for *x* must equal the marginal cost of a unit of *G*, that is one. Equations (3.6) and (3.7) say that the marginal rate of transformation of *x* for *z*, which is one, should be equal to the joint benefit of all households from provision of an additional unit of the local public good in the given jurisdiction. The joint benefit is the private benefit of the locality's households from the local public good plus the marginal externality multiplied by the sum of all households' benefit from a marginal increase in the total level of spillovers. These equations imply that, in the Pareto-optimum, jurisdictions generating larger spillovers should have a lower marginal rate of substitution of z for x. For well-behaved utility functions this would mean that in such jurisdictions the level of the local good provision should be higher. It should be noticed that it in the Pareto-equilibrium the jurisdiction's size or endowment has no bearing for the allocation of private and public goods.

Now let us consider the case when the local jurisdictions are autonomous and the above-derived Pareto-efficient provision of public goods is induced from local governments via grants from the central government. Thus, the central government imposes a lump-sum tax *T* on each household, provides a set of matching grants $\{m_j\}$ and lump-sum grants $\{g_j\}$ to localities, and allocates the rest to the provision of *G*. Then

jurisdictions with higher spillover-generating capabilities will receive larger unit subsidies. Indeed, let t_j be the per-capita level of local taxation in jurisdiction j. Then the level of local public good consumed by each household in jurisdiction j is $\bar{z}_j = \frac{t_j + g_j}{1 - m_j}$.

As was shown in Wildasin(1997), under the expectation of Pareto-efficient provision in other jurisdictions, jurisdiction j's optimal choice of the local public good provision satisfies the following equation:

$$\frac{u_z(\bar{x}_j, \bar{z}_j, Z, G)}{u_x(\bar{x}_j, \bar{z}_j, Z, G)} + \beta'_j \frac{n_j u_Z(\bar{x}_j, \bar{z}_j, Z, G)}{u_x(\bar{x}_j, \bar{z}_j, Z, G)} = 1 - m_j .$$

Thus, decentralized provision of the local public good takes into account only a fraction of the joint benefits from the local public good that is captured by households within that jurisdiction. In order to impose the Pareto-efficient provision of the local public good, the central government should internalize the spillovers on other jurisdictions with a matching rate of

$$m^*_j = \beta'_j \sum_{i \neq j} \frac{n_i u_Z(\bar{x}_i, \bar{z}_i, Z, G)}{u_x(\bar{x}_i, \bar{z}_i, Z, G)} .$$

If the joint benefit from a unit of externalities is the same for any subset of J-1 jurisdictions, then jurisdictions with a larger marginal externality β' should have a higher rate of subsidization. At the same time, the amount of lump-sum grant $g^*_j = max\{0, (1-m^*_j)z^*_j + x^*_j + T^* - w_j\}$ reflects both the optimal level of the local good provision and the local endowment.

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