Federal tax arrears in Russia

Liquidity problems, federal redistribution or regional resistance?*

Maria Ponomareva* and Ekaterina Zhuravskaya**
*Northwestern University, USA.
**Institute for Advanced Study, Princeton, Center for Economic and Financial Research, Moscow, and CEPR. Email: zhuravsk@ias.edu

Abstract

Three hypotheses about the nature of federal tax arrears in Russia in the second half of the 1990s are tested empirically. Tax arrears can be a result of: 1) liquidity problems in firms, 2) redistributive subsidies of the federal government, or 3) regional political resistance to federal tax collectors. Liquidity problems in firms explain a large part of the variation in tax arrears. Regional political resistance to federal tax collectors was also an important factor: For a given level of liquidity, federal arrears accumulated faster in regions where governors had a larger popular base, in regions with a better bargaining position *vis-à-vis* the centre, and in regions with governors in political opposition to the centre. We find that patterns of federal arrears are inconsistent with the redistributive politics premise that redistribution favours jurisdictions with 'closer races' for the incumbent in the national elections. Variation in authorized tax deferrals can be explained in part by federal redistributive politics.

JEL classifications: H11, H26, R5, P26.
Keywords: Tax arrears, regional protection, Russia, transition, redistributive politics.

---

1. Introduction

During the 1990s, tax arrears played a significant role as indirect subsidies to firms in Russia and were one of the major contributors to a substantial reduction in the size of government. Between 1993 and 1998 accumulated tax arrears to Russia's consolidated budget grew from 1.8 to 9.6 percent of annual GDP and tax revenues to the consolidated budget fell from 25.5 to 20.7 percent of annual GDP.[1] Figure 1 shows that the stock of tax arrears to the consolidated budget went up steadily from the beginning of 1995 until March 1998, reaching the level of about 35 percent of quarterly GDP and then fell. Arrears to the federal budget accumulated almost at the same pace as the total stock of arrears up to March 1998 and stabilized after that. In March 1998, federal tax arrears accounted for two-thirds of the total tax arrears. Calculations support the impression (from Figure 1) that federal tax arrears initially grew faster and then declined slower than regional arrears during the 1990s: on average, 60 percent of the increases but only 40 percent of the decreases in arrears were related to the federal budget share of the consolidated budget (the difference between the two figures being statistically significant). This paper aims at studying the nature of this phenomenon.

There have been several empirical studies of the determinants of tax arrears in Russia. Using survey data on Russian enterprises, Alfandari and Schaffer (1996) found that in the early 1990s financially distressed firms had considerably higher tax arrears than financially solvent firms. Schaffer (1996) agued that arrears propagate: an increase in the inter-enterprise arrears led to a significant increase in tax arrears and wage arrears. These papers show that liquidity problems were important in determining tax arrears in the first half of the 1990s. In a later study, Schaffer (1998) confirmed that the tax authorities did not force penalties on loss-making firms for not paying taxes and conjectured that tax arrears arise as the result of firms' lobbying.
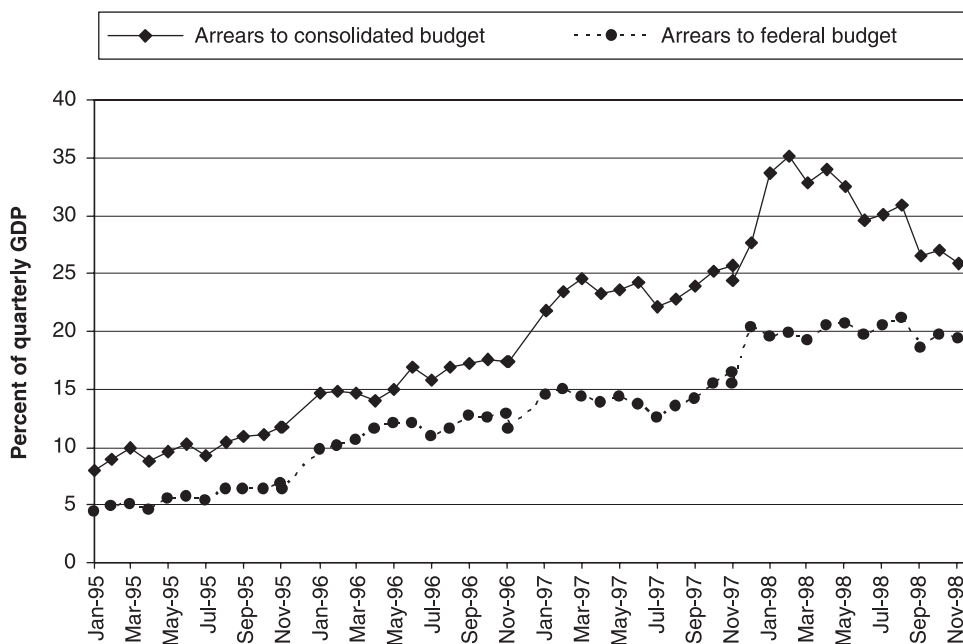
An explanation for why the federal government was less successful in tax collection than regional governments was suggested by several studies (Shleifer and Treisman, 2000; Treisman, 2000; Cai and Treisman, 2004; Lambert-Mogiliansky *et al.*, 2003; Sonin, 2003). These works argue that politically strong governors protected firms in their regions from the federal tax collectors through the capture of local branches of federal courts and tax collection agencies.[2]

Studies of intergovernmental fiscal relations in Russia point out that the 1990s were characterized by an enormous shift towards a higher degree of *de facto* decentralization with the gradual but dramatic loss of federal control over regional policies and finances. This *de facto* decentralization was not accompanied

---

[1] Data source is Treisman (2000).
[2] Black *et al.* (2000), OECD (2000), and Lavrov *et al.* (2001) provide evidence of regional political influence on regional branches of federal agencies, including the tax ministry.

**Figure 1. Growth in federal tax arrears accounts for most of the growth
in total arrears**

by appropriate changes to the *de jure* central command over subnational budgets.[3]
Shleifer and Treisman (2000) were the first to associate the strengthening of regional
political and fiscal powers *vis-à-vis* the federal centre with shortfalls in federal tax
revenues and the growth of fiscal imbalances in the second half of the 1990s.
Motivated by the ideas of Shleifer and Treisman's book, Cai and Treisman (2004)
developed a Tiebout-like formal model of inter-regional competition to attract
capital by providing protection from federal tax collectors. The model shows that
the accumulation of federal tax arrears can be explained by the regional protection-
ist policies of politically strong governors. Sonin (2003) produced another testable
hypothesis about the determinants of regional protection from paying federal
taxes. He built a model of interactions between a regional governor and a benevolent
federal tax enforcer to show that the industrial structure of regional economies and
the ability of governors to extract rents from regional enterprises are important
determinants of the extent of regional protection.

---

[3] For the best available surveys of development of Russia's federalism see OECD (2000) and Lavrov *et al*.
(2001). Treisman (2000) provides aggregate data on dynamics of consolidated revenues and tax arrears.

Using regional level data on tax debt, Treisman (2000) attempted to test the hypothesis about the regional protection explanation of tax arrears. He found some, albeit very weak, evidence in support of the conjecture that tax arrears were the result of political and fiscal interactions between the regional and federal authorities. In particular, the presence of very large enterprises in the region significantly increased regional tax debt and so did the existence of a newly elected communist governor (other political variables turned out to be insignificant). The absence of firm-level data precluded Treisman from drawing definite conclusions about the nature of arrears because it was not possible to control for the financial performance of firms. This is particularly important because the previous literature identified financial distress as a primary source of federal arrears (Alfandari and Schaffer, 1996 and Schaffer, 1996).

Federal tax arrears and bailouts of non-paying firms in the form of authorized tax deferrals may also arise because federal governments, which can enforce tax collection, have incentives not to do so.[4] In particular, we look at whether the Russian federal government used tax arrears and deferrals to redistribute income towards those regions where it faces tougher electoral competition in national elections – (as argued by Lindbeck and Weibull (1987) and Dixit and Londregan (1995 and 1998)) – and whether there is any evidence of a purer form of income redistribution produced by enforcing taxes more strictly in richer than in poorer regions.

Treisman's empirical study (2000) is the one most closely related to this paper: essentially this paper revisits the same hypothesis. The advantage of our approach rests on the availability of micro-level data. Firm-level data allow us to differentiate empirically between the alternative hypotheses at the regional and firm level – regional resistance to paying federal taxes, implicit redistributive federal subsidies to firms and the lack of liquidity (financial distress) of firms. In particular, we test the empirical relevance of the regional protection story after controlling for liquidity at the firm level.

We find that both lack of liquidity in firms and governors' political resistance to federal tax collection were important in determining federal arrears. Liquidity problems in firms explain a large part of the variation in the flow and stock of tax arrears. In addition, for a given level of liquidity, federal arrears accumulated faster and authorized tax deferrals were more frequent in regions where governors had a larger popular base, in regions that had better bargaining position *vis-à-vis* the centre, and in regions where the governor was in political opposition to the centre. Contrary to the premise of the redistributive politics paradigm, there is no

---

[4] Tax deferral is an official permission given to a particular firm by tax authorities to postpone payment of a certain amount of taxes due. A sequence of mass authorized tax deferrals took place in 1994, 1996 and 1997. Ivanova and Wyplosz (1999) used time-series data to show that official deferrals in tax payments caused tax arrears to go up. They also provided evidence of strategic behaviour of enterprises in accumulation of tax arrears: enterprises correctly predicted that the policy of granting deferrals was persistent over time and accumulated tax arrears in expectation of future deferrals.

evidence that regions where the incumbent had a 'close race' in the presidential elections had higher levels of arrears. These results explain why federal tax arrears accumulated faster than regional arrears. In contrast, authorized tax deferrals granted by the federal government exhibit a pattern that is consistent with the story of federal government buying off 'swing' voters: in regions where the vote for the incumbent president and the opposition candidate were closer, deferrals were more frequent. However, some federal deferrals were granted because regional governors successfully bargained for them on behalf of regional companies.

The paper is organized as follows. Section 2 presents testable hypotheses related to alternative theories of the nature of federal tax arrears. Section 3 describes the data and empirical methodology. Section 4 presents results. The conclusions follow in Section 5.

2. The nature of tax arrears: Testable hypotheses

2.1 Lack of liquidity

Many Russian enterprises, profitable according to their books, did not have liquidity to finance their profit tax obligations because they were involved in barter chains (Guriev and Ickes, 2000) and experienced inter-enterprise arrears (OECD, 2000). In addition, genuinely loss-making enterprises accumulated tax obligations that they were unable to meet: a large part of federal tax liabilities was independent of enterprise performance characteristics, e.g., payroll and revenue taxes. Thus, the literature has cited liquidity problems in firms as the most natural cause of tax arrears in the 1990s (see, for instance, Schaffer, 1996). Henceforth, we denote this explanation the *lack of liquidity* (LL) hypothesis.

Liquidity problems alone may explain the difference in dynamic patterns of federal and regional arrears that this paper aims to explain because regional and local governments often accepted in-kind contributions towards subnational taxes (i.e., public work by the firm's employees, paving roads, provision of housing, sports and cultural facilities to the local population) whereas the federal government required cash payments (Litwack, 2002).

We measure the extent of firms' liquidity problems by the absolute, 'quick', and current liquidity ratios as well as the relative size of overdue receivables (details are given below in the methodology section). If liquidity constraints are binding, we expect a negative correlation between liquidity measures and federal tax arrears. Since our liquidity measures are based on the accounting statements of firms, the fact that the measures indicate low liquidity may just reflect the endogenous outcomes of firms' tax evasion because managers can use improper accounting to hide revenues from tax collectors. With the available data it is impossible to differentiate between real and fraudulent liquidity problems. Thus, we may overstate the importance of lack of liquidity as a cause of tax arrears.

2.2 Regional resistance

Arrears do not only arise because firms do not have the liquidity to pay the taxes due. It is possible that while firms are able to pay taxes and the federal government wants to enforce tax collection, arrears accumulate because the federal government lacks instruments for enforcement. Shleifer and Treisman (2000) suggested that this was the reason for the fall in federal revenues and the rise in federal tax arrears between 1995 and 1998. Federal tax collection efforts were impaired because the agents who carry out tax collection and enforcement in the regions (formally federal employees) as well as the regional judiciary (formally independent) were often under the control of regional governments. Lavrov *et al.* wrote 'federal organs operating in the regions typically have close relations with the regional administration, depending on the latter for a number of reasons, sometimes even for the provision of office space. Federal organs in the regions are typically staffed by local officials with a background in regional administration. Until recently, the regional governor had informal veto power over the selection of some federal representatives, most notably the head of the tax ministry' (2001, p. 14). Tax and treasury officials from the regional branches of these federal agencies usually looked to a position in the regional administration as the best possible continuation of their careers.

There are several reasons why regional governments may want to provide protection to firms in their regions from federal taxes. They may want to attract profitable firms to their regions in order to reduce regional employment or for purely fiscal reasons. Moreover, regional governments may facilitate their own tax collections by withholding federal taxes because the federal and regional tax bases overlap. Other causes of regional resistance to paying federal taxes are corruption and capture of the regional government by politically powerful industrial elites in the regions. It may be cheaper and more feasible for firms to bribe the regional authorities than to bribe the federal government. The same can be true if special relationships of business to government are not based on other methods of political influence rather than bribes.

The OECD Economic Survey on Russia (2000) reported that threats by regional governments to withhold the federal share of tax revenues in the region as well as issuance of official instructions to regional branches of tax collection agencies on how to do it were quite common. For example, Tatarstan, Bashkorkostan, Sakha-Yakutia, and Chechnia regions showed that direct withholdings of federal taxes were possible. The report states, however, that many of the threats were not implemented and it is not clear whether they were credible. Lambert-Mogiliansky *et al.* (2003) showed that the bankruptcy law of 1998 was frequently used by many regional governors to justify large regional enterprises not paying federal taxes.

We refer to the explanation that the shortfall in federal tax collection was caused by opportunistic behaviour by federal agents in the regions as the *regional resistance* (RR) hypothesis. This hypothesis generates several predictions. First, one can look at whether regional governors were in political opposition to the federal

centre. Governors that were loyal to Yeltsin and relied on the federal government's political support during elections were less likely to engage in regional resistance to paying federal taxes because this was likely to spoil their relationship with the president. Second, more popular governors were likely to find it easier to control federal tax agents based in their regions because of these agents' career concerns. Since governors with a broader political base were more likely to win the next elections, they could more credibly promise positions in the regional administration to opportunistic federal agents who might get fired. Third, higher concentration within the regional industrial sector increases the incentives of regional authorities to protect firms because concentration usually indicates close ties between a regional governor and the largest industrial enterprises (Slinko *et al.*, 2003); and higher rents can be extracted from the largest enterprises in regions with higher concentration (Sonin, 2003). Fourth, regions that protect their firms from paying federal taxes may not depend on federal transfers as the main source of financing of public expenditure (instead they may have a relatively high percentage of expenditures covered by their own sources of revenues).[5] Otherwise, the federal government can fight regional resistance by cutting transfers to regions that capture federal tax collectors. And finally, regions that have a history of countermanding federal laws by regional legislation probably have a strong bargaining position *vis-à-vis* the centre and, therefore, are more likely to credibly threaten the centre by withholding its revenues.

We use indirect measures of political relationships between the centre and the regional authorities because we were unable to find variables that directly measure regional characteristics needed to test some of the outlined predictions. The best available proxies for loyalty of the regional governor to the federal centre and countermanding federal legislation by regional legislation were the two independently constructed composite indices that evaluate the relationships of governors and the centre. We discuss the construction and use of all variables in the next section.

2.3 Federal financing

An alternative explanation for the accumulation of federal tax arrears is that the federal government did not (as the RR hypothesis suggests) have problems enforcing tax collection but that it simply did not want to enforce tax payments by certain enterprises. Governments may have incentives not to enforce tax collection because tolerating tax arrears can serve as an effective way of subsidizing firms. In particular, permitting tax arrears may be politically more feasible than giving direct subsidies when governments are cash constrained or when the law prohibits direct subsidies. In this case, politicians may choose to tolerate, delay, or write off tax

---

[5] Treisman (1998) studied the determinants of the distribution of federal transfers across regions.

arrears instead of liquidating non-paying firms or forcing them to pay. The reasons for subsidizing firms have been extensively studied in the literature.[6] Politicians at all levels of government may have incentives to subsidize firms in order to secure inefficiently high employment (Shleifer and Vishny, 1994; and Kornai, 1980) and bribes (Shleifer and Vishny, 1993); or because they cannot commit not to do it if subsidies are *ex post* efficient even when they are associated with large *ex ante* inefficiencies (Maskin and Xu, 2001). The motive for *ex post* subsidization can be both political (when governments fear the political costs of liquidation of large firms) and financial (when governments can get taxes after they have re-financed failing firms).

If, independently of each other, federal and regional governments had the same incentive to subsidize large firms by means of tax arrears, either there would be no difference between federal and regional tax collection or regional tax enforcement would be smaller. This is because some large regional enterprises are very important politically at the regional level but small and unimportant from the point of view of the federal government.

We, however, aim to explain the opposite pattern of divergence between federal and regional arrears. Federal governments may have a stronger desire than regional governments to subsidize firms because it may have strong incentives for redistribution. In the absence of a better mechanism of redistribution, tax arrears may be used. A pure form of income redistribution implies that the federal government would enforce tax collection more strictly in richer than in poorer regions. The redistributive politics paradigm (Lindbeck and Weibull, 1987 and Dixit and Londregan, 1995 and 1998) argues that the federal government would redistribute towards regions where it faces tougher electoral competition in national elections and many voters are undecided between incumbent or opposition candidates. Thus, if we compare similar firms in different regions, we should observe higher federal tax arrears in firms located in regions with smaller gross regional product (GRP) per capita and/or regions that had closer races in presidential elections. We call this explanation the *federal financing* (FF) hypothesis.[7]

Data on distribution of authorized tax deferrals across firms allow us to test the hypotheses further. If tax arrears are a result of a deliberate federal redistribution policy, official deferrals should be more frequent in economically weaker regions and regions with closer races in national elections. If tax arrears are a result of regional governors' resistance, higher deferrals should be observed in regions where the governor is in open opposition to the federal centre and regions that have stronger bargaining power *vis-à-vis* the centre.

It is worth noting that the hypotheses considered here are not mutually exclusive. It is possible that all three hypotheses are relevant in explaining a part of

---

[6] See Roland (2000) for an excellent survey of this literature.
[7] Note that the redistribution motive for federal arrears is consistent with on average less strict federal (compared to regional) tax enforcement.

federal tax arrears. We can only investigate what is the prevailing nature of federal arrears and deferrals. The question that interests us most is whether regional economic and political factors matter for determining the scope of arrears for a given level of firms' liquidity.

3. Data, variables, and empirical methodology

3.1 Data sources and the sample

The Russian Tax Ministry supplied us with two lists containing firm-level data: one with information on the stock of federal tax arrears on January 1, 1997 and the flow of authorized federal tax deferrals on April 1, 1997; and the other with the same information for 1998. The lists overlap for about five hundred companies. The selection criteria were not carefully specified by tax ministry officials but they claimed that 'the sample in each year is close to a random draw' from the lists of the largest debtors to the federal budget in the 1996 and 1997.

We merged these lists of companies with the Russian Enterprise Registry Longitudinal Data Base (RERLD), which contains statistical data for large and medium-size Russian enterprises.[8] The resulting dataset contains 863 firms in 1997 and 1,374 firms in 1998.[9] In addition, to this dataset we merged several financial indicators from the accounting statements of firms provided by Goskomstat (Russia's Official Statistical Agency) and regional level data for 73 out of 89 regions of the Russian Federation. This reduced our sample further to 776 firms in 1997 and 1,254 firms in 1998. Regional data come from Goskomstat with the exception of two indices that characterize political relationships between the federal government and regional governors. These indices were independently constructed by the Urban Institute and the MFK Renaissance. In addition, for the 476 companies (present in both lists) that accumulated arrears in 1997, we constructed a variable indicating the flow of federal arrears. The resulting sample consists of big industrial firms. Distributions of firms in our sample across industries and regions are presented in Tables A1 and A2 in the Appendix. Table A3 provides summary statistics for federal tax arrears and authorized tax deferrals.

3.2 Empirical methodology and description of variables

To test the hypotheses described in the previous section, we ran three series of cross-section firm-level regressions. First, we estimated the following set of regressions for the stock of arrears at the beginning of 1997 and 1998 separately:

---

[8] Detailed information on how the RERLD was constructed is given in Brown and Brown (1999).
[9] Few companies from these lists have arrears or deferrals data missing.

$$Log[Arrears\_stock/output]_i = \alpha_1 Liquidity\_ratio_i + \alpha_2 Log[Overdue\_receivables/output]_i$$
$$+ \alpha_3 Governor\_pol\_power_i + \alpha_4 Reg\_own\_revenue\_share_i + \alpha_5 Fed\_pol\_comp_i$$
$$+ \alpha_6 Log[GRP\_pc]_i + \alpha_7 Reg\_Concentration + \alpha_8 Controls_i + \varepsilon_i \qquad (1)$$

The first thing to note is that, although, the sample consists mostly of very large firms, the variation in size is very high. Thus, it is important to normalize financial variables (e.g., stock and flow of arrears, overdue receivables) by a proxy for enterprise size. We normalize these variables by the value of nominal output. Second, since we aim to analyse tax arrears the most important control variable should be the amount of taxes due. We do not, however, have these data for the whole sample (only a few firms reported the amount of tax obligations in their balance sheets). The closest proxy for the amount of tax obligations available for a sufficient number of firms turned out to be the value of enterprise output.[10] Thus, our normalization controls for the amount of tax due.

Liquidity_ratio stands for the absolute, 'quick', or current liquidity ratio – standard accounting measures of liquidity. We take the absolute liquidity ratio (equal to cash over short term liabilities) as our baseline measure because it has the largest number of observations and unlike the other liquidity ratios does not have trade credits in the numerator. In the special Russian case, trade credits may not be a sign of expected liquidity; instead they may indicate that the enterprise has been forced into a chain of inter-enterprise arrears. Nonetheless, we verify that the baseline results obtained using the absolute liquidity ratio are robust to using other liquidity ratios. *Overdue_receivables/output* is a direct measure of whether an enterprise is a part of an inter-enterprise arrears chain. Unfortunately, data on overdue receivables are scarce, so that the inclusion of this variable in the regression reduced the number of observations by about forty percent. Thus, as a baseline we report regression results without this variable. Again, the baseline results for liquidity as well as other explanatory variables are robust to the inclusion of overdue receivables as an additional regressor.

Fed_pol_comp is a measure of federal political competition. It is important for the FF hypothesis because this measure reflects political motives for federal redistribution. It is equal to the negative of the absolute value of the difference between the votes for the incumbent presidential candidate, Yeltsin, and his opponent, Zuganov, in the second round of the Russian presidential elections of 1996.

Governor_pol_power (standing for governor's political power) is the label for three variables that we include in the regressions in turn: the percentage of votes

---

[10] Initially we tried to predict the federal tax obligations for the firms in our sample, by 1) estimating the equation of determinants of federal tax obligations for a smaller set of firms that reported tax obligations data, and 2) calculating the predicted tax obligations for the whole set of our firms with the fitted values. We, however, found that the value of output is the best predictor of taxes due and, thus, dropped this two-stage procedure.

for the governor in the first tour of the last regional elections and two indices that characterize the nature of relationship between the federal and regional authorities.

The first index measures tensions in relationships between the governor and the federal centre in 1997 (higher value means higher tension in relationships). It was constructed by the former investment group MFK Renaissance. This index summarizes information on the frequency of public statements by the governor personally against president Yeltsin and against Yeltsin's policies, the level of political support of the governor by the centre during the last regional elections (with the negative sign) and the presence (or not) of a bilateral treaty between the region and the centre. As we discussed in the previous section, if the regional governor is in opposition to the federal centre and does not rely on federal political support during regional elections, regional resistance to federal tax collection is more likely.

The second index proxies for the strength of the bargaining power of the region with the federal centre in 1996 (higher values mean a stronger bargaining position for the region). This index was constructed by the Urban Institute in Moscow (http://www.urbaneconomics.ru/eng/index.php). The first component of this index summarizes the information about contradictions of federal laws by regional legislation and regulations. This component should have unambiguous effect on regional resistance because it reflects the lack of federal control in the region. The second component is a measure of regional natural resource endowments. The effect of natural resource endowments is ambiguous, because, on the one hand, natural resources give governors additional bargaining power *vis-à-vis* the centre which would help regional resistance, but on the other hand, companies that export natural resources are very large and likely to bargain directly with the federal government rather than use regional governments for protection. Natural resource exporters have strong incentives to invest in their relationship with the federal government because most of natural resource taxes are collected by federal customs at the border rather than by tax collectors inside the regions.[11] The third component of the index is the evaluation of whether regional population votes against or for federal policies during national elections. On the one hand, it would be politically less costly for the regional governor to obstruct federal tax collection if the population of the region votes against the federal policies (which is in line with the regional resistance story). On the other hand, this component of the index is correlated with the closeness of the race of the incumbent and opposition candidate in the national elections (which is relevant for federal redistributive financing). We control, however, for the closeness of the race at the national elections. Thus, this index also serves as a proxy for regional resistance.[12]

---

[11] Controlling for the natural resource potential or export of natural resources directly in order to eliminate this ambiguity does not change our baseline results. The coefficients of the resource potential variables are insignificant in all regressions.

[12] The baseline results do not change if we control for Yeltsin's political popularity in the regions.

Regional own tax revenues as a share of total regional expenditures, *Reg_own_revenue_share*, proxies for the scale of dependence of regional budgets on federal transfers (important for the RR hypothesis). All proxies for governors' political power and the regional own revenue share are highly correlated (which proves that all of them essentially measure the same thing – bargaining power of the region *vis-à-vis* the centre). Thus, we include these variables in regressions one by one.[13]

Log of GRP per capita is included in all regressions as a proxy for regional income (which might be relevant for income redistribution under the FF hypothesis). Concentration of output among the largest non-state industrial enterprises in the region is included to test Sonin's (2003) prediction (RR hypothesis). To make concentration comparable across regions, it is measured by the Herfindahl-Hirschman measure calculated among the ten largest non-state regional firms.

We use the following control variables: dummy for electricity suppliers, dummy for regional election in the preceding year, log of geographical distance to Moscow from the region where the firm is located, dummy for the military sector, and dummies for 2-digit industries. Military and electricity enterprises have special relationships to the federal government; thus, they may enjoy special treatment by the federal tax authorities.[14] 2-digit industry dummies are included because taxability of firms in different industries differs for technological reasons (Gehlbach, 2003). Distance from the capital of the region to Moscow is an important control because whenever the federal government has limited resources for enforcement of tax collection, it chooses to collect taxes where it is cheaper to do so (i.e., closer to the centre).

Both regional and federal elections can affect the incentives of the federal government for redistribution as well as the incentives of the regional government for protection from federal taxes. In particular, predictions about the regional incentives for capture of federal agents in the regions can be weakened substantially in times of gubernatorial elections because federal political support during election campaigns can be very helpful for incumbent governors. On the other hand, governors that do not count on federal support during regional elections may intensify protection because it brings additional revenue to the region. The federal government's political incentives also change in the face of elections which strengthen the political motive for redistribution. 1996 was the year of presidential elections and elections of regional governors in many of the regions. A few regional elections also took place in 1997. Thus, we separately run regressions for the arrears in the beginning of 1997 and of 1998 to control for federal elections and include dummies for regional election in the previous year to control for regional elections.

---

[13] The results do not change much if we include the share of own revenues in all regressions.

[14] Electricity companies were paid by the federal government (by tolerating tax arrears) for channeling subsidies to politically important firms in the form of low energy prices. Military firms depend on the federal government for orders.

All independent variables in regressions for arrears at the beginning of 1997 are taken in 1996 (with the exception of the index of tensions in relationships between the governor and the federal centre which is only available in 1997); and in regressions for arrears at the beginning of 1998 independent variables are for 1997 or 1996 depending on data availability.[15] Endogeneity is a serious issue in the regressions described above, even though we lag all except one explanatory variable, because the dependent variables are stocks and we do not have information on when these stocks were accumulated. Unfortunately, we do not have appropriate instruments. Therefore, we also run a series of similar cross-section regressions for the flow of arrears accumulated in 1997 normalized by the level of firm's output.

$$Log[Arrears\_flow/output]_i = \alpha_1 Liquidity\_ratio_i + \alpha_2 Log[Overdue\_receivables/output]_i$$
$$+ \alpha_3 Governor\_pol\_power_i + \alpha_4 Reg\_own\_revenue\_share_i + \alpha_5 Fed\_pol\_comp_i$$
$$+ \alpha_6 Log[GRP\_pc]_i + \alpha_7 Reg\_Concentration_i + \alpha_8 Controls_i + \varepsilon_i \qquad (2)$$

We included 476 firms in which the stock of arrears increased during 1997 in this estimation. There are, however, another 120 firms that have observations for the beginning of both 1997 and 1998, but their arrears decreased during 1997. We exclude these observations from the sample for two reasons: 1) as it turns out, the rate of repayment of arrears is unrelated to our variables of interest; and 2) pooling the two subsamples (the one in which arrears rose and the one in which they fell) and allowing only the coefficients of interest to differ is rejected by econometric tests. Evidently, the pattern of federal tax enforcement for companies that pay more to the government than just the flow of new tax obligations follows a different rule than that for companies which accumulate arrears. All explanatory variables are the same as in the previous specification and taken in 1996 (with the exception of the index of tensions in relationships between the governor and the federal centre that is measured for 1997). The regression that contains this index may suffer from an endogeneity problem because the fact that regional firms accumulate federal tax arrears creates tensions in relationships between authorities of two levels. We cannot eliminate this problem because there are no appropriate instruments. Thus, the alternative explanation that results based on this index are driven by reverse causality cannot be ruled out. One can only note that many components of the index (however, not all of them) were measured before 1997 and did not change in 1997. We include a dummy for regional elections in 1997 to control for a possible political budget cycle.[16]

---

[15] The Share of own revenues in total regional expenditures is available only for 1996. Regional output concentration is always taken in 1996 because it is very persistent and does not change over time.

[16] See Alesina, Roubini and Cohen (1997) for a survey of the theoretical and empirical literature on electoral business cycles. For Russian evidence of political cycles consult Treisman and Gimpelson (2001) on federal elections and Akhmedov and Zhuravskaya (2003) on regional elections.

The question that we address next is which enterprises have been granted authorized tax deferrals for a given level of tax arrears. We have data on official federal tax deferrals at the end of the first quarters of 1997 and 1998. Most firms did not receive a deferral, thus, we simultaneously estimate the probability that a firm is granted an authorized tax deferral and the size of the deferral relative to the stock of accumulated federal arrears (given that it is granted). Heckman's estimation procedure was used with the following specifications for selection and size equations, respectively:

$P\{Delays\_flow > 0$ or $Delays\_flow = 0\}_i = F(\alpha_1 Liquidity\_ratio_i$
$+ \alpha_2 Log[Overdue\_receivables/output]_i + \alpha_3 Governor\_pol\_power_i$
$+ \alpha_4 Reg\_own\_revenue\_share_i + \alpha_5 Fed\_pol\_comp_i + \alpha_6 Log[GRP\_pc]_i$
$+ \alpha_7 Reg\_Concentration_i + \alpha_8 Log[Employment]_i + \alpha_9 Controls_i + \varepsilon_i)$

$Log[Delays\_flow/Arrears\_stock]_i = \alpha_1 Liquidity\_ratio_i + \alpha_2 Log[Overdue\_receivables/output]_i + \alpha_3 Governor\_pol\_power_i + \alpha_4 Reg\_own\_revenue\_share_i + \alpha_5 Fed\_pol\_comp_i + \alpha_6 Log[GRP\_pc]_i + \alpha_7 Log[Employment]_i + \alpha_8 Controls_i + \varepsilon_i$ (3)

The list of explanatory variables in these specifications is very similar to the one in the regressions for tax arrears. One important difference is that the list of regressors includes the logarithm of employment to account for the firm size because in this case the natural choice for normalization is the stock of arrears, rather than enterprise size. Employment size, however, may be important for political reasons. Selection equation includes the full set of regressors while the size equation excludes regional output concentration, distance to Moscow, and the electricity dummy because they have no explanatory power. We run regressions separately for deferrals in 1997 and 1998 and use lagged independent variables.

Since many of our regressors in firm-level regressions are the same within each region, in all specifications discussed above we allow error terms to be clustered (correlated) within regions. Summary statistics for the variables used in regressions are in Table A4 in Appendix.

4. Results

Let us start by presenting the results about the determinants of arrears (estimation of Equations (1) and (2)). Table 1 presents the results of the baseline regressions for the stock of arrears. The first result is that independent of the liquidity measure used (absolute, 'quick', or current liquidity ratio, including or not including overdue receivables) we find that firms with liquidity problems have a significantly higher stock of federal tax arrears in both years, which is consistent with earlier findings of Alfandari and Schaffer (1996). A one standard deviation increase in the absolute liquidity ratio led to a decrease in the stock of arrears per ruble of output of 24 percent on 1.1.1997 and 18 percent on 1.1.1998.

Table 1. Stock of federal arrears

	Log arrears per ruble of output, stock (Jan 1, 1997)				Log arrears per ruble of output, stock (Jan 1, 1998)			
Absolute liquidity ratio	−6.072	−6.187	−6.313	−7.396	−6.428	−5.986	−6.071	−6.133
	[1.695]***	[1.626]***	[1.331]***	[1.587]***	[0.841]***	[0.809]***	[0.804]***	[0.819]***
Regional barganing power index	0.147				0.159			
	[0.062]**				[0.051]***			
Tensions in relations of governor with the centre index		0.055				0.092		
		[0.048]				[0.036]**		
Votes for governor in last elections			0.015				0.005	
			[0.004]***				[0.003]*	
Regional own tax revenues as a share of total regional expenditures				0.100				−0.198
				[0.236]				[0.153]
Electoral competition at the federal level	0.004	0.004	−0.002	0.002	−0.003	−0.003	−0.005	−0.006
	[0.005]	[0.006]	[0.005]	[0.005]	[0.003]	[0.003]	[0.003]	[0.003]*
Log gross regional product per capita	0.212	0.196	0.202	0.221	−0.237	−0.299	−0.148	−0.126
	[0.203]	[0.200]	[0.161]	[0.253]	[0.183]	[0.190]	[0.163]	[0.199]
Regional output concentration	0.445	0.603	0.897	0.663	0.112	0.172	0.438	0.522
	[0.526]	[0.564]	[0.486]***	[0.506]	[0.315]	[0.329]	[0.345]	[0.418]
Regional elections dummy	−0.010	−0.039	−0.007	−0.069	0.322	0.386	0.305	0.392
	[0.115]	[0.125]	[0.106]	[0.134]	[0.094]***	[0.103]***	[0.092]***	[0.098]***
Log distance to Moscow	0.031	0.032	0.032	0.041	0.133	0.145	0.132	0.123
	[0.051]	[0.052]	[0.048]	[0.056]	[0.058]**	[0.061]**	[0.062]**	[0.061]**
Electricity	−1.590	−1.660	−1.446	−1.658	−1.056	−1.125	−1.066	−1.128
	[0.194]***	[0.198]***	[0.190]***	[0.199]***	[0.220]***	[0.220]***	[0.214]***	[0.217]***
Military	0.421	0.411	0.400	0.420	0.105	0.090	0.125	0.097
	[0.126]***	[0.126]***	[0.126]***	[0.127]***	[0.104]	[0.104]	[0.110]	[0.107]
Two-digit industry dummies	***	***	***	***	***	***	***	***
Observations	776.000	776.000	771.000	776.000	1164.000	1164.000	1154.000	1164.000
R-squared	0.200	0.200	0.220	0.200	0.200	0.200	0.190	0.190

Notes: Robust standard errors adjusted for clustering at the regional level are in brackets.
* significant at 10%; ** significant at 5%; *** significant at 1%.

Second, controlling for firms' liquidity, the hypothesis about regional resistance to paying federal taxes finds strong support in the data. The coefficients of indices measuring regional bargaining power with the centre and tensions in the relations of the governor with the centre as well as the political popularity of the governor are always positive (independent of specification) and significant except for the coefficient of the index of tensions of regional relations with the centre in the regression for arrears on Jan 1, 1997. A one standard deviation increase in the indices led to an increase in the stock of arrears of approximately 15 percent. A one standard deviation increase in the number of votes cast for the governor in the last elections led to an increase in the stock of arrears of approximately 10 percent. Regional output concentration is consistently positive (as Sonin's model of provincial protectionism predicts) but almost never significant.[17] The share of own revenues in total expenditures also does not have an effect on the stock of arrears.

Third, neither GRP per capita nor the extent of electoral competition at the national level is significant (with the exception of one regression for Jan 1, 1998 where electoral competition is significant with the wrong sign). Thus, the data are not consistent with the theory of federal redistribution.

Table 2 presents results of the baseline regressions for the flow of arrears. Again, all liquidity measures are strongly negatively significantly correlated with the federal arrears that were accumulated during the 1997. A one standard deviation increase in the absolute liquidity ratio led to a decrease in accumulation of arrears per ruble of output of about 25 percent. Indices of the bargaining power with central government and of tensions in relationships of the governor with the centre are positive and strongly significant. So is the governor's popularity. A one standard deviation increases in these variables led to 22, 27, and 18 percent increases in the flow of arrears, respectively. The regional output concentration is consistently positive, but significant only in one out of four regressions of the baseline estimation. The share of own revenues is insignificant. Coefficient of the gross regional product per capita has a negative sign in all specifications, but becomes significant only very infrequently (it is significant in one out of four baseline regressions). The effect of electoral competition at the federal level is zero.

Overall, lack of liquidity in firms did have an important effect on accumulation of federal tax arrears, consistent with the LL hypothesis. Regional political resistance to federal tax collection is also an important determinant of both the stock and the flow of federal arrears. Moreover, political power of the regional governments (measured by the governor's political popularity and the indices of the governor's political relationship with the centre) turns out to be more important than regional

---

[17] In regressions for arrears in Jan 1, 1997, output concentration can be made significant by the exclusion of measures of political bargaining between the centre and the regions. In contrast, in regressions for Jan 1, 1998, the coefficients of the regional concentration are insignificant irrespective of specification.

Table 2. Flow of tax arrears

	Log flow of arrears per ruble of output, 1997			
Absolute liquidity ratio	−6.526 [1.864]***	−6.601 [1.895]***	−6.542 [1.840]***	−6.783 [1.855]***
Regional bargaining power index	0.241 [0.079]***			
Tensions in relations of governor with the centre index		0.179 [0.051]***		
Votes for governor in last elections			0.008 [0.004]**	
Regional own tax revenues as a share of total regional expenditures				0.17 [0.219]
Electoral competition at the federal level	0.000 [0.005]	0.003 [0.005]	−0.004 [0.006]	−0.002 [0.006]
Log gross regional product per capita	−0.331 [0.227]	−0.471 [0.226]**	−0.253 [0.209]	−0.296 [0.244]
Regional output concentration	0.336 [0.677]	0.28 [0.698]	1.109 [0.602]*	0.719 [0.724]
Regional elections dummy, 96	−0.28 [0.136]**	−0.23 [0.135]*	−0.366 [0.151]**	−0.36 [0.152]**
Regional elections dummy, 97	−0.109 [0.178]	−0.005 [0.188]	−0.244 [0.176]	−0.132 [0.174]
Log distance to Moscow	0.022 [0.076]	0.023 [0.069]	0.015 [0.071]	0.025 [0.074]
Electricity	−0.952 [0.227]***	−1.087 [0.224]***	−1.03 [0.215]***	−1.119 [0.214]***
Military	0.216 [0.201]	0.208 [0.199]	0.237 [0.207]	0.201 [0.208]
Two-digit industry dummies	***	***	***	***
Observations	476	476	475	476
R-squared	0.17	0.18	0.16	0.16

Notes: Robust standard errors adjusted for clustering at the regional level are in brackets.
* significant at 10%; ** significant at 5%; *** significant at 1%.

industrial structure (measured by the level of industrial concentration) in explaining successful resistance. Unlike the other two hypotheses, the hypothesis about the redistributive nature of federal tax arrears is not robustly supported by the data. There is only very weak and unrobust evidence that federal arrears are higher in regions with a lower level of gross regional product per capita.

Let us turn to the discussion of the determinants of authorized federal tax deferrals. Table 3 presents the results for the baseline specification (estimation of the system of equations (3)). In contrast to the results for tax arrears, none of the liquidity measures are statistically significant in explaining either the incidence or the size of federal tax deferrals. There is also no robust significant relationship between the measures of regional political resistance and the size of tax deferrals (given that a deferral was granted).[18] Yet, regional bargaining power and tensions in relationships between regional governments and the federal centre were very important in determining the probability that a particular firm was granted a deferral. One standard deviation increase in the index of the tensions in relationships and in the index of bargaining power led to an increase in the probability of getting an authorized deferral of about 4 and 6 percentage points, respectively. In addition, the effect of political popularity is consistently positive and, in the selection equation for 1998, significant. Regional output concentration and regional own revenue share do not have an effect on the size or frequency of deferrals.

Granting an authorized tax deferral requires an action on behalf of the federal government. Thus, if there is any room for voluntary federal redistribution, we should see its evidence in these regressions most clearly. Indeed, we find that gross regional product per capita has a robust negative effect on the size of deferrals in both years (absolute values of t-statistics in all specifications are greater than unity and in half of regressions coefficients are significant). There is, however, no robust relationship between GRP per capita and the probability of a regional firm getting a deferral. On the contrary, if at all, electoral competition seems to be important for the incidence of tax deferrals rather than their size. (Two out of four baseline regressions have significant positive coefficients of electoral competition in 1998.) One standard deviation increase in electoral competition increased the probability of a tax deferral by 2 percentage points. Finally, firms' employment size comes out significantly positive in explaining the probability of getting an authorized deferral only in 1998. Overall, the results about authorized deferrals suggest that both the political bargaining of the regional governors and the centre and federal redistributive politics do play a role in determining the incidence of federal tax deferrals. The size of deferrals seems to be determined with the objective of economic redistribution in mind: firms in poorer regions got larger deferrals.

---

[18] Only the power in relationships of regions with the center is positive and marginally significant in the regressions for 1997.

Table 3. Flow of authorized tax deferals

	Size equations							
	Log flow of officially deferred federal taxes (Apr 1, 97) per ruble of the stock of federal arrears (Jan 1, 97)				Log flow of officially deferred federal taxes (Apr 1, 98) per ruble of the stock of federal arrears (Jan 1, 98)			
Absolute liquidity ratio	0.903	2.696	0.352	1.229	−5.561	−5.769	−5.725	−6.095
	[4.606]	[4.946]	[5.478]	[5.224]	[5.464]	[5.523]	[5.443]	[5.698]
Regional barganing power index	0.739				0.174			
	[0.410]*				[0.526]			
Tensions in relations of governor with the centre index		0.155				−0.190		
		[0.182]				[0.218]		
Votes for governor in last elections			−0.019				−0.011	
			[0.019]				[0.035]	
Regional own tax revenues as a share of total regional expenditures				0.397				−1.095
				[0.876]				[0.697]
Electoral competition at the federal level	−0.002	−0.003	−0.005	−0.010	0.008	0.000	0.009	0.002
	[0.017]	[0.017]	[0.017]	[0.016]	[0.013]	[0.013]	[0.012]	[0.013]
Log gross regional product per capita	−0.889	−1.022	−0.763	−0.927	−0.838	−0.587	−0.735	−0.638
	[0.589]	[0.568]*	[0.611]	[0.583]	[0.431]*	[0.455]	[0.368]**	[0.346]*
Log employment	0.065	0.062	0.008	0.005	−0.105	−0.104	−0.117	−0.106
	[0.189]	[0.190]	[0.251]	[0.241]	[0.256]	[0.248]	[0.276]	[0.238]
Regional elections dummy	−0.519	−0.373	−0.446	−0.391	−1.669	−1.574	−1.472	−1.487
	[0.479]	[0.528]	[0.550]	[0.493]	[0.654]**	[0.598]***	[0.762]*	[0.550]***
Military	−0.751	−0.778	−0.946	−0.894	−0.613	−0.533	−0.611	−0.421
	[0.331]**	[0.389]**	[0.451]**	[0.350]**	[0.351]*	[0.354]	[0.385]	[0.304]
Constant	7.032	9.750	10.607	10.214	10.157	9.131	10.320	10.492
	[6.325]	[5.679]*	[6.519]	[6.667]	[3.645]***	[3.742]**	[4.224]**	[3.244]***
Uncensored obs.	108.000	108.000	108.000	107.000	116.000	116.000	115.000	116.000
Absolute liquidity ratio	0.837	0.854	1.487	0.553	−0.122	−0.405	−0.223	−0.475
	[1.695]	[1.745]	[1.721]	[1.712]	[1.726]	[1.599]	[2.687]	[1.670]
Regional barganing power index	0.342				0.542			
	[0.138]**				[0.115]***			

Table 3. (cont) Flow of authorized tax deferals

| | Selection equations | | | | | | | |
	Deferrals > 0 vs. Deferrals = 0				Deferrals > 0 vs. Deferrals = 0			
Tensions in relations of governor with the centre index		0.181 [0.085]**				0.275 [0.070]***		
Votes for governor in last elections			0.010 [0.009]				0.072 [0.017]***	
Regional own tax revenues as a share of total regional expenditures				−0.108 [0.497]				0.445 [0.216]**
Electoral competition at the federal level	0.007 [0.009]	0.010 [0.010]	0.002 [0.008]	0.004 [0.009]	0.010 [0.005]**	0.012 [0.005]**	−0.002 [0.009]	0.007 [0.004]
Log gross regional product per capita	0.064 [0.263]	−0.015 [0.233]	0.105 [0.266]	0.190 [0.323]	−0.119 [0.209]	−0.294 [0.197]	−0.065 [0.772]	−0.081 [0.192]
Log employment	0.127 [0.098]	0.128 [0.097]	0.127 [0.098]	0.121 [0.102]	0.087 [0.056]	0.091 [0.055]*	0.104 [0.057]*	0.084 [0.052]
Regional output concentration	0.219 [1.047]	0.366 [1.102]	1.068 [0.891]	1.035 [0.706]	0.336 [0.709]	0.459 [0.531]	1.797 [1.551]	0.883 [0.605]
Regional elections dummy	−0.039 [0.233]	−0.055 [0.205]	−0.094 [0.203]	−0.142 [0.206]	−0.152 [0.198]	0.074 [0.149]	−1.014 [0.570]*	0.062 [0.144]
Military	0.353 [0.249]	0.284 [0.255]	0.319 [0.254]	0.256 [0.264]	0.128 [0.300]	0.017 [0.282]	0.507 [0.235]**	−0.019 [0.288]
Log distance to Moscow	0.020 [0.105]	0.036 [0.097]	0.010 [0.086]	0.010 [0.097]	−0.140 [0.098]	−0.082 [0.086]	−0.213 [0.183]	−0.082 [0.063]
Electricity	−0.851 [0.283]***	−0.933 [0.288]***	−0.885 [0.251]***	−0.945 [0.253]***	−6.240 [0.146]***	−6.472 [0.165]***	−7.160 [0.507]***	−6.400 [0.131]***
Constant	−3.494 [2.130]	−2.648 [1.974]	−3.893 [2.331]	−3.775 [2.259]	−0.934 [1.893]	0.609 [1.768]	−5.432 [6.747]	−1.145 [1.636]
Total obs.	767.000	767.000	761.000	767.000	1254.000	1254.000	1240.000	1254.000

Notes: Robust standard errors adjusted for clustering at the regional level are in brackets.

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

5. Conclusion

This paper provides evidence that in the second half of the 1990s liquidity problems in firms remained an important factor in the escalation of federal tax arrears. Arrears were greater and accumulated faster in firms with liquidity problems. Enforcement of tax collection, however, varied greatly even for a given level of firms' liquidity. Politically strong governors successfully resisted federal tax collection in their regions: federal arrears were higher and accumulated faster in regions where governors had a larger popular base, in regions that had better bargaining position *vis-à-vis* the centre, and with regions that had governors in open political opposition to the centre. Moreover, these regions managed not only to disrupt the federal government's tax collection efforts; they were also successful in bargaining with the centre for official tax deferrals on behalf of regional companies. While illiquid firms were unable to pay their federal tax obligations, the federal government did not bail them out directly with the use of authorized tax deferrals. This suggests that the federal government apart from a political objective of not liquidating failing firms pursued the fiscal objective of attempting to enforce tax collection where it was possible. Instead of bailing out firms with liquidity problems, the federal government allocated tax deferrals strategically to firms in regions with larger numbers of 'swing' voters.

The main lesson from the empirical exercise of this paper is that Russia's federal structure and, more precisely, the weakness of central government enforcement at the level of regions was one of the fundamental reasons for the accumulation of federal tax arrears and the collapse of federal government revenues in the second half of the 1990s.

References

Akhmedov, A. and Zhuravskaya, E. (2003). 'Opportunistic political cycles: Test in a young democracy setting', *CEFIR working paper no. 25*, Moscow: CEFIR.

Alesina, A., Roubini, N. and Cohen, G. (1997). *Political Cycles and the Macroeconomy*, Cambridge, MA: MIT Press.

Alfandari, G. and Schaffer, M. (1996). 'On "arrears" in Russia', *Centre for Economic Reform and Transformation discussion paper 9608*, Edinburgh: CERT.

Black, B., Kraakman, R., and Tarassova, A. (2000). 'Russian privatization and corporate governance: What went wrong?' *Stanford Law Review*, 52, pp. 1731–1808.

Brown, A. and Brown, D. J. (1999). 'The transition of market structure in Russia: Economic lessons and implications for competition', mimeo, SITE.

Cai, H. and Treisman, D. (2004). 'State corroding federalism', *Journal of Public Economics*, 88(4), pp. 819–43.

Dixit, A. and Londregan, J. (1995). 'Redistribute politics and economic efficiency', *American Political Science Review*, 89(4), pp. 856–66.

Dixit, A. and Londregan, J. (1998). 'Fiscal Federalism and redistribute politics', *Journal of Public Economics*, 68, pp. 153–80.

Gehlbach, S. (2003). 'Taxability, elections, and government support of business activity', *CEFIR working paper no. 30*, Moscow: CEFIR.

Guriev, S. and Ickes, B. (2000). 'Barter in Russian firms', in Seabright, P. (ed.) *The Vanishing Ruble: Barter and Currency Substitution in Post-Communist Economies*, Cambridge: Cambridge University Press, pp. 147–75.

Ivanova, N. and Wyplosz, C. (1999). 'Arrears: The tide that is drowning Russia', *RECEP working paper no. 5*, Moscow: RECEP.

Kornai, J. (1980). *Economics of Shortage.* Amsterdam: North-Holland.

Lambert-Mogilianski, A., Sonin, K. and Zhuravskaya, E. (2003). 'Capture of bankruptcy: Theory and Russian evidence', *CEFIR working paper no. 9*, Moscow: CEFIR.

Lavrov, A., Litwack, J. and Sutherland, D. (2001). 'Fiscal federalist relations in Russia: A case for subnational autonomy', OECD Center for co-operation with Non-Members, working paper, Paris: OECD.

Lindbeck, A. and Weibull, J. (1987). 'Balanced-budget redistribution as the outcome of political competition', *Public Choice*, 52, pp. 273–97.

Litwack, J. M. (2002). 'Central control of regional budgets: Theory with applications to Russia', *Journal of Comparative Economics*, 30(1), pp. 51–75.

Maskin, E. and Xu, C. (2001). 'Soft budget constraint theories: From centralization to the market', *Economics of Transition*, 9(1), pp. 1–27.

OECD (2000). *OECD Economic Surveys 1999–2000: The Russian Federation*, OECD: Paris.

Roland, G. (2000). *Transition and Economics: Politics, Markets and Firms*, Cambridge, MA: The MIT Press.

Schaffer, M. (1994). 'Government subsidies to enterprises in Central and Eastern Europe: Budgetary subsidies and tax arrears', *Centre for Economic Performance Working paper no. 671*, London: CEP.

Schaffer, M. (1996). 'The "propagation" of arrears: Empirical evidence from Russia', mimeo, CERT, Edinburgh.

Schaffer, M. (1998). 'Do firms in transition economies have soft budget constraints? A reconsideration of concepts and evidence', *Journal of Comparative Economics*, 26, pp. 80–103.

Shleifer, A. and Treisman, D. (2000). *Without a Map: Political Tactics and Economic Reform in Russia*, Cambridge, MA: MIT Press.

Shleifer, A. and Vishny, R. W. (1993). 'Corruption', *Quarterly Journal of Economics*, 108(3), pp. 599–617.

Shleifer, A. and Vishny, R. W. (1994). 'Politicians and firms', *Quarterly Journal of Economics*, 109(4), pp. 995–1025.

Slinko, I., Yakovkev, E. and Zhuravskaya, E. (2003). 'Institutional subversion: Evidence from Russian regions', *CEPR Discussion Paper no. 4024*, CEPR: London.

Sonin, K. (2003). 'Provincial protectionism', mimeo, CEFIR.

Treisman, D. (1998). 'Deciphering Russia's federal finance: Fiscal appeasement on 1995 and 1996', *Europe–Asia Studies*, 50(5), pp. 893–906.

Treisman, D. (2000). 'Fiscal pathologies and Federal politics: Understanding tax arrears in Russia's regions', book chapter, mimeo: UCLA.

Treisman, D. and Gimpelson, V. (2001). 'Political business cycles and Russian elections, or the manipulations of "Chudar"', *British Journal of Political Science*, 31(2), pp. 225–46.

Appendix

Table A1. Industrial distribution of firms in the sample

Industry code	Industry name	Number of firms	
		1.1.97	1.1.98
181	Flavouring	44	130
141	Engineering (turbine, cables, refrigerators)	74	106
113	Coal	85	100
147	Other engineering (defence, aviation, ship building)	49	92
151	Logging	28	86
111	Electricity	74	82
161	Construction materials	27	63
131	Chemical	51	59
143	Instrument engineering	50	59
121	Ferrous metallurgy	45	56
112	Fuel industry (oil and gas)	40	51
171	Textile	30	46
149	Repair	23	44
152	Wood-working	9	32
133	Petrochemical	22	30
142	Machine building tool manufacturing	14	21
144	Tractors, agricultural equipment	18	21
153	Wood-pulp industry	10	19
122	Non-ferrous metallurgy	11	16
145	Road, construction and public utilities	13	14
183	Fish	10	14
148	Metal construction	6	13
173	Tanning, fur, boot, shoe	5	13
165	Glass, porcelain	3	12
146	Engineering for light and food industry, home appliances	6	11
162	Facing material	1	10
124	Noble metals diamonds	4	9
182	Meat and Dairy	2	9
191	Microbiology	2	8
192	Flour-grinding	3	6
125	Non-ferrous metalworking	2	4
172	Sewing	1	3
193	Medical	2	3
197	Other	6	4
123	Rare-metals and semi-conducting materials	1	2
127	Electrode	3	2
154	Resin	0	2
114	Shale	1	1
128	Refractory and high temp. metal alloys	0	1
	Total	776	1254

Table A2. Regional distribution of firms in the sample

	No. of firms			No. of firms	
	1.1.97	1.1.98		1.1.97	1.1.98
Adygeya republic	2	2	Murmansk oblast	12	10
Altai krai	14	23	Nizhny Novgorod oblast	32	40
Amur oblast	2	3	North Osetiya republic	0	4
Arkhangelsk oblast	13	33	Novgorod oblast	1	3
Astrakhan oblast	2	2	Novosibirsk oblast	10	19
Bashkortostan republic	20	29	Omsk oblast	9	10
Belgorod oblast	6	18	Orenburg oblast	18	21
Bryansk oblast	9	12	Oryol oblast	0	4
Buryat republic	2	5	Penza oblast	11	13
Chelyabinsk oblast	54	63	Perm oblast	19	46
Chita oblast	4	5	Primorskii krai	11	19
Chuvash republic	4	10	Pskov oblast	3	3
Evrei autonomous oblast	1	1	Rostov oblast	21	17
Irkutsk oblast	20	22	Ryazan oblast	7	14
Ivanovo oblast	21	34	Sakha (Yakutia) republic	6	9
Kabardino-Balkar republic	4	3	Sakhalin oblast	14	26
Kaliningrad oblast	3	5	Samara oblast	17	22
Kaluga oblast	4	8	Saratov oblast	14	15
Kamchatka oblast	6	6	Smolensk oblast	6	5
Karachaevo-Cherkess republic	0	1	St. Petersburg city	10	35
Karelia republic	9	13	Stavropol krai	5	17
Kemerovo oblast	64	110	Sverdlovsk oblast	7	54
Khabarovsk krai	13	19	Tambov oblast	9	16
Khakasia republic	13	13	Tatarstan republic	12	21
Kirov oblast	17	25	Tomsk oblast	5	12
Komi republic	9	19	Tula oblast	12	17
Kostroma oblast	6	17	Tver oblast	9	13
Krasnodar krai	11	13	Tyumen oblast	10	27
Krasnoyarsk krai	21	31	Ulyanovsk oblast	10	12
Kurgan oblast	6	9	Ulyanovsk oblast	0	11
Kursk oblast	8	12	Vladimir oblast	12	25
Leningrad oblast	4	10	Volgograd oblast	20	24
Lipetsk oblast	2	4	Vologda oblast	9	13
Magadan oblast	12	11	Voronezh oblast	21	26
Mari-El republic	5	9	Yaroslavl oblast	20	23
Mordovia republic	3	8	Total	776	1254

Table A3. Summary statistics for federal arrears and authorized deferrals

	1.1.1998	1.1.1997
Federal tax arrears (billion rubles)		
Observations	2,288	1,325
Median	5,877	5,618
Mean	18,012.1	23,674.3
Std. Deviation	78,385.3	111,313.8
Min	2	1
Max	2,830,869	2,855,191
Authorized federal tax deferrals (billion rubles)		
Observations	2,633	1,323
Median	0	0
Mean	2,278.5	3,483.8
Std. Deviation	29,349.4	29,589.4
Min	0	0
Max	955,633	619,078

Note: The summary statistics in this table are calculated for the whole sample of firms.
(Regressions contain fewer observations because there are no data for many of these firms)

Table A4. Summary statistics of variables used in regressions analysis

Variable	Obs	Mean	Std. Dev.	Min	Max
Log arrears per ruble of output, stock, 1.1.97	776	−3.040	1.288	−8.047	0.391
Log arrears per ruble of output, stock, 1.1.98	1164	−2.424	1.241	−6.164	0.734
Log flow of arrears per ruble of output, 1997	476	−2.936	1.321	−7.709	3.843
Log flow of authorized deferrals per ruble of arrears stock, 4.1.1997, if deferrals granted	108	−0.189	2.014	−6.959	9.625
Log flow of authorized deferrals per ruble of arrears stock, 4.1.1998, if deferrals granted	116	0.554	2.263	−6.310	7.601
Dummy for 'deferrals granted,' 1997	767	0.141	0.348	0	1
Dummy for 'deferrals granted,' 1998	1254	0.093	0.290	0	1
Index of tensions in relations of governor with the centre, 1997	1254	3.216	1.398	1	5
Index of regional bargaining power, 1996	1254	2.187	0.842	1	3
Votes for governor in the last regional elections, 1997	1240	64.049	15.870	30.760	99.425
Votes for governor in the last regional elections, 1996	1240	55.260	20.700	16.600	98.500
Regional own tax revenues as a share of total regional expenditures	1254	1.231	0.289	0.220	1.820
Electoral competition at the federal level, 1996	1254	−20.620	14.972	−59.033	−0.034
Concentration of output among the largest regional firms, 1996	1254	0.189	0.103	0.105	0.622
Absolute liquidity ratio, end of year, 1996	1241	0.020	0.044	0.000000457	0.513
Absolute liquidity ratio, end of year, 1997	1164	0.010	0.034	2.18E−08	0.538
Regional elections dummy, 1996	1254	0.525	0.500	0	1
Regional elections dummy, 1997	1254	0.186	0.389	0	1
Electricity industry	1254	0.065	0.247	0	1
Log distance to Moscow	1254	7.187	1.018	5.118	9.382
Log gross regional product per capita, 1996	1254	9.393	0.388	7.981	10.964
Log gross regional product per capita, 1997	1254	9.548	0.405	8.542	11.089
Military sector	1254	0.110	0.313	0	1

Note: Control variables are summarized for the maximum sample used in regression analysis.