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ABSTRACT: In a centralized federation, where tax rates and taxation rules are set by the federal government, manipulating the thoroughness of tax auditing and the effectiveness of tax collection could be attractive for regional authorities because of a variety of reasons. These range from tax competition to principal-agent problems, state capture and benefits of fiscal equalization. In this paper we discuss strategic tax auditing and collection from the perspective of fiscal federalism and test for strategic tax collection empirically using data of the Russian Federation. Russia's regional authorities in the 1990s have always been suspect of tax auditing manipulations in their favor. However, in the 2000s increasing bargaining power of the centre seems to induce tax collection bodies in the regions to manipulate tax auditing in favor of the federal centre. Our findings confirm the existence of strategic tax collection for the Yeltsin period after exclusion of outliers; the results for the Putin period are however rather ambiguous.

JEL Codes: H26, H77

Keywords: Fiscal federalism, tax arrears, transition economies

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1. Introduction

In centralized federations with administrative powers of the sub-federal jurisdictions (administrative federalism), in which the federal government sets tax rates, tax bases and the rules of tax collection, tax auditing often remains the only instrument available for regions to conduct own tax policies. Indeed, there is some (so far mostly anecdotal) evidence for several federations that regions differ in their thoroughness in enforcing tax laws. In Germany, rich and poor states (*Länder*) are supposedly less strict in their tax auditing activity to compete for mobile taxpayers (Baretti, Huber and Lichtblau, 2002; Stöwhase and Traxler, 2005). In Belgium, the Flemish region has been repeatedly accused of being relatively lax in its tax auditing (Cremer and Gahvari, 2000). Occasionally regional governments even provide different support to local businesses to avoid federal taxation and legislation (Cai and Treisman, 2004). And, naturally, this issue becomes more important in developing and transition economies, since a deficit of the rule of law provides for additional opportunities for regional governments and enterprises to collude.

There are several reasons for regional governments to reduce their efforts in tax auditing and collection. In a framework of inter-jurisdictional fiscal competition enforcement policy will act as an instrument to attract mobile capital, if direct changes of tax rates are impossible. Regions compete by “sheltering” firms from federal taxation or other interventions (Cremer and Gahvari, 2000; Cai and Treisman, 2004; Sonin, 2005). This activity becomes especially important, if the degree of state capture (i.e. privileged relations between individual businesses and public officials of the respective government level able to determine economic policy making) at the regional level is higher than at the central level, and influential firms seek protection of the regional authorities against the (uncontrolled) centre (Treisman, 1999). The results of fiscal competition through tax auditing depend on the scheme of fiscal equalization implemented in the federation (Stöwhase and Traxler, 2005). From the perspective of vertical fiscal relations, a bad standing in tax collection could be attractive for regional governments, if benefits from federal grants exceed potential losses from lower tax collection or fiscal transfers depend on deficits of regional budgets. Finally, the federal (central) government could also be interested in reducing its tax collection effort. In this case different tax auditing policies in different regions act as an instrument of spatial redistribution or business subsidizing, if direct grants or transfers are politically undesirable (Ponomareva and Zhuravskaya, 2004). The central question then becomes who is effectively controlling tax authorities in the regions.

Moreover, strategic tax auditing and collection could be used as a way of *de facto* fiscal decentralization. Throughout this paper we *define* fiscal decentralization as an increase of the tax retention rate, i.e. the share of tax revenue generated from a certain territory obtained by the regional government. It is not the *de jure* tax retention rate which is interesting for us, but the *de facto* share of revenue, which can be influenced by different factors, among others by strategic tax collection. Moreover, in this sense decentralization can vary among different regions. As auditing effort is often not directly observable, it could create a principal-agent problem. There is no reason to believe that regions (if they control tax auditing activities) are equally thorough to enforce tax laws, when a larger share of tax revenue collected is attributed to the federal government, as compared to taxes, which mostly benefit regional budgets. It is thus possible to hypothesize that tax arrears would mostly accumulate on the expense of the federal centre, i.e. taxes with a higher regional share are more actively collected than those which are mostly attributed to the centre. On the contrary, the federal centre can also be interested in the “hidden” re-centralization through strategic tax collection. In this sense the behavior of the tax authorities is strategic, i.e. distribution of effort between different taxes is not random, but rationally determined through the interaction of the regional/ federal governments and the tax administrators.

In this paper we test hypotheses on strategic tax collection empirically using data of the Russian Federation. To the best of our knowledge, this paper is the first to empirically investigate strategic tax collection. There are several factors, which make Russia an interesting case for such an analysis. First, during the 1990s, tax collection in Russia experienced a significant decline; the situation improved in the 2000s under the new administration, but the share of the shadow economy still remains significant. Therefore selective application of tax collection instruments seems to be a reasonable assumption for the behavior of tax authorities in this environment (as compared to countries with high tax morale). Second, Russian regions are suspect of manipulating tax collection throughout the 1990s: both because of a *de jure* highly centralized federal structure, but *de facto* increasing unilateral devolution. Third, changes of tax collection behavior from Yeltsin to Putin make Russian federalism an important laboratory, which can be used to understand how shifts of relative bargaining power between the centre and the regions affect tax auditing and collection behavior. However, the downside of studying Russia consists in potential difficulties by modeling Russian federalism econometrically. On the one hand, Russia has been an extremely asymmetric country both in terms of political, economic and fiscal structure. This suggests a po-

tential impact of influential cases on the estimation results. On the other hand, transition from Yeltsin to Putin can pose additional modeling problems, for example the timing of changes. We employ a variety of estimation techniques to account for these challenges.

This paper is related to the empirical literature dealing with institutional and political determinants of tax arrears in Russia. Ponomareva and Zhuravskaya (2004) apply a micro-level approach based on individual data on tax arrears of about one thousand firms in 1997 and 1998 and find higher federal tax arrears (controlling for liquidity) for regions with a stronger bargaining position against the centre, with higher support of governors in the last elections and with higher tensions in relations between governors and the centre. Treisman (1999) also presents a study of 42 enterprises in 1994-1997 and finds that in regions with a lower share of the federal centre in total tax revenue in the previous year companies pay higher taxes as share of reported pre-tax income. Slinko, Yakovlev and Zhuravskaya (2005) study a set of Russian regions in 1996-2000 and argue that state capture is associated with an increase of federal tax arrears, but does not have any significant influence on regional tax arrears. Finally, Yakovlev (2006) presents some anecdotal evidence of tax auditing as a tool in horizontal tax competition and Plekhanov (2006) shows for a sample of 79 regions in 1998-1999 that protecting enterprises from taxation seemed to be an important instrument to attract mobile capital. Most of the papers, however, do not specifically look at the interaction between tax arrears and the retention rates and therefore do not test for strategic tax collection as instrument of fiscal decentralization.

In the latter respect our paper is complementary to Treisman (2003), who discusses the influence of decentralization on tax arrears. The analysis by Treisman (2003) covers the period of 1994-1997 and is mostly based on region-level data. According to his results, regions with larger enterprises tend to have higher tax arrears, the election of a Communist governor is positively correlated with tax arrears, and territories in which the share of regional government increased most in the previous year had lower growth of tax arrears. His approach is, hence, quite different from ours; he considers the size of tax arrears as *an outcome of fiscal decentralization* in the past. The idea is that observing its retention rate the regional governments make the decision with respect to their tax auditing and collection effort. Though probably applicable for the early period of development of the Russian Federation, this approach, however, seems to be less reliable if we consider its later political-economic structure based on administrative federalism – the reason for our choice of studying Russia in the first place! In a centralized federation, de jure retention rates

are identical for all regions (as it is the case for Russia); differences in retention rates (fiscal asymmetries) arise from differences in economic structure predetermining the tax base and the activity of tax collection agencies, i.e. tax auditing and tax collection. This line of causality is also of greater scientific importance, it is applicable not just to Russia, but is a general issue of centralized federations. Moreover, unlike Treisman, we attempt to find out, how strategic tax collection changed during the evolution of Russian federalism in the 1990s and 2000s. Our data set covers the period between 1995 and 2006, and therefore does not only include the first term of Yeltsin's presidency, but also his second term and a significant part of Putin's first and second terms. To our knowledge, this paper is thus also one of the first attempts to apply tools of empirical research to explicitly studying the changes in Russian fiscal federalism under Putin in the 2000s.

The paper is organized as follows: the next section describes the basic logic of strategic application of tax collection instruments in centralized federations with different allocations of de facto bargaining power between levels of government. It also clarifies the concepts of tax auditing and tax collection as they are used in this paper. The third section provides a brief overview of Russian federalism, the reasons for strategic tax collection in this institutional setting and presents our main hypotheses. The fourth section describes the data, and the fifth section discusses the econometric methodology. The sixth section presents our findings for the main steps of analysis (panel data, TSLS and median regressions) and discusses their potential implications. The seventh section deals with an additional robustness check, based on the number of tax audits carried out by the local branches of the Russian tax collecting authority. The last section offers some conclusions.

2. Tax auditing and tax collection in a centralized federation

We start with considering a general (and unavoidably simplified) setting, which should then be adapted for the institutional specifics of the Russian case. The existing literature on strategic tax auditing (see e.g. Stöwhase and Traxler, 2005) models the auditing effort as a probability p of detection of tax evasion (which is a *choice variable* for the tax authority given that the tax rate is exogenous). For our purposes we transform the concept as follows. Assume that there exists a population of firms in the economy with overall real profit π^R (instead of profit one could consider any other tax base); however, the officially *declared* profit, which should be used as the tax base, is $\pi^D < \pi^R$. The government does not take the declarations of firms for granted and im-

plements the *tax auditing* measures in order to find out the real profit. Then on average, assuming the detection probability p , the uncovered profit of the firms after tax auditing is $\pi^D + (\pi^R - \pi^D)p$. For any $p < 1$ (i.e. when the auditing is imperfect) the detected profit after tax auditing is smaller, than real profit.

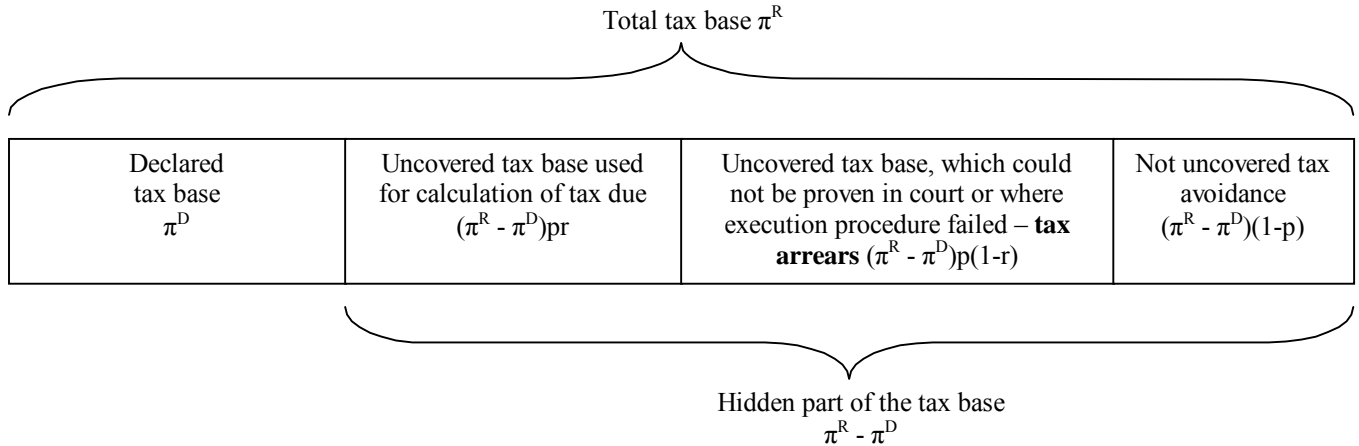


Figure 1: Tax base after tax collection and tax auditing activities

However, it would be too simple to assume, that the government is indeed able to tax the detected profit. The results of tax auditing are usually subject to lawsuits and further execution procedures by law-enforcement agencies, i.e. to *tax collection* activity. Loopholes in tax laws in developing or transition countries and extreme complexity of the tax system in many developed countries provide for large opportunities to challenge the results of tax auditing. However, the decision of the court heavily depends upon the effort invested in preparing the case by the prosecutor, i.e. the tax authority. Moreover, in a developing or transition economy with poor rule of law the enforcement procedure is also non-trivial and requires additional investments. So, there is yet another choice variable for the tax authority: the probability of collecting the detected tax (say, r). Then the tax base used for calculating the taxes due is in fact $\pi^D + (\pi^R - \pi^D)p r$, while the difference between this tax base and the detected tax base $(1-r)p(\pi^R - \pi^D)$ represents the *uncollected tax arrears*. The structure of the tax base is represented in *Figure 1*. Naturally, the situation can be much more sophisticated, if time delays and fines are taken into account.

In order to describe the application of tax collection and auditing in a federation we consider a simple principal-agent framework, where a local tax authority (agent) acts on behalf of two principals: the federal and the local (regional) governments (as both gain from tax collection). The results of the agent’s activity depend upon his effort and the environmental characteris-

tics. Agent's utility is derived from potential benefits provided by the principals (e.g. direct (formal and informal payments), non-monetary benefits, career advancements etc.). Obviously, negative benefits (punishments) are possible. On the other hand, an agent's activity is constrained by his resources, which could be used for tax auditing and collecting effort, i.e. tax service (given its resources) is unable to collect the total taxes due anyway. We assume that the resources for tax auditing and collection are exogenous. Moreover, the agent can choose between allocating effort in auditing and collection of "federal" or "regional" taxes (or taxes with a higher share of the federal or the regional governments). However, this allocation decision is only partly observable by the principals, whose monitoring capacity is unequal. Hence, the principals cannot completely distinguish between the results of the agent's activity caused by environmental characteristics or by allocation of his effort. Each principal maximizes his own tax revenue regardless of the revenue of the other principal (of course, in the real world federation may care for regional tax collection – then, however, we simply do not find the effect in the empirical application). The agent's benefits depend upon the principal's assessment of the agent's efforts for collecting taxes attributed to this principal regardless of total tax auditing and collecting effort. Note that there is no incentive for the agent to reduce her overall effort, since it only reduces the benefits; so, the decision variable is the allocation of tax collecting activity.

This setting gives rise to at least two alternative scenarios (which, as shown below, correspond to two phases of development of the Russian federalism). In the *region-centered* environment the regional government has a double advantage over the federal centre: first, it has better instruments to observe both effort and environmental conditions and, second, it has a relative advantage in bargaining power. Hence, the benefits from the regional government are higher than those provided by the federal government (and potential punishment also exceeds that of the federal centre), as regional governments can effectively "protect" the agent from potential federal punishment, and its resources for punishment and the benefits for the agent exceed those of the federal centre. Moreover, the agent's ability to "cheat" is higher with respect to the federal centre than with respect to the region. Thus, it is more likely that the agent directs his efforts in a way to better satisfy the requirements of the local than the federal principal. Assume further that different agents in different regions face different tax collection constraints (because of economic heterogeneity of regions); however, the federal centre is "equally weak" vis-à-vis different regions.

Since the tax revenue potentially originating from the tax base generated by the economy is not fully collected by the tax authorities, enterprises form tax arrears (both formally claimed by the tax collection service and successfully “hidden” from the state, i.e. $(1-r)p(\pi^R-\pi^D)$ and $(1-p)(\pi^R-\pi^D)$). Then, strategic tax collection and auditing influence the distribution of tax arrears: tax arrears are larger for taxes, which are less thoroughly collected (given similar tax bases). From this point of view one can claim that under the conditions described above tax arrears for regional taxes are smaller than those for federal taxes (note, that in a setting with joint taxes the distinction is less strict; one can rather argue, that taxes are more or less attractive for the federal or regional governments). If tax arrears accumulate to the detriment of federal taxes, the ratio of federal taxes to total taxes collected goes down (since both the numerator and the denominator are equally affected), resulting in effective fiscal decentralization (as defined above). *Ceteris paribus, regions with higher tax arrears therefore achieve higher fiscal decentralization.* Obviously, bargaining power of the federal centre also varies differently in centre-region relations. Hence, for the sake of the empirical analysis, one has to control for potential political variables influencing the ability and the willingness of the regions to bargain with the federal centre in order to establish the *ceteris paribus* condition (i.e. the price of decentralization as defined by Congleton et al., 2003).

The second (*federation-centered*) scenario implies a shift of the bargaining power balance to the federal centre and an increase of its monitoring abilities. Hence, the incentives for the agent are reversed: it can derive higher utility (from benefits and avoiding punishments) from directing tax collection and auditing effort into federal taxes. Note, that there are no changes of agent’s or principals’ utility functions in this setting: we assume only changes of monitoring capacity and bargaining power. The shifts of strategic tax auditing and collection behavior result from actions of the agent facing constraints of limited ability to collect taxes in general, while the principal’s action has only an indirect impact (from bargaining over “protecting” the agent from the punishment by another principal). The logic is exactly reverse to that of the region-centered case: tax arrears are mostly accumulated on costs of regional governments; in the ratio of federal tax revenue to total tax revenue the increase of tax arrears affects the denominator much stronger than the numerator, and *the regions with higher tax arrears achieve lower fiscal decentralization.*

A simple model can be helpful to understand this reasoning. Consider a region in a federation, where two taxes with strictly separate tax bases are collected. Denote the *contested* tax bases as T_L for the local (regional) tax and T_C for the central (federal) tax (i.e. the portion of the

overall tax bases for taxes L and C claimed by the tax authority, but rejected by the taxpayer) and the *declared* and *uncontested* tax bases as T_L^U and T_C^U respectively (i.e. the portion of the overall tax base which is accepted by both taxpayer and tax authority). Therefore $T_i = (\pi_i^R - \pi_i^D)p_i$ and $T_i^U = \pi_i^D$, where $i \in \{L; C\}$. We disregard the tax auditing activity and focus on tax collection (in fact, both tax auditing and tax collection run in the same direction, so this simplification is possible). The tax rates of both taxes for the tax bases are constant and exogenous τ (the equal tax rates are without loss of generality). The coefficients α_C and α_L measure the monitoring capacity *and* bargaining power of respective governments (which, in fact, run in the same direction in our story); e_L and e_C denotes the tax collection effort of the tax authority to collect the regional and the federal tax respectively, so that tax arrears $a(\cdot)$ are functions of respective efforts. We focus on strategic tax collection: so, both principals and the agent know the tax base. There is no effort necessary for collecting the uncontested tax base. Tax arrears are defined as a share of the tax base, so that the collected tax for the government i is $(1 - a(e_i))T_i = (\pi_i^R - \pi_i^D)p_i r_i$ and $a(e_i) = 1 - r_i$. The overall tax collection effort in the region is constrained by a certain level E , so that $e_C + e_L = E$. Therefore the problem for the tax collection authority can be written as follows:

$$\begin{aligned} & \max_{e_L, e_C} e_L^{\alpha_L} + e_C^{\alpha_C} - c(e_L; e_C); \\ & s.t. \\ & e_C + e_L = E; \\ & e_C \leq E_C; \\ & e_L \leq E_L. \end{aligned}$$

where $c(\cdot)$ denotes the cost of tax collection, which is increasing and strictly concave in both arguments (the functional form of influence of alphas on the function is without loss of generality: any increasing function of respective e and α would suffice; in a similar way, $c(\cdot)$ is simply a differentiable continuous function, which may as well be a function of the sum of e_C and e_L). The reason for the construction of the objective function is that the principals (federal and regional governments) provide benefits/ punishments according to the efforts of the tax authority for “their” own tax. The last two restrictions ensure that there is no need to increase tax collection efforts beyond a certain threshold (simply speaking, when the tax base is completely collected). We assume that at least one of these conditions is binding: otherwise there is a certain tax base, which the tax collection authority is not able to collect at all. Obviously, the problem has a corner

solution: for $\alpha_L > \alpha_C$ the tax collection authority invests its efforts only in regional tax collection, and vice versa. Only if the respective tax collection is complete (one of the last two conditions is binding), the authority proceeds with investing in tax collection of the weaker government. The share of the regional government in overall tax collection is then denoted by:

$$s = \frac{T_L^U + (1 - a(e_L))T_L}{T_L^U + T_C^U + (1 - a(e_L))T_L + (1 - a(e_C))T_C}.$$

Consider four regions, which are denoted A , B , C and D . All regions have identical tax bases for both taxes, and therefore T_L , T_C , E_L and E_C are the same. Regions A and C have identical (large) overall tax arrears $a(e_L)T_L + a(e_C)T_C$, and regions B and D have identical (small) tax arrears, so that tax arrears of A are larger than of B . A and B have higher bargaining power vis-à-vis the federal centre and $\alpha_L > \alpha_C$, and for regions C and D the opposite holds. Therefore, differences in tax arrears between A and B and C and D arise through the overall restriction on tax effort E (which is larger by the second region in each pair). Considering regions A and B (the region-centered scenario) it is straightforward that they both collect the total regional tax and form federal tax arrears: then A has larger federal tax arrears than B , and both have identical (zero) regional tax arrears (this is of course an extreme simplification of reality, where regional tax arrears can arise even in spite of effort invested by the respective government – from the empirical point of view one can look at it as the “noise” in the data); hence $s^A > s^B$ (where the superscript denotes the respective region). On the contrary, for C and D (the federation-centered case) both regions have identical (zero) federal tax arrears and C has larger regional tax arrears than D . Then $s^D > s^C$.

As we show in the next section, these two statements give rise to two hypotheses we can test. In fact, one could say that in a federation-centered case a region with huge tax arrears is extremely centralized, and in a region-centered case the same region with the same tax arrears is extremely decentralized. However, any empirical specification has to control for differences in tax bases and in bargaining power. Obviously, the retention rate *per se* is of secondary importance, since the government is looking at the absolute size of its budget. It is hence important to notice that the “fiscal decentralization” as defined in this section is just a *by-product* of the decisions of governments, motivated by the desire to increase their overall *fiscal revenue*, which can, however, be used in an empirical study to identify the behavior of interest.

3. Strategic tax collection and Russian fiscal federalism

3.1. Formal institutions and asymmetries in retention rates

The ideal playground for studying the strategic tax collection problems should, as it follows from our previous discussion, have two main features: *high centralization of formal fiscal authorities* (but possible decentralization of tax administration) and high *external constraints (low E)* making manipulation with tax collection effort attractive. In what follows we will try to show that Russian federalism indeed meets these two criteria.¹

In the early 1990s, the share of taxes attributed to the federal centre in the Russian Federation was set individually for every region and all issues of inter-budgetary relations were determined by negotiations between regions and the centre. The split of tax revenue was set for each tax and region annually (or even on a quarterly basis). When the president managed to consolidate power on the federal level after the dissolution of the old parliament (Supreme Council) in autumn 1993, the situation changed; the new constitution of 1993 accompanied by basic acts on inter-budgetary relations in 1994 established the *de jure* assignment of responsibilities and of tax revenues between different levels of government. The new Russian federalism was based on a high degree of centralization of tax authorities. The *exclusive list of taxes* was set by the federal parliament, originally in the Law on the Fundamentals of the Tax System, and after 1999 in the Tax Code. There was one notable exception from this regulation: the Presidential Decree No. 2268 signed on December 22, 1993, allowed the regional and local authorities to introduce own taxes. However, though several regions used these possibilities, most taxes introduced by the regions did not even cover their administrative expenses (although they still influenced economic processes as they were used to manipulate competition between businesses to support privileged business groups, see East-West Institute, 2001). In 1996 the Decree was abolished, and although some regions continued using their “own” taxes, their influence on tax revenue was fairly low. The federal government also set the rules for calculating the *tax base* for all taxes. Consequently, there is only *one unified tax collection system in Russia*; all taxes are administered by the federal government.²

So, *de jure* the only source of fiscal asymmetries in tax revenue assignment could be differences in the tax base endowments (any changes of federal legislation, like new tax rates or new taxes simultaneously hit all regions). Indeed, this *de jure* highly centralized federal order was implemented in an extremely heterogeneous country. Different regions of Russia are characterized

¹ In what follows we refer only to the revenue side of the fiscal structure. The expenditures side, which has been more decentralized, is outside the scope of this paper.

² Some details on Russian tax system are described in *Appendix E*.

by different resource endowments and industrial capacities, different population structures and different access to transportation infrastructure and markets. The asymmetries in tax revenue distribution have been enormous. In the period between 1994 and 2006 the share of taxes received by the centre from different regions varied from practically zero (Sakha in 1994 and 1995) to more than 95% (Kalmykia and Voronezh in 2005). *Figure 2* presents the distribution of Russian regions according to their share in the tax revenue from their territory. The question is, however, whether the tax base composition is the only factor driving the heterogeneity.

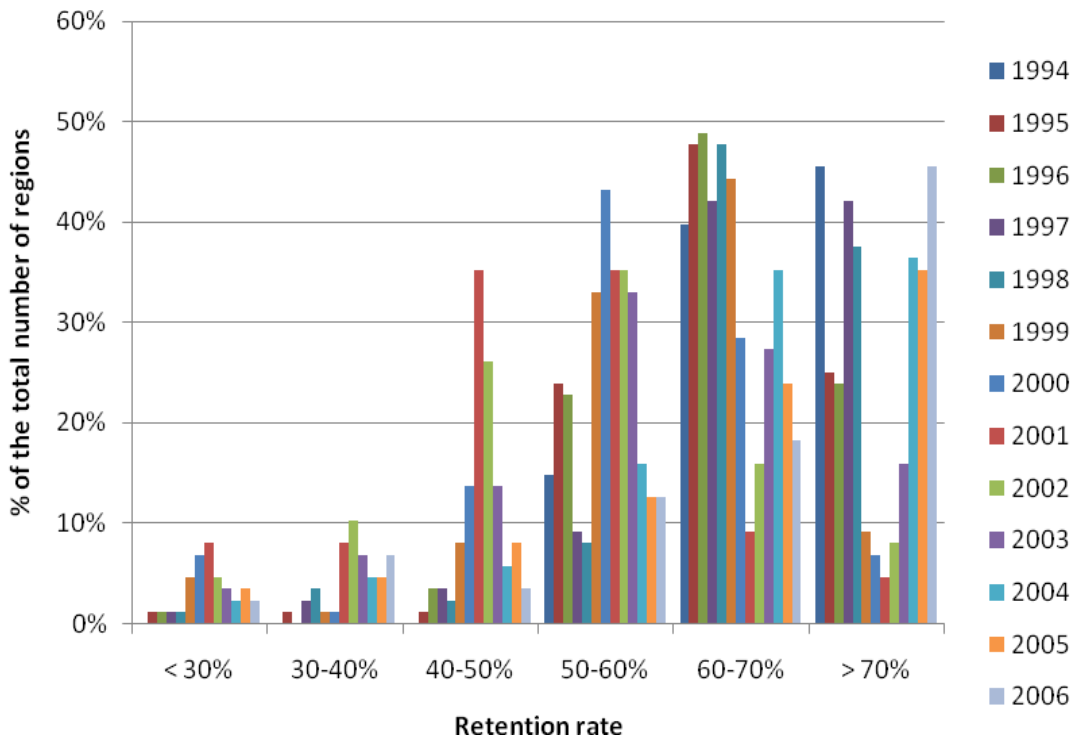


Figure 2: Distribution of regions according to the retention rates.

Sources: Goskomstat, Ministry of Finance, Federal Tax Service, Federal Treasury, Freinkman, Treisman and Titov, 1999

One factor to explain fiscal asymmetries in Russia could be a strong political asymmetry resulting from the effort of Russian regions to achieve greater autonomy. Partly this activity took place within the framework of direct bilateral bargaining between federal and regional governments, leading to the establishment of formal power-sharing treaties which are often referred to as elements of an asymmetric federation (Filippov, Ordeshook and Shvetsova, 2004, Chapter 4). On the other hand, federal law (parliamentary acts and presidential decrees) was used to give additional authorities to regions. More important is the unilateral activity of regions leading to

devolution. Its most prominent forms included “the war of laws” (introduction of regional legislation running contrary to the federal one) or decisions to prevent the local tax authorities from transferring the tax revenue to the federal government – a kind of “tax separatism”.

However, a closer look reveals that political asymmetries and open conflicts could hardly influence the distribution of tax revenue. Although the significant differences between federal and local regulation existed until the early 2000s (Chang, 2005), the possibilities for the regions to manipulate the transfer of tax revenue to the federal government went down relatively quickly. While in 1993 about 30 regions declared plans to “withhold” the federal share in tax revenue, not a single one really implemented them. In 1996 St. Petersburg was the only region withholding 20% of the land tax revenue. There were only seldom attempts of open “budgetary separatism” in the 1990s. After the crisis of 1998 several regions announced the decision to block the federal portion of tax revenue, and the parliament of Kalmykia (one of the national republics in the Southern part of Russia) decided to stop payments to the federal budget, but quick and severe actions of the federal centre (e.g. the Ministry of Finance stopped funding federal programs on the Kalmykian territory) resulted in abolition of this regulation. Moreover, the major advantages obtained by the regions in bilateral treaties were of non-fiscal nature – control over oil and gas exploration in Tatarstan and Bashkortostan or for the diamond industry in Sakha. The first two treaties with Tatarstan and Bashkortostan allowed these republics to receive all royalties from the natural resources instead of federal centre. However, Sakha, the third region, was only able to enforce the special privileged regime to use part of the federal taxes collected on its territory for the funding of federal programs, i.e. a limitation was put rather on the expenditure than the revenue side of the budget. Later treaties either did not include any fiscal arrangements or were mostly based on the Sakha scheme (if they included any fiscal aspect at all).

Finally, the political asymmetry went down in the 2000s under the new administration of Vladimir Putin. One of the first acts of the new president was to regain control over the federal political structures in regions (what was called “strengthening the vertical of power”): in 2000 seven new federal districts were established in which presidential representatives (mostly with a background in the military or security service) obtained the right to oversee the selection and placement of personnel in local branches of federal authorities (Ross, 2003). Furthermore, regional governors lost a significant part of their influence because of institutional changes (like the reform of the upper chamber of the Russian parliament, the Federal Council, or the right of the

president to remove a governor from his office; see Hyde, 2001) accompanied by a strong public support for the new president. Meanwhile the degree of asymmetry between regions in tax distribution remained significant: Magadan was able to get about 98% in 2003 of the whole tax revenue and may be compared with the most “secessionist” republics of the early 1990s. Indeed, the standard deviation of shares of tax collection de facto attributed to regional budgets increased significantly in the last six years (*Figure 3*).

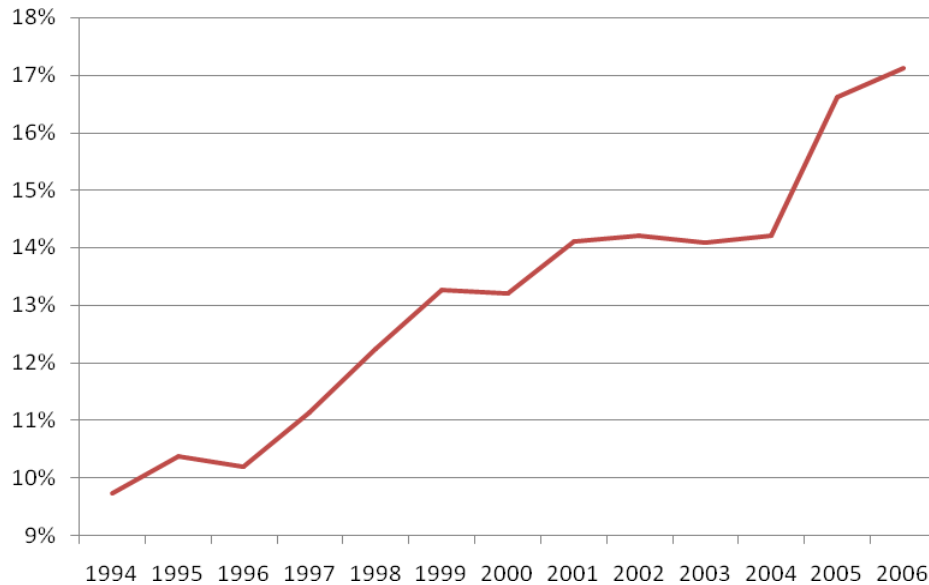


Figure 3: Standard deviation of the region’s share in the tax revenue from its territory

Sources: Goskomstat, Ministry of Finance, Federal Tax Service, Federal Treasury; Freinkman, Treisman and Titov (1999)

3.2. Manipulation of tax collection effort

Throughout the last two decades the tax collection in Russia remains a difficult task. First, Russia experienced increasing tax evasion in the first ten years of transition resulting from a deficit of current financial assets and the so-called “mutual arrears networks” (unsettled claims of enterprises persisting for years) of the early 1990s, of low tax morale and of a legitimacy deficit of the state as well as inefficient enforcement (see e.g. Yakovlev, 1999, Wintrobe, 2001 or Alm et al., 2006). In 2002-2003 the share of the shadow economy accounted for 48.7% of Russian GDP (Schneider, 2005). After 2000, a consolidation of government (with increasing pressure of tax authorities and state-loyal decisions of courts), internationalization of Russian businesses requiring an increase in transparency (Yakovlev, 2005) and advancements in tax reform (Jones Luong

and Weinthal, 2004) seem to have made evasion less attractive. Moreover, the tax burden was weakened by the introduction of the flat tax on personal income. Although empirical studies on its effect are inconclusive (Ivanova, Keen and Klemm, 2005), it appears that it mainly affected tax revenue because it has facilitated tax collection and thus reduced the extent of tax evasion. After a permanent increase of tax arrears as a share of GDP or budget tax revenue, this indicator seems to go down since 1999 (*Figure 4*).

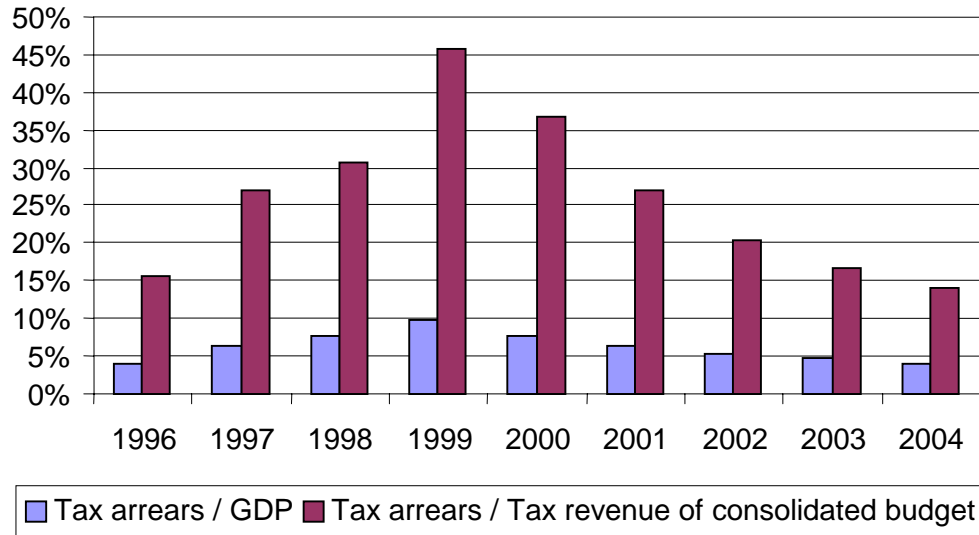


Figure 4: Tax arrears in the Russian Federation (as of December 31 of respective year)

Source: Goskomstat

Nevertheless, tax evasion remained an important problem for the Russian economy. Even in 2003-2004 it exceeded 40% of taxes paid when considering the so-called “spacemen schemes” (which include the creation of a short-life firm) of an average firm only (Mironov, 2006).

In the world of huge tax evasion, tax collection authority is obviously unable to track any hidden source of revenue. However, not only the tax audit was problematic; tax collection has also not been an easy task because of huge enforcement problems for the tax administration (Shleifer and Treisman, 2000). In fact, in the 1990s companies often voluntarily declared tax arrears (i.e. claimed but unpaid portion of taxes), since the general deficit of liquidity and the virtually absent bankruptcy law allowed them to operate even without paying the taxes, which they recognized. The latter became subject of various “mutual recognition” schemes, i.e. joint cancellation of fiscal claim of the government to the enterprise (for the regional portion of taxes) and of government’s debt to the enterprise (e.g. for goods and services), often providing substantial gains to (mostly regional) bureaucrats and politicians, not only in

providing substantial gains to (mostly regional) bureaucrats and politicians, not only in form of individual payments, but also through re-allocation of control over attractive assets and financial flows for themselves and their privileged companies or electoral support (Treisman, 1998; Kuznetsova et al., 2002).

On first sight, this setting seems to be a violation of the basic model described in the previous section; however, in fact it just shifts the problem of tax collector on a different level. Instead of finding out the “hidden” tax base the issue is to force the enterprises to comply with a specific scheme of settlement for tax debt allowing the government to receive certain gains from the taxpayer. Once again, in an environment where liquidity deficit is omnipresent, the tax collector has to allocate its effort to force the taxpayer to comply with a settlement scheme preferred by a certain principal. In fact, the only difference is that as a result of strategic tax collection preferred principal receives not the fiscal revenue, but other benefits, while the arrears disappear through mutual recognition. The other principal remains with her own tax arrears. Obviously, in this environment *tax audit* is irrelevant, but *tax collection* is still a problem. Moreover, the recognition schemes were often an outcome of bargaining. Pappe (2002) suggests that governmental agencies were likely to lose in a confrontation with private businesses during the period studied (including tax matters); however, if consolidated, they were able to succeed in any conflict. Thus, the efforts with respect to negotiations over concerted action of different agencies could be also manipulated, heavily affecting results.

Though the issue of claims settlement became less important since the liquidity crisis went down, the “traditional” problem of “finding out” the “true” tax base also remained a huge issue for the Russian tax collecting authorities throughout the last two decades (under both Yeltsin and Putin). In this setting, strategic tax collection also played an important role. As mentioned above, one of the channels of strategic tax collection is the allocation of efforts in lawsuits. In Russia, a lawsuit in taxation matters has not just been a formal step, as one probably would expect given the low degree of judicial independence in Russia: Russian tax authorities are notorious for a relatively low success rate in the court. This is true not only for the period of the “weak state” under Yeltsin, but also (contrary to the common belief) under Putin. According to the data provided by the federal tax authority itself, in 2001-2005 72% of all disputes were settled in favor of the taxpayers. Moreover, even weighting by the size of the claim, the rate of success of taxpayers in 2001-2003 exceeds 60% (and reaches 80% in 2002), though it decreases to less than 50% in 2004 and 32% in 2005.³ In a random selection of 160 deals in transfer pricing mat-

50% in 2004 and 32% in 2005.³ In a random selection of 160 deals in transfer pricing matters in 2002-2004 tax authorities lost about 84%, mostly because of lacking evidence and bad documentary backing of deals (Rodionov, 2005). The officials are often not thorough enough while preparing the documents for the court. This effort is, however, crucial for the outcome of the legal procedure. Hence, manipulating this effort in an environment of large tax avoidance, tax authorities can pursue the goals of strategic tax collection.⁴ Notice, that although *individual* claims of the tax authority might as well be erroneous (or used as a source of rent-seeking of uncontrolled bureaucrats), *in aggregate* in an economy with huge tax avoidance they are likely to be correct.

To conclude, there are reasons to believe that the Russian federalism meets two main requirements for studying strategic tax collection. However, these requirements are sufficient to expect the presence of strategic tax collection, but not enough to predict the potential main beneficiary of the strategic tax collection (and therefore identify the federation-centered and region-centered designs, necessary to formulate empirical hypotheses). This is what we will attempt in the following subsection.

3.3. *Informal practices and tax collection under Yeltsin and Putin*

The discussion of the fiscal federalism in Russia under Yeltsin makes it reasonable to look for instruments which are able to establish a link between economic heterogeneity and political asymmetry to fiscal asymmetry. From this point of view the *de jure* structure of the tax system should be confronted with the *de facto* organization of tax collection and distribution in Russia. Technically speaking, the federal tax administration collects all tax payments from individuals and legal entities on an account in the Federal Treasury (*Kaznacheistvo*) that are then distributed between different governments and governmental entities. That means that all regional governments just receive their portion of tax revenue from the federal tax service (Lavrov, 2005). The

³ By the way, this difference also supports our idea of strategic tax collection: obviously, tax authorities seem to put more effort in disputes with larger prize to win.

⁴ The fact that tax authorities often address taxpayers with claims which they cannot justify is acknowledged by the high-ranking officials of the Ministry of Finance (see e.g. the interview of Ilya Trunin, head of the Department of Tax Policy, to polit.ru, 2008, January 17). Often the tax administrators are guided by a formal or informal plan, setting their goals to the “overall tax collection”, and therefore have clear incentives to set higher claims, given their effort to collect them cannot be monitored completely. Even an unjustified claim is not “completely lost” for the tax authority. The taxpayer also compares the expenses of a legal process to defend her rights (involving substantial costs) and the benefits; in case of a smaller claim the decision could be just to “pay and forget”. However, the costs for a taxpayer depend on the efforts the tax administrators put into their claim.

federal tax service does formally not rely on regional administrations from the point of view of tax collection or enforcement, nor does it require any cooperation from the regional governments. There are also no regional law enforcement agencies (several attempts to introduce a “municipal militia” were crushed by the federal centre) and no regional courts.

However, the real bureaucracy of the federal tax service does not operate as smoothly as prescribed by the law. The main reasons for that are typical for the Russian bureaucracy in general (and, actually, for most bureaucracies of developing and transition countries): low qualification of public officials, often abuses of power by public officials, high corruption etc. In this imperfect world regions could use a variety of strategies to shift revenue in favor of their budgets, e.g. “monetary surrogates” and non-cash tax collection, extra-budgetary financial establishments with quasi-mandatory contributions of private entities etc. Some of these institutions flourished in the 1990s, while others managed to survive in the 2000s, and have been well studied in the literature (e.g. Genkin, 2000, Lavrov et al., 2001, Gaddy and Ickes, 2002). We focus on one particular strategy, which could drive the development of the retention rates, i.e. the “capture” of local tax administrations by the regional governments. Regional politicians and bureaucrats were able to develop personal relations with the officials of tax services, who, because of absent territorial rotation, stayed in their offices for years. Given the bad federal financing of the public service, regions could provide additional benefits for the employees of regional tax collection authorities (e.g. housing assistance). Finally, although formally tax administrators were completely autonomous, in reality the cooperation of regional governments was quite helpful or even necessary to deal with large taxpayers with significant political capital which became an issue of bargaining between governments and agencies (Enikoplov et al., 2000; Dabla-Norris et al., 2000). This environment facilitated the emergence of tax arrears.

Of course, it would be farfetched to claim that all regional tax authorities were successfully “captured” by the regional governments: in fact, conflicts between regional governments and federal branches were also present. However, capture seems to be an important factor determining the behavior of a great number of local tax collecting agencies. Moreover, the use of different strategies may be complementary. For example, the abovementioned “mutual recognitions” for regional portions of tax arrears seem to have significantly exceeded those for federal portions of tax arrears, thus, once again, reproducing the de-facto fiscal decentralization result (see Schetnaya Palata, 2000); in order to facilitate mutual recognition schemes (and to get benefits from them) governments used quasi-money, extra-budgetary funds etc. However, the

them) governments used quasi-money, extra-budgetary funds etc. However, the support of tax authority is of course key to any endeavor dealing with taxes calculated according to the law. Anyway, the environment observed in the Russian Federation in the 1990s resembles the region-centered setting described in Section 2; therefore the following hypothesis could be formulated.

Hypothesis 1: In the 1990s (under Yeltsin's presidency) regions with *higher* tax arrears are more likely to exhibit ceteris paribus *higher* fiscal decentralization in terms of tax revenue attributed to the federal centre.

As already mentioned, political changes under the administration of Putin seem to reduce the willingness and the ability to manipulate taxation in favor of the regions. Nevertheless, the tax avoidance remained huge, and there is also no evidence that the quality of bureaucracy in Russia increased. Given the shifts of bargaining power between the federal centre and the regions one could thus expect that the strategic tax collection behaviour changes in line with the second (federation-centred) setting, giving rise to the following hypothesis:

Hypothesis 2: In the 2000s (under Putin's presidency) regions with *higher* tax arrears are more likely to exhibit ceteris paribus *lower* fiscal decentralization in terms of tax revenue attributed to the federal centre.

In fact, the measures of the federal centre to improve monitoring and control over regional branches of federal ministries seems to set incentives necessary for the local tax authorities. Consider the most obvious way of providing incentives for the local officials: personnel policy. Unfortunately, there is no empirical evidence with respect to personnel changes in the regional tax authorities. However, there is some anecdotal evidence from other regional branches of federal law enforcing agencies, that the federal government started an active personnel restructuring since 2001 in order to ensure higher loyalty of regional authorities to the federal centre and to break the informal connections between local governments and local branches of federal agencies. For example, in 2001 the Federal Ministry of Internal Affairs (which is also responsible for the police in Russia) changed the heads of its regional branches in 7 regions; in 2002 it were 13 regions, in 2003 25 regions and in 2004 22 regions. Most successors of the heads of regional police offices were not appointed from the regional staff, like it used to be the case in the 1990s; mostly they came from other regions or from the federal bodies of the Ministry (Voronov, 2005, see also Petrov, 2009 for other federal authorities). It is likely, that other local branches of federal

ministries expected similar changes (which were only partly reported by the press). But even if there were no direct changes in the tax collection service since 2000, the very experience of other ministries and services could have a strong impact on the behavior of regional authorities.

However, the principal-agent framework presented above does not provide any arguments regarding strategic tax collection under increasing centralization, typical for Putin's presidency. On the contrary, since the influence of regional authorities went down, there seem to be no reasons for continuing strategic tax collection; the federal government, regaining control over regional tax authorities, could implement its aims through formal legislation (and indeed, the tax reforms since 2000 partly aimed at increasing the share of tax collection attributed to the federal government). An alternative point of view is offered by the discussion of the semi-authoritarian regime in Russia, mostly originating from political sciences. The main idea of the approach is to differentiate between "classical" authoritarianism, in which the central government is able to enforce its objectives against other political groups via direct pressure, and the "hybrid regime", or "semi-authoritarianism", in which the central government enforces its aims through indirect or hidden channels, imitating the "formal" democratic framework of developed countries (Olcott and Ottaway, 1999; Levitsky and Way, 2002; Furman, 2007). Technically, one assumes the additional constraints for the federal centre to change the institutional environment in its favor.

This "imitation" results from a variety of reasons. First, unlike "classical" authoritarian regimes, semi-authoritarian governments have a vested interest in the integration in the international community and hence in complying with the rules of democratic societies (at least formally). Second, it can follow from a relatively weak power concentration (as compared to "classical" authoritarianism), which makes the use of "indirect channels of control" inevitable. The idea is that of the "blackmail state" described by Darden (2001): the federal government is interested in semi-illicit activities of regions to obtain an additional instrument of control. Formal redistribution of tax revenue between the centre and the regions could be politically undesirable after certain thresholds are passed; so, the federal centre may also be interested in strategic tax auditing as a "hidden" instrument to ensure the re-centralization goals while formally complying with the "rules of conduct" established for democratic federations in the international community. Hence, the semi-authoritarian approach also provides some background for *Hypothesis 2*.

4. Data

Our analysis covers the period of 1995-2006 (12 years), which includes practically the whole history of Russian federalism – from the period of “regional feudalism” in the mid 1990s to the current “vertical of power” under President Putin. The analysis covers all regions of the Russian Federation excluding nine autonomous okrugs⁵ and the Chechen Republic for which no reliable data are available. Thus, we observe 79 regions annually.⁶ Following the discussion above, we estimate the influence of tax arrears (as explanatory variable and proxy for tax collection efforts) on the distribution of tax revenue between the centre and the regions, controlling for alternative factors. From *Hypotheses 1* and *2* we expect a positive sign of tax arrears in the regressions with fiscal decentralization as dependent variable in Yeltsin’s governing period and a negative sign in the Putin period.

The empirical regression estimated is specified as follows:

$$SHARE = \alpha_0 + \alpha_1 ARREARS + \alpha_2 TAX_STRUCTURE + \alpha_3 LEGAL_CONTROLS + \alpha_4 POLITICAL_CONTROLS + \varepsilon.$$

where

- *SHARE* denotes the share of regional government in the overall tax revenue of the region (retention rate);
- *ARREARS* denote the tax arrears;
- *TAX_STRUCTURE* denotes the control variables associated with different tax structures in different regions;
- *LEGAL_CONTROLS* denote the control variables due to the legal structure of the federal organization in Russia and
- *POLITICAL_CONTROLS* denote the control variables due to political asymmetry of bargaining power and of preferences in Russia.

In what follows, we discuss the variables of the regression in greater detail.

⁵ One autonomous okrug (Chukotka) is not part of another member of the Federation; therefore Goskomstat provides statistical data for this region in full scale, and it could be included in our research.

⁶ We are forced to exclude Kalmykia in 2006, since in this year it reported negative revenue of the federal government from its territory (because of the VAT repayment). This is not the first time in the history of the Russian federalism a region reports negative tax collection: in the early 2000s Taimyr autonomous okrug (not part of the sample) reported negative fiscal revenue of the regional government due to tax optimization by Noril’ski Nickel, its largest taxpayer. Moreover, for Kurgan and Tula in 2005 retention rates larger of 100% were obtained; the data seems to come from statistical artifacts of comparing information of different sources and hence were also excluded.

SHARE: This indicator is obtained by dividing the revenue of the regional government from taxation originating from a certain region by the overall tax revenue from its territory. We use the “consolidated” regional government including both government of the region and local governments.⁷ A higher share represents less centralization as defined above.⁸

ARREARS: An advantage of the Russian dataset is that there are data available on tax arrears for most of the regions and at least from 1995 onwards as reported by the federal statistical authority. The reported tax arrears in Russia include (1) tax obligations, which are claimed by the tax authorities, but were not paid by the taxpayer (*nedoimka*), (2) restructured tax liabilities (e.g. when the payment of taxes was officially delayed), (3) tax liabilities not collected in due time because of the bankruptcy of the taxpayer, (4) tax liabilities, currently under collection by the court executives (bailiffs) and (5) liabilities from stopped tax collection activities. This measure has certain advantages and disadvantages. For example, it can also be influenced by events like bankruptcy of large taxpayers or “wrong” claims of tax authorities, which could be later suspended by the court. One should be aware that the measure is not an indicator of the shadow economy and therefore does not measure the overall economic activity, which is “ignored” (consciously or not) by the tax authorities and therefore does not represent the *tax auditing* activity. However, it seems to be a good proxy for *tax collection* activity as defined above.

The problem is unfortunately that, on the one hand, increasing tax arrears may indicate less severe *tax collection* activities, but may on the other hand result from more intensive *tax auditing*. The reasons are straightforward: tax due identified by the tax collection authority is first registered as tax arrears and later (often after a decision of a court) “transformed” into real tax payments. The main question is therefore whether tax collection or tax auditing activity is really relevant for Russian federalism. The arguments above do not discriminate between these two processes. However, as already mentioned, in the liquidity crisis environment under Yeltsin it was the tax collection, and not the tax auditing issue, which dictated the fiscal process; under Putin tax collection remained a non-trivial activity and therefore still constituted a significant issue. Thus, our approach to the interpretation seems to be justified. Finally, in section 7 we deal with

⁷ Throughout the paper the *consolidated regional budget* comprises the overall budget of the region and all subordinated jurisdictions (municipalities). Since Russian regions are highly centralized and municipalities depend on the regional governments in their essential tasks, this is a reasonable indicator to use.

⁸ Since the variable is bounded between zero and one, it is sometimes suggested to perform a log-odds transformation ($\log(\text{SHARE}/(1-\text{SHARE}))$) to obtain the independent variable. We have used it for robustness checks and did not find any significant differences in the results of the estimations.

alternative explanatory variables, which are, unfortunately, available only for a short time period, and also provide some tentative evidence in favor of our interpretation of tax arrears.

Tax arrears used in the study accumulate for all taxes due to all levels of government of the Russian Federation (i.e. include both “regional” and “federal” taxes, as defined by the Russian tax law). The reason is the existence of joint taxation which in fact forms the main revenue source for regional governments. As already mentioned, any joint tax can be more or less attractive for regional governments (or for the federal centre) assuming different distribution of tax revenue: therefore the tax collection effort could vary. It is probably helpful to assume that different taxes are more or less attractive for different levels of government *as opposed to each other* rather than to use a dichotomy of “attractive” or “not attractive” forms of taxation. The indicator used in regressions is therefore tax arrears per unit of gross regional product (the normalization is needed to account for significant differences in terms of size of regions in Russia).⁹ We square this indicator in order to account for non-linearity in the relation between tax arrears and decentralization.¹⁰ Indeed, the strategic tax collection activity is non-trivial for tax authorities and associated with additional effort for *organizing strategic tax collection*. Since this effort at least partly has the character of fixed costs (or, at least, is decreasing with experience because of learning effects), it seems to be reasonable, that only if tax arrears become very large, the officials start really thinking about strategic tax collection; the increase of tax arrears over-proportionally increases the incentives to engage in this activity if high levels of tax arrears relative to the regional economy are reached. For the panel data specifications we include two tax arrears indicators: under Yeltsin and under Putin. Both are equal to tax arrears per unit of GRP for the periods of administration of the respective president and zero otherwise. So, we consider as an independent variable an interaction term between a time effect and tax arrears.

TAX_STRUCTURE: We include two variables accounting for economic differences among the regions. By including controls we, first, capture other factors leading to asymmetries between regions in the tax split between the regional and the federal budget. Mostly, they cover economic asymmetries or differences in tax base endowments. Their major effect is that they in-

⁹ A disadvantage of this proxy for tax collection effort is that we had to exclude nine Russian regions (the so-called “autonomous okrugs” which are officially both members of the federation and parts of other larger regions), for which GRP data are only available until 2000, for the aims of consistency of annual cross-sections.

¹⁰ Estimations without squaring tax arrears yield almost the same results: the effect for Yeltsin survives and for Putin there are even more significant and negative outcomes (since Kalmykia becomes more influential). Specifications

fluence the ability of regions to collect different types of taxes. Under equal rules for distribution of tax revenue from a region, great disproportions in the structure of tax revenue effectively allow regional governments to have a different share in the tax revenue of their territory. We control for variables roughly representing two sources of taxation: the *flow of economic activity* (average income per capita) and the *stock of economic assets* (capital funds).

LEGAL_CONTROLS: Another group of controls represents formal factors leading to differences in tax sharing. From this point of view we include a dummy variable for Tatarstan and Bashkortostan. As mentioned above, these two regions were the first to enter the direct bilateral bargaining with the federal centre in the early 1990s and to sign separate power-sharing agreements, which allowed these republics to receive all excises and rental payments for the natural resources instead of the federal centre (Lavrov, 2005). Therefore it is reasonable to assume, that these two regions have a significantly different share of taxes attributed to their budgets. There are reasons to claim that the effect for these two territories differed substantially under Yeltsin and under Putin; hence, the regressions actually include two dummies: for these two republics in 1995-1999 (Yeltsin) and 2000-2006 (Putin).

POLITICAL_CONTROLS: Finally, we include control variables capturing political bargaining power and preferences of the regional elite vis-à-vis the federal centre. Naturally, these factors are partly captured by the tax arrears structure. It has also been demonstrated by previous empirical studies cited above, that political bargaining power plays a role. However, even if the other regions apart from Tatarstan and Bashkortostan cannot directly influence the distribution of tax revenue, they still have an opportunity to bargain with the federal centre in order to set taxes split in a particular way, which favors particular jurisdictions given their endowment with a tax base. Therefore bargaining over policies regarding the *whole federation* becomes an instrument of *selective* support of different regions. There is some anecdotal evidence that strategically acting governments influence the federal decisions on the distribution of overall taxes (for the whole Russian Federation) to their advantage (see Petkov and Shklyar, 1999). Also, preferences account for a desire of regional elites to invest more heavily in the bargaining process. From this point of view we estimate all regressions with and without political variables, in order to check the robustness of results (but only regressions with political variables are reported in the paper).

with linear *and* squared term are hard to justify theoretically, and, once performed, yield highly non-robust outcomes with mostly insignificant coefficients.

Political variables, generally speaking, include two main groups: differences in bargaining power and in political preferences. The following bargaining factors are considered:

1. Economic potential of the region: territory, population and share of oil and gas extraction in the region (due to importance of these resources for Russia). The variables of economic potential (especially oil and gas share) represent both political bargaining power and differences in the structure of tax bases and therefore have a double role in our model.

2. Formal status of the region. The formal structure of the federation was inherited from Soviet times and, unlike the absolute majority of federations with a unified regional unit, includes territorial units of three major types: republics, administrative units (oblast, federal city or krai¹¹) and autonomous okrugs. National republics are often argued to enjoy special privileges as compared to other units of the federation (Filippov and Shvetsova, 1999); that is why we include a dummy for republics in our regressions.

3. The ability of the region to secede (which is higher for border regions, for regions with higher distance from the capital and for regions with lower share of ethnically Russians). We include two variables to capture this effect: a dummy for border regions and the geographical distance between regional capitals and Moscow.

4. Over- (or under-)representation of the region in the lower chamber of the Russian parliament. Since 1993 the Russian parliament consists of two chambers: the Council of Federation, which includes one representative of the region's legislature and one representative of the region's governor administration, and the State Duma, which consists of 450 deputies, 225 elected by a system of proportional representation and 225 elected in single member districts. The mal-apportionment in the State Duma is of greater interest, since the mal-apportionment in the Council of Federation is basically covered by the population variable among the controls (for influence of mal-apportionment on political decisions see Samuels and Snyder, 2001).

5. Power concentration within the office of the regional governor or president and conflict potential with the centre. The most common way to measure power is to discuss electoral statistics (share of governor in the latest elections or years in office). The conflict potential with the centre is often measured by the partisan status of the governor (e.g. Communist governors in the 1990s or support of pro-presidential parties *Our House Russia*, *Unity* and *Unified Russia* in the elections of 1995, 1999 and 2003). Other indicators and expert opinion could be applied. They all

¹¹ Yevreiskaia autonomous oblast has a similar status, although formally belongs to national units of the Federation.

are questionable to a certain extent: In Russia, cheating and administrative manipulation of elections make their results less meaningful for analysis. The Communist governors used to establish excellent contacts with the centre after their elections and expert opinion is always subjective. Nevertheless, in this paper we reduce the variety of possible indicators to the power index of Jarcinska (2004), partly including other indicators discussed above.¹²

6. Dependence upon federal transfers. High centralization of tax revenue resulted in a relatively high dependence of many regions from the central transfers to fulfill even their basic responsibilities. Once again, there is a *de jure* dimension of federal grants (which officially followed a predetermined scheme) and *de facto* dimension (for example, political reasoning behind the grants distribution). The transfers are likely to influence both the size of tax arrears (since they act, to a certain extent, as a substitute for regions' own tax revenue) and the degree of decentralization (through the regions' bargaining position over general rules of tax collection); hence, in order to avoid the omitted common cause problem, we have to control for the impact of transfers. The issue of transfers is interesting, as it represents a trade-off for the regions: to pay more taxes and (probably) to receive higher compensation in form of transfers or to pay little taxes and loose a claim for financial support from the centre. In a real world setting with asymmetric information it is possible that a region uses both strategies or switches from one strategy to another. Regions with a relatively high bargaining power can succeed in both strategies. We include the share of fiscal transfers in total expenditures of regional governments to account for this effect. Obviously, the timing of events should represent an important feature from this point of view: if transfers are distributed before tax collection effort is made, there should be no effect on tax collection. However, from the empirical point of view this issue seems to be relatively intransparent. Governments collect taxes throughout the year (partly on quarterly basis), and hence, there is no clear "timing" vis-à-vis transfer decisions. Moreover, the relations between regional and federal governments could be analyzed as a repeated game for which expectations should play an important role.¹³

¹² The index is calculated for 1995-2000; there is no information after 2000 available. Since there have been a number of significant political changes in Russia after this period, we include, once again, two variables: Power (1995-2000) is equal to the actual variable in these years and zero otherwise; Power (2001-2006) is equal to the power index in 2000 for the years 2001-2006 and zero otherwise. The interpretation of the respective coefficients, even if they are similar, ought to be different: the latter rather reflects the path-dependent effect of power asymmetries in the 1990s persistent even after Putin's recentralization.

¹³ One should finally notice that a yet additional parameter of the fiscal system able to influence the logic of our study is public debt. From the point of view of public debt, Russian regions and municipalities received loans and

The simplest way to measure the heterogeneity in political preferences is to consider the ethnic composition of a region (share of non-Russian population) as well as other socio-demographic indicators. In this study we included the urbanization indicator, which proved to be significant in other empirical papers on endogenous centralization.¹⁴ Moreover, there are significant differences in the democratization levels of different Russian regions which also account for heterogeneity of preferences (but also for peculiarities of regional political process). We use the Carnegie Endowment index of democratization, which covers all regions in our analysis and varies over time. Some bargaining indicators (like average income per capita) also may be considered as a proxy for heterogeneous preferences. A detailed description of all variables and the summary statistics are provided in *Appendix A*.

5. Econometric strategy

As mentioned above, economic and political asymmetry of Russian federalism and the transition from Yeltsin to Putin during the period of observation create a series of econometric problems. Therefore we use a four-stage research strategy.

First, in order to get a general “impression” on the specifics of the data, we estimate individual annual cross section regressions by OLS. An advantage of the Russian Federation is that the high number of regions renders this approach statistically feasible. Already at this stage, as well as in the case of panel data regressions, we perform a simple outlier control as an additional robustness analysis ensuring normal distribution of residuals in order to make correct inference in a still small sample. Yet we do not take annual cross-sections as the main source of inference in our analysis; therefore the results are reported only in the appendix.

Second, we address the problem of unobserved heterogeneity (both region-specific and time-specific) and run panel-data regressions with Newey-West corrected standard errors. We es-

issued bonds of different types (Danielyants and Potanina, 2007); moreover, in the 1990s it has been common practice for governments in Russia to delay wages and salaries for public employees and officials, as well as other payments indefinitely. Tax arrears partly include delayed tax payments; that is why public debt decisions can be (voluntarily or involuntarily) determined by the problems of tax administration. However, this relation does not pose any problem for our empirical analysis given the aim of this paper. Another direction of causality (public debt influences the quality of tax administration) is less reasonable: it is hardly possible to imagine a government relying on debt if tax revenue is available (even if one ignores all budgetary principles, it is illogical, since tax revenue is “cheaper”). There is still one aspect of the debt problems which is relevant: if the payments to tax administrations are delayed, it will influence the quality of their work. However, there is no data available to measure these delays for individual regional tax administrations over the period of our sample.

¹⁴ Although this indicator may also represent a higher bargaining power of metropolitan areas.

timate pooled cross-sections-time series models as well as one way and two way fixed effects regressions (time and cross-section). Regional fixed effects are helpful, as they account for unobserved heterogeneity among regions, which seems to be very strong given the extremely asymmetric spatial structure of the Russian economy and the political constitution of Russian federalism; pooled cross-sections and one way time fixed effects allow the direct inclusion of institutional variables (which often do not vary across time) into our model. Pooled OLS includes a dummy for all years when Vladimir Putin was in office, so that one can directly observe the changes induced by the transition of power. Under Putin the development of tax arrears and the distribution of tax revenue may be driven not only by strategic tax collection, but also by tax reform described above. One can consider it an omitted variables problem: the increase of both tax arrears and the share of taxes attributed to the federal centre are driven by a third variable (tax reform and intensification of overall tax collection activity). Time FE and the Putin dummy are instrumental to cope with this problem.

In order to form separate variables for the Yeltsin and Putin tax arrears (as considered above) and the dummy variable for Putin's presidency we count the year 2000 as the first year when Putin was already in office. Indeed, Putin became acting president on December 31, 1999. The first shift in the structure of federalism was in May 2000, as the president appointed his representatives to the newly established "federal districts" in order to control local governors. Moreover, the year 2000 was associated with a rapid change of informal rules of the game; combined with expectations of further centralization by regional officials, one could expect the changes in strategic tax collection behavior already in 2000. However, since Putin's rise to power was extremely quick and completely unexpected for both population and local elites (in fact, in 1999 most influential governors counted on the alternative candidate, former prime minister Yevgeniy Primakov), one should not expect any changes in tax collection due to shifts in expectations in 1999, and hence, it is reasonable to attribute this year to the "Yeltsin period".

Third, as mentioned above, the asymmetric character of Russian federalism is likely to cause problems of outliers. In particular, this outcome seems to be plausible for the Putin period, since the standard deviation of both fiscal decentralization indicator (*Figure 4* above) and tax arrears (*Figure 5*) increased significantly. The latter trend can be attributed to increases of tax arrears in a small group of regions, particularly in Kalmykia, where tax arrears exceeded the size of its GRP or were nearly equal to it. Kalmykia did not show up as outlier in the previous analysis

based on large error terms; however, an extreme size of the variable for this observation can still influence the outcomes of the analysis. The reduction of standard deviation in 2006 is due to the already discussed exclusion of Kalmykia from the sample.

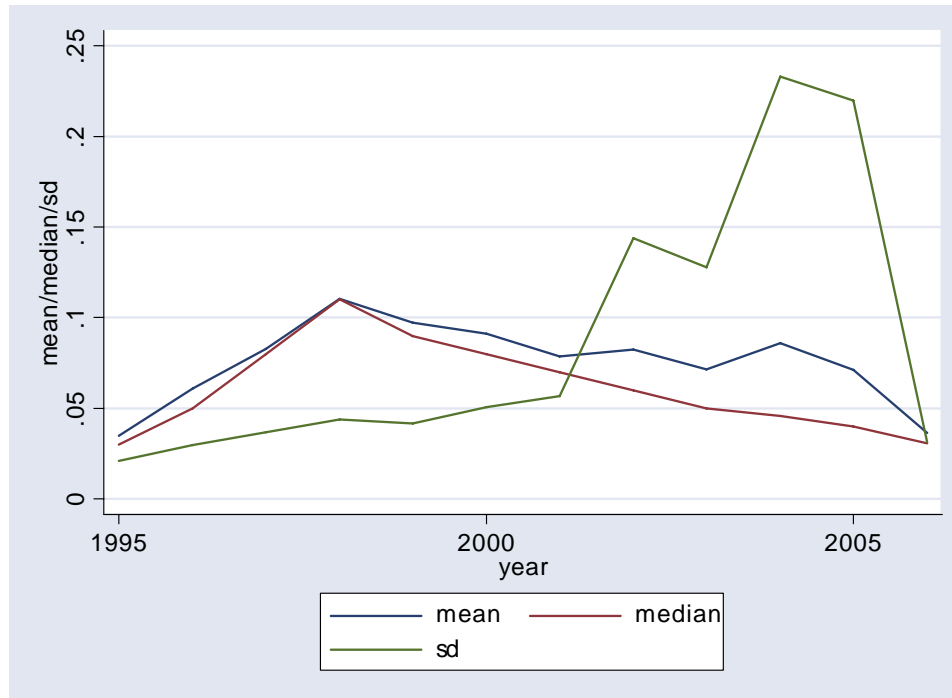


Figure 5: Statistics for tax arrears per unit of GRP for the regions in the sample of this paper

Source: Goskomstat

Generally speaking, the situation in Kalmykia confirms the explanation presented above. During the 1990s this region functioned as a kind of “internal tax haven”: extremely loyal policies of the local tax authorities combined with the reduction of a region’s share in tax rates and privileged treatment of companies with the majority of operations outside the region made it attractive for a huge variety of firms, including several large oil giants, which used Kalmykia for their transfer pricing design. On the other hand, the region had one of the strongest authoritarian regimes in post-Soviet Russia even compatible to that of post-Soviet Central Asian republics (see Gel’man, 1999). The government of the Republic dominated its economic structure. Kalmykia used to be not only one of the strongest, but also one of the most eccentric regimes, often directly opposing the federal government or declaring its region an “independent state” within the Russian Federation. That is why after Putin’s rise to power Kalmykian president Iliumdzinov had to have more fears than his counterparts in other Russian regions. Kalmykia was also partly subject to busi-

ness-government struggles of the mid-2000s, associated with tax auditing of the largest Russian oil companies like Yukos or Sibneft, previously using the Kalmykian offshore. The problem of outliers requires careful econometric modeling.

The previous steps already included outlier control based on tests on normality of residuals. In the third stage, however, we explicitly address this issue using two main instruments. First, we estimate least absolute deviation (median) regressions with bootstrapped standard errors, which are known to be more robust to samples with significant outliers. Second, we repeat all estimations performed in the steps one through three excluding observations with very large values of tax arrears and with known atypical tax policies. In particular, we exclude three regions: Kalmykia, as well as Ingushetia and Altai Republic. Both latter regions are well-known for using the described “tax haven strategy” based on the special status obtained (unlike most other tax havens) through presidential decrees to create a more favorable tax regime for companies incorporated in this jurisdictions (partly only for specific large taxpayers associated with influential multi-regional business groups or privileged companies owned by the representatives of the regional elite). We have experimented with excluding further tax havens (Mordovia), but the results do not change; in fact, virtually all results are obtained immediately after excluding Kalmykia. These estimations for a reduced sample often differ substantially from the estimations for full sample.

The need to exclude outliers even in a region fixed effects specification is supported by highly significant Chow test: for both two-way FE and region FE the joint significance test for the variables additionally included in the regression and constructed by interacting all covariates with a dummy for these three regions (but excluding the fixed effect itself) is significant at any reasonable level (and equal to 21.44 and 40.97 respectively). Hence, the effect of these three outliers is not captured completely by the intercept changes (implied by region fixed effects); there seems to be a strong effect on the slope.

Fourth, we address the potential endogeneity bias due to a reverse causality problem (fiscal decentralization may influence tax collection behavior). There are theoretical reasons which make reverse causality questionable though. It is not clear whether the bargaining and economic power of the region depend upon the tax distribution or (as it is assumed by the empirical model) vice versa. Theoretically, there are some reasons to believe that this problem is less relevant for Russia. First, economic policies of Russian regions have been mostly inefficient, and their economic success is mostly limited to agglomeration effects or natural resources. Ahrend (2005)

finds significant effects of fiscal policy on economic performance which, however, vanish in his TSLS regressions. There is some evidence from principal component analysis that fiscal policy can be important for regional economic development reported by Mau and Yanovsky (2002). However, Kolomak (2007) finds that investors are less sensitive to the size or duration of tax exemptions, when implemented, than to the very existence of the investment law, and that the sub-federal tax exemptions are unable to block an unfavorable industrial specialization and low development of infrastructure.

Second, since our paper deals with *asymmetric distribution of tax revenue* and not with *differences in overall tax revenue*, even effective tax policy does not necessarily lead to biased results. There is no consistent point of view in theory as to whether the federal centre or the regions carry out more efficient economic policies; and in Russia with its huge regional variety both variants could be present. Therefore it is difficult to establish a clear backward causal link between tax distribution and economic asymmetry. Nevertheless, Desai et al. (2005) show, that there is a positive relation between some specific indicators of economic performance of the regions and the retention of taxes.

Finally, endogeneity may arise if regions increase their tax administration effort only if they are provided sufficient fiscal incentives in form of high retention rates (see Weingast, 2007). However, first, this logic is more applicable for tax auditing rather than for tax collection. Second, one should understand, that in Russia retention rates represent *outcomes* of interaction rather than *rules of the game* (which, as mentioned, require equal treatment of all regions). In fact, one can be certain that the decision-makers in regional governments and tax collection authorities simply do not *know* the retention rates (these values are never reported and were calculated in a number of English-language publications obviously seldom consulted for regional governors). What they do observe (and manipulate) is their *overall fiscal revenue*; decentralization is just an *ex-post* result of the strategic tax collection and not its goal.

Nevertheless, in order to check for robustness of our results to potential endogeneity we use two procedures. First, we estimate all regressions with lagged variables (i.e distribution of tax revenue in year t is explained by variables of the year $t-1$). These estimations are helpful as tax collection of the current year is partly calculated on the basis of past year's revenues, which can be captured by our additional analysis. However, according to our understanding of Russian fiscal system, taxes are usually collected throughout the year rather than next year (even for income

tax collected by tax agents). Hence, in a rapidly changing environment this specification may seriously miss true interaction of political and economic variables.

The second approach is based on the instrumental variables estimator. We use retail sales and net profits as instruments for both tax arrears under Putin and under Yeltsin. Indeed, these variables may indicate the performance of local enterprises, important for tax arrears formation. As these variables prove to be largely insignificant in the panel and cross section OLS regressions and as there are theoretical arguments that these variables influence tax arrears, they may serve as (weak) instruments when no other, more suggestive instruments are available. Using additional instruments suggested by Treisman's (2003) specification (share of agriculture and share of dominant enterprises) those turn out to be much weaker as instruments. In particular, the Hansen J test statistics largely indicate over-identification. Unfortunately the quality of instruments is much better for the Yeltsin than for the Putin tax arrears.

6. Results

6.1. Strategic tax collection

The results of the four-stage strategy are reported in *Tables 1-4* for panel data and in *Appendix B* for annual cross-sections. Panel data analysis (OLS) and annual cross-sections yield different results. In annual cross-sections we do not find any significant impact of the tax manipulation in the Russian Federation on the decentralization until 2000. Since 2000 we find strongly significant evidence of influence of tax arrears on the distribution of taxes, and the sign of the coefficient is negative in each cross-section, consistent with *Hypothesis 2*. However, the pooled cross-sections (both with and without year dummies or Putin dummy) indicate a non-significant (although negative) sign of tax arrears under Putin. This might indicate an existence of a time trend in some other variables correlated with the tax arrears and hence creating multicollinearity problem and calls to caution in interpreting the results. Tax arrears for the Yeltsin period have the positive sign predicted by *Hypothesis 1*, but are, however, mostly insignificant.

The Jarque-Bera test for all panel data and annual cross-section regressions is significant, such that the hypothesis of normal distribution of residuals must be rejected. This requires us to test on the robustness of the regression results to outliers. While the estimations for Putin period are mostly robust to this procedure, tax arrears for the Yeltsin period hold their sign after the exclusion of outliers and even become significant in all panel data specifications (*Appendix B, Ta-*

ble B2; Appendix C, Table C1). Hence, provided the outliers are excluded, both hypotheses find some support. In order to check the robustness of the results we exclude all political variables (given their relatively “vague” nature, causing the threat of measurement errors) and control the restricted regressions for the normality of residuals. Generally, this analysis does not change our results (*Appendix C, Table C2*) and even yield significant negative coefficients for Putin tax arrears in pooled OLS (indicating that our suggestion of possible multicollinearity might be right). A further robustness check is to estimate regressions for Yeltsin and Putin periods independently (i.e. assuming that slopes of coefficients and intercepts are different for the two regimes). We find no significant influences of tax arrears for the Yeltsin period (with an unstable and only partly theory-consistent sign, see *Appendix D, Table D1*) and non-robust impact of Putin tax arrears (see *Appendix D, Table D3*).

As already mentioned, however, the estimation results seem to be heavily influenced by outliers. The results of the outlier-robust median regressions are striking: we find support for *Hypothesis 1* – a positive and significant impact of Yeltsin tax arrears on the retention rates – in almost all specifications for the full sample (*Tables 1-4*), and also for most specifications in estimations for Yeltsin period (*Appendix D, Table D3*). Putin tax arrears are insignificant and non-robust in terms of sign (*Tables 1-4* and *Appendix D, Table D4*). Moreover, after excluding three outliers with abnormal fiscal policies and/ or extraordinarily large tax arrears – Kalmykia, Ingushetia and Altai Republic – we find convincing support for *Hypothesis 1* regardless of the specification, estimation method and sample (all years or only for the Yeltsin period). The results for Putin tax arrears are not robust in terms of sign and mostly insignificant. Hence, we find strong evidence that, controlling for outliers, regional governments under Yeltsin were able to manipulate tax arrears in a way leading to de-facto fiscal decentralization. The results for Putin period, if present, are driven by several outliers and are not robust to the model specification.

Finally, we use several approaches to account for a potential endogeneity problem. The lagged variables specification basically does not support *Hypothesis 1*: Yeltsin tax arrears are mostly non-robust. The same is true for *Hypothesis 2*. We caution however, that, as already noticed, given the institutional design of the Russian fiscal federalism the lagged approach is not the most reliable one, and hence, consider the results of these regressions as less convincing. *Table 4* reports TSLS estimations for two-way fixed effects specification. For both specifications with and without outliers we once again find significant and positive impact of Yeltsin tax arrears on

the retention rates. Since the instruments for Putin tax arrears are very weak, we also perform the TSLS estimation skipping this variable, and the results do not change (yielding significance at 5% level in full sample and at 1% level excluding three outliers). Finally, fiscal transfers, being used as one of the control variables, are clearly endogenous. Hence, we have also estimated all specifications and models without fiscal transfers and, once again, did not find any significant differences.

6.2. *Determinants of retention rates*

Although our main aim is to test the strategic tax collection hypothesis in the Russian sample, our results may also be instructive in terms of the analysis of factors driving the differentiation of retention rates in Russian regions and thus contribute to the understanding of positive determinants of fiscal decentralization. The results of the panel data analysis partly follow the predicted pattern: higher bargaining potential and/or higher heterogeneity as compared to the Russian average lead to higher decentralization. As expected, the dummy for Tatarstan and Bashkortostan for the Yeltsin period has a positive sign and is significant in all specifications. In the annual cross-sections we find that the republics of Tatarstan and Bashkortostan have a significantly lower share of taxes attributed to the centre than the rest of the members of the Federation until 2000 (when the centralization effort of Vladimir Putin started). They seem to have lost their significant impact on tax collection even before the formal abolition of power sharing treaties in 2002. Even more, for 2004 we find a *negative* and significant effect: it looks like the Putin's government specifically focused on reducing the fiscal autonomy of these two regions. Similarly, it is significant in the Yeltsin regressions in *Appendix D*, but insignificant in the Putin regressions estimated by OLS and negative and significant for some median specifications. In the panel data estimation the dummy republic is significant and has a positive sign in the majority of regressions, representing a higher bargaining power of republics and/or path dependency effects. The dummy for border regions is also almost always significant and positive, indicating higher bargaining power of potential secessionist territories (or relative underdevelopment of the region requiring special treatment). Territory is highly significant and positive, supporting the idea, that territory was used as a bargaining argument in Russia. The effects of population are partly significant, but the sign varies from specification to specification; it is negative without region fixed effects and positive and significant with region fixed effects. The latter sign seems also to be

more in line with the hypotheses, while the former might come from the effects of interaction between territory and population.

However, we do not find any robust influence of the indices of power and democracy on tax distribution (the result is sensitive to the specification of the model because of multicollinearity problems, inevitable for an artificially constructed index).¹⁵ It is possible to interpret this result as indicating a very low transparency of tax relations between the Russian regions and the federal centre. A surprising result is, that regions with a higher share of Russian population were associated with a higher share of taxes remaining in the region (as already noted, this effect was probably achieved through the significance and the sign of the coefficient in the early 2000s). To a certain extent it contradicts the common wisdom that the national republics were more secessionist and interested in decentralization than Russian regions. Indeed, the dummy republic already captured potential secessionist tensions. Nevertheless, the result is still unexpected.

There are several explanations for this. First, regions may be more interested in federal transfers than in taxes. It is true for both more powerful regions (which gain from redistribution on the federal level) and heterogeneous poor regions with large populations. Indeed, the model contains a significant positive effect of fiscal transfers on tax distribution in favor of regions, which does not hold after excluding outliers. Second, the treatment of the city of Moscow with a relatively low share of tax revenue attributed to its government and excellent indicators may influence the regressions. However, Moscow is not an outlier (from the point of view of residuals), and so should not influence the robustness of regressions. Third, it is possible, that higher power and higher heterogeneity cause an opposite effect: the federal government is even more likely to put pressure on these regions. For example, a possible interpretation of the results is that the centralization pressure from the centre in the early 2000s was higher for national than for Russian regions (as the latter were perceived as a larger threat for the unity of Russia). The federal centre seems to be more active in suppressing wealthy regions than poor territories still depending on tax transfers. This policy could include both, specific measures for individual territories or a general design of the tax system. In fact, in the annual cross-sections the share of Russians also has a

¹⁵ Power variable is in fact partly negative and significant, and the results seems to appear more often for the 2001-2006 than for the 1995-2000 variable; hence, shadow of the past, as in case of Tatarstan and Bashkortostan, may support central government's desire to reduce the retention rates for formerly powerful agents (or reflect higher stability of power relations than often perceived).

positive sign; the significant results concentrate in the 2000s (yet separate regressions in *Appendix D* discussed below show that the variable is significant for both Yeltsin and Putin periods).

The dummy for Putin’s office period is highly significant and negative for all models in which it is included: it shows once again the centralization trend in Russian federalism under Putin. Moreover, controlling for time series fixed effects or the Putin dummy does not change the results suggesting that the omitted variables problem due to the Putin tax reform does not affect our regressions. The tax structure variables were mostly unstable or even insignificant, thus supporting the extremely high importance of political factors for tax assignment, which seems to be present in the 2000s. However, a surprising result is that separate regressions for Yeltsin and Putin periods yield basically the same determinants of retention rates (with the exception of legal status dummy for Tatarstan and Bashkortostan). It may indicate that we need to re-evaluate the common perception of crucial changes in the regions-federation nexus under Putin vis-à-vis the Yeltsin period. Under Putin fiscal transfers and democracy seem to play a more important role. The former have positive sign (indicating that the same regions receive higher portion of federal grants and enjoy higher retention rates), but is, as mentioned, virtually impossible to interpret due to the endogeneity. The democracy variable is significant and negative in median regressions, but not significant in OLS.

While for the panel data the set of outliers could be hardly interpreted, the changes in the group of outliers throughout annual cross-sections (*Appendix B, Table B2*) allow for some interesting conclusions. The number of outliers increased in the late 1990s-early 2000 and then went down again; it is the highest in 1998 (the year of the Russian financial crisis) and 2001 (when Putin’s reforms were in discussion). This indicates an unstable situation in the Russian Federation in the “transition period” from Yeltsin to Putin, when regions partly carried out “atypical” economic policies, which cannot be captured by our modeling. Most outliers did not fit the general pattern for the Russian Federation exactly in these years when these regions were more active in carrying out the already mentioned “tax haven strategy” (Ingushetia in the early 1990s, Mordovia in the early 2000s, Altai Republic throughout the period), i.e. used legal possibilities provided by the presidential decrees or loopholes in the legislation to create a more favorable tax regime for companies incorporated in this jurisdictions (partly only for specific large taxpayers associated with influential multiregional business groups or privileged companies owned by the representatives of the regional elite). Unfortunately, absence of transparent and consequent information makes an

ex ante control for this strategy in empirical research practically impossible. The outliers after 2004 on are less easy to interpret, since the internal tax havens were abolished.

Table 1: Panel data regressions (no fixed effects), 1995-2006, dep. var.: retention rate

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	OLS	OLS	Median	Median	OLS	OLS	Median	Median
Tax arrears squared (Putin)	-0.048 (0.032)	-0.045 (0.031)	-0.038 (0.298)	-0.036 (0.290)	-0.417 (0.594)	-0.079 (0.449)	-1.702 (1.450)	-0.520 (1.090)
Tax arrears squared (Yeltsin)	1.391 (0.998)	0.361 (1.056)	1.952*** (0.541)	1.232** (0.550)	2.501*** (0.486)	1.665*** (0.480)	2.174*** (0.558)	1.305** (0.545)
Dummy Putin		-0.075*** (0.017)		-0.079*** (0.012)		-0.061*** (0.014)		-0.073*** (0.016)
Tax structure								
Average income per capita	0.014*** (0.004)	0.015*** (0.004)	0.019*** (0.004)	0.021*** (0.004)	0.013*** (0.004)	0.014*** (0.004)	0.019*** (0.004)	0.024*** (0.004)
Capital funds	-0.069*** (0.019)	-0.073*** (0.020)	-0.082*** (0.023)	-0.094*** (0.024)	-0.052** (0.021)	-0.055*** (0.021)	-0.076*** (0.026)	-0.103*** (0.027)
Legal factors								
Dummy Tatarstan and Bashkortostan (Putin)	-0.003 (0.044)	0.009 (0.047)	-0.037 (0.035)	-0.025 (0.040)	-0.026 (0.043)	-0.017 (0.046)	-0.061 (0.039)	-0.037 (0.040)
Dummy Tatarstan and Bashkortostan (Yeltsin)	0.230*** (0.033)	0.236*** (0.032)	0.178*** (0.036)	0.180*** (0.035)	0.186*** (0.031)	0.191*** (0.030)	0.143*** (0.037)	0.172*** (0.035)
Political variables								
Territory	0.036*** (0.012)	0.036*** (0.012)	0.023* (0.013)	0.026** (0.013)	0.020* (0.012)	0.020* (0.011)	0.007 (0.012)	0.017 (0.012)
Population	-0.004 (0.005)	-0.004 (0.005)	-0.006 (0.004)	-0.005 (0.004)	-0.007 (0.004)	-0.007 (0.004)	-0.006 (0.004)	-0.005 (0.004)
Oil & gas share	-0.028 (0.057)	-0.02 (0.056)	-0.053 (0.066)	-0.015 (0.071)	-0.056 (0.062)	-0.050 (0.061)	-0.017 (0.076)	0.010 (0.075)
Dummy border region	0.027** (0.011)	0.026** (0.011)	0.027*** (0.009)	0.028*** (0.008)	0.014 (0.010)	0.013 (0.010)	0.015* (0.009)	0.019** (0.008)
Distance from Moscow	0.007*** (0.002)	0.007*** (0.002)	0.005*** (0.002)	0.005** (0.002)	0.008*** (0.002)	0.008*** (0.002)	0.007*** (0.002)	0.005*** (0.002)
Dummy republic	0.076*** (0.029)	0.075** (0.029)	0.064** (0.025)	0.061*** (0.022)	0.079*** (0.027)	0.078*** (0.027)	0.081*** (0.023)	0.072*** (0.023)
Overrepresentation in State Duma	-0.013 (0.009)	-0.014 (0.009)	-0.008 (0.008)	-0.006 (0.009)	-0.007 (0.009)	-0.008 (0.009)	0.001 (0.008)	-0.001 (0.009)
Power (2001-2006)	-0.029*** (0.009)	-0.025*** (0.009)	-0.017** (0.007)	-0.011 (0.007)	-0.022** (0.009)	-0.019** (0.009)	-0.013* (0.007)	-0.005 (0.007)
Power (1995-2000)	-0.021** (0.009)	-0.024*** (0.009)	-0.006 (0.007)	-0.008 (0.007)	-0.014 (0.009)	-0.016* (0.009)	-0.004 (0.007)	-0.001 (0.007)
Fiscal transfers	0.128** (0.052)	0.143*** (0.051)	0.051 (0.046)	0.094** (0.045)	0.085** (0.04)	0.099** (0.039)	0.008 (0.045)	0.083* (0.045)
Democratization	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.000 (0.001)	-0.002** (0.001)	-0.001 (0.001)
Share of Russians	0.191*** (0.065)	0.192*** (0.064)	0.135*** (0.052)	0.152*** (0.045)	0.161*** (0.048)	0.162*** (0.047)	0.142*** (0.044)	0.150*** (0.040)
Urbanization	1.755** (0.728)	1.802** (0.709)	0.322 (0.557)	0.246 (0.459)	-0.392 (0.586)	-0.355 (0.570)	-0.715 (0.502)	-0.614 (0.472)
Constant	0.459*** (0.105)	0.488*** (0.103)	0.525*** (0.083)	0.526*** (0.076)	0.586*** (0.081)	0.608*** (0.080)	0.598*** (0.076)	0.541*** (0.069)
Outliers included	Yes	Yes	Yes	Yes	No	No	No	No
No. obs.	945	945	945	945	910	910	910	910
R²	0.493	0.263			0.267	0.530		
Pseudo R²			0.165	0.183			0.190	0.205
F-test	21.49***	20.76***			19.72***	19.92***		
Jarque Bera	234.7***	235.3***			390.0***	429.0***		

Notes: Numbers in parenthesis are robust Newey/West standard errors for first-order autocorrelation (for OLS) and Bootstrapped standard errors (bootstraps n = 1000) for median regressions; ***, **, * indicate significance at the 1, 5, 10 % levels respectively. Significant results are marked bold.

Table 2: Panel data regressions (time fixed effects), 1995-2006, dep. var.: retention rate

	(10)	(11)	(12)	(13)
	OLS	Median	OLS	Median
Tax arrears squared (Putin)	-0.063** (0.026)	-0.061 (0.138)	0.054 (0.319)	-0.135 (0.558)
Tax arrears squared (Yeltsin)	-0.290 (1.115)	1.026 (0.748)	1.080* (0.579)	1.267* (0.726)
Tax structure				
Average income per capita	-0.006 (0.005)	-0.002 (0.005)	-0.004 (0.005)	-0.003 (0.005)
Capital funds	-0.026 (0.024)	-0.044 (0.037)	-0.015 (0.025)	-0.034 (0.037)
Legal factors				
Dummy Tatarstan and Bashkortostan (Putin)	-0.006 (0.055)	-0.056 (0.054)	-0.025 (0.053)	-0.062 (0.055)
Dummy Tatarstan and Bashkortostan (Yeltsin)	0.221*** (0.033)	0.182*** (0.035)	0.182*** (0.029)	0.156*** (0.035)
Political variables				
Territory	0.048*** (0.010)	0.029*** (0.011)	0.032*** (0.009)	0.017* (0.010)
Population	-0.003 (0.005)	0.001 (0.005)	-0.005 (0.004)	-0.003 (0.005)
Oil & gas share	-0.062 (0.064)	0.023 (0.094)	-0.088 (0.066)	0.036 (0.108)
Dummy border region	0.027*** (0.010)	0.023*** (0.007)	0.015 (0.009)	0.015** (0.007)
Distance from Moscow	0.008*** (0.002)	0.007*** (0.002)	0.008*** (0.002)	0.008*** (0.002)
Dummy republic	0.085*** (0.027)	0.087*** (0.019)	0.084*** (0.025)	0.091*** (0.019)
Overrepresentation in State Duma	-0.002 (0.006)	0.005 (0.006)	0.001 (0.007)	0.008* (0.005)
Power (2001-2006)	-0.031*** (0.012)	-0.018* (0.010)	-0.028** (0.012)	-0.010 (0.010)
Power (1995-2000)	-0.013* (0.008)	-0.008 (0.006)	-0.003 (0.007)	-0.001 (0.006)
Fiscal transfers	0.163*** (0.052)	0.123*** (0.035)	0.131*** (0.041)	0.080** (0.034)
Democratization	-0.001 (0.001)	-0.002** (0.001)	-0.001 (0.001)	-0.002* (0.001)
Share of Russians	0.197*** (0.059)	0.178*** (0.039)	0.164*** (0.043)	0.176*** (0.036)
Urbanization	2.972*** (0.704)	1.357*** (0.460)	0.762 (0.568)	0.193 (0.450)
Constant	0.536*** (0.121)	0.603*** (0.092)	0.666*** (0.100)	0.636*** (0.087)
Outliers included	Yes	Yes	No	No
No. obs.	945	945	910	910
R²	0.468		0.414	
Pseudo R²		0.287		0.312
F-test	19.46***		24.84***	
Jarque Bera	396.0***		916.3***	

Notes: see table 1. Coefficients for time and region FE are not reported. Some controls are dropped due to time invariance.

Table 3: Panel data regressions (region fixed effects), 1995-2006, dep. var.: retention rate

	(14)	(15)	(16)	(17)
	OLS	Median	OLS	Median
Tax arrears squared (Putin)	0.041 (0.028)	0.041 (0.250)	-0.370 (0.446)	-1.073 (1.502)
Tax arrears squared (Yeltsin)	3.705*** (0.760)	4.578*** (0.831)	4.131*** (0.735)	4.460*** (0.998)
Tax structure				
Average income per capita	0.012*** (0.003)	0.017*** (0.003)	0.012*** (0.002)	0.017*** (0.003)
Capital funds	-0.086*** (0.021)	-0.123*** (0.030)	-0.073*** (0.021)	-0.121*** (0.035)
Political variables				
Population	0.094*** (0.036)	0.106** (0.046)	0.056* (0.032)	0.062 (0.047)
Oil & gas share	4.204 (4.840)	5.907 (7.801)	1.401 (4.666)	4.686 (7.218)
Overrepresentation in State Duma	-0.018 (0.016)	-0.011 (0.024)	-0.014 (0.014)	0.006 (0.019)
Fiscal transfers	-0.069 (0.069)	-0.167*** (0.059)	-0.231*** (0.051)	-0.243*** (0.055)
Democratization	-0.006*** (0.002)	-0.008*** (0.003)	-0.006** (0.002)	-0.007*** (0.002)
Urbanization	0.432 (4.155)	4.288 (4.702)	4.959 (3.846)	7.861* (4.419)
Constant	0.742** (0.327)	-0.626 (0.620)	-0.337 (0.297)	-0.619 (0.605)
Outliers included	Yes	Yes	No	No
No. obs.	945	945	910	910
Pseudo R²		0.332		0.338
F-test	11.27***		12.62***	
Jarque Bera	240.5***		236.9***	

Notes: see table 1. Coefficients for time and region FE are not reported. Some controls are dropped due to time invariance in region fixed effects specification.

Table 4: Panel data regressions (two-way fixed effects), 1995-2006, dep. var.: retention rate

	(18)	(19)	(20)	(21)	(22)	(23)
	OLS	Median	TOLS	OLS	Median	TOLS
Tax arrears squared (Putin)	0.015 (0.020)	0.028 (0.087)	-0.172 (0.875)	0.289 (0.255)	-0.049 (0.529)	-10.529 (16.172)
Tax arrears squared (Yeltsin)	1.028 (0.803)	1.666** (0.739)	53.811* (31.48)	1.677* (0.862)	1.666** (0.784)	48.676** (20.087)
Tax structure						
Average income per capita	-0.007 (0.005)	-0.001 (0.005)	0.028* (0.017)	-0.004 (0.005)	-0.000 (0.005)	0.036* (0.019)
Capital funds	-0.060*** (0.022)	-0.067* (0.037)	-0.072** (0.036)	-0.056** (0.023)	-0.072* (0.038)	-0.054 (0.044)
Political variables						
Population	0.153*** (0.040)	0.097** (0.041)	-0.163 (0.180)	0.113*** (0.034)	0.097** (0.042)	-0.240 (0.210)
Oil & gas share	7.341 (5.091)	5.285 (8.386)	-13.994 (16.909)	4.723 (4.902)	5.047 (8.525)	-12.575 (9.577)
Overrepresentation in State Duma	-0.008 (0.012)	0.005 (0.016)	0.046 (0.037)	-0.007 (0.011)	0.005 (0.015)	0.049 (0.034)
Fiscal transfers	-0.008 (0.012)	0.005 (0.016)	0.046 (0.037)	-0.007 (0.011)	0.005 (0.015)	0.049 (0.034)
Democratization	-0.000 (0.002)	-0.000 (0.002)	0.012 (0.018)	-0.001 (0.002)	-0.000 (0.002)	0.002 (0.007)
Urbanization	0.033 (4.102)	2.473 (3.720)	8.03 (23.884)	3.451 (3.940)	5.341 (3.895)	5.211 (10.336)
Constant	0.329 (0.303)	-0.439 (0.522)	0.627 (2.086)	-0.625 (0.493)	-0.747 (0.540)	1.733 (1.664)
Outliers included	Yes	Yes	Yes	No	No	No
No. obs.	945	945	942	910	910	907
Pseudo R²		0.477			0.476	
F-test	18.19***		6.10***		18.86***	4.11***
Jarque Bera	854.5***				1266***	
F-test first stage (Putin)		2.15				3.68**
F-test first stage (Yeltsin)		3.88**				5.68***

Notes: see tables 1 and 2. For TOLS robust Huber/White standard errors are applied.

7. Number of tax audits and tax arrears

Previously we have mentioned that the size of tax arrears as proxy for strategic tax collection has certain disadvantages. In particular, it may be difficult to disentangle the effects of strategic tax auditing and strategic tax collection on arrears; furthermore, strategic tax auditing might as well be of great interest for research. Recently Russian tax authority started reporting an alternative indicator, which may be used to complement our study: the *number of tax audits* performed by the tax collector in a given period. Unfortunately, the results are unavailable for the Yeltsin and early Putin period and cannot substitute our previous study; however, we can use the new variable to perform a robustness check. Basically, “tax audit” in these statistics means an auditing event when the executives of the tax collection office visit the taxpayer’s premises and control the accounts and records. Tax audits may be performed by both individuals and legal entities and are concluded with a statement by the tax collection office confirming the correctness of records or indicating violations of the tax law. It goes without saying that the number of tax audits is a very good proxy for *tax auditing activity*.

We have collected the data on the number of tax audits reported by local tax offices in Russia for the year 2006. Unfortunately, the data are available only for a subsample including 68 regions. However, even this approach may yield some interesting results. *Table 5* reports the estimation results for the year 2006, including various measures of tax collection activity. We use the same set of controls as in the previous exercise with the only exception of measures of power and democracy (which, as discussed, are obviously outdated for the second term of Putin administration).

We obtain the measures of tax collection and auditing by dividing tax arrears and number of tax audits by GRP and squaring the result, as in the previous parts of the paper. Obviously, tax arrears have a *significant and negative impact* on the retention rate. The number of audits is positive, but insignificant. The most interesting part of the exercise, however, is regression (27). We simultaneously include the variable of tax collection (tax arrears) and tax auditing (number of tax audits) activity in the regression. In this case one can interpret the coefficient of tax arrears as *an impact of tax arrears on the retention rate conditional on tax auditing effort of the regional government*. We still find a negative and significant effect, supporting our conjecture that tax collection *per se* has a significant impact on the de-facto fiscal decentralization. Of course, one cannot immediately conclude from the estimation for 2006 that the same effect was present in the whole

sample; however, this is at least certain evidence in our favor, especially because, as mentioned above, the problem of disentangling tax collection and tax auditing is more important for Putin, and not for the Yeltsin period.

Table 5: Cross-section regression, 2006, dep. var.: retention rate

	(24)	(25)	(26)	(27)
	OLS	OLS	OLS	OLS
Tax arrears squared		-2.438***		-2.770***
		(0.700)		(0.821)
Number of audits squared			37.003	49.782
			(36.808)	(37.432)
Tax structure				
Average income per capita	-0.021**	-0.022***	-0.015*	-0.018**
	(0.009)	(0.008)	(0.009)	(0.008)
Capital funds	0.093*	0.108**	0.077	0.101*
	(0.053)	(0.051)	(0.058)	(0.055)
Political variables				
Territory	0.032	0.033	0.033	0.036
	(0.028)	(0.027)	(0.029)	(0.028)
Population	-0.018	-0.023	-0.011	-0.020
	(0.023)	(0.023)	(0.027)	(0.027)
Oil & gas share	-0.864**	-0.965***	-0.723*	-0.882**
	(0.345)	(0.332)	(0.371)	(0.359)
Distance from Moscow	0.018***	0.020***	0.018**	0.020***
	(0.007)	(0.007)	(0.007)	(0.007)
Dummy border region	0.030	0.035	0.028	0.035
	(0.037)	(0.038)	(0.038)	(0.038)
Dummy republic	0.140	0.131	0.218**	0.205**
	(0.091)	(0.092)	(0.084)	(0.085)
Overrepresentation in State Duma	-0.015	-0.015*	-0.014	-0.013
	(0.010)	(0.009)	(0.010)	(0.009)
Fiscal transfers	0.611***	0.606***	0.669***	0.646***
	(0.192)	(0.191)	(0.189)	(0.186)
Share of Russians	0.498**	0.486**	0.686***	0.681***
	(0.207)	(0.206)	(0.204)	(0.203)
Urbanization	6.174***	6.183***	5.030**	5.103**
	(2.277)	(2.3)	(2.199)	(2.236)
Constant	-0.218	-0.191	-0.386	-0.363
	(0.300)	(0.299)	(0.310)	(0.312)
Observations	78	78	67	67
R²	0.487	0.499	0.528	0.544
F-test	28.61***	28.60***	34.46***	36.47***
Jarque Bera	3.44	3.525	3.230	3.273

Notes: Numbers in parenthesis are robust Huber/White standard errors; *** significant at 1% level; ** significant at 5% level; * significant at 10% level. Significant results are marked bold.

Obviously a single cross-section is not sufficient to provide convincing evidence. Moreover, small sample problems preclude solving a variety of potential problems, including endogeneity. However, as an additional experiment we estimate all regressions from *Table 5*

ity. However, as an additional experiment we estimate all regressions from *Table 5* excluding fiscal transfers (which are highly significant and potentially endogenous). The results in terms of tax arrears do not change, but also the number of tax audits in regressions (26) and (27) becomes significant and *positive*. On the one hand, the results still support our hypotheses with respect to strategic tax collection. On the other hand, in terms of strategic tax auditing, the regional tax authorities seem to act in favor of the regional budget. Once again, it may suggest that the power shift in the structure of Russian fiscal federalism was not as decisive, as it may seem: however, the issue certainly requires special investigation.

8. Conclusion

The aim of this paper is to test whether the strategic manipulations of tax arrears could be used in a principal-agent setting with a central government which does not have sufficient information and monitoring capacities for a regional influence on tax collection, and regions which are able to focus their tax auditing and collection effort on taxes mostly benefiting their budgets. Moreover, we have tested, whether federal governments in semi-authoritarian regimes have an incentive to manipulate tax collection in their favor. In order to conduct these tests, we analyze the case of the Russian Federation.

Generally speaking, our results partly confirm the intuition behind this paper: there is evidence that tax arrears are used strategically to manipulate distribution of taxes between the federal centre and the regions. Our four stage estimation strategy, however, yields heterogeneous results. After controlling for potential outliers we show that under Yeltsin the regions seemed to have used strategic tax collection to re-allocate the tax revenue in their favor. These results also survive the TSLS regressions in order to check for endogeneity and various fixed effects specifications. On the other hand, annual cross-sections mostly provide evidence in favor of the second hypothesis: the federal government was likely to use its power for tax arrears manipulation when it became strong. These results, however, seem to be partly driven by a small number of regions with extraordinarily high levels of per capita tax arrears.

Finally, given the data availability, we provide a short discussion of potential effects of tax auditing on fiscal decentralization. According to our estimates from the second term of Putin tax arrears have a negative impact on the revenue split even controlling for the tax auditing activ-

ity; the latter, however, depending upon the specification, has a positive and partially significant effect on the retention rates.

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Appendix A: Data

Table A1: Descriptive statistics

Variable	Obs.	Mean	Std. Dev.	Min	Max
Average income per capita	945	3.05	3.27	0.12	29.80
Capital funds	945	0.30	0.52	0.00	6.46
Democratization	945	28.59	6.25	14.00	45.00
Distance from Moscow	945	2.37	2.74	0.00	11.88
Dummy border region	945	0.43	0.50	0.00	1.00
Dummy Putin	945	0.58	0.49	0.00	1.00
Dummy republic	945	0.25	0.43	0.00	1.00
Dummy Tatarstan and Bashkortostan (Yeltsin)	945	0.01	0.10	0.00	1.00
Dummy Tatarstan and Bashkortostan (Putin)	945	0.01	0.12	0.00	1.00
Fiscal transfers	945	0.25	0.19	-0.03	1.11
Net profit	945	18.29	115.06	-78.59	2797.69
Number of audits per unit of GRP squared	67	0.00	0.00	0.00	0.00
Oil and gas share	945	0.01	0.09	0.00	0.80
Overrepresentation in the State Duma	945	1.26	1.26	0.22	12.54
Population	945	1.83	1.54	0.05	10.44
Power (1995-2000)	945	3.51	3.53	0.00	8.50
Power (2001-2006)	945	3.49	3.53	0.00	8.50
Retail trade	942	41.86	119.27	0.10	1817.77
Retention rate	945	0.61	0.14	0.05	1.00
Share of Russians	945	0.77	0.24	0.01	0.97
Tax arrears squared	945	0.02	0.20	0.00	4.27
Tax arrears squared (Putin)	945	0.02	0.20	0.00	4.27
Tax arrears squared (Yeltsin)	945	0.00	0.01	0.00	0.06
Territory	945	0.22	0.47	0.00	3.10
Urbanization	945	0.07	0.01	0.02	0.10

Table A2: Description of variables

Name	Description	Period	Source
Average income per capita	Average income per capita of the region, thousands of RUR ¹⁶	1995-2003; 2006	Goskomstat ¹⁷
Capital funds	Value of tangible assets of all enterprises, bln. RUR	1995-2003; 2006	Goskomstat
Democratization	Index of democratization of the region, estimated by the experts of the Carnegie Centre in Moscow. The higher value of index represents a higher democratization level	1995-2003	Carnegie Centre and Independent Institute for Social Policy
Distance from Moscow	Distance between the capital of the region and Moscow, thousands of km, 0 for Moscow and Moscow oblast, identical for St. Petersburg and St. Petersburg oblast	NA	Goskomstat
Dummy border region	1 if the region has a border to any state outside the Russian Federation, 0 otherwise	NA	Own estimation
Dummy Putin	1 if Putin was president or acting president, 0 otherwise	NA	Own estimation
Dummy republic	1 if the region has the status of a republic, 0 otherwise	NA	Own estimation
Dummy Tatarstan and Bashkortostan (Yeltsin)	1 for Tatarstan or Bashkortostan in 1995-1999, 0 otherwise	NA	Own estimation
Dummy Tatarstan and Bashkortostan (Putin)	1 for Tatarstan or Bashkortostan in 2000-2006, 0 otherwise	NA	Own estimation
Net profit	Net profit (profit – loss) of all region's organizations, bln. RUR	1995-2003	Goskomstat
Number of audits squared	(Number of audits / GRP (in mln. RUR)) ²	2006	Local branches of the State Tax Service
Oil & gas share	(Share of oil extraction in the region in the total oil extraction in Russia + Share of the gas extraction in the region to the total gas extraction in Russia) / 2	1995-2003, 2006	Goskomstat
Overrepresentation in the State Duma	Share of seats of the region in the State Duma (calculated on 225 deputies basis) / Share of region in Russian population	1995-2003, 2006	Goskomstat, State Duma, own estimation
Population	Population of the region, mln. people	1995-2003, 2006	Goskomstat
Power (1995-2000)	Index of power of regional governors, based on data like years in office, share on regional elections, control of parliament etc. The higher value of index represents a higher influence of regional governor. The variable is equal to this index of power (time-invariant) in 1995-2000 and zero otherwise	1995-2000 (applied for all years)	Jarocinska, 2004
Power (2001-2006)	The variable is equal to the time-invariant index of power (calculated in 1995-2000) in 2001-2006 and zero otherwise	1995-2000 (applied for all years)	Jarocinska, 2004
Retail trade	Total retail trade revenue (current prices), bln. RUR	1995-2003	Goskomstat

¹⁶ In 1998 the Russian rubl was denominated; therefore all indicators for previous years were divided by 1000.

¹⁷ All Goskomstat (Russian statistical authority) data are provided on the annual basis in the regular publication *Regions of Russia*.

Name	Description	Period	Source
Retention rate	Tax revenue of the consolidated regional budget executed / Total tax collection on the territory of the region	1995-2003, 2006	Until 1997: Freinkman, Treisman and Titov, 1999 Since 1998: Ministry of Finance and State Treasury (for budget data), State Tax Service and Goskomstat (for tax collection data)
Share of fiscal transfers	Fiscal transfers from other governments / Total expenditures of the region's consolidated budget	1995-2003, 2006	Until 1997: Freinkman, Treisman and Titov, 1999 Since 1998: Ministry of Finance and State Treasury ¹⁸
Share of Russians	Share of ethnic Russians in the region's population	2002 (applied for all years)	Russia's Census, 2002
Tax arrears squared	(Total tax arrears / GRP) ²	1995-2003, 2006	State Tax Service and Goskomstat
Territory	Territory of the region, mln. sq.km, 0 for Moscow and St. Petersburg	NA	Goskomstat
Urbanization	Share of urban population	1995-2003, 2006	Goskomstat

¹⁸ The budget data are provided by the Institute of Public Finance, Centre for Fiscal Policy (Moscow) databank; by the databank *Russian Budget* supported by the Moscow State University and by the Federal Treasury.

Appendix B: Annual cross-sections

Table B1: Regressions for individual annual cross-sections, 1995-2006, dependent variable: retention rate

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Tax arrears squared	-1.692 (5.355)	0.977 (2.395)	0.897 (1.788)	-0.676 (1.458)	-1.646 (2.085)	-2.031*** (0.696)	-1.209*** (0.394)	-0.180*** (0.054)	-0.279*** (0.055)	-0.043*** (0.013)	-0.034* (0.020)	-1.878** (0.868)
Tax structure												
Average income per capita	0.167** (0.072)	0.075 (0.048)	-0.001 (0.055)	0.044 (0.052)	0.064* (0.038)	0.015 (0.024)	0.013 (0.018)	-0.008 (0.015)	-0.010 (0.017)	-0.002 (0.010)	-0.018* (0.011)	-0.021*** (0.008)
Capital funds	-2.075** (0.901)	-0.646** (0.278)	-0.301 (0.399)	-0.655** (0.318)	-0.919*** (0.308)	-0.355 (0.237)	-0.302* (0.178)	-0.011 (0.178)	0.002 (0.128)	-0.077 (0.082)	0.091 (0.074)	0.100* (0.056)
Legal factors												
Dummy Tatarstan and Bashkortostan	0.232*** (0.082)	0.278*** (0.087)	0.143* (0.072)	0.284*** (0.066)	0.361*** (0.075)	0.266*** (0.093)	0.055 (0.108)	-0.075 (0.081)	-0.012 (0.058)	-0.114** (0.054)	-0.127 (0.085)	-0.030 (0.110)
Political variables												
Territory	0.084*** (0.027)	0.035* (0.017)	0.054** (0.027)	0.040 (0.027)	0.055** (0.021)	0.053** (0.026)	0.040* (0.022)	0.042* (0.024)	0.048* (0.025)	0.071*** (0.023)	0.050* (0.030)	0.048** (0.024)
Population	0.052* (0.028)	0.026 (0.022)	0.001 (0.031)	0.031 (0.028)	0.059** (0.026)	0.019 (0.024)	0.033 (0.022)	0.006 (0.027)	0.000 (0.022)	0.020 (0.020)	-0.020 (0.029)	-0.017 (0.026)
Oil & gas share	0.781** (0.345)	0.379** (0.156)	0.211 (0.208)	0.351* (0.179)	0.396*** (0.139)	0.316 (0.235)	0.725* (0.422)	-0.087 (0.556)	-0.213 (0.422)	-0.018 (0.309)	-0.827** (0.361)	-0.871** (0.355)
Dummy border region	0.006 (0.018)	0.018 (0.018)	0.028 (0.022)	0.033 (0.021)	0.020 (0.021)	0.043 (0.028)	0.018 (0.026)	0.028 (0.029)	0.020 (0.029)	0.038 (0.027)	0.025 (0.042)	0.021 (0.037)
Distance from Moscow	0.009** (0.005)	0.007* (0.004)	0.006 (0.006)	0.004 (0.004)	-0.004 (0.006)	0.003 (0.005)	0.010* (0.006)	0.007 (0.005)	0.012* (0.006)	-0.001 (0.006)	0.015* (0.008)	0.022*** (0.007)
Dummy republic	0.090** (0.045)	0.068 (0.050)	0.065 (0.053)	0.011 (0.051)	0.066 (0.050)	0.039 (0.090)	0.150 (0.098)	0.138 (0.098)	0.073 (0.066)	0.091 (0.058)	0.038 (0.094)	0.134 (0.091)
Overrepresentation in State Duma	-0.031* (0.017)	0.001 (0.016)	-0.007 (0.018)	-0.005 (0.019)	0.001 (0.024)	0.005 (0.020)	-0.024 (0.014)	-0.014 (0.013)	-0.013 (0.017)	0.013** (0.006)	0.022** (0.010)	-0.012 (0.010)
Power	-0.017 (0.012)	-0.015 (0.013)	-0.019 (0.017)	0.004 (0.016)	-0.014 (0.016)	-0.013 (0.020)	-0.002 (0.020)	-0.001 (0.021)	-0.003 (0.019)	-0.043* (0.0230)	-0.049 (0.038)	-0.055* (0.031)
Fiscal transfers	0.192 (0.163)	-0.045 (0.134)	-0.102 (0.138)	-0.035 (0.101)	0.133 (0.111)	0.065 (0.118)	0.202 (0.124)	0.249* (0.137)	0.269* (0.156)	0.499** (0.199)	0.182 (0.149)	0.556*** (0.195)
Democratization	0.001 (0.002)	0.002 (0.002)	0.000 (0.003)	-0.001 (0.003)	-0.001 (0.003)	-0.001 (0.004)	-0.002 (0.004)	-0.003 (0.004)	-0.002 (0.003)	-0.002 (0.002)	-0.000 (0.004)	-0.000 (0.003)
Share of Russians	0.170 (0.160)	0.193 (0.166)	0.167 (0.145)	-0.009 (0.121)	0.243* (0.135)	0.122 (0.180)	0.263 (0.171)	0.258* (0.135)	0.260** (0.108)	0.197* (0.109)	0.113 (0.202)	0.415** (0.192)
Urbanization	0.237 (0.961)	0.825 (0.947)	1.927 (1.594)	1.853 (2.054)	3.777* (2.255)	3.200 (2.250)	3.609** (1.605)	3.260* (1.797)	2.739 (1.882)	4.753*** (1.509)	3.519 (2.462)	6.623*** (2.160)
Constant	0.476* (0.248)	0.422* (0.234)	0.548*** (0.203)	0.544*** (0.173)	0.191 (0.207)	0.312 (0.238)	-0.007 (0.266)	0.085 (0.306)	0.199 (0.285)	0.370 (0.281)	0.646** (0.308)	0.205 (0.350)
No. obs.	79	79	79	79	79	79	79	79	79	79	77	78
R ²	0.533	0.403	0.335	0.43	0.486	0.367	0.421	0.424	0.508	0.547	0.342	0.531
F-test	12.51***	8.40***	13.42***	36.89***	25.51***	8.57***	37.56***	404.10***	36.22***	65.95***	22.73***	35.21***
Jarque Bera	577.3***	404.5***	24.22***	7.066**	9.838***	14.18***	81.95***	46.89***	7.465**	7.317**	137.5***	5.291*

Notes: Numbers in parenthesis are robust Huber/White standard errors; *** significant at 1% level; ** significant at 5% level; * significant at 10% level. Significant results are marked bold.

Table B2: Regressions for individual annual cross-sections after exclusion of outliers (until Jarque Bera test becomes insignificant), 1995-2006, dependent variable: retention rate

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Tax arrears squared	-5.791* (3.190)	-0.492 (1.940)	0.623 (1.490)	1.377** (0.634)	-2.873 (1.946)	-3.178*** (0.560)	-1.443*** (0.189)	-0.233*** (0.040)	-0.308*** (0.051)	-0.031*** (0.011)	-0.024 (0.018)	-1.681** (0.742)
Tax structure												
Average income per capita	0.112** (0.052)	0.034 (0.034)	-0.055 (0.049)	-0.016 (0.031)	0.028 (0.027)	-0.015 (0.015)	-0.008 (0.011)	-0.019 (0.012)	-0.022 (0.015)	0.002 (0.009)	-0.013 (0.008)	-0.019** (0.007)
Capital funds	-1.296** (0.639)	-0.424** (0.207)	0.089 (0.341)	-0.012 (0.171)	-0.667*** (0.228)	0.014 (0.136)	-0.103 (0.112)	0.089 (0.153)	0.091 (0.112)	-0.137* (0.069)	0.048 (0.053)	0.081 (0.052)
Legal factors												
Dummy Tatarstan and Bashkortostan	0.147*** (0.034)	0.204*** (0.052)	0.075 (0.054)	0.226*** (0.038)	0.295*** (0.055)	0.166*** (0.059)	0.015 (0.063)	-0.156*** (0.053)	-0.031 (0.059)	-0.114** (0.052)	-0.125 (0.081)	-0.032 (0.108)
Political variables												
Territory	0.066*** (0.015)	0.030** (0.013)	0.048** (0.023)	0.028 (0.017)	0.055*** (0.020)	0.036** (0.014)	0.054*** (0.016)	0.038 (0.025)	0.049** (0.019)	0.089*** (0.021)	0.066** (0.025)	0.056** (0.023)
Population	0.026 (0.019)	0.008 (0.015)	-0.028 (0.027)	-0.017 (0.016)	0.040** (0.020)	-0.012 (0.014)	0.015 (0.013)	-0.012 (0.023)	-0.001 (0.021)	0.039** (0.015)	-0.004 (0.021)	-0.008 (0.023)
Oil & gas share	0.500** (0.249)	0.247** (0.109)	0.000 (0.168)	-0.001 (0.104)	0.276*** (0.103)	0.002 (0.137)	0.232 (0.251)	-0.383 (0.479)	-0.518 (0.369)	0.213 (0.259)	-0.621** (0.263)	-0.769** (0.332)
Dummy border region	0.017 (0.010)	0.025* (0.014)	0.024 (0.020)	0.022 (0.014)	0.022 (0.020)	0.022 (0.017)	0.033* (0.019)	0.033 (0.026)	0.037 (0.026)	0.059** (0.024)	0.046 (0.035)	0.033 (0.034)
Distance from Moscow	0.009*** (0.003)	0.006* (0.003)	0.003 (0.005)	0.005 (0.003)	-0.004 (0.005)	0.003 (0.003)	0.005 (0.003)	0.006 (0.005)	0.013** (0.006)	-0.003 (0.005)	0.011 (0.007)	0.020*** (0.006)
Dummy republic	0.049* (0.028)	0.029 (0.038)	0.041 (0.045)	0.029 (0.036)	0.039 (0.049)	0.122** (0.048)	0.116** (0.046)	0.211*** (0.070)	0.083 (0.067)	0.122** (0.049)	0.061 (0.085)	0.146 (0.088)
Overrepresentation in State Duma	-0.016* (0.009)	0.011 (0.008)	0.004 (0.014)	0.012* (0.007)	0.013 (0.020)	0.035*** (0.013)	-0.020** (0.010)	-0.010 (0.009)	-0.008 (0.013)	0.013** (0.006)	0.022** (0.009)	-0.011 (0.010)
Power	-0.020** (0.009)	-0.016 (0.012)	-0.011 (0.015)	0.013 (0.013)	-0.013 (0.016)	-0.004 (0.016)	0.011 (0.015)	0.004 (0.019)	-0.004 (0.018)	-0.048** (0.020)	-0.072** (0.029)	-0.068** (0.029)
Fiscal transfers	0.039 (0.060)	-0.127 (0.076)	-0.041 (0.111)	0.069 (0.061)	0.091 (0.086)	-0.008 (0.075)	0.233*** (0.067)	0.133 (0.109)	0.154 (0.127)	0.667*** (0.141)	0.250* (0.132)	0.570*** (0.191)
Democratization	-0.000 (0.001)	0.001 (0.002)	-0.002 (0.003)	0.001 (0.002)	-0.003 (0.003)	-0.002 (0.002)	-0.002 (0.002)	-0.006** (0.003)	-0.002 (0.003)	-0.002 (0.002)	-0.000 (0.003)	-0.000 (0.003)
Share of Russians	-0.015 (0.053)	0.026 (0.071)	0.054 (0.087)	0.011 (0.059)	0.116 (0.094)	0.181* (0.097)	0.149* (0.082)	0.337*** (0.106)	0.257** (0.107)	0.266*** (0.089)	0.206 (0.179)	0.455** (0.187)
Urbanization	-0.072 (0.874)	1.110 (0.740)	2.092 (1.724)	-1.357 (1.066)	4.414** (2.163)	0.686 (1.210)	3.280** (1.303)	2.453 (1.543)	1.447 (1.545)	5.741*** (1.303)	3.011 (2.417)	6.312*** (2.115)
Constant	0.746*** (0.098)	0.639*** (0.115)	0.670*** (0.168)	0.612*** (0.126)	0.350** (0.169)	0.456*** (0.152)	0.064 (0.162)	0.185 (0.263)	0.355 (0.243)	0.191 (0.207)	0.694** (0.289)	0.251 (0.336)
No. obs.	78	78	77	75	78	74	73	77	78	76	76	77
R ²	0.718	0.519	0.363	0.726	0.503	0.601	0.688	0.575	0.548	0.690	0.471	0.578
F-test	18.76***	14.05***	14.94***	46.32***	100.14***	9.80***	45.98***	263.11***	43.36***	93.73***	31.63***	34.49***
Jarque Bera	0.385	1.177	0.678	0.535	4.436	0.011	2.264	1.416	0.643	1.076	3.217	0.789
Outliers	Ingushetia	Ingushetia	Ingushetia Kalmykia	Altai Rep. Ingushetia Kalmykia Vologda	Ingushetia	Altai Rep. Omsk Mordovia Ingushetia Magadan	Kabardino- Balkaria Khakassia Mordovia Ingushetia Lipetsk Magadan	Magadan Mordovia	Magadan	Lipetsk Novgorod Briansk	Voronezh	Voronezh

Notes: see table B1

Appendix C: Robust regressions and regressions with lagged variables

Table C1: Robust regressions after exclusion of outliers (until Jarque Bera test becomes insignificant), 1995-2006, dep. var.: retention rate

	(C1) OLS	(C2) OLS	(C3) OLS	(C4) OLS	(C5) OLS	(C6) OLS	(C7) OLS	(C8) OLS	(C9) OLS	(C10) OLS
Tax arrears squared (Putin)	-0.035*** (0.007)	-0.033*** (0.007)	-0.555 (0.608)	-0.194 (0.452)	-0.064*** (0.005)	-0.117 (0.343)	0.049** (0.025)	-0.726 (0.520)	0.033*** (0.012)	-0.080 (0.297)
Tax arrears squared (Yeltsin)	2.575*** (0.426)	1.719*** (0.433)	2.566*** (0.433)	1.662*** (0.427)	1.121** (0.494)	1.338*** (0.499)	3.772*** (0.630)	3.719*** (0.661)	0.975** (0.452)	1.185* (0.611)
Dummy Putin		-0.069*** (0.011)		-0.067*** (0.011)						
Tax structure										
Average income per capita	0.021*** (0.003)	0.022*** (0.003)	0.020*** (0.003)	0.021*** (0.003)	-0.001 (0.003)	0.002 (0.003)	0.014*** (0.002)	0.014*** (0.002)	0.001 (0.003)	0.001 (0.003)
Capital funds	-0.086*** (0.014)	-0.088*** (0.014)	-0.079*** (0.015)	-0.083*** (0.015)	-0.044** (0.018)	-0.041** (0.020)	-0.089*** (0.018)	-0.085*** (0.018)	-0.080*** (0.017)	-0.085*** (0.018)
Legal factors										
Dummy Tatarstan and Bashkortostan (Putin)	-0.065* (0.035)	-0.061* (0.037)	-0.070** (0.035)	-0.062* (0.037)	-0.132*** (0.035)	-0.130*** (0.036)				
Dummy Tatarstan and Bashkortostan (Yeltsin)	0.170*** (0.028)	0.171*** (0.026)	0.168*** (0.029)	0.174*** (0.027)	0.146*** (0.024)	0.153*** (0.025)				
Political variables										
Territory	0.024** (0.011)	0.025** (0.011)	0.015 (0.011)	0.015 (0.010)	0.031*** (0.007)	0.025*** (0.007)				
Population	-0.005 (0.004)	-0.004 (0.004)	-0.004 (0.004)	-0.004 (0.004)	-0.000 (0.004)	-0.002 (0.004)	0.081** (0.032)	0.067** (0.031)	0.107*** (0.025)	0.105*** (0.026)
Oil & gas share	-0.018 (0.047)	-0.011 (0.045)	-0.009 (0.049)	-0.001 (0.047)	-0.035 (0.046)	-0.046 (0.052)	2.865 (4.750)	1.955 (4.711)	5.255 (3.727)	5.756 (3.870)
Dummy border region	0.023*** (0.009)	0.024*** (0.008)	0.017** (0.008)	0.016* (0.008)	0.020*** (0.007)	0.016** (0.007)				
Distance from Moscow	0.005*** (0.002)	0.005*** (0.002)	0.006*** (0.002)	0.005*** (0.002)	0.006*** (0.001)	0.006*** (0.001)				
Dummy republic	0.079*** (0.022)	0.082*** (0.022)	0.102*** (0.021)	0.100*** (0.021)	0.096*** (0.016)	0.105*** (0.016)				
Overrepresentation in State Duma	-0.007 (0.005)	-0.007 (0.005)	0.004 (0.006)	0.003 (0.006)	0.008** (0.003)	0.010*** (0.003)	0.003 (0.007)	0.005 (0.006)	0.006 (0.004)	0.005 (0.004)
Power (2001-2006)	-0.028*** (0.007)	-0.024*** (0.007)	-0.018** (0.007)	-0.015** (0.007)	-0.022*** (0.008)	-0.017** (0.008)				
Power (1995-2000)	-0.018** (0.007)	-0.021*** (0.007)	-0.009 (0.007)	-0.012* (0.007)	-0.006 (0.006)	-0.002 (0.006)				
Fiscal transfers	0.053 (0.036)	0.072** (0.035)	0.060* (0.035)	0.076** (0.034)	0.080*** (0.028)	0.083*** (0.029)	-0.182*** (0.041)	-0.231*** (0.042)	-0.021 (0.027)	-0.047 (0.028)
Democratization	-0.002* (0.001)	-0.002* (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.002** (0.001)	-0.001 (0.001)	-0.006*** (0.002)	-0.006** (0.002)	0.000 (0.001)	0.001 (0.002)
Share of Russians	0.138*** (0.042)	0.145*** (0.042)	0.190*** (0.039)	0.190*** (0.038)	0.152*** (0.030)	0.177*** (0.029)				
Urbanization	0.266 (0.570)	0.365 (0.547)	-1.079** (0.510)	-1.044** (0.491)	0.636 (0.429)	-0.280 (0.396)	3.173 (3.558)	5.642 (3.463)	1.469 (2.469)	4.206 (2.66)
Constant	0.615*** (0.074)	0.633*** (0.071)	0.580*** (0.070)	0.605*** (0.068)	0.700*** (0.075)	0.665*** (0.075)	0.501* (0.261)	0.344 (0.252)	0.335* (0.189)	-0.702*** (0.204)
Region fixed effects	No	No	No	No	No	No	Yes	Yes	Yes	Yes
Time fixed effects	No	No	No	No	Yes	Yes	No	No	Yes	Yes
Kalmykia, Altai Rep. and In-gushetia included	Yes	Yes	No	No	Yes	No	Yes	No	Yes	No
Observations	899	895	884	884	875	866	924	901	879	870
R ²	0.363	0.394	0.392	0.413	0.610	0.613				
F-test	27.87***	29.61***	24.70***	25.38***	45.34***	37.91***	13.55***	13.58***	34.84***	69.64***
Jarque Bera	4.442	4.275	1.463	3.965	4.548	1.044	4.294	3.276	2.083	4.447

Notes: see tables 1 and 2. Outliers include:

(C1)	(C2)	(C3)	(C4)	(C5)	(C6)	(C7)	(C8)	(C9)	(C10)
Evereyskaia 2004	Evereyskaia 2004	Chukotka 2002	Chukotka 2002	Chukotka 2002	Chukotka 2001	Chukotka 2002	Chukotka 2002	Chukotka 2001	Chukotka 2001
Evereyskaia 2005	Evereyskaia 2005	Chukotka 2003	Chukotka 2003	Chukotka 2003	Chukotka 2002	Chukotka 2003	Chukotka 2003	Chukotka 2002	Chukotka 2002
Evereyskaia 2006	Evereyskaia 2006	Chukotka 2006	Chukotka 2006	Chukotka 2006	Chukotka 2003	Chukotka 2006	Chukotka 2006	Chukotka 2003	Chukotka 2003
Chukotka 2002	Chukotka 2002	Magadan 2003	Magadan 2003	Moscow (City) 1998	Chukotka 2006	Omsk 2000	Omsk 2000	Chukotka 2005	Chukotka 2005
Chukotka 2003	Chukotka 2003	Magadan 2004	Magadan 2004	Moscow (City) 2006	Arkhangelsk 2005	Tula 2006	Voronezh 2005	Chukotka 2006	Chukotka 2006
Chukotka 2006	Chukotka 2006	Omsk 2000	Omsk 2000	Arkhangelsk 2005	Arkhangelsk 2006	Voronezh 2005	Altai (Rep.) 1995	Moscow (City) 2006	Moscow (City) 2006
Novgorod 2004	Lipetsk 2004	Riazan 2001	Riazan 2001	Arkhangelsk 2006	Magadan 2001	(Rep.) 1995	(Rep.) 1996	Amur 1996	Arkhangelsk 2005
Novgorod 2005	Magadan 2003	Riazan 2002	Riazan 2002	Lipetsk 2000	Magadan 2002	(Rep.) 1999	(Rep.) 1997	Arkhangelsk 2005	Arkhangelsk 2006
Omsk 2000	Novgorod 2004	Tomsk 2004	Tomsk 2004	Lipetsk 2002	Magadan 2003	Ingushetia 1995	(Rep.) 1998	Arkhangelsk 2006	Cheliabinsk 2005
Riazan 2001	Novgorod 2005	Tomsk 2005	Tomsk 2005	Magadan 2001	Magadan 2004	Ingushetia 1996	(Rep.) 1999	Cheliabinsk 1999	Magadan 1998
Riazan 2002	Novgorod 2006	Tomsk 2006	Tomsk 2006	Magadan 2002	Novgorod 2004	Ingushetia 2001	(Rep.) 2000	Cheliabinsk 2005	Magadan 2003
Tomsk 2004	Omsk 2000	Tula 2004	Tula 2004	Magadan 2003	Novgorod 2005	Ingushetia 2004	(Rep.) 2001	Cheliabinsk 2006	Omsk 2000
Tomsk 2005	Riazan 2001	Tula 2006	Tula 2006	Magadan 2004	Omsk 2000	Ingushetia 2005	(Rep.) 2002	Lipetsk 1995	Omsk 2002
Tomsk 2006	Riazan 2002	Voronezh 2005	Voronezh 2005	Novgorod 2004	Orenburg 2005	Ingushetia 2006	(Rep.) 2003	Magadan 1995	Orenburg 2005
Tula 2004	Tomsk 2004	Voronezh 2006	Voronezh 2006	Novgorod 2005	Orenburg 2006	Kabardino-Balkaria 2006	(Rep.) 2004	Magadan 1998	Orenburg 2006
Tula 2006	Tomsk 2005	Altai (Rep.) 1995	Altai (Rep.) 1995	Novgorod 2006	Riazan 2001	Kalmykia 1995	(Rep.) 2005	Magadan 2003	Tomsk 2004
Vologda 1998	Tomsk 2006	Altai (Rep.) 1996	Altai (Rep.) 1996	Omsk 2000	Tomsk 2004	Mordovia 1998	(Rep.) 2006	Omsk 2000	Tomsk 2005
Voronezh 2005	Tula 2004	Altai (Rep.) 1997	Altai (Rep.) 1997	Orenburg 2005	Tomsk 2005	Mordovia 2000	Ingushetia 1995	Omsk 2002	Tomsk 2006
Voronezh 2006	Tula 2006	Altai (Rep.) 1998	Altai (Rep.) 1998	Orenburg 2006	Tomsk 2006	Mordovia 2001	Ingushetia 1996	Orenburg 2005	Tula 2004
Altai (Rep.) 1998	Vologda 1998	Altai (Rep.) 1999	Altai (Rep.) 1999	Riazan 2001	Tula 2004	Mordovia 2002	Ingushetia 1997	Orenburg 2006	Tula 2006
Altai (Rep.) 1999	Voronezh 2005	Altai (Rep.) 2000	Altai (Rep.) 2000	Tomsk 2004	Tula 2006	Sakha 1995	Ingushetia 1998	Tomsk 1997	Voronezh 2005
Altai (Rep.) 2000	Voronezh 2006	Altai (Rep.) 2001	Altai (Rep.) 2001	Tomsk 2005	Vologda 1998		Ingushetia 1999	Tomsk 2004	Voronezh 2006
Ingushetia 1995	Altai (Rep.) 1998	Altai (Rep.) 2002	Altai (Rep.) 2002	Tomsk 2006	Voronezh 2005		Ingushetia 2000	Tomsk 2005	Altai (Rep.) 1995
Ingushetia 1996	Altai (Rep.) 1999	Altai (Rep.) 2003	Altai (Rep.) 2003	Tula 2006	Voronezh 2006		Ingushetia 2001	Tomsk 2006	Altai (Rep.) 1996
Ingushetia 1997	Altai (Rep.) 2000	Altai (Rep.) 2004	Altai (Rep.) 2004	Vologda 1998	Altai (Rep.) 1995		Ingushetia 2002	Tula 2004	Altai (Rep.) 1997
Ingushetia 1999	Ingushetia 1995	Altai (Rep.) 2005	Altai (Rep.) 2005	Voronezh 2005	Altai (Rep.) 1996		Ingushetia 2003	Tula 2006	Altai (Rep.) 1998
Ingushetia 2000	Ingushetia 1996	Altai (Rep.) 2006	Altai (Rep.) 2006	Voronezh 2006	Altai (Rep.) 1997		Ingushetia 2004	Voronezh 2005	Altai (Rep.) 1999
Ingushetia 2001	Ingushetia 1997	Ingushetia 1995	Ingushetia 1995	Altai (Rep.) 1997	Altai (Rep.) 1998		Ingushetia 2005	Voronezh 2005	Altai (Rep.) 2000
Ingushetia 2006	Ingushetia 1999	Ingushetia 1996	Ingushetia 1996	Altai (Rep.) 1998	Altai (Rep.) 1999		Ingushetia 2006	Voronezh 2006	Altai (Rep.) 2001
Kabardino-Balkaria 2006	Ingushetia 2001	Ingushetia 1997	Ingushetia 1997	Altai (Rep.) 1999	Altai (Rep.) 2000		Kabardino-Balkaria 2006	Altai (Rep.) 1995	Altai (Rep.) 2002
Kalmykia 1998	Ingushetia 2006	Ingushetia 1998	Ingushetia 1998	Altai (Rep.) 2000	Altai (Rep.) 2001		Kalmykia 1995	Altai (Rep.) 1996	Altai (Rep.) 2003
Kalmykia	Kabardino-	Ingushetia	Ingushetia	Altai (Rep.)	Altai (Rep.)		Kalmykia	Altai (Rep.)	Altai (Rep.)

(C1)	(C2)	(C3)	(C4)	(C5)	(C6)	(C7)	(C8)	(C9)	(C10)
1999	Balkaria 2006	1999	1999	2001	2002		1996	1998	2004
Kalmykia 2000	Kalmykia 1997	Ingushetia 2000	Ingushetia 2000	Altai (Rep.) 2005	Altai (Rep.) 2003		Kalmykia 1997	Altai (Rep.) 1999	Altai (Rep.) 2005
Kalmykia 2001	Kalmykia 1998	Ingushetia 2001	Ingushetia 2001	Altai (Rep.) 2006	Altai (Rep.) 2004		Kalmykia 1998	Altai (Rep.) 2000	Altai (Rep.) 2006
Kalmykia 2002	Kalmykia 1999	Ingushetia 2002	Ingushetia 2002	Bashkortostan 2000	Altai (Rep.) 2005		Kalmykia 1999	Bashkortostan 1998	Ingushetia 1995
Kalmykia 2003	Kalmykia 2000	Ingushetia 2003	Ingushetia 2003	Ingushetia 1995	Altai (Rep.) 2006		Kalmykia 2000	Bashkortostan 2005	Ingushetia 1996
Komi 2005	Kalmykia 2001	Ingushetia 2004	Ingushetia 2004	Ingushetia 1996	Bashkortostan 2000		Kalmykia 2001	Ingushetia 1995	Ingushetia 1997
Komi 2006	Kalmykia 2002	Ingushetia 2005	Ingushetia 2005	Ingushetia 1997	Ingushetia 1995		Kalmykia 2002	Ingushetia 1996	Ingushetia 1998
Mordovia 2000	Kalmykia 2003	Ingushetia 2006	Ingushetia 2006	Ingushetia 1999	Ingushetia 1996		Kalmykia 2003	Ingushetia 1997	Ingushetia 1999
Mordovia 2001	Komi 2005	Kabardino- Balkaria 2006	Kabardino- Balkaria 2006	Ingushetia 2000	Ingushetia 1997		Kalmykia 2004	Ingushetia 1999	Ingushetia 2000
Mordovia 2002	Komi 2006	Kalmykia 1995	Kalmykia 1995	Ingushetia 2001	Ingushetia 1998		Kalmykia 2005	Ingushetia 2001	Ingushetia 2001
Sakha 1995	Mordovia 2000	Kalmykia 1996	Kalmykia 1996	Kabardino- Balkaria 2001	Ingushetia 1999		Mordovia 2000	Ingushetia 2002	Ingushetia 2002
Tatarstan 2000	Mordovia 2001	Kalmykia 1997	Kalmykia 1997	Kabardino- Balkaria 2006	Ingushetia 2000		Mordovia 2001	Ingushetia 2003	Ingushetia 2003
Tyva 2004	Mordovia 2002	Kalmykia 1998	Kalmykia 1998	Kalmykia 1996	Ingushetia 2001		Mordovia 2002	Ingushetia 2004	Ingushetia 2004
Tyva 2005	Ossetia 2005	Kalmykia 1999	Kalmykia 1999	Kalmykia 1997	Ingushetia 2002			Ingushetia 2005	Ingushetia 2005
Udmurtia 2006	Sakha 1995	Kalmykia 2000	Kalmykia 2000	Kalmykia 1998	Ingushetia 2003			Ingushetia 2006	Ingushetia 2006
	Tatarstan 2000	Kalmykia 2001	Kalmykia 2001	Kalmykia 1999	Ingushetia 2004			Kabardino- Balkaria 2001	Kabardino- Balkaria 2001
	Tyva 2004	Kalmykia 2002	Kalmykia 2002	Kalmykia 2000	Ingushetia 2005			Kabardino- Balkaria 2005	Kabardino- Balkaria 2005
	Tyva 2005	Kalmykia 2003	Kalmykia 2003	Kalmykia 2001	Ingushetia 2006			Kabardino- Balkaria 2006	Kabardino- Balkaria 2006
	Udmurtia 2006	Kalmykia 2004	Kalmykia 2004	Kalmykia 2002	Kabardino- Balkaria 2001			Kalmykia 1995	Kalmykia 1995
		Kalmykia 2005	Kalmykia 2005	Kalmykia 2003	Kabardino- Balkaria 2006			Kalmykia 1996	Kalmykia 1996
		Komi 2005	Komi 2005	Karelia 2002	Kalmykia 1995			Khakassia 2001	Kalmykia 1997
		Komi 2006	Komi 2006	Khakassia 2001	Kalmykia 1996			Komi 2005	Kalmykia 1998
		Mordovia 2000	Mordovia 2000	Khakassia 2002	Kalmykia 1997			Komi 2006	Kalmykia 1999
		Mordovia 2001	Mordovia 2001		Kalmykia 1998			Mordovia 1995	Kalmykia 2000
		Mordovia 2002	Mordovia 2002	Komi 2005	Kalmykia 1999			Mordovia 1998	Kalmykia 2001
		Northern Ossetia 2005	Northern Ossetia 2005	Komi 2006				Mordovia 2000	Kalmykia 2002
		Sakha 1995	Sakha 1995	Mordovia 2001	Kalmykia 2001			Mordovia 2001	Kalmykia 2003
		Tatarstan 2000	Tatarstan 2000	Mordovia 2002	Kalmykia 2002			Mordovia 2002	Kalmykia 2002
		Tyva 2005	Tyva 2005	Mordovia 2003	Kalmykia 2003			Northern Ossetia 2005	Kalmykia 2005
		Udmurtia 2006	Udmurtia 2006	Mordovia 2005	Kalmykia 2004			Sakha 1995	Khakassia 2001
				Northern Ossetia 2003	Kalmykia 2005			Tatarstan 2000	Komi 2005
				Northern Ossetia 2005	Khakassia 2001			Tatarstan 2005	Komi 2006
				Sakha 1995	Khakassia 2002			Tatarstan 2006	Mordovia 1995
				Tatarstan 2000				Udmurtia 2005	Mordovia 1998
				Tatarstan	Komi 2004			Udmurtia	Mordovia
					Komi 2005				

(C1)	(C2)	(C3)	(C4)	(C5)	(C6)	(C7)	(C8)	(C9)	(C10)
				2001				2006	2000
				Tyva 2005	Komi 2006				Mordovia 2001
				Udmurtia 2004	Mordovia 2000				Mordovia 2002
				Udmurtia 2005	Mordovia 2001				Northern Ossetia 2005
				Udmurtia 2006	Mordovia 2002				Sakha 1995
					Mordovia 2003				Tatarstan 2000
					Mordovia 2005				Tatarstan 2005
					Northern Ossetia 2005				Tatarstan 2006
					Sakha 1995				Udmurtia 2005
					Tatarstan 2000				Udmurtia 2006
					Tatarstan 2001				
					Udmurtia 2004				
					Udmurtia 2005				
					Udmurtia 2006				

Table C2: Robust regressions after exclusion of political variables, 1995-2006, dep. var.: retention rate

	(C11)	(C12)	(C13)	(C14)	(C15)	(C16)	(C17)	(C18)	(C19)	(C20)
	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS
Tax arrears squared (Putin)	-0.084** (0.038)	-0.074** (0.036)	-0.086*** (0.033)	0.039 (0.030)	0.027 (0.023)	-0.439 (0.661)	0.019 (0.511)	0.193 (0.318)	-0.474 (0.512)	0.206 (0.249)
Tax arrears squared (Yeltsin)	2.266** (1.028)	0.217 (1.123)	0.162 (1.264)	4.305*** (0.786)	2.266** (0.904)	3.175*** (0.522)	1.270*** (0.487)	1.286** (0.587)	4.783*** (0.783)	2.795*** (0.933)
Dummy Putin		-0.074*** (0.017)					-0.067*** (0.015)			
Tax structure										
Average income per capita	0.010*** (0.003)	0.016*** (0.004)	0.007 (0.005)	0.009*** (0.002)	0.004 (0.004)	0.009*** (0.003)	0.014*** (0.004)	0.006 (0.005)	0.009*** (0.002)	0.006 (0.004)
Capital funds	-0.084*** (0.015)	-0.095*** (0.017)	-0.079*** (0.016)	-0.056*** (0.020)	-0.044** (0.022)	-0.089*** (0.015)	-0.098*** (0.017)	-0.083*** (0.016)	-0.055*** (0.020)	-0.046** (0.022)
Legal factors										
Dummy Tatarstan and Bashkortostan (Putin)	-0.058 (0.036)	-0.039 (0.039)	-0.044 (0.047)			-0.060* (0.035)	-0.043 (0.038)	-0.049 (0.045)		
Dummy Tatarstan and Bashkortostan (Yeltsin)	0.169*** (0.024)	0.167*** (0.021)	0.163*** (0.023)			0.147*** (0.024)	0.147*** (0.020)	0.143*** (0.022)		
Constant	0.601*** (0.009)	0.635*** (0.010)	0.639*** (0.022)	0.201*** (0.051)	0.542*** (0.044)	0.611*** (0.008)	0.641*** (0.006)	0.646*** (0.023)	0.532*** (0.050)	0.528*** (0.042)
Region fixed effects	No	No	No	Yes	Yes	No	No	No	Yes	Yes
Time fixed effects	No	No	Yes	No	Yes	No	No	Yes	No	Yes
Kalmykia, Altai Rep. and Ingushetia included	Yes	Yes	Yes	Yes	Yes	No	No	No	No	No
Observations	945	945	945	945	945	910	910	910	910	910
R²	0.108	0.143	0.230			0.137	0.419	0.265		
F-test	20.59***	25.23***	19.81***	13.09***	17.10***	22.59***	25.76***	22.05***	10.57***	17.19***

Notes: see tables 1 and 2

Table C3: Lagged regressions, 1996-2006, dep. var.: retention rate of the period t+1

	(C21)	(C22)	(C23)	(C24)	(C25)	(C26)	(C27)	(C28)	(C29)	(C30)
	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS
Tax arrears squared (Putin)	-0.021 (0.031)	-0.016 (0.029)	-0.031 (0.026)	0.078*** (0.025)	0.057*** (0.017)	-1.280 (0.927)	-0.660 (0.620)	-0.442 (0.427)	-1.312* (0.754)	-0.300 (0.348)
Tax arrears squared (Yeltsin)	0.182 (1.032)	-1.500 (1.070)	-0.525 (1.173)	1.492** (0.746)	1.238 (0.862)	1.104* (0.594)	-0.364 (0.617)	0.874 (0.626)	1.515** (0.764)	1.588* (0.936)
Dummy Putin		-0.125*** (0.017)					-0.109*** (0.015)			
Tax structure										
Average income per capita	0.007 (0.005)	0.011** (0.005)	-0.006 (0.006)	0.014*** (0.004)	-0.007 (0.007)	0.006 (0.005)	0.010* (0.005)	-0.003 (0.006)	0.013*** (0.004)	-0.003 (0.007)
Capital funds	-0.062** (0.026)	-0.071*** (0.026)	-0.034 (0.028)	-0.093*** (0.028)	-0.073*** (0.028)	-0.041 (0.027)	-0.049* (0.028)	-0.018 (0.029)	-0.075*** (0.029)	-0.063** (0.029)
Legal factors										
Dummy Tatarstan and Bashkortostan (Yeltsin)	0.257*** (0.036)	0.269*** (0.036)	0.244*** (0.035)			0.215*** (0.034)	0.227*** (0.032)	0.204*** (0.032)		
Dummy Tatarstan and Bashkortostan (Putin)	-0.060* (0.035)	-0.035 (0.041)	-0.040 (0.048)			-0.080** (0.033)	-0.058 (0.038)	-0.056 (0.045)		
Political variables										
Territory	0.037*** (0.013)	0.037*** (0.012)	0.046*** (0.010)			0.021* (0.012)	0.020* (0.011)	0.029*** (0.009)		
Population	-0.004 (0.005)	-0.005 (0.005)	-0.003 (0.005)	0.091** (0.039)	0.141*** (0.050)	-0.007 (0.005)	-0.007 (0.005)	-0.006 (0.005)	0.047 (0.035)	0.097** (0.043)
Oil & gas share	-0.060 (0.078)	-0.045 (0.072)	-0.076 (0.066)	4.743 (5.814)	7.732 (6.020)	-0.083 (0.083)	-0.071 (0.079)	-0.100 (0.069)	2.326 (5.662)	5.323 (5.819)
Dummy border region	0.029** (0.012)	0.027** (0.012)	0.028*** (0.011)			0.015 (0.011)	0.014 (0.011)	0.015 (0.010)		
Distance from Moscow	0.007*** (0.003)	0.007*** (0.003)	0.007*** (0.002)			0.009*** (0.002)	0.008*** (0.002)	0.008*** (0.002)		
Dummy republic	0.072** (0.031)	0.068** (0.031)	0.077*** (0.029)			0.079*** (0.029)	0.076*** (0.029)	0.083*** (0.027)		
Overrepresentation in State Duma	-0.009 (0.009)	-0.011 (0.009)	-0.003 (0.007)	-0.018 (0.019)	-0.008 (0.014)	-0.001 (0.009)	-0.003 (0.009)	0.002 (0.007)	-0.012 (0.015)	-0.005 (0.013)
Power (2001-2006)	-0.024** (0.010)	-0.017* (0.009)	-0.036*** (0.014)			-0.016 (0.010)	-0.010 (0.009)	-0.032** (0.014)		
Power (1995-2000)	-0.025** (0.010)	-0.029*** (0.009)	-0.012 (0.008)			-0.017* (0.010)	-0.020** (0.009)	-0.001 (0.007)		
Fiscal transfers	0.116** (0.056)	0.147*** (0.055)	0.169*** (0.055)	-0.027 (0.066)	0.074 (0.059)	0.077* (0.043)	0.106** (0.041)	0.134*** (0.041)	-0.168*** (0.044)	-0.054 (0.039)
Democratization	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.006** (0.003)	-0.000 (0.002)	-0.001 (0.001)	-0.001 (0.001)	-0.000 (0.001)	-0.005** (0.002)	-0.000 (0.002)
Share of Russians	0.180*** (0.065)	0.181*** (0.064)	0.191*** (0.059)			0.165*** (0.052)	0.166*** (0.051)	0.177*** (0.045)		
Urbanization	2.371*** (0.779)	2.398*** (0.754)	3.100*** (0.770)	3.792 (4.739)	0.415 (4.574)	0.189 (0.674)	0.215 (0.646)	0.702 (0.625)	8.015* (4.595)	3.053 (4.585)
Constant	0.448*** (0.112)	0.490*** (0.107)	0.550*** (0.131)	0.509 (0.575)	0.284 (0.329)	0.561*** (0.091)	0.595*** (0.088)	0.674*** (0.112)	0.242 (0.351)	0.207 (0.332)
Region fixed effects	No	No	No	Yes	Yes	No	No	No	Yes	Yes
Time fixed effects	No	No	Yes	No	Yes	No	No	Yes	No	Yes
Kalmykia, Altai Rep. and Ingushetia included	Yes	Yes	Yes	Yes	Yes	No	No	No	No	No
Observations	867	867	867	867	867	834	834	834	834	834
R ²	0.188	0.209	0.292			0.216	0.231	0.311		
F-test	15.13***	17.45***	19.92***	36.11***	20.67***	14.21***	19.18***	25.05***	10.65***	19.95***

Notes: see tables 1 and 2

Appendix D: Separate estimations for Yeltsin and Putin periods

Table D1: Panel data regressions for Yeltsin period, 1995-1999, dep. var.: retention rate

	(D1)	(D2)	(D3)	(D4)	(D5)	(D6)	(D7)	(D8)
	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS
Tax arrears squared (Yeltsin)	0.282 (1.082)	-0.156 (1.260)	0.628 (0.844)	-0.615 (0.795)	1.362*** (0.403)	1.131** (0.529)	2.488*** (0.511)	1.113** (0.531)
Tax structure								
Average income per capita	-0.030*** (0.011)	0.021 (0.017)	-0.066*** (0.014)	0.003 (0.018)	-0.040*** (0.010)	0.006 (0.011)	-0.058*** (0.013)	0.006 (0.015)
Capital funds	-0.027 (0.069)	-0.276*** (0.096)	0.155** (0.060)	-0.076 (0.087)	0.073 (0.052)	-0.110* (0.063)	0.091** (0.045)	-0.124* (0.068)
Legal factors								
Dummy Tatarstan and Bashkortostan	0.218*** (0.044)	0.247*** (0.045)			0.145*** (0.024)	0.176*** (0.026)		
Political variables								
Territory	0.057*** (0.014)	0.052*** (0.015)			0.038*** (0.011)	0.034*** (0.012)		
Population	-0.014** (0.007)	-0.001 (0.007)	-0.118 (0.275)	-0.254 (0.252)	-0.019*** (0.005)	-0.011** (0.004)	0.248 (0.232)	0.004 (0.212)
Oil & gas share	0.039 (0.048)	0.135** (0.057)	-1.074 (3.889)	-4.588 (3.695)	-0.015 (0.032)	0.048 (0.036)	-1.821 (3.752)	-5.300* (2.955)
Dummy border region	0.023** (0.012)	0.023** (0.011)			0.014* (0.008)	0.015** (0.007)		
Distance from Moscow	0.006** (0.003)	0.006** (0.003)			0.006*** (0.002)	0.005*** (0.002)		
Dummy republic	0.068** (0.031)	0.058** (0.029)			0.057*** (0.020)	0.048*** (0.018)		
Overrepresentation in State Duma	0.001 (0.010)	-0.004 (0.011)	0.007 (0.041)	0.011 (0.034)	0.014*** (0.005)	0.009* (0.005)	0.007 (0.035)	0.014 (0.029)
Power	-0.015* (0.008)	-0.015* (0.008)			-0.006 (0.007)	-0.006 (0.007)		
Fiscal transfers	0.054 (0.080)	0.039 (0.080)	0.085 (0.065)	0.059 (0.057)	0.012 (0.034)	0.011 (0.033)	-0.031 (0.040)	-0.042 (0.035)
Democratization	-0.000 (0.002)	-0.000 (0.002)	-0.018 (0.011)	-0.003 (0.010)	-0.000 (0.001)	-0.000 (0.001)	-0.015 (0.010)	-0.003 (0.008)
Share of Russians	0.160* (0.094)	0.148 (0.091)			0.064* (0.035)	0.059* (0.032)		
Urbanization	2.425** (0.963)	1.774* (1.010)	-7.467 (7.731)	-7.455 (6.550)	-0.082 (0.51)	-0.722 (0.487)	5.804 (5.300)	4.036 (4.987)
Constant	0.437*** (0.137)	0.409*** (0.135)	2.812*** (0.689)	3.446 (2.515)	0.640*** (0.067)	0.605*** (0.063)	0.588 (2.120)	0.355 (1.947)
Region FE	No	No	Yes	Yes	No	No	Yes	Yes
Time FE	No	Yes	No	Yes	No	Yes	No	Yes
Outliers included	Yes	Yes	Yes	Yes	No	No	No	No
No. obs.	395	395	395	395	380	380	380	380
R²	0.304	0.372			0.486	0.566		
F-test	19.52***	14.72***	54.67***	19.30***	23.83***	28.35***	108.13***	17.78***

Note: see tables 1 and 2

Table D2: Median regressions for Yeltsin period, 1995-1999, dep. var.: retention rate

	(D9)	(D10)	(D11)	(D12)	(D13)	(D14)	(D15)	(D16)
	Median	Median	Median	Median	Median	Median	Median	Median
Tax arrears squared (Yeltsin)	1.175** (0.522)	0.763 (0.828)	1.688* (0.865)	0.458 (1.029)	1.400*** (0.523)	1.262* (0.764)	2.160** (0.893)	1.928* (0.986)
Tax structure								
Average income per capita	-0.041*** (0.012)	-0.002 (0.017)	-0.052*** (0.015)	-0.008 (0.025)	-0.044*** (0.012)	-0.001 (0.017)	-0.052*** (0.015)	0.009 (0.025)
Capital funds	0.092 (0.058)	-0.080 (0.097)	0.109 (0.071)	-0.001 (0.104)	0.111* (0.060)	-0.050 (0.091)	0.100 (0.066)	-0.087 (0.109)
Legal factors								
Dummy Tatarstan and Bashkortostan	0.162*** (0.037)	0.189*** (0.041)			0.157*** (0.035)	0.166*** (0.039)		
Political variables								
Territory	0.030** (0.015)	0.022 (0.015)			0.025* (0.013)	0.015 (0.012)		
Population	-0.022*** (0.005)	-0.013** (0.006)	0.118 (0.312)	-0.140 (0.326)	-0.022*** (0.005)	-0.014** (0.006)	0.175 (0.294)	-0.027 (0.313)
Oil & gas share	-0.013 (0.093)	0.059 (0.159)	0.996 (7.687)	-2.674 (6.791)	-0.007 (0.094)	0.039 (0.197)	0.68 (7.760)	-4.193 (6.786)
Dummy border region	0.020** (0.008)	0.018** (0.009)			0.014* (0.007)	0.012 (0.008)		
Distance from Moscow	0.007*** (0.002)	0.006*** (0.002)			0.007*** (0.002)	0.006*** (0.002)		
Dummy republic	0.044* (0.024)	0.050** (0.022)			0.046* (0.025)	0.037 (0.023)		
Overrepresentation in State Duma	0.010 (0.008)	0.011 (0.008)	-0.056 (0.066)	-0.018 (0.058)	0.016** (0.007)	0.012 (0.007)	-0.041 (0.066)	-0.021 (0.056)
Power	-0.008 (0.007)	-0.003 (0.007)			-0.007 (0.007)	-0.000 (0.007)		
Fiscal transfers	0.004 (0.053)	-0.007 (0.049)	0.086 (0.064)	0.044 (0.060)	0.010 (0.046)	0.005 (0.046)	0.036 (0.067)	0.005 (0.053)
Democratization	-0.001 (0.001)	-0.001 (0.001)	-0.013 (0.022)	0.003 (0.020)	-0.001 (0.001)	-0.000 (0.001)	-0.013 (0.03)	0.003 (0.026)
Share of Russians	0.069 (0.056)	0.097** (0.049)			0.046 (0.046)	0.049 (0.043)		
Urbanization	0.873 (0.549)	0.317 (0.601)	1.800 (10.738)	-2.002 (9.549)	0.084 (0.508)	-0.744 (0.587)	1.507 (10.944)	2.186 (10.316)
Constant	0.604*** (0.096)	0.531*** (0.078)	1.300 (1.026)	0.977 (0.933)	0.653*** (0.080)	0.593*** (0.075)	-0.712 (3.023)	0.374 (3.187)
Region FE	No	No	Yes	Yes	No	No	Yes	Yes
Time FE	No	Yes	No	Yes	No	Yes	No	Yes
Outliers included	Yes	Yes	Yes	Yes	No	No	No	No
No. obs.	395	395	395	395	380	380	380	380
Pseudo R²	0.219	0.259	0.523	0.571	0.287	0.337	0.507	0.563

Note: see tables 1 and 2

Table D3: Panel data regressions for Putin period, 2000-2006, dep. var.: retention rate

	(D17)	(D18)	(D19)	(D20)	(D21)	(D22)	(D23)	(D24)
	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS
Tax arrears squared (Putin)	-0.041 (0.030)	-0.056** (0.023)	0.085*** (0.017)	0.052*** (0.013)	0.063 (0.361)	-0.041 (0.317)	0.711* (0.417)	0.596 (0.365)
Tax structure								
Average income per capita	0.017*** (0.004)	-0.009* (0.005)	0.023*** (0.004)	-0.011 (0.007)	0.015*** (0.004)	-0.008 (0.005)	0.021*** (0.004)	-0.007 (0.007)
Capital funds	-0.080*** (0.027)	-0.030 (0.030)	-0.075** (0.035)	-0.046 (0.034)	-0.059** (0.027)	-0.019 (0.031)	-0.062* (0.034)	-0.041 (0.033)
Legal factors								
Dummy Tatarstan and Bashkortostan	-0.011 (0.054)	-0.038 (0.060)			-0.017 (0.053)	-0.038 (0.059)		
Political variables								
Territory	0.020 (0.013)	0.045*** (0.010)			0.007 (0.013)	0.031*** (0.010)		
Population	0.002 (0.008)	0.009 (0.007)	0.028 (0.039)	0.120*** (0.045)	-0.001 (0.007)	0.006 (0.007)	0.013 (0.040)	0.096** (0.040)
Oil & gas share	-0.045 (0.102)	-0.096 (0.132)	2.064 (8.268)	5.411 (8.678)	-0.084 (0.113)	-0.120 (0.137)	0.505 (8.140)	3.899 (8.513)
Dummy border region	0.035** (0.016)	0.036** (0.015)			0.018 (0.015)	0.022 (0.015)		
Distance from Moscow	0.005 (0.004)	0.008** (0.003)			0.008** (0.003)	0.009*** (0.003)		
Dummy republic	0.095** (0.042)	0.110*** (0.038)			0.113*** (0.041)	0.121*** (0.038)		
Overrepresentation in State Duma	-0.018* (0.010)	-0.002 (0.007)	-0.016 (0.016)	-0.003 (0.010)	-0.012 (0.010)	0.001 (0.007)	-0.018 (0.015)	-0.006 (0.010)
Fiscal transfers	0.229*** (0.063)	0.270*** (0.065)	-0.202* (0.112)	-0.031 (0.111)	0.187*** (0.059)	0.247*** (0.063)	-0.339*** (0.094)	-0.142 (0.106)
Democratization	-0.002 (0.002)	-0.002 (0.002)	0.002 (0.009)	-0.001 (0.012)	-0.001 (0.002)	-0.001 (0.001)	-0.009* (0.005)	0.001 (0.011)
Share of Russians	0.277*** (0.077)	0.275*** (0.067)			0.291*** (0.070)	0.284*** (0.064)		
Urbanization	1.749* (0.940)	4.017*** (0.923)	-0.172 (4.424)	-6.228 (4.358)	-0.194 (0.856)	2.150** (0.877)	-0.896 (4.407)	-5.940 (4.266)
Constant	0.178 (0.114)	0.194* (0.111)	0.680** (0.305)	0.851** (0.396)	0.285*** (0.103)	0.278*** (0.106)	1.221*** (0.178)	0.822** (0.385)
Region FE	No	No	Yes	Yes	No	No	Yes	Yes
Time FE	No	Yes	No	Yes	No	Yes	No	Yes
Outliers included	Yes	Yes	Yes	Yes	No	No	No	No
No. obs.	550	550	550	550	530	530	530	530
R²	0.244	0.409			0.235	0.389		
F-test	16.42***	17.08***	15.36***	29.91***	12.37***	18.33***	16.42***	28.96***

Note: see tables 1 and 2

Table D4: Median regressions for Putin period, 2000-2006, dep. var.: retention rate

	(D25) Median	(D26) Median	(D27) Median	(D28) Median	(D29) Median	(D30) Median	(D31) Median	(D32) Median
Tax arrears squared (Putin)	-0.035 (0.227)	-0.061 (0.221)	0.062 (0.105)	0.040 (0.141)	0.289 (0.827)	-0.171 (0.515)	0.275 (0.592)	0.428 (0.801)
Tax structure								
Average income per capita	0.026*** (0.004)	-0.006 (0.006)	0.027*** (0.004)	-0.012* (0.007)	0.025*** (0.004)	-0.003 (0.006)	0.026*** (0.004)	-0.006 (0.007)
Capital funds	-0.119*** (0.025)	-0.074* (0.043)	-0.060 (0.045)	-0.012 (0.053)	-0.112*** (0.028)	-0.061 (0.044)	-0.056 (0.045)	-0.025 (0.051)
Legal factors								
Dummy Tatarstan and Bashkortostan	-0.072 (0.050)	-0.111** (0.055)			-0.083 (0.057)	-0.101* (0.054)		
Political variables								
Territory	0.009 (0.020)	0.050*** (0.011)			-0.005 (0.020)	0.045*** (0.011)		
Population	0.010 (0.007)	0.019** (0.008)	-0.001 (0.103)	0.063 (0.074)	0.007 (0.007)	0.015** (0.007)	0.001 (0.107)	0.058 (0.077)
Oil & gas share	0.067 (0.274)	0.044 (0.233)	-5.481 (15.24)	7.257 (16.246)	0.055 (0.296)	-0.021 (0.339)	-3.777 (14.845)	10.72 (16.976)
Dummy border region	0.028* (0.015)	0.025** (0.012)			0.017 (0.015)	0.021* (0.011)		
Distance from Moscow	0.003 (0.003)	0.004 (0.003)			0.004 (0.003)	0.004 (0.003)		
Dummy republic	0.122*** (0.043)	0.132*** (0.025)			0.129*** (0.043)	0.129*** (0.023)		
Overrepresentation in State Duma	-0.015 (0.013)	0.009 (0.011)	-0.001 (0.023)	0.003 (0.017)	-0.014 (0.013)	0.010 (0.008)	-0.003 (0.021)	0.002 (0.016)
Fiscal transfers	0.127* (0.068)	0.196*** (0.050)	-0.307*** (0.078)	-0.073 (0.068)	0.084 (0.066)	0.195*** (0.051)	-0.376*** (0.076)	-0.088 (0.077)
Democratization	-0.004*** (0.001)	-0.003*** (0.001)	-0.013 (0.011)	0.009 (0.009)	-0.003** (0.001)	-0.003** (0.001)	-0.016** (0.007)	-0.014 (0.012)
Share of Russians	0.300*** (0.076)	0.243*** (0.046)			0.283*** (0.075)	0.255*** (0.042)		
Urbanization	-0.137 (0.845)	2.453*** (0.753)	4.763 (5.462)	-2.357 (4.916)	-1.038 (0.820)	1.497** (0.638)	5.220 (5.706)	-3.354 (4.818)
Constant	0.327*** (0.111)	0.377*** (0.088)	0.897*** (0.309)	0.779*** (0.243)	0.409*** (0.113)	0.402*** (0.081)	0.989*** (0.217)	1.386*** (0.264)
Region FE	No	No	Yes	Yes	No	No	Yes	Yes
Time FE	No	Yes	No	Yes	No	Yes	No	Yes
Outliers included	Yes	Yes	Yes	Yes	No	No	No	No
No. obs.	550	550	550	550	530	530	530	530
Pseudo R²	0.186	0.311	0.504	0.572	0.199	0.323	0.506	0.565

Note: see tables 1 and 2

Appendix E: Russian tax system

- The tax system comprises *federal*, *regional* and *local* taxes. The most important taxes (*profit tax*, *VAT*, *personal income tax*, *excises on alcohol, tobacco etc.*, *rental payments for natural resources*, and *single social tax*, which replaced the contributions to public health, pension and unemployment insurance and was imposed on wages and paid by employers¹⁹) are *federal taxes*. These taxes should be imposed in all regions of the Russian Federation. However, the revenue from several of these taxes (profit tax, personal income tax, several excises, payments for natural resources, and, until Putin's tax reform, VAT) are divided between different levels of government; the share of the federal centre can even become equal to zero – but the tax is still legally a *federal* one, because it is set by the federal centre. The *tax rates* for the federal taxes are set by the federal government with only one exception: for the profit tax the federal government does not set the tax rate, but the *maximal* tax rate, and the regions can reduce it by several percentage points. Moreover, until 2000 regions had the right to grant exemptions from their portions of federal taxes, and there were some presidential decrees establishing special tax regime for individual regions (like Ingushetia in 1994 or Karelia in 1992-1994). These options were used in two ways. Many regions implemented specific tax regimes for individual business groups with strong ties to the regional government (Yankovsky, 2001); the impact of these regimes is, however, quantitatively completely opaque (it would require the knowledge of individual tax bases for hundreds of enterprises). Few regions used the opportunity to lower federal tax rates at a larger scope, and became “internal tax heavens”.
- The *division of tax revenue* from the federal taxes was originally set in federal acts on individual taxes, which were consequently replaced by chapters of the Tax Code. For several taxes (VAT, income tax) the division was changed in annual budget acts (the so-called “regulating taxes”), which were passed by the federal parliament. However, the proportions are identical for all regions of Russia, with the only exception of Tatarstan and Bashkortostan. The distribution of tax revenue and tax rates was quite volatile: for example, for the *personal income tax* the regions received 100% in 1994; 90% in 1995-1996, once again 100% in 1997-1999, 84% in 2000, 99% in 2001 and 100% in 2003 and 2004. The tax rate moved from a progression system to the flat tax of 13%. For the *VAT* the regions received 25% until the first quarter of 1999, 15% from the second quarter of 1999 to 2000, and 0% afterwards; the overall tax rate was lowered from 28% in the early 1990s (before the start of our sample) to 20%, and once again to 18% in 2004. For the *corporate profit tax* the federal government until the first quarter of 1999 applied a tax rate of 13%, from the second quarter of 1999 to 2001 of 11%, from 2002 to 2004 7.5%, and from 2004 6%. The overall tax rate for the corporate profit tax was 35% until 2002 and 24% afterwards, so the difference was attributed to the regions. However, regions had the right to manipulate only part of “their” tax rate: from 2001 on they could reduce it only by 5 percent points.
- *Regional* and *local* taxes are set by the regions (which still may only “choose” from the predetermined list of the federal government), which may also choose the tax rate (within the range set by the federal government). This group includes, however, mostly property taxes (*land tax*, *personal and corporate real estate taxes*). The specifics of the Russian economy make these taxes unimportant (in fact, for the personal real estate tax the costs of administration systematically exceed its tax revenue). First, the structure of property rights for real estate and land is very vague and provides for many options for tax avoidance. Second, the valuation of many objects is far below their market value and based on outdated norms, partly inherited from the Soviet past. The tax rates are small: those of the real estate tax for individuals varied from 0.1 to 2% (depending on the value of the real estate object) and for organizations it changed over time from 2% to 2.2% (maximum rate determined by the federal government). Most regions used the maximum tax rate,²⁰ but granted countless exceptions. Another regional tax used from 1999 to 2003 was the *sales tax* of 5%, which was, however, introduced by practically all regions and did not form any source of regional heterogeneity.
- Finally, the royalties for natural resources formed an important base for regional tax revenue until Putin's tax reform 2001. During this period the regional consolidated budget received 60% for extraction of hydrocarbon raw materials and 75% for other minerals. After the tax reform under Putin the taxation of natural resources was redistributed towards the federal center.

¹⁹ We list only the main taxes, although the Russian fiscal system included a variety of minor taxes. The overall description of the tax system is rather stylized than exact; nevertheless, it is hardly possible to provide a detailed overview of the turbulent changes in the Russian taxation for nearly a decade.

²⁰ In fact, in an environment of strategic tax collection this behavior is no surprise: it is reasonable to set its „own“ tax rate to the maximum and try to manipulate the tax collection effort for the taxes mostly attributed to the other level of government.

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