THE EFFECTS OF SOFT BUDGET CONSTRAINTS ON MARKET DEVELOPMENT: THE CASE OF RUSSIAN REGIONS

By

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Aitalina Azarova

Budapest

June 2010

To Anna, Nicholas and John

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List of abbreviations

AIC Akaike Information Criterion

ALROSA Almazy Rossii Sakha

AO Autonomous Okrug

CSO Central Selling Organization

DMI Development of Market Institutions

FFSR Federal fund for support to regions

FIG Financial Investment Groups

Goskomstat the Russian Federation's State Committee of Statistics

GDP Gross Domestic Product

GRP Gross Regional Product

HBS Hard Budget Constraints

IHS The risk rating of the region, developed by the Vienna Institute for Advanced Studies

PCSE Panel-corrected standard errors

Rosstat the Federal State Statistic Service

RSPP Russian Union of Industrialists and Entrepreneurs

SBC Soft Budget Constraints

SME Small and Medium Size Enterprises

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CHAPTER 1: INTRODUCTION

The domino-like collapse of socialist and communist states in 1989 that brought about the end of Cold War heralded the victory of democracy and free markets. Today, twenty years on, while many of the countries of Central and Eastern Europe can be described in broad terms as successes both in democratization and the establishment of the free market, the Russian Federation presents a less rosy picture. While Russia may, in the words of Shleifer and Treisman (2005), have become 'a normal country' to the extent that it is a middle-income democracy - though some may dispute Shleifer and Treisman's optimistic assessment of Russia's democratic qualities - particularly the process of marketization in Russia has been less consistent and smooth than in other countries of CEE. While the extraordinary speed and scope of democratic as well as market transformations were praised by both academics and policy makers, the Russian economic system that emerged as a result of these transformations by the end of nineties was far from perfect for four reasons.

First, while the Russian state was strong enough to support a common market, it was too weak to resist capture. Several reasons have been mentioned for weak institutional capacity of the state, such as hyper-centralized executive power, or the legacy of communism, which enable powerful actors to 'privatize' the state. As managers of important enterprises influenced the legislative enactment in return for private benefits, the slow pace of economic development and ill-designed economic institutions were the result of the inability of a weak state to resist 'state capture' (Desai et al. 2003, Hellman et al. 2000).

The second reason was that while the state was market-oriented enough to launch the reform swiftly and dramatically with all its pillars, including price liberalization, privatization, and decentralization, at the same time it was not sufficiently market-consistent to complete all, or indeed any of these processes. The Russian economic transition created a situation of partially installed market institutions, which was exploited by powerful economic actors for their personal gain. Price liberalization without simultaneous anti-monopoly regulation and regulations securing free entry to the market induced many monopolist producers to raise prices beyond reasonable limits and gain immense monopoly rents. At the same time, inputs for some types of production were still heavily subsidized by the state, securing them low production costs. This remnant of the old system, combined with liberated prices and free

foreign trade, gave the producers an opportunity to profit from this duality: while the costs of production were not market-driven, sales were made according to world market prices.[1]

The third in the quartet of reasons is that the Russian state, while it was responsive enough to the demands of powerful economic actors, failed to be accountable to consumers, small businesses, labor force and minor shareholders. In other words it did not take on the role of re-balancing power relations among economic actors in order to prevent misuse of asymmetries in economic power (Bruszt 2001).[2] And last, while it was flexible enough to respond to the changing circumstances that emerged as an inevitable feature of the transition (Frye 2000), at the same time it was not sufficiently firm enough to create stable expectations on the part of owners and shareholders regarding the irrevocability of economic rights.

1.1 Motivation for the present research

Even more puzzling was the fact that the degree of marketization across the regions was dramatically uneven: while some regional governments were market-oriented and invested heavily in the development of business environment and infrastructure, others resisted reforms by erecting barriers to free movement of labor, goods and capitals, controlling prices and sheltering loss-making enterprises. This diversity in regional experience can be illustrated by descriptive statistics.

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[1] As Hellman (1998) persuasively argues, not only did the losers from the transition to a market economy have no incentives for the development of a liberal market. More often than not, the winners' behaviour constituted a serious obstacle to the entrenchment of market institutions. Those who gained significantly during the first years of privatisation, liberalisation of prices and foreign trade put all their efforts into weakening the viability of the state, its legal system and the institutional infrastructure supporting the market. Hellman states that the managers and owners of the large financial-industrial conglomerates, emerging from the privatisation process and especially after the loans-for-shares auctions, had interests at odds with those of market-oriented actors (1998, 233). They viewed the development of market institutions as detrimental to their privileged position and an impediment to their activities. When talking about financial-industrial conglomerates Hellman has in mind primarily financial industrial groups (FIGs), which emerged in 1994 and were active during the years 1994-1999; their activities gradually declined or were transformed after the October 1998 crisis.

[2] As Bruszt (2001) notes, since the times of the New Deal era, the state's role in creating/preserving markets was dramatically changed from prevention of particularistic groups from misusing the public sphere to the prevention of these groups from misusing the private sphere of the market to redistribute wealth and opportunities.

Table 1.1 below presents the figures for the degree of implementation of market reform among Russian regions: the share of industrial subsidies in budget expenditures in 1995, the share of agricultural subsidies in 100 rubles of produce as of 1995, the level of small-scale privatization as of 1 July 1996, the share of production and services with regulated prices in 1996, the level of state regulation of food prices in 1996 measured following the method, described in Section 2.3, and the level of large-scale privatization in the first half of nineties.[3] The columns denote, respectively, the mean of the region in the sample, the size of the sample, the maximum and minimum values of the variable, and two estimates of variation in the variable: standard deviation, and a coefficient of variation, dimensionless measure of variation calculated as the standard deviation divided by the mean. All the variables except the level of small-scale privatization show a very high degree of variation, with the coefficient of variation exceeding 40 per cent.

The industrial subsidies shows a sizable variation, with a coefficient of variation of 41 per cent: subsidies for industrial enterprises account for more than 15 per cent of the budgetary expenditures in more than one third of all regions (27 regions), while in Samarskaya oblast they accounted only for four per cent, and in the Evenkiiskii AO three per cent. The share of agricultural subsidies varies even more: the coefficient of variation is 61 per cent. On average a regional government subsidized about 10 kopeks in each ruble of agricultural production, but in Samarskaya oblast (again) they subsidized only 1.5 kopeks, while in the Nenetskii AO the share of subsidized price was as high as 33 kopeks. Both measurements for privatization show a similar pattern of variation, with a minimum level of 20.3 and 25 for small and large-scale privatization respectively, and the maximum value of 100 and 90 per cent for small and large-scale scale privatization respectively. The values for small-scale privatization are more densely distributed around the mean of 78, however while the distribution for large-scale privatization have much thicker tails, which is reflected in the higher value of the coefficient of variation: 23 and 42 for small and large-scale privatization respectively. Both indicators of state price regulation demonstrate a striking diversity among the regions: while the share of production and services with regulated prices varies between 3.2 and 70 per cent, the level of state regulation of prices vary between 1 and 85 (the methodology of calculation is discussed at length in Section 2.3). The level of state regulation of food prices shows the most

[3] Data for the first five variables is taken from Lavrov et al. (1997), for the sixth variable from Klimanov (2000, 139).

variability: while the mean is 20 points, the distribution has a very long right hand tail, reaching maximum 85 points for Khabarovskii krai, and minimum of one point in thirteen different regions. More informative is the second indicator, for prices fixed by the regional government. In Orlovskaya oblast, led by Communist governor Egor Stroev almost three quarters of prices were regulated by his administration, while on the average this share was only 15 per cent.

Table 1.1. Cross-regional Differences in Market-Reform Indices

	Mean	Standard Deviation	Min.	Max.	Coefficient of Variation,%	N
Share of industrial subsidies in budget expenditures in 1995	12.8	5.3	0.6	26.8	41	88
Share of agricultural subsidies in 100 rub of produce in 1995, rub	9.74	5.98	1.5	32.9	61	80
Level of small scale privatization at 1.07.96	78.2	18.6	20.3	100	23	78
Share of production and services with regulated prices in 1996	15.3	8.77	3.2	69.1	57	77
Level of state regulation of food prices in 1996, points	19.5	18.4	1	85	94	77
Level of large scale privatization	49.9	20.9	25	90	42	79

Thus, the second puzzle to be investigated is why regional economies in Russia showed different performances during the first decade of transition. What influenced the formation of robust market institutions in some regions but not others? This question is embedded in the more general question mentioned above: what are the conditions of creating market-oriented and effective government?

The goal of the present research is to identify those factors that led regional government to invest into the development of market institutions in their territories and improve the business environment, or not as the case may be. In order to account for these differences I examine the external settings the regional governments found themselves in. In explaining how federational institutional settings created external market-inducing sets of incentives for some of the regional governments, I draw extensively on the theory of market preserving federalism (Weingast 1995, 1997, Montinola, Qian, and Weingast 1995). This theoretical framework has

a profound analytical power in that it explains the political foundations for markets both in developed and in nascent federations. More importantly, not only it provides analytical tools for comparative studies at national level, but offers a sound theory for explaining differences of market development at a sub-national level.

1.2 Structure of the thesis

The next, second chapter provides theoretical background for the study. The three broad groups of studies, namely those of market making states, studies of federalism and of soft budget constraints, will be critically assessed in order to identify the gaps and the theoretical framework for the study. The third chapter lays out the research objective against the backdrop of the research carried out on the subject to date, the justification for the selected time period and the analytical framework for the study. This is followed by the formulation of the three main hypotheses.

Chapter four will examine empirically whether the development of market institutions is important for economic growth and will show that this is indeed the case. The novelty of the chapter lies in the fact that instead of employing easily observable indicators of reform measures, such as the level of privatization, price liberalization, and the level of subsidization, attention is, drawn here to the stability of the market institutions in the region, with the variable of development of market institutions as a proxy. Its explanatory power will be tested not only against variables conventionally used for explaining economic performance, such as initial endowment with natural and human resources, but also against alternative methods of measuring the market transformation.

Chapter five concentrates on identifying the specific conditions that motivated regional governments to develop market institutions in localities. Investigating a full sample of the Russian regions, I address the question of what conditions made some regional governments conduct market-oriented policies in the interests of economic development. My task in this chapter is to analyze the political foundation for the environment that stimulated regional governments to invest in the development of market-friendly institutions or to avoid doing so. Different testing techniques and various model specifications will be employed to prove the robustness of the empirical results which came out as consistent with the theory of market-preserving federalism.

After a thorough study of explanations of the patterns of market development across the regions, the thesis turns to the investigation of the determinants of the soft budget constraints. The study of origins and preconditions of the emergence of this fiscal federal institution occupies a substantial part of the chapter six. A novel method of measuring the concept of SBC will be offered. The core of the chapter is the test of one of the most influential theories of Russian fiscal federalism, Treisman's theory (1996), which associates greater transfers to the greater threat of political disruption. Special attention will be devoted to the rarely explored puzzle of expanding public employment against the backdrop of a drastic drop in the number of public enterprises. I will put the investigation of this puzzle within the framework of the bargaining game between the federal center and sub-national governments.

The final chapter, chapter seven, concludes.

CHAPTER 2: REVIEW OF THE RELEVANT LITERATURE ON CREATING FUNCTIONING MARKETS

2.1. Introduction

In order to investigate the puzzle laid out in the introduction the thesis draws on and brings together three overlapping bodies of literature. The first encompasses studies of market making states; the second group is made up of studies of federalism, including theories of fiscal federalism, decentralization theories, and jurisdictional competition theories. The final group focuses on the study of soft budget constraints. The last two bodies overlap significantly, especially due to the ground-breaking work of Weingast on market-preserving federalism which applied budget constraints to a level of analysis higher than firms.

2.2. The market-making state

The dominant debate in investigating markets in the early nineties centered on the ability of newly marketizing states to persistently and comprehensibly push forward market reforms despite the (possible) resistance of the some societal groups (Bruszt and Stark 1998, Hellman 1997, 1998). Hence, the emphasis was placed on the protection of economic policy making from often reform-averse groups of economic actors. Later, such elements were delineated as separation of powers, accountability of executives, and federalism. These features of the state created the pre-conditions for benevolent *co-ordination* among economic actors which forced the state to *credibly commit* to preserving the market, and at the same time prevented the *capture* of the state by any of these actors (Bruszt 2001, 5).

Several scholars hold that providing secure and predictable political foundations for the market requires a specific *form of governance structure* (Williamson 1985, 1996, North 1990, Bruszt 2000, Iaryczower et al. 2000). Particularly, the study of the relationships between constitutional provisions and economic performance has attracted intensive attention (North 1990, North and Weingast, 1989). The other approach claims that it is not so much the

governance structure as the political *relationships among levels* of government that is the most salient in the market making characteristics of the state.[4]

Bruszt (2001) analyzes the features of constitutions that are supportive for market making, research which is framed in a broader debate on the conditions of creating functioning markets. He claims that the characteristics of the state, such as the separation of powers and the system of checks and balances, diversify the portfolio of the definition and representation of different notions of public good. A bicameral parliamentary system, coalition governments, and mixed electoral systems facilitate the emergence and sustainability of a well-functioning market in the most effective way. Frye (2000) contributes to this debate by investigating the link between bureaucratic competition and development of market institutions by delineating conditions when state bureaucrats devolve powers in favor of the expansion of markets. He connects the promotion of market-friendly policies to the bureaucratic struggle for power, based on the findings from his study of self-governing bodies of the equities market in 1994-1997 in Russia.

The market-preserving[5] state is a state with a structure of 'virtuous representation' that allows universal rights (liberal aspect of state) to be upheld and defends them from corruption. Regardless of the true motives, virtuous or otherwise, of politicians, political competition forces them to produce virtuous representation, to accommodate in their programs the biggest number of diverse interests (Bruszt 2001, 12). Bruszt conceptualizes two constitutional sources for the emergence of such a state as on one hand, the process of representation from citizens to the state, i.e. the formation of modes and institutions of representation that are responsive to a variety of interests (election period); and on the other hand, the creation of mechanisms that ensure that state policies accommodate this diversity of interests (between election periods). The process of democratization, in his view, is a necessary but not sufficient step in creating a market-preserving state. He notes, that 'democratization of political regime, which is about the restructuring the first stage of representation' (2001, 14), is not enough for

[4] The present analysis draws on the theories recognising the independent role of human agency as opposed to deterministic approaches, concentrating on the saliency of preconditions to the success of democracy in transition countries, for detailed classification see Cameron Ross (2000).

[5] In this thesis the concept of the market-preserving state and market-making state are used interchangeably.

robust markets. It is sufficient only if followed by the restructuring of the second stage of representation within the state.

The magnitude of accomplishment of policy reforms *per se*, such as liberalization, privatization, monetization, and macroeconomic stabilization, were crucial elements of transition – necessary, but not sufficient for the stable growth of economies. The emphasis on the stability of political institutions of market is a recurrent theme in the literature on the market-making state. Concerns regarding the failure of the state to promote and maintain robust economic institutions of the market and its inability to unravel bad institutions (either inherited from the Soviet times, or newly emerged) have been frequently aired in the literature of the Russian state. Shleifer (1997) argues that the difficulties Russia faced in fighting economic decline in the early years of transition lay in the government's inability to provide market institutions. Popov's (2000) study on economic performance demonstrated that if the institutional capacity of market institutions is weak, the impact of economic liberalization on economic growth is inadequate and marketization dividend is only present in income redistribution.

The literature on the protection of property rights emphasizes that it is not the level of privatization itself, but that proper protection of property rights that is a crucial for investment and growth.[6] One of the most illustrative cases was brought to light by Guriev and Sonin (2009). The owners of the seven most influential banks, the first generation of Russian oligarchs, controlling about the half of the economy in 1996, became dependent on the robust establishment of the market institution of property right protection, even when they had earlier benefited enormously from partial enforcement of the property right.[7]

[6] There are two main mechanisms that the lack of institutions protectiong property rights hinder the economic growth. First, the threat of expropriation distorts the incentives and forces the economic actors to follow sub-optimal paths of accumulation and production, second, the economic actors have to turn to the private protection of the property rights, which wastes the resources. (Sonin 2003,717)

[7] "[O]ligarchs initially benefited from rent-seeking as they diluted the stakes of the government and outside owners. Once they consolidated ownership and saw the huge benefits to limiting the rent-seeking (due to resumed economic growth), they switched from rent-seeking to investment and started to lobby for stronger property rights" (Guriev and Sonin 2009)

In sum, the literature reveals specific features of states that even out the imbalances the Russian state was prone to that were delineated in the introduction. In short, the market-enabling state is one where a stable equilibrium is struck in two respects. First, the state should be close enough to diversity of interests, but at the same time far enough from them so as to avoid arbitrary distribution. The state should stay immune from the intensity of often conflicting interests of private competitors, and immune from capture by any powerful economic group. And second, the state should be strong enough to be able to constitute and preserve markets, evenhandedly uphold economic freedoms, secure property rights, and resolve conflicts in a fair way, but at the same time weak enough not to encroach on these rights for its own benefit (Weingast 1993), so that any economic actor can have a stable expectation that 'they can safely profit from rational enterprise… and they did not have to fear arbitrary state interventions' (Bruszt 2001, 7). In other words, the state's 'grabbing hand' should be sufficiently tied so as to limit its ability to expropriate wealth from private agents (Frye and Shleifer, 1997).

The analysis of previous work on the market-enabling state in also instrumental in that it helps to formulate an *operational definition* of the phenomenon of the market-enabling state. Based upon Bruszt's (2000) and Weingast's (1995) definitions, it is a government that is strong enough to maintain rule of law and market order, and at the same time self-limited. In other words, a government whose policy choices are oriented to reach the equilibrium, where institutional infrastructure makes any extra-market redistributing behavior on the part of individual actors more costly to pursue than market productive behavior, and based on reliance on the rule of law. Where good behavior predominates, the structure of social incentives favors such behavior, productive efforts are institutionally feasible, and benefits that are produced by such behavior are properly secured. Actors gain much lower payoffs from re-distributional activities than productive ones. In practical terms a region can be considered market-oriented, if it has a developed judicial system that allows for the impartial enforcement of contracts and property rights, and a system of safeguards or checks that prevent powerful interest groups from capturing the process of public policymaking, and institutions that ensure safe and transparent protection and transfer of ownership rights, as well as ensuring that input markets operate smoothly and effectively.

2.3 Federalism and Market

From the more general query as to the preferable design of political institutions facilitating market economy, we move to the question of the institutional capability of federalism to preserve markets. There is a stable consensus that the division of powers in federalism makes it highly sensitive to the diversity of representation of public good form of government and therefore it is particularly supportive for markets. Federal institutions are considered to be the most market-enabling, since the division of powers between the central and regional level, institutionalized in the federal settings creates strong possibilities for the durability of limits on government (Tiebout 1956, Weingast 1995, 1997).

The two basic features of federalism, decentralization and jurisdictional competition, stimulate regional governments to align with the interests of citizens. The benefits of competition are only valid in the case of sufficiently mobile households and factors of production (Tiebout's model of households' 'voting with their feet'). Thus, competition for capital encourages regional officials to provide public services efficiently and prevents them from embezzling funds by increasing the cost to officials (Brennan and Buchanan 1980). Competition for mobile labor forces regional governments to reach an optimal[8] assignment of provision and assortment of public services (Oates 1972, Tiebout 1956). Competition provides for more effective resource allocation by drastically reducing incentives for bailing out ineffective enterprises (Qian and Roland 1998).

Inter-jurisdictional competition only works given mobility of labor, capital and goods, but the benefits from decentralized provision of public goods are present even if this is not he case. By tailoring the menu of public services to the local population's demands, decentralization improves quality and quantity of service delivery and induces innovation. Moreover, in societies like Russia, which experience a transition from authoritarianism to democracy, decentralization provides the political security for market reforms: alternative centers of power in regions establish forces that resist the attempts of the central authority to interfere with markets (Weingast 1995), since cooperation between regions constrains transgression by the predatory center (Solnick 1998). Students of Russian federalism (Stepan 1999, Solnick 1998, 1999) argue strongly that decentralization is a necessary element for establishing stable

democracy and market economy in the country, given the cultural, structural and demographic diversity of Russia's regions, and the country's sheer size.

According to an argument proposed by Weingast (1997), there is a distinction between earlier theories of federalism, which assumed benevolent behavior on the part of regional governments, and the second generation of economic theories of federalism, which opened up the black box of sub-national government and assumed that regional officials follow utility-maximizing behavior, which does not exclude benefiting from rents, given the chance. The followers of the second generation economic theory of federalism (Qian and Weingast 1997, Brennan and Buchanan 1980, Inman and Rubinfield 1997, Oates 2005, Qian and Roland 1998) emphasize the agency problems between the citizenry and government officials and concentrate on the design of institutions that induce sub-national governments to promote markets and ultimately, citizens' welfare. The mechanisms that limit behavior can be effectively framed as 'transgression' or 'appeasement' game models, and addressed in terms of the problem of the sustainability of self-enforcing limits on government. These self-enforcing limits are one of the implications of the 'rule of law' scenario. The problem of policing the state (or sovereign, in his terms) is viewed by Weingast as basically a co-ordination problem. If citizens' beliefs on the boundaries of the state differ to a significant degree, it creates a co-ordination problem, which, if not circumvented, leads to unrestrained transgressions on the part of the sovereign. In this context, strict reliance on formal institutions or a constitution serves as a coordinating mechanism for the political foundations of markets. A multiplicity of actors is the first core assumption of this game. If there is one sovereign, and only one citizen (in Weingast's terms), the game transforms into an appeasement game. Second assumption requires a particular nature of regions' interaction and character of their strategies: they should be co-operative but in a competitive way, so that transgressions of the general law made by a sovereign (making privileges towards one actor), are not tolerated by other actors.

All economic actors, in order to have stable expectations about the stability of their rights, need self-enforcing limits on the state, deterring it from intervention upon their rights (Weingast 1995, Treisman 1999). Federalism prevents distortional political intrusion into

[8] Or at least increase citizen's welfare above that level that is likely to arise from more uniform level, that a centralized economy can provide (Oates, 1999)

markets for the reason that it is hard for any group to capture sub-national governments. Extra-constitutional institutional structures, such as a national party system (Riker 1964, Filipov et al. 2004) and the institutions of inter-governmental functional co-operation (Watts 1989) facilitate its operational efficiency. Even more important is a commitment to the primary concept and shared consensus on the value of federation. The presence of 'overarching loyalties' (Lijphart 1977, Linz 1997) provides cohesion for a federal state. Cai and Treisman (2004) and Weingast (1995) pursue the key argument that central law enforcement and constitutional order is crucial for the federalism is to preserve markets. Cai and Treisman's work shows how intense interstate competition for capital in the case of a weak rule of law leads to sub-optimal outcomes (covert protection of regional firms against federal regulations, corrosion of central state). Weingast (1995) examines various conditions that support constitutional order, such as grass roots traditions, central authority, or independent courts. These arguments support my study in that the lack of law enforcement and constitutional order was one of the core reasons of the failure of the federalism Russian style to preserve market. Since in pre-transition Russia there was no common law tradition of judicial independence, or of protecting individual rights through the judicial review of administrative acts (Kahn 2002, 58-59), it was overwhelmingly difficult to establish the environment of the 'rule of law', or as Kahn puts it, of 'government under law'.

Nevertheless, the advantages of federalism are not clear-cut. The central government in federations inherently lacks some power dimensions, since the distribution of authority between the levels of government requires a delegation of authority over some issue areas to constituent regions, with the right to adopt regulations in accordance with regional government's motives and preferences (Stepan 2000). The diversity of market regulations in different sub-units led to partial fragmentation the Russian federal common market, as individual constituents erected barriers to the interstate mobility of goods, labor and capital. The interstate cooperation and free 'spillover' of entrepreneurial activity to other regions was hindered because host regional governments either directly restricted the entry of business from other regions, or created a situation where 'outsider' companies found themselves in a disadvantaged position because selected regional enterprises were 'sheltered' from fair competition by privileges granted to them by the regional authorities (Solnick 2000a).

Even jurisdictional competition has been proven to take distortional forms in some cases. Competition for capital may induce a 'race-to-the-bottom' in the provision of public welfare and basic infrastructure or encourage transfer of negative externalities to neighboring regions

(Gordon 1982, Oates and Schwab 1988). These distortions are best avoided with the help of central government regulation or centralization of the provision of controversial goods (Rivlin 1992).

2.4 Political foundations of federalism Russian style

There is a wide range of theories of federalism, with different definitions of the concept. Perhaps the one most often cited and referred to is that of Riker: "Federalism is a political organization in which the activities of government are divided between regional governments and a central government in such a way that each kind of government has some activities on which it makes the final decision" (1975, 101). By this definition he implies that the principle of central-regional division of powers is central to the concept of federalism[9]. Linz and Stepan (1996) conceptualize federalism in a framework of the 'state-nation'. Linz emphasizes the salience of federal allegiances as "overarching loyalties' to federal allegiance: "Only complementary principles like that of solidarity… compensate for that fundamental differentiation with the same demos" (Linz 1997, 39). The principles of federalism, according to Linz, are generally vaguely defined and subject to negotiation between the center and periphery. It is worth noting, though, that it is not the principle of central-regional division of powers which underpins the cohesion of federal polity, but the shared consensus on the value of federation. As Jeff Kahn suggests, it is a basic idea overarching all different theories of federalism: "in a would-be federal state, the consensus on the inherent value and basis for forming a federation is critical for success" (2000, 80). It is important to note that in the early stages of Russian federal-building, the political discourse suggests separation rather than consensus and co-operation: the concepts of "self-determination", "sovereignty", and "greater autonomy" were catch-words in the political discourse. As Kahn correctly points out, the content of these terms emphasized "separateness, individuality, freedom from some indeterminate suppresser of vague inalienable rights"(2000, 80). One can agree with Kahn that it was the dramatic failure to find a consensus regarding the inherent value of the federal project that was responsible for the inability to reach success.

[9] Lijphart identifies five more principles of the federalism: bicameralism, decentralised government, written constitution, right of constituents to amend the federal constitution, stronger representations of the smaller components in the upper chamber (Lijphart 1984).

The institutional choices that engineered the grand design of Russian federalism were made in a stormy environment, which prevented this consensus from emerging. The republican elites conceived the idea of federalism as constructed from the bottom up, therefore the first step in federation-building was, in their understanding, to grasp almost unlimited powers and, more important, set them superior to those of federal government. Only after that, for federalism to be workable, should the sovereign states/republics gather together and concede part of their authority to the federal center, but no more than necessary. It can be argued that this concept of federation building is consistent with Riker's perception of federation building as a development out of a "bargain between prospective national leaders and officials of the constituent governments for the purposes of aggregating territory, the better to levy taxes and raise armies" (1964, 11). The bargain is aimed at designating areas of authorities in such a way that national and sub-national governments will each have at least one area of jurisdiction over which they have an upper hand.

At the heart of Riker's theory lies the belief that all federations come into existence in the same way, namely that a group of states comes together to increase their security, the size and the quality of their markets. In reality, there are other paths than one suggested by Riker. In most of cases, there was no 'coming together': the previous political communities in most cases, except the USA, were unitary states, colonies, or empires (Australia, India, Brazil, Argentina, Germany, Canada). As a political consequence, there was rarely a 'bargain' between the future member states willing to establish a federation, and it is too strong to say that they joined the federation voluntarily.[10] The Russian Federation is not an exception to this rule: though it was called the Russian [Soviet Socialist] Federal Republic, it was one of the sub-units in a highly centralized unitary state, the USSR. But the unique path via which the Russian Federation came about implies that some features of Riker's definition may be applicable to the Russian case. Though during the period of 1990-1991 all Russian republics declared their sovereignty, this does not mean that they became truly independent states, which afterwards would come together to form a new political entity. The ultimate goal of

[10] As Migranyan rightly asserts: "Nowhere in the world have states ever been built on the "from bottom up principle", and nowhere has it been said that local governments may take as much power as they want and give the upper levels as much as they deem necessary. Throughout the world, democratic political systems have been formed on a principle a long and agonising redistribution of authority and powers from the top down, never the other way around" (*Izvestiya*, September 20, 1990, 3).

instigating regional declarations was to boost Yeltsin's bargaining power in the would-be Union Treaty at Novo-Ogarevo, on his part; and the eagerness of regional elites to use the 'window' of opportunity that allowed them to unilaterally grab authority from the center and at the same time gain democratic legitimacy in the eyes of the people in their territories, on the side of sub-units. Nevertheless, the principle of creating a federation from the 'bottom up', as set up and promoted by Yeltsin, creates room for a political bargain over the design of political institutions of federalism. It is notable, though, that in contrast to Riker's description, the bargain was conducted in the center-periphery dimension, rather than the horizontal one, among would-be constituents. The salience of the center-periphery bargain is important for the proof of hypothesis II, outlined below, which claims that the degree of market development in the region is dependent on the bargaining power of the region, as those with high level were able to soften budget constraints for themselves.

We can conclude that the nature of Russian federalism was:

1. It was built from 'bottom up', as a result of Yeltsin's aspiration to use the regional mobilization in his personal political struggle.

2. A significant part of federal institutions came about as an outcome of a bargain, but unlike classical case, it was a center-periphery bargain, rather than a horizontal one.

3. Because center bargained with regions individually, and the bargaining power of regions differed enormously, the resulting federation was highly asymmetrical.

4. Centralizing forces that would keep the federation together were extremely weak, i.e. 'overarching loyalty', central law enforcement, constitutional order, as economic transition.

5. Fiscal decentralization was significant part of federation-building, The next section will provide an overview of fiscal federalism in Russia and whether fiscal decentralization, the way it was conducted in Russian Federation, brought long-term benefits to economic growth.

2.5 Fiscal decentralization Russian style

The argument popularized by theories of fiscal federalism holds that political and fiscal relations are closely connected; however, Garrett and Rodden (2003) demonstrate to the contrary that political and fiscal realms may have different sources of development and may be driven by different processes. They accept and indeed prescribe that fiscal and political

processes of decentralization of authoritative power and fiscal (re)centralization move in opposite directions.[11] Blanchard and Shleifer (2001) suggest that it is the very fact of fiscal decentralization against the backdrop of political centralization (central capacity to collect the relevant information from provinces, reward and punish provincial officials) that helped to preserve markets in China. However, in the Russian case, for better or worse, because both fiscal and political decentralization were seen as inexorable parts of Russian federation building, decentralizing processes were strongly evident in both realms. The decentralization of budgetary revenues and expenditures was thus tightly intertwined with the de-concentration of bureaucracy and welfare provision.

The normative approaches to fiscal decentralization concentrating on such objectives of decentralization as efficiency and flexibility in provision of public goods, income redistribution and macroeconomic stability have been extensively debated in policy discussions (Martinez-Vazquez and McNab 2003). The effects of decentralization on economic systems, however, have been much less investigated. Within this strand of the literature I am interested in theories that offer insights into the interplay between fiscal decentralization and the institutional capacities of sub-national units, and how this affects economic growth.

[11] The federal center may devolve formal political authority to sub-units by increasing their constitutional responsibilities and freedoms, setting up regional parliaments, and allowing direct elections for regional officials, while fiscal authority being concentrated at the federal level. There are several factors, both internal and external, which increase pressures towards fiscal (re)centralisation. For example the decentralisation of fiscal politics may become increasingly costly to the central government to hold a heterogeneous country together.

Fiscal decentralization is considered a major composite measure of decentralization.[12] Recent studies explore direct relationship between decentralization and economic performance (Davoodi and Zou 1998, Lin and Liu 2000), as well as indirect effect of decentralization via changes in producer efficiency, cross-regional income distribution, or the level of corruption (Martinez-Vazquez and McNab, 2003, Martinez-Vazquez and Rider 2006). These studies are surrounded by a great deal of inconclusiveness, as mixed empirical evidence has been found in favor and against the positive impact of degree of fiscal decentralization and growth promoting features (income equality, producer efficiency, lack of corruption, and low inflation).[13] Regarding the Russian context, the 'decentralization – economic growth' link has been examined in terms of regional autonomy/dependence from the central budget. Stoner-Weiss claims that fiscal autonomy from the center was detrimental to economic development as it gave regional politicians and managers a free hand to use large regional enterprises as sources of rent. Autonomy allowed regions to relax the hard budget constraints for the regional enterprises, thus stalling and even reversing reforms (2001). Other authors disagree, providing evidence that the lack of dependence on federal transfers encouraged regional governments to develop their regional tax base and grow faster (Ahrend 2002).

The concept of decentralization between the regional and local governments itself has been operationalized variously in contemporary literature. Traditionally, the degree of decentralization is quantified as a proportion of regional revenues or expenditures in consolidated budgets. Davoodi and Zou (1998) or IMF (2006), for example, measure it as a

[12] Although there is evidence that the degree of decentralization of revenues or expenditures communicate little about the real decentralization of spending authority. For example, Denmark came as a third most decentralized country (after Canada and Switzerland) in a ranking of twenty-nine Western developed countries, as far as the share of regional and local expenditures in total expenditures is concerned (Rodden 2004, 483), but if one takes into account the much tighter control of the central government over local finances, it is, in fact, much less decentralized than the USA, for example, which came behind it in the ranking. The measurement of decentralization of fiscal authority should, in principle, include the degree of region's discretion over spending and levying taxes, limit on the center's access to regional information, and limit on its ability to reverse regional decisions *ex post* (Qian and Weingast 1997). While this argument would work strongly in cross-country studies, we can fairly confidently assume that the variation in the three above-mentioned variables is not so wide among Russian regions, as compared to the variation in federal transfers and (under)collection of taxes, which will be scrutinized in further chapters.

[13] For an excellent overview see Martinez-Vazquez and McNab (2003).

share of regional expenditures in total government expenditures. In Zhuravskaya (2000) it is a degree of local budgetary independence from the regional level reflected in greater responsibility for the expenditure decisions and incentives to raise their own revenues. It is formulated numerically in the form of a coefficient α which denotes the share of revenue surplus from local tax and non-tax revenues that is not crowded out by the subsequent reduction in the shared revenues in a local budget. The value of α varies between [-]1[14] and zero. In the former case, all the surplus is fully counterweighed by the cut of an equal amount of budgetary transfers from regional government. Thus the crowding out of own revenues by shared revenues creates zero incentive for the local government to provide a business-friendly environment and physical infrastructure for local business.

The other indicator of decentralization the degree of retention of regional tax, measured as the share of the taxes generated in a region and left with a regional budget (Desai et al. 2003). They proved that fiscal decentralization causes higher rates of economic growth. However, this causal link is only valid in the presence of an intervening variable: namely whether the region ensures constraints on the rent-seeking behavior of government officials and business elites. '[R]egional government-firm collusion and mutual rent-seeking' can reverse the benevolent impact of greater fiscal autonomy. This behavior is prompted by the availability of 'externally generated revenues'. They discuss several sources of such 'unearned income' (resource rents from production and export of natural resources,[15] revenues from central transfers, massive remittances form foreign workers). A causal mechanism directly links fiscal decentralization to economic growth, though it is possible to theorize the causal link in a different way: economic growth may be inversely associated with the presence of 'unearned

[14] The negative sign is important for the model equation, which denotes that the increase in own revenues is associated with decrease in transfers.

[15] They conceptualise both sources under the concept of 'rents', when public sector expenditures are not dependent on the domestic tax base but on 'externally generated revenues'. The governments in these regions will have little or no incentives to invest into business environment for two reasons. If streams of central federal or foreign aid constitue a large portion of the regional revenues, economic actors will quickly discern the relative profitability of the productive and predatory actions in favor for the latter, as the cost-benefit ratio is more favourabe. This situation parallels the situation of the terms-of-trade improvement, or discovery of the new source of natural commodity, when the 'competititon over newly available rents creates a divertion from more productive activities in economy'. The second reason outlined by Desai et al. is that the public institutions become more and more detached from the the tax base (Desai et al. 2003, 9).

income', distracting regional governments from productive behavior, while the possibility to retain more tax serves as an amplifier, alternatively inhibiting or advancing economic growth.

If these distractions do exist, increased fiscal autonomy may encourage local government agencies to compete for rents, colluding with the owners of major local firms, while doing very little to improve the business environment for the rest of local economy. In regions with more limited rent seeking opportunities, fiscal autonomy is more likely to promote economic growth and recovery (Desai et al. 2003, 11).

In this form, the argument put forward by Desai et al. is in accord with the reasoning of this thesis: through the development of the market institutions, economic growth is inversely related to the predatory behavior of regional government that emerges as a result of the center-periphery relations (soft budget constraints).[16] Desai et al. point to only to one source of the mechanism that can constrain rent-seeking appetites of both regional government and enterprises' managers: central political guidance. The theoretical framework adopted in this work is not constrained to this solution. The theory of market-preserving federalism requires the condition of hard budget constraints on regional governments, which can be imposed from above (centralization of fiscal authority) or from below, as a result of interstate competition that endogenously creates the condition of hard budget constraints. Just as market competition pressures firm managers to reflect the interests of shareholders, competition among local governments helps to limit government's predatory behavior. Mobile resources can quickly leave jurisdictions with inappropriate behavior (Qian and Weingast 1997, 88).

This debate proves that the benevolent effects of decentralization are reversed if regional governments engage in predatory pursuit of gains from rent-seeking. The question is whether and how this can be induced by the SBC granted them by the central government. The next two sections are devoted to a more thorough overview of the phenomenon of SBC and its role in developing markets.

[16] In Desai et al. (2003) the independent variables are federal transfer, which 'includes all main channels through which federal funds were transferred to regions, i.e. it reflects, in addition to the largest program of equalisation transfers, smaller federal programs, such as e.g. budget subventions' or resource rents, measured as share of 'regional industrial output that derives from 'fuel and energy production', in my work the independent variable is the degree of softness of budget constraint, which takes into account only those federal tranfers that are given to the region beyond reasonable amount.

2.6 Soft budget constraints

One of the leading explanations of the pathologies of the central planning system is based on the theory of soft budget constraints (henceforth SBC) put forward by Kornai (1980). His theory involves three main actors, softly restrained enterprises, their creditors and a 'paternalistic' state. Firms' willingness to run up debt, financed by creditors, is sustained by expectations of rescue by the state. Nowadays, the existence of this phenomenon is evident in all polities, though more vividly in transition economies. Maskin and Xu (2001, 10) show that the SBC syndrome is persistently present in economic life in all countries in Eastern Europe and the former Soviet Union. Much of the existing research, however, has focused on SBC between the state and enterprises, while here we are interested in regional governments in a federal system. In this chapter I explore the theoretical preconditions for the emergence of soft budget constraints at sub-national level. Following this, narrowing the focus, I identify the preconditions that increased the likelihood of regional governments in Russia 'enjoying' SBC conditions.

Only relatively recently have SBC as imposed on agents other than enterprises (administrative bodies, sub-national governments) begun to attract the attention of researchers (Qian and Roland 1998, Besfamille and Lockwood 2004, Cai and Treisman 2005). Consequently, the approaches for analyzing the conditions and implications of SBC for governments of sub-national units are based to a large degree on those taken from the analysis of SBC imposed on firms. Since it was the analysis of SBC at enterprise level that set the path for a broader scope of studies of SBC in general, it is worth briefly recapping the relevant literature.

The term soft budget constraint was first coined by Kornai in his work on the behavior of economic units in planned economies (1980, 1986). A firm in a market experiences three types of constraints in its pursuit of profit maximization: resource constraint, demand constraint and budget constraint. The last refers to the rule that the expenditures of the firm cannot exceed its financial capital and revenues from sales. In Kornai's view, the difference between market and socialist planned economies is that in the latter resource constraint is more important than demand constraint in defining the amount of goods to be produced by a firm. In a market economy, the demand constraint is efficient: no more goods are produced than buyers are willing to purchase.

But at the core of Kornai's theory is the difference between the two types of economies with respect to the budget constraint. In market economies, firms experience hard budget

constraints: they go bankrupt if expenditures exceed revenue. In a planned economy the state is unwilling to let enterprises fail, providing them with soft budget constraints. The paternalistic state bails out firms either by direct financing of deficits, or setting low prices for the resources that the firm uses, or fixing high prices for the firm's production, or exempting it from all or part of the taxes it should pay.

Because the state guarantees the survival of the firm, this 'negatively' affects the incentives and behavior of managers, who invest in various inefficient projects, or waste resources without fear of future financial difficulties. The growth of the firm is not constrained either by demand or budget constraints. Prices for input resources do not affect the demand of a firm, which causes that demand to be absolutely inelastic with respect to prices. The only constraint which prevents firms from unlimited growth is the resource constraint. This behavior is guided by the expectations induced by the government's paternalistic concerns. The firm's efforts towards expansion force them to purchase all input goods at any price, and this explains the pervasive deficit in a planned economy. The central argument of the subsequent literature (Kornai 1980, Besfamille and Lockwood 2004, Dewatripont and Maskin 1995, Kornai, Maskin and Roland 2003) is that SBC 'arise because politicians cannot commit not to [refinance] bad projects ex post and cannot distinguish bad from good ex ante' (Robinson and Torvik 2007, 3).

Since the phenomenon of SBC was championed by Kornai in 1980, the academic literature on this concept has proliferated substantially. Dewatripont and Maskin (1995) argued that the SBC exist not only in planned economies but in the case of any concentration of financial resources which can be later allocated to agents facing crises. Much of recent research is concentrated on the (negative) implications of SBC. While all agree on the decline in efficiency of the use of resources, Qian and Xu (1998) examine how SBC lead to a decrease in the level of innovations, and Qian (1994) proves that SBC may lead to shortages in commodity markets. Much of the current debate on SBC has moved towards discussing the ways in which the negative effects of SBC can be prevented. The majority of authors argue for the importance of endogenously emerging hard budget constraints (henceforth HBS) as an outcome of fiscal competition between the regions (Qian and Roland 1998) or a decentralized competitive system of crediting and financial intermediation (Berglof and Roland 1998).

In the case of the Russian Federation, the SBC were supported not only vertically, by the state, but also horizontally, by creditors, and institutionally by the file card system, which

survived until mid-1992. Under this system, payments were made almost automatically, were managed by banks, and as long as there were some funds in the account, the bills were paid in order of their receipt. Moreover, in Russia the constraints for enterprises remained soft even after the card file system was abolished, since firms continued to believe that even if there were no money in the debtor's account, the state would step in and settle the obligations. The requirement of the hard budget constraints - or strict limitation on revenue-sharing between the levels - has further limitations for the Russian case since the country's high degree of diversity of income levels requires some redistribution on the part of the central budgeting.

2.7 Market-preserving federalism

In the theory of market preserving federalism (Weingast 1995, 1997, Monitola et al. 1995) the concept of soft budget constraints goes beyond state-enterprise interpretation: it is the propensity and capability of regional governments to remove/ignore obligation to balance revenues and expenditures. SBC conditions therefore encompass a recurrent pattern of extra-constitutional revenue-sharing between levels, and are characterized by governments' stable expectation of a central bailout in the event of insolvency. Federalism of the type existing in England in the eighteenth century,[17] the Dutch Republic in the sixteen and seventeen century, in the USA in the late nineteenth and early twentieth century, or in recent China, creates stable limits on governments at both levels: decentralization limits the control of the federal government over the economy, while interstate competition and hard budget constraints discipline sub-national government, the former providing incentives to develop regional business environment(Weingast 1995, Jin et al. 2005, Roland and Qian 1998).

Close examination of the premises of market-preserving federalism shows that its prerequisites in many ways follow the principles model of corporate control and the new theory of the firm.[18] The two first requirements – for the institutionalization of autonomy of

[17] Federalism, in a specific meaning, 'de-facto' federalism, which is not necessarily 'de-jure'. This specific meaning was assigned to England and China by Weingast in his seminal work (1995).

[18] Weingast and Qian (1997) conceptualized these parallels in their other work on federalism, where they use the insights from the new theory of the firm to the problem of credible commitment to market on the part of sub-national governments. The commitment to market is inspired, according to them, via two mechanisms: the delegation of information and authority to lower units, and the competition, which can create incentives for governments to commit themselves to the interests of populace.

central and sub-national governments, and for the authority of national government to provide interstate commerce – both enable the coherence of the federal polity, ensure that its territory represents a common market, and warrant the free movement of labor, capital and goods. The last three requirements – namely conditions for hierarchy of governments, hard budget constraints and the primary authority of sub-national government over the economy within their jurisdictions – ensure that the federal setting resembles settings in the theory of firm, where regional governments take the place of managers, allowing the incentive structure of agency to be applied to governments' behavior. Thus perfect competition in a perfectly secure legislative environment which is free from state interventions (benevolent or predatory) stimulates good behavior on the part of managers. Being in a position to compete for scarce capital and labor, managers are forced to create attractive conditions for capital and labor, which, applying it to the case of federal sub-units means, essentially, establishing robust market institutions and investing in public goods/infrastructure, but withstanding the temptation to increase the tax burden.

The potential gains from market-preserving federalism are especially relevant for Russian Federation and other transitional democracies. In terms of Bruszt's theory of two constitutional sources for the emergence of a market-enabling state, it can be formulated as follows. While the first source, elections as an institution of representation of interests, was established and consolidated, the second, mechanisms of credible limits on state (between election periods), was not fully institutionalized. Therefore, during the early nineties, federalism was perceived by political analysts as a primary solution to the problem of credible limits on state, since more conventional forms such horizontal accountability (separation of powers) were weak. Qian and Weingast put a similar statement in description of Chinese style federalism: "(F)ederalism may be one of the few ways in which a large, nondemocratic state can provide credible limits on its behavior"(1996, 179). Section 3.2 provides a more extensive discussion on the theory of market-preserving federalism and its applicability to the case of the Russian regions see.

To sum up the theoretical part, the theory of market-preserving federalism will be instrumental in identifying those mechanisms – namely competition and hard budget constraints – that induce a market-oriented set of incentives. The absence of the condition of hard budget constraints is potentially useful in explaining not only why federalism Russian-style failed to preserve the market overall, but why it did so for some regions and not others.

The second generation of the economic theory of federalism borrows from the new theory of the firm, which studies how institutions can be designed so as to create incentive structures for managers, so that they act to the benefit of shareholders. Along the same lines, the new theory of federalism highlights the necessity of designing special governance structures and institutions that will reshape incentives for regional governments away from rent-seeking and towards aligning their policy decisions with citizens' welfare. Specifically, the literature identifies the federational center-periphery institutions, namely Hard Budget Constraints, that can induce such productive behavior.

There is great deal of uncertainty regarding the impact of decentralization on economic growth, and especially in the case of Russian Federation we know very little about the issue, due to the lack of research. However, there is one important finding in the literature of Russian federalism relevant for the present study, namely that not only the proportions of revenue and expenditure sharing but also the different styles of fiscal relations create a productive set of incentives for regional governments (see Zhuravskaya 2000). Empirically, much work remains to be done on the potential effect of fiscal center-periphery relations on the emergence of systematic distortions in incentives. There is, however, a consensus in the literature that inter-budgetary relations are based not on the predetermined transparent rules, but rather on the bargaining abilities of the regions (Frienkman, Treisman and Titov 1999, Treisman 1996, 1998), a situation which is not likely to create pro-market incentives for sub-national governments.

CHAPTER 3: THE STRUCTURE OF RESEARCH

3.1 Concept and analytical framework

While the dominant comparative theories of federalism operate almost exclusively at *national level*, theories of regional institutional performance explaining variations in economic performance of regional governments have to date never applied their theoretical framework to *asymmetrical* federal settings. The scholars who focus on regional differences in Russia (Gel'man 1999, Gel'man et al. 2000, McFaul et al. 2004) have concentrated mostly on *state-society relations* rather than the *relations between the levels of government*. This study combines several methodologies, including those of comparative politics and federal theory; however, I orient myself principally within institutionalist theory. I draw in my research on the institutional theory of North (1990), namely that in the case of Russian Federation, the development of market institutions was shaped by the asymmetric fiscal federal institutions that evolved over the first decade of transition.

The first goal of this thesis is to evaluate the share of variation in economic growth across Russian regions that is determined by the influence of market developments. Much of the literature hitherto on the determinants of economic growth (Hanson 2000, Hanson and Bradshaw 2000, Ahrend 2002, Berkowitz and DeJong 2003, Popov 2001, Golubchikov 2007) has found that these two variables are not closely associated. Consequently, a broad consensus has formed that the degree of implementation of reformatory policies has little impact on economic performance, especially given the continuous contraction of output that Russia experienced between 1991 and 1998. The multidimensional nature of the transition to a market economy made me believe that the problems of measurement could have prevented the previous analysis from revealing the effect of marketization on economic performance. Moreover, the cumulative and gradual character of its effect on economic growth (Havrylyshin 2007) calls for a time-series analysis of the relationship between marketization and growth, which was lacking in the cross-regional analysis. I hypothesize therefore, that development of market institutions is indeed likely to predetermine economic growth in the long run. Thus the first hypothesis can be formulated as follows.

Hypothesis 1: The degree of development of market institutions is likely to matter for economic growth.

The second goal of my work is to quantify the scale of fiscal incentive problems that affects market development in each region. The political context of the Russian Federation and the specific way in which it was built created asymmetrical institutional settings that in turn generated a market-inducing set of incentives for some of the regional government, but not for others. Hence, the following context-specific hypothesis:

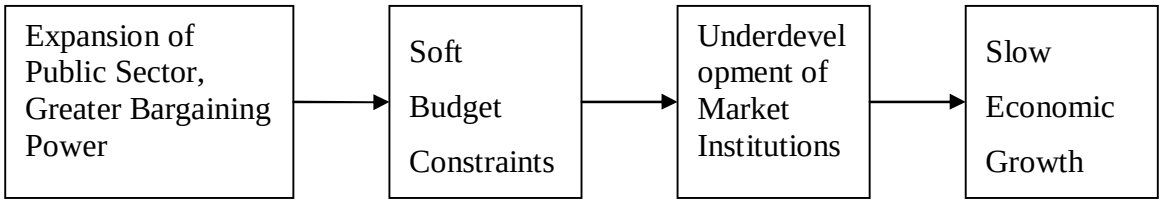
Hypothesis 2: Those regional governments which gained more bargaining power against the central government and were able to extract conditions of soft budget constraints in fiscal center-periphery relations were unlikely to be market-oriented in their performance.

It is important to examine both the consequences and determinants of soft budget constraints, therefore, the third goal I pursue is to explore how soft budget constraints were conditioned by the bargaining that was an ongoing feature of center-periphery relations in the period examined, by taking the level of softness budget constraints as a dependent variable. Most theories explaining the pattern of inter-budgetary transfers emphasize the threat of political disruption (Treisman 1996), such as secessionist threats, as the most salient in eliciting transfers. I depart from this conventional approach, first, by placing more importance on the operationalisation of the theoretical concept of soft budget constraints, building the measurement not exclusively on the value of transfers, but on the tax potential of a region; and second, by bringing into consideration a wider range of explanatory variables. The secessionist opportunities that were possible in the period of political openings and intense uncertainty, characteristic of early 90s, disappeared with the consolidation of the Russian state. What was perceived as a possible scenario in 1991 has become a political utopia half a decade later. Assertive acts of political and economic separatism, both as an ultimate aspiration or a tool to extract preferential treatments, had become politically unfeasible. But did the nature of fiscal center-periphery relations changed fundamentally? Did the central government stop yielding to regional pressures altogether, or did it become susceptible to different forms of pressure? The multiple occurrences of workers' strikes, which were staged predominantly by the public employees, and the monumental volumes of wage arrears accumulated in public sector, motivated me to explore closely the link between SBC and public employment. The evidence shows that against a backdrop of slumping output and shrinking budgets, regional governments were nevertheless grossly expanding employment. Was it a measure to shelter workforce and prevent massive unemployment, or was it used as a powerful bargaining chips in the center-periphery game? Thus I posit the third hypothesis.

Hypothesis 3: By 1996 the regions could no longer use the strategy of threat of political disruption in their bargaining for soft budget constraints; instead they used the threat of the social unrest of underpaid legions of public employees. Those regions that expanded the public sector were more likely to receive SBC conditions.

These three hypotheses form a logical chain of reasoning, starting from a more general question of the factor of economic growth, moving backwards along the causality chain as shown in Fig. 1.1 below.

Fig. 1.1 Logical Chain for the Three Main Hypotheses



Third Hypothesis Second Hypothesis First Hypothesis

Therefore the variables of development of market institutions and SBC both alternately play the role of the dependent variable and independent variable, depending on which hypothesis is being investigated. It is worth mentioning at the outset that this causal chain is by no means exhaustive, in that there are several variables other than SBC and DMI capable of predicting the level of economic growth. The most relevant of these will be included in multivariate regressions so that the effect of the development of market institutions on output growth, for example, will be assessed while holding other variables constant.

It is important to note at this stage that even if we focus only on the abovementioned variables, in many previously published works some of the links in the chain were omitted, for example, analysts (e.g. Desai et al. 2003) often connected economic growth directly to the pattern of transfers.[19] Similarly, the magnitude of the public sector was regarded as a plausible

[19] Some authors connect the level of economic performance to the level of central transfers granted to a region (discussion presented in section 1.6). However, these studies, as was briefly mentioned above, overlook the important consideration of the tax potential of the region. Transfers to a poor region are different for the transfers to a fiscally stronger one. The absence of equalization transfers from the center could adversely affect economic

predictor of economic performance, thus leading authors to omit the other three variables in between. My dissertation does not intend to invalidate these findings. But creating the causal chain presented in the Fig. 1.1 makes it possible to build the analysis on analytically sound theories. The present study introduces the variable of soft budget constraints and development of market institutions, the former variable being a new variable, measurement methodology of, which represent a value added of this thesis, while the latter, produced by the independent Russian think tank, was rarely used in the relevant literature. By introducing these additional variables it is possible to apply the theory of market preserving federalism and the bargaining theory to the case of Russian regions.

3.2 Case selection and sources of data

While the present research focuses on explaining the puzzle of variability in market development among Russian regions, the findings may provide a range of insights into the institutional behavior in transitional multi-level entities, since Russia is a particularly illustrative setting in which to study regional variations for several reasons, besides its federal structure. First, the federation is extremely heterogeneous, which makes interregional comparisons potentially fruitful. Second, both the economic system and the political structure were in a state of flux starting from the late 80s. This makes the underlying mechanisms that connect political institutional choices to the economic outcomes easier to expose. The Russian case is valuable in the sense that it allows us to systematically investigate the birth and development of federal institutions in times of economic transition.

The fact that the Russian regions are numerous is particularly advantageous for the analysis of the transition processes in post-communist world, as it has proven difficult to analyze models with a relatively large number of potential regressors using country-level data. A sample of eighty-nine regions[20] has at least three times more units of observations than the twenty-seven

growth if 'fiscally favored jurisdictions can exploit their position to promote continued economic growth, some of which comes at the expense of poorer ones. Fiscal equalization, from this perspective, helps to create a more level playing field for inter-jurisdictional competition' (Oates 1999, 1128). Therefore, in a study of autonomy of regions and their impact on economic growth, one should take into account the value of transfers that is granted beyond certain level of necessity.

[20] Maximum number of units in this thesis is eighty eight, thus excluding Komi-Permyak AO from the study, due to unavailability of data.

countries of post-communist world (of which fifteen are former Soviet republics). The rule of thumb observation-to-independent variable ratio, fifteen, in the case of cross-country studies limits the number of regressors to two. A larger sample of eighty-nine cross-regional observations makes it statistically feasible to run models simultaneously with six explanatory variables, which by no means is a negligible difference.

In this thesis, the Russian region is defined as an independent constituent territory, one of the eighty-nine formally equal 'subjects of federation' described as such in the 1993 Russian Constitution.[21] In some of the model specifications in this thesis the number of regions is reduced due to the need to exclude Chechnya, and/or nine autonomous okrugs, some of which are nested within larger constituents ('matryoshka' okrugs).

Most of the data for statistical modeling came from the Russian Federation's State Committee of Statistics (Goskomstat).[22] The data on the variable of development of market institutions is provided by a Moscow independent think tank RA Expert, published annually for the entire sample of Russian regions, and using a stable methodology from 1996 till now. The rating on development of market institutions is composed on the basis of objective evaluations of the situation in individual regions and experts' opinion polls. It is one of the most widely recognized indicators of the development of market institutions, respected by both business and academic communities in both Russia and the West. The rest of the regional data is acquired from open publications in print and the Internet.

3.3 Scope of the study (selected period)

The empirical data in the present study is limited to the time period between 1996 and 2001. While a longer time period would be more advantageous for time-series analysis, which I use in Chapter four and five, these limits were predetermined by the availability of data and the requirement of the stability of the legislative environment in the fiscal sphere. The starting date 1996 was chosen because most of the statistical data pertinent for the research, such as core variables on the development of market institutions and on public employment, is available only from this year on. Second, it would be unwise to start the study of budgetary

[21] The eighty nine regions consist of 49 oblasts, 21 ethnic republic, 10 autonomous okrugs, 6 krais, 2 cities, and one autonomous oblast.

[22] It was renamed recently as the Federal State Statistic Service (Rosstat)

relations before the year of 1994, when the Law on the Provision of Basic Principles of Taxation was adopted. According to one of the provisions of this Law, the proportions of federal and regional levels in shared taxes, while different for each tax, were set up uniformly across the regions. The degree of SBC for the years preceding 1994 would be very difficult to measure, given this additional source of variation. Not only would it complicate the calculus, but the varying proportions of federal and regional shares might provide an additional facet to the degree of the softness of budget constraints. Finally, the Duma elections were held in the late 1995, the year, immediately preceding the starting point. The year 1996 itself was the year of a presidential election, which was conducted in a truly democratic matter. The drama of the political struggle and the dynamic nature of center-periphery relations represent a unique, politically rich setting for the research.[23]

The time-point for the end of the period of study is dictated by the major tax reform that occurred in 2001. From 2001, the provisions of the Law on the Provision of Basic Principles of Taxation, started to be gradually replaced by those enumerated in the Tax Code (adopted in 2000). For example, revenue from the value added tax shared between the federal and regional budgets at a ratio of 75:25 before 1999, and a ratio of 85:15 between 1999 and 2001, was centralized completely in 2001. Even though this was partially compensated by the increase in the share of the regional budget in personal income tax from 84 to 99 percent, it resulted in significant a drop in the pre-transfer revenues of regional governments, as it accounted on average for 15 percent of regional pre-transfer revenues. This loss was compensated by the subventions earmarked for the two major federal mandates. The limitation of the time period to within these boundaries ensures a more or less stable legislative background, which will eliminate variation in central tax policies from the list of potential predictors.

The political reasons for choosing 2001 as the end point are motivated by the fact that the second year of Putin's presidency denotes a point when the change in central politics towards building the 'power vertical' took on an irreversible character. During the first term of Putin's presidency the centralization of budgetary resources at federal level became complimentary to

[23] For example, the timing enabled me to take into account the pro-refrom and anti-reform attitudes of the attitude of the electorate, by proxying them to the voting for pro-reform or Communist parties accordingly.

the policies of building the ‘power vertical’. The federal center employed the mechanism of centralization of taxes and subsequent massive re-distribution of financial resources.

CHAPTER 4: DETERMINANTS OF ECONOMIC GROWTH: EVIDENCE FROM RUSSIAN REGIONS

4.1 Introduction

The impact of reform measures on the economic performance of the post-communist countries of Central and Eastern Europe and the former Soviet Union has been the focus of an emerging literature on transition economies. While some researchers find a clear indication of the negative effect of transition indicators on output change in cross-country comparison (Popov 2000, Lawson and Wang 2005), a growing number of studies suggest that such indicators of marketization as price liberalization, privatization and enterprise reform are positively correlated to growth (de Melo et al. 1996, Heybey and Murrell 1999, Aslund et al. 1996, Havrylyshyn and Wolf 2001). There is, however, broad agreement that the initial conditions are inversely related to growth: countries with higher level of development tend to grow slower than less advanced economies (Barro and Sala-i-Martin 1992, De Melo et al. 2001, Iradian 2007). The issues of this debate have to a certain extent been applied in comparative studies on the sub-national units of Russia, though with differing conclusions: contrary to the expectations of conditional growth convergence raised by cross-country analyses, in the Russian regions growth and investments strongly and positively correspond to the initial conditions at the start of economic reform, such as endowment in natural resources, geographical advantages, human capital, and physical infrastructure (Hanson 2000, Hanson and Bradshaw 2000, Ahrend 2002, Berkowitz and DeJong 2003, Popov 2001). Unlike in the literature of transition countries, there is a stable consensus on the negligible role of reform measures in explaining patterns of economic development across regions (Ahrend 2002, Popov 2001). This chapter will depart from this consensus by showing that in the case of the Russian regions the dominant link between the development of market institutions on one hand, and growth and investment on the other, in fact, is positive.

First, I review different ways of measuring development of the market reform at the sub-national level and report the outcome of different research attempts in building the causal link between market development and economic growth, casting into question the validity of previously utilized measurements of market development. I go on to introduce and present arguments in favor of the measurement of market reform used in my study, followed by the statistical analysis of the effect of this variable on GRP. As a robustness test I run several

models, replacing the dependent variable with growth of real GRP, investment flow and industrial output. In order to explore the long-term effects of the development of the market at the regional level, I carried out a mixed effect model for the analysis of the change in GRP and investments. The next section presents outcomes of the comparative explanatory power of the various estimates of market development against various variables of economic performance. First, I report bi-variate regression estimates for each pair of response and predictor variables and then proceed to more elaborate analysis using Bayesian Model Averaging method. The last section concludes.

4.2 Different ways of measuring market reform

Most of the relevant sources agree that structural characteristics, such as natural resource endowment, development of human capital, initial competitiveness of regional industries, transport infrastructure and level of urbanization are the driving forces behind regional variation in economic performance (Hanson 2000, Hanson and Bradshaw 2000, Ahrend 2002, Berkowitz and DeJong 2003, Popov 2001). Many authors included the degree of progress of market reform in their set of explanatory variables, in the expectation that the degree to which a region implemented economic reform measures would explain the speed of economic growth (Ahrend 2002, Berkowitz and DeJong 2002 and 2003, Cai and Treisman 2005, Popov 2001). The general conclusions, however, converge towards the view that the degree of implementation (development) of reform has a negligible impact on economic performance at regional level (Ahrend 2002, Popov 2001). Relative speed in reforms did not lead to better performance in terms of value added, industrial output and real investments (Popov 2001). Only after eliminating the effect of initial conditions were some authors able to identify the impact of the development of core market institutions on flow of investments (Cai and Treisman 2005), of degree of price liberalization on per capita income growth (Berkowitz and DeJong 2003), of the share of the regional population that voted for pro-reform parties (as proxy for regional reform) or on new enterprise formation and growth of per capita income (Berkowitz and DeJong 2002). This section offers an overview of the different attempts to include the measurements of market reform into analyses of economic growth.

Without endeavoring to provide the definitive answer as to whether market-orientedness indeed did not matter for the economic growth, or whether it does but the link was not adequately captured due to pitfalls in the process of measurement, my analysis add insights into the reasons why previous analyses fail to explain cross-regional variation in economic

performance. First, I will show that some of the previously used variables of market reform lack construct validity. Second, the process of emergence and development of market institutions, rather than having an immediate impact on the economic performance, had a more distant effect that is difficult to depict using conventional methods of data analysis. In contrast to the relatively short life span of the factors previously used for the explaining economic growth, the longer time span of the present research allows me to provide a fuller and more complex picture.

Ahrend (2002) uses a wide spectrum of variables in his study of regional economic performance, including political attitudes of the regional leadership and population, adequacy of fiscal incentives, potential of violent conflicts, efficiency of state institutions, degree of implementation of economic reform, and several measures of initial conditions (resource endowment, geographical position, share of competitive industries and the service sector, development of physical infrastructure and urbanization). His finding was that the degree to which market reforms were implemented – measured as the share of privatized or private economic activity, relative level of foreign direct investments in investment structure, the share of regulated prices and subsidies in budgetary expenditures – had close to zero impact on growth performance (2002, 21). He stressed that for the transition period of declining output (1990-1998), the market orientedness of a region played a minor role, while the most significant and robust factors were the initial competitiveness of industry and share of exports in regional production.

Popov in his (2001) analysis of the varying patterns of economic growth and incomes in Russia's regions includes the measurements of initial conditions, institutional capacity of governments, and the speed of liberalization and privatization. He shows that both institutional capacities of the regional government, a Moscow dummy and resource advantages were statistically significant and accounted for half of the interregional variation of GRP change. However, he found that the reform progress variables (share of private enterprises in trade, public catering and services, share of regulated prices) did not have any noticeable impact on economic performance measured as industrial output, investment change, and GRP per capita. Reform policies yielded dividends solely in the form of better income performance, via redistribution of business incomes. Holding the budgetary interregional flows constant (which redistributed income from rich to poor), the net effect of progress of market reform was strong and positive income concentration effect – i.e. more

liberal, market-oriented regions were 'sucking' incomes from regions that were less successful in terms of reform progress.

Cai and Treisman (2005) report a strong correlation between the level of investments and development of both physical infrastructure and leading market institutions. Regional governments that spent more budgetary funds on infrastructure cut back less on construction of roads and water mains and put special effort in developing market institutions in their localities were more competitive in attracting investments, both domestic and foreign.

Other authors explain market development in a region by the market-orientedness of the regional government or populace. Case studies by de Melo and Ofer (1999) showed that the party orientation of the regional executive branch mattered for the degree of implementation of economic reform (measured as speed of privatization and degree of price control). Berkowitz and DeJong (1999) go further in their causal inference: they documented that the 'redness' of the region, measured as the percentage of voters voting for Zyuganov in the 1996 presidential election was closely connected to the formation of new enterprises, which in turn matters for the growth of real incomes (Berkowitz and DeJong, 1998). In a later study (Berkowitz and DeJong, 2002) they used a measurement of the voters' support for pro-reform parties in 1995 Duma elections as a proxy for the regional level of market reform. This method they justify with the reference to Warner's (1999) finding that voting patterns were closely connected to the level of small-scale privatization and price liberalization.

4.3 Analysis of the validity of measurements of market reform

The descriptions of reform progress in the Russian regions reported by different analysts create a chaotic picture of the pattern of regional market reform, not least because the measurement methods have been far from adequate. The last mentioned variable, electoral support for pro-reform parties in 1995 Duma elections, seems to represent perhaps a least appropriate way of measurement of reform progress. Berkowitz and DeJong (2002, 227) showed that the marginal explanatory power of small-scale privatization and price liberalization variables is marginalized once voting for pro-reform parties is taken into account.[24] Bearing in mind the unstable floating party system in Russia at that time, it would

[24] Not to mention that its usefulness is impaired by the impossibility of applying it to other time periods, as the division of parties on the marketisation issue no longer existed starting from the next Duma elections.

be unreasonable to associate the progress of reform with the volatile character of the voting patterns of the Russian electorate, even though it happened to be the case in a single year in 1995.[25] Moreover, behavior in national elections is only loosely connected to regional political behavior (Slider 1996, Zlotnik 1996). Regions that are labeled as conservative in national elections may have governors and administrations that introduced more radical market-oriented reforms.

Among the most widely used measurements of market development have been privatization and price liberalization levels. Below I summarize the potential weaknesses in using them.

Privatization of state enterprises is considered a major component of the transition to a market economy. Voucher privatization (before 1996), which was used by the majority of enterprises, can potentially be justified as a proxy for the speed and magnitude of reform. On the other hand, money privatization schemes, which included trade sales, non-competitive auctions and other methods, were riddled with incidents of insider self-dealing (Desai, Freinkman, and Goldberg 2005), whereby governmental officials and managers of large enterprises colluded with privatize enterprises for corrupt gains. As Friebel (1995) argues, privatization that invigorates official corruption, arbitrary taxation and insider self-dealing can scarcely be used as proxy for market-oriented tendencies at the regional level. As well as the dichotomy between the voucher and money schemes, in the Russian privatization one can distinguish between small- and large-scale reforms. Aslund (2008) and Black et al. (2000) claim that it was predominantly large-scale privatization that stimulated rent-seeking behavior in both regional government officials and managers alike. The indicator of privatization of small enterprises is a better proxy for the degree of the market orientedness of the regions.

Price liberalization directly enhances the efficiency of allocation of resources; thus lifting state price control was one of the core objectives of market reform. The process started on a national scale in January 1992, when a federal decree liberalized 90 percent of state retail prices and 80 per cent of state wholesale prices (Berkowitz, DeJong, Husted 1998). At

[25] There is another possible problem with their methodology: as the ultimate goal of the research was to investigate the determinants of regional growth, the choice of the voting pattern as one of the explanatory variables seems unjustified for reasons of endogeneity. It is likely that not only the negative attitude toward reform, but also the lower level of economic growth prompted the populace to vote against pro-reform parties.

regional level, however, the prices for a significant share of consumer goods (mainly food produce) remained under the control of regional governments, as some regional authorities resisted federally mandated reforms. As well as direct fixation of prices, regional governments used indirect methods, such as imposing a ceiling on price levels or profitability, imposing limits on the growth rates of prices, granting subsidies, or limitations on trade margins. At the beginning of 1995 as much as 30 per cent of all goods were controlled by regional and local governments (Berkowitz and DeJong 1997). Some regions also used systems of food rationing which limited the sales of certain goods to residents. The federal statistical agency (Goskomstat) possesses information on 285 types of products in 140 cities of Russia, registering how the prices were regulated in individual regions. Based on these statistics, Lavrov et al. (1997) compiled their two indices: first, the share of the services and produce with regulated prices in the list of prices of 285 types. The second index is more complex: first, they allocated points to regulated prices according to the degree of state regulation: 'weak' forms of regulation (imposing limits on profitability of the production of food processing and manufacturing, granting of subsidies, limitation on trade margins) were scored one point; 'medium' forms of regulation (imposition of fixated prices or limits of price growth) were scored as two points. The 'hard' forms, such as the introduction of rationing, scored three points. The degree of price regulation in the region is calculated as the sum of these points.

As we can see, the two indicators are far from perfect: while the first catches the scope of the assortment that is regulated, as opposed to completely liberalized, it does not take into account the amount of sales of these products or services. The second one has the same drawback, and the rather high scoring of rationing distorts the pattern of pro- versus anti-market-orientedness by failing to take into account the reasons why rationing was introduced. Even in a developed market economy it is possible for rationing to be introduced as a temporary measure to provide minimal sustenance levels for the population in case of adverse external shock.[26] These limitations led to an index which lacked construct validity for the

[26] In 1997, for example, the amount of 'severnyi zavoz' (Northern delivery) fell back substantially due to extremely dry summer that lowered the level of water in rivers, which in turn shortened the time for delivery of basic provisions. The amount of food that was planned to be delivered via river involving relatively low cost, had to be delivered by air, which substantially inflated the expenditure part of the budgets of several northern regions.

measurement of the market development: such clearly market-oriented regions as Nizhegorodskaya oblast and St. Petersburg city scored 16 and 15 points respectively, while much less market-oriented regions, Kurganskaya and Penzenskaya scored one and seven points respectively (Lavrov, 275-276). [27]Thus the measurement of the degree of regulation of prices has to be based on more finely tuned analysis of the price liberalization/regulation policies of the individual regions. Another drawback of this measurement is that it is available only for cities, which dramatically reduces its use for interregional comparisons.[28]

In their widely quoted study on the entrepreneurial climate of the Russian regions, Lavrov et al.(1997) calculated an overall index of attractiveness of the business climate, which consisted of several second-level indices describing the economic, demographic, geographic, financial, political, etc. climate. The overall index is very well correlated with the growth of GDP, but this indicator cannot be used because of an autocorrelation problem: its component parts included changes in industrial output and construction output. Among them, however, was an index of development of market reform that seems potentially useful for the measurement of market development. This index is constructed as a sum of points, estimated as the ratio of the average in Russia of the level of the industrial subsidies in budgetary expenditures; the share of privatized small enterprises; the ratio of agricultural subsidies to the value of agricultural output; the share of the services and produce with regulated prices, and the degree of price regulation. All these indicators, while individually worthy, cannot be compiled into a meaningful index of the degree of development of market institutions for several reasons.

The first indicator, for example, the level of industrial subsidies, while in itself a useful indicator of the market-hindering policies of an individual region (*ceteris paribus*, the greater the share of subsidies, the less market-oriented the regional economy), cannot be used for the entire sample of 88 regions, since it will bias in favor of less industrially developed regions. Take for example Sverdlovskaya oblast and Altai republic, geographically close regions; while the first has a score of 10.1 on the scale of industrial subsidies, the latter was better off with 4.7. But this does not mean that market institutions are better developed in Altai

[27] The highly developed market environment in Sant Petersburg and Nizhegorodskaja oblast are documented in several studies, i.e. Hanson and Bradshaw (2000), ranking of RA Expert.

[28] Berkowitz and DeJong (2003) circumvented this problem by reducing the sample size to 48 units, by selecting only those regions where the share of the capital was more than 30%.

republic, because this indicator is not suitable to compare two regions with different economic structures. The reliability of the measure based on this indicator depends on the choice of comparison: Sverdlovsk oblast has to be compared with regions with a similar, greater than average share of industry in their regional economic activity. The same applies to the indicator of the share of agricultural subsidies.

Another possible indicator of market reform could be the degree of structural adjustment. The relative proportion of the sectors of the economy in Soviet and market economies differ substantially, with the former emphasizing the importance of heavy over light industries and industry over services. Such features of Soviet economy as 'overindustrialization', industrial 'gigantomania' and spatial allocation incur high production and transportation costs, and cause many regional economies to become unviable in a liberalized market environment. In the transition from a Soviet-type economy towards markets, regions should undo these distortions by downsizing the share of heavy industries in favor of services, especially consumer services, and reducing government consumption in favor of private consumption.[29] Therefore, the degree to which regions de-industrialize could be used as a proxy for market development.

This method of measurement can be argued against for several reasons, however, most notably, the initial level of industrialization. In some regions the level of services was already relatively high and the degree of de-industrialization, which remained low, will be inconsistent with the level of market development. Second, while some types of industrial development, such as machinery, equipment, agriculture, do indeed require downsizing, other, more competitive industries, such as fuel, electrical energy, steel and nonferrous metals were used as a locomotives of regional economic growth. De-industrialization of competitive production capacities was not needed, and indeed would have been detrimental for both economic performance and marketization of regional economy. Third, other structural factors can impede re-industrialization, notably the level of industrial specialization and geographical disadvantages. Less diversified regions have far more difficulties in adjusting to markets, since developing new industries requires massive initial capital inputs, scarce during periods of economic decline. In this case, they cannot be restructured without massive reduction of

[29] The inter-branch restructuring is to be distinguished from the spatial restructuring, since the allocation of industries introduced by Soviet planning system biased distant and cold regions.

the size of the labor force. Distant and cold regions are particularly unsuitable for both investment and living conditions alike; they can be made economically viable only if their population falls to much lower numbers. However, this process is seriously impeded by the related political and transaction costs. Regional governments may be especially interested in preventing out-migration of the population, since a decline in population would mean less political weight in bargaining with the center. Interregional labor mobility was also slowed down by the prohibitively high cost of moving, including the low liquidity of assets in host regions, heavy transportation costs, and the immigration restrictions of the destination regions.

Several authors used the index of FDI as an indicator of market development (Ahrend 2005, Desai et al. 2005), arguing that foreign investors may be attracted to more institutionally developed regions that provide a robust market environment which to a certain degree warrants security of their investments. However, in Russian case, there is a great deal of uncertainty about the usefulness of this indicator as it is significantly biased in favor of the energy sector.

Observers of the Russian transition employ a plethora of variables with varying degrees of internal and external validity, measuring differing aspects of reform, and having different time-limits of applicability, but they almost unanimously agree on observing a great variation in the degree of implementation of a market paradigm among Russian regions. They provide a rich data base for the (comparative) descriptive analysis of market reform in regions in Russia, as well as the analysis of the relationship between market reforms and economic growth, which abounds in the literature.

All the above-mentioned studies prove that for the period 1990-1998, the implementation of market reform had little impact on growth, measured as GDP growth, industrial output growth or investment growth. This can be explained by various considerations, the main one being that simple division of regions into pro-reform vs. anti-reform (or fast vs. slow liberalizers) cannot capture the multidimensional picture of Russian regional deviations from the Western-type market economy. All the variables discussed above measured a single aspect of reform (i.e. level of privatization, price liberalization, new enterprise formation), which runs the risk of distorting the real picture transition to market economy, given its multidimensionality. On the other hand, complex indicators are often even less successful in depicting the magnitude of that process, as their component parts tend to cancel each other out in the process of

summing up. The second consideration is that the result of the reform is often substituted for the process, for example, a greater inflow of foreign direct investments cannot be justifiably used as an indicator of the progress of the reform. This kind of substitution, as a rule, creates an endogeneity problem, as in many cases the reform progress indicators are used as explanatory variables in equations of economic performance. The third explanation is that some of these variables were not measuring what they claim to measure; in other words these variables have not reached an acceptable level of construct validity. For example, vote for the liberal parties in national elections to the Duma, no matter how tightly it may correspond to the measures of reform progress, cannot replace them in regression analysis. The last, but not the least reason is that most of the studies based their models on variables measured at a single time point in the transition period. It may well be the case that factors of market development had a less pronounced short-term effect, but analyses based on the lagged values, which could shed more light on this problem, have rarely been undertaken.

4.4 Indicator of the development of market institutions

In the previous section I have demonstrated that identifying a single informative and regionally comparable variable of the development of market reforms is a daunting task. In order to avoid at least some of the pitfalls mentioned above, and to circumvent the potential problem of multicollinearity, it is necessary to choose only one aspect of reform, but one which represents a cornerstone of the marketization process and will be a consistent measure of reform progress. As well as informative, it should also be a spatially and temporally comparable variable.

The relevant literature almost unanimously claims that market reforms can be only successful in a robust market institutional environment (Bruszt 2001, Campos and Coricelli 2002, Djankov and Murrell 2002). As Havrylyshyn summarizes (2006, 64),

> […] transfer of ownership alone may at best have some small positive effects, but significant benefits come only with the complementary development of competitive market institutions… it does strongly confirm the view that some minimum degree of institutional development is needed alongside private-sector development.

The relative importance of the liberalization and institution-building parts of the reformist agenda is an important part of the debate between gradualists vs. big bang reformers, as they approached the order of sequencing differently: gradualists insisted that formation of market

institutions should precede the liberalizing policies of privatization, freeing prices and trade, while rapid reform advocates argued for an opposite order. Recent studies (Aslund 2007, Havrylyshyn 2006, Havrylyshin and van Rooden 2003) have shown, however, that these processes were symbiotic, and the 'pace of institutional development is broadly related to the pace of economic reform' (Havrylyshyn 2002, 36). Therefore, by measuring the level of development of market institutions, the overall level of private market activity can be assessed. In the case of the Russian regions, it has been proven that if the institutional capacity of market institutions is weak, the impact of economic liberalization on economic performance is inadequate and a marketization dividend is only present in income redistribution (Popov 2000). Moreover, it has been found in the cross-country regressions, that reform variables lose their importance once the variables for institutions are included (Brunetti, Kisunko and Weder, 1997).

One of the most widely recognized indicators of the development of market institutions for the Russian regions is constructed by the Russian think-tank RA Expert.[30] This is a rating of regions on the basis of the development of market institutions (hereafter DMI), and it constitutes a component part of the overall rating of investment attractiveness.[31] This indicator has been produced on a consistent basis annually since 1996, and for the entire sample of 89 regions.[32] DMI is a rating based on a composite index that polls both objective measures of development of institutions in individual regions and outcomes of experts' opinion questionnaires. The rating takes into account perceptions of business experts on the institutional capacities of market institutions of individual regions, which is distinct from their

30 This rating, or more precisely, underlying indices, was used by several authors in their analysis: Popov (2001) used the risk index in his analysis of output and incomes, and Cai and Treisman (2005) used index of development of market institutions in their investigation of the various trends of investments.

31 The overall rating is based on the two sub-ratings: that of investment potential, and that of investment risk. The first rating is a weighted average of resource, industrial, labor, financial, consumer, innovative, infrastructural and development of market institutions. The second index is a weighted average of economic, legal, financial, political, criminal, social, and ecological risks. The weightings of factors were calculated on the basis of interviews with a panel of experts, which included not only Russian but foreign interviewees.

32 Reduced between 2003 and 2008 to 83 regions due to amalgamations.

perceptions of the region's potential with respect to its natural and human endowment, or infrastructure development.

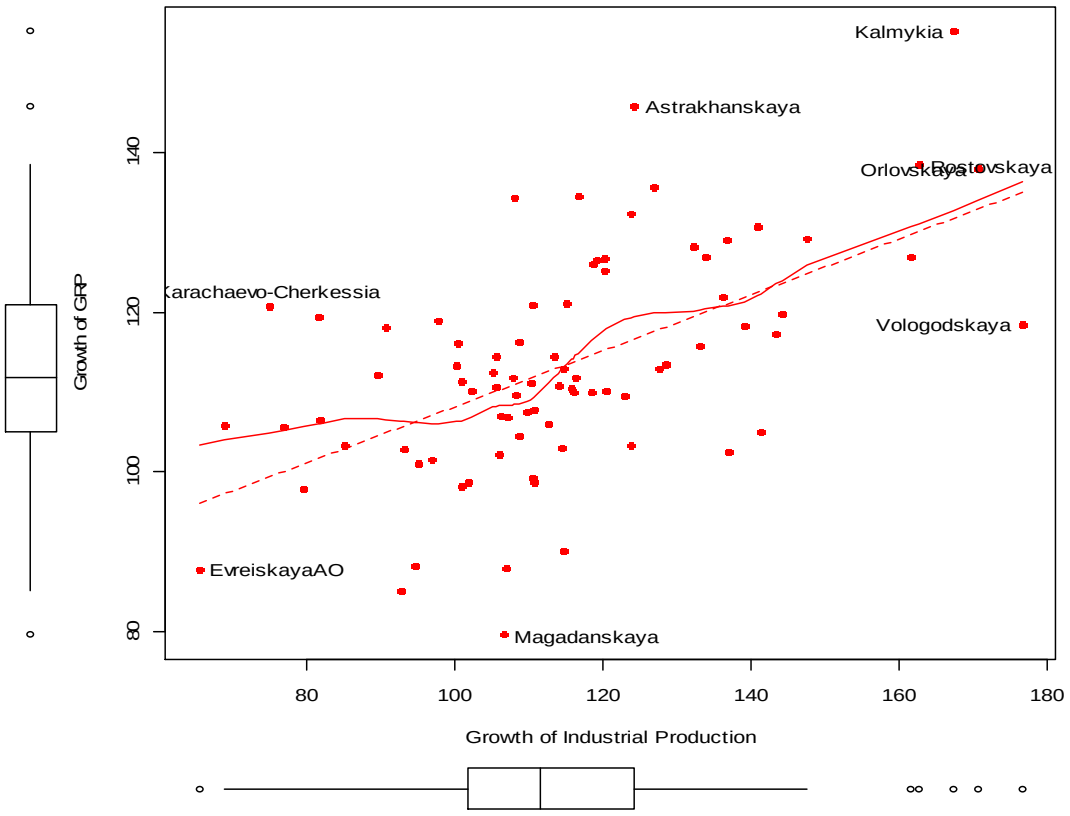
DMI can hardly be regarded as a perfect measure of regional market development, as it can be criticized on grounds of subjectivity, but to date it is the only consistently measured index which covers the entire period between 1996 and 2001, and also it is consistent with other indicators of market regional market environment (Lavrov index, HIS index), and partial measures of transformation. Given that the concept of marketization cannot be narrowly defined, DMI serves as a good proxy for the summary of progress in marketization, as the following analysis will show. The next section is devoted to a test the explanatory power of this variable against different dependent variables, in one-level and multi-level regressions, using data collected for a sequence of years (1996-2001) and, finally, estimate its comparative advantages in explaining different aspects of regional economic performance against other plausible variables of market reform. The DMI variable is a ranking, where the lower value represents higher development of market institutions, i.e. 1 denotes the region with the highest level of development of market institutions.

4.5 The effect of DMI in cross-regional models

4.5.1. Description of dependent variables

The explanatory power of DMI as independent variable will be tested against three response variables, in turn: the real change in gross value added over time; the changes in quantities of industrial output of ten industry branches; and the flow of investments. Fig. 4.1 plots a scatterplot of the first two variables for 83 regions in 2001 relative to 1996, as well as least squares and non-parametric regression lines. Box-and-whisker plots are presented on the margins, indicating interquartile range, median, minimum and maximum values, and outliers.

Fig. 4.1 Gross Regional Product Growth and Growth of Industrial Production of Russia's Regions in 2001 Relative to 1996.
(1996=100)



Source: Calculations based on Goskomstat Yearbook for 2003: *Regiony Rossii in 2003*.
Notes: The least squares regression line (dotted) with r= 0.351 and R^2 adjusted 0.31, and non-parametric (solid) regression line are overlaid. On margins: box-and-whisker plots, indicating interquartile range (box), median (a line inside a box), minimum value (end of line close to the zero point) – the smallest value, but not smaller than 1.5 times than the value for the first quartile, maximum value (end of line away from the zero point) – biggest value, but not bigger than 1.5 times value for the third quartile, and outliers.

It is note worthy that the vast majority of regions experienced a quick recovery from the precipitous deterioration of the first stage of transition, as is reflected in net GRP growth over the period 1996-2001. The mean regional gross value added increased by 13.5 percent of its 1996 level, growing at 2.7 percent per annum on average. The median growth was 11.6 percent, or 2.32 percent per annum. This is a remarkable outcome, bearing in mind the sharp decline Russia experienced during 1992-1998, where the number of regions which experienced GRP decline in physical terms was as high as thirty-nine (out of eighty for which data is available) in 1997, and seventy (!) out of eighty in 1998, while in 2001 GRP fell below

the level of a preceding year in only six regions. As is apparent from the Fig. 4.1, GRP has a strong correlation with the expansion of industrial output, which implies that the post-1998 growth 'relied on locally-anchored expansion of industrial output, rather than on transfers from a few regions' (Golubchikov 2007, 199).[33]

The analysis of impact of market institutions on economic growth would be incomplete without taking into account the third dependent variable, the flow of investments. The economic growth literature (Barro and Sala-i-Martin 2003) pinpoint the positive correspondence between investment and economic growth in post-communist countries. Similarly to the majority of post-communist economies, Russian economic revival from the prolonged decline of the first stage of transition was not possible without new investment. The recovery of untapped industrial capacities was not enough to trigger economic growth (Havrylyshyn 2007). Manufacturing capacities inherited from the Soviet economy could not be fully engaged without serious restructuring, or in some cases radical rebuilding. Most manufacturing in the Soviet Union was a negative value-added (Boettke 2003, 118), or value-destructing (Aslund 2007, 65) production, a fact that made new investment crucial for regional economic development. [34] Indeed, the scatter plot and the regression line in Fig 4.2 below for the investments and GRP for the year 1996 prove that there is a strong and positive association between the two variables.

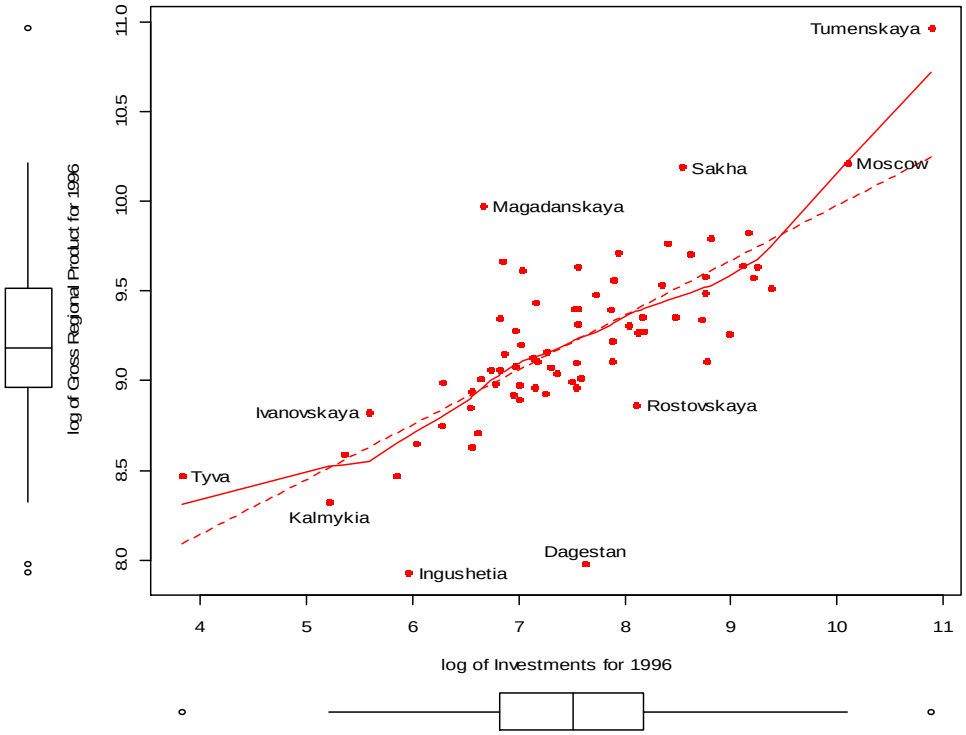
Table 3 in the Appendix displays that for the period 1996-2001 the regression coefficient for investments varies between 0.91 and 0.83, (p-value < 0.001 in all cases) and that for variable

[33] What is more interesting, the real growth rates of GRP and industrial production are not strongly associated with the initial wealth of each region, for which I constructed an index of initial endowment, described below in section 4.6. Table 2 in the Appendix to this chapter demonstrates that the statistical significance of the regression coefficients of the effect of the initial endowment on both the real GRP and industrial growth, measured as mentioned above, is very low, which implies that the factors of initial preconditions, at least in relation to the real growth, play a less decisive role, as was perceived by earlier research.

[34] Aslund (2007) argues that a drop in investment was a necessarily outcome of the early transition, as it reflected the reduction in inventory, which was referred to in accounts as investments in planned economy. These oversized inventories were accumulated in most Russian manufacturing enterprises as a precautionary measure in case of shortages. The shift from inefficient to efficent industries and from inefficient to efficient production lines, as a rule, created negative or low net investment (Campos and Coricelli 2002). However, in

initial endowments[35] varies between 0.68 and 0.62 (p-value < 0.001 in all cases). The regression estimates for these models confirm the hypothesis that these two variables are indeed principal predictors for the level of economic performance.[36]

Fig. 4.2 Relationship between GRP and Investment minus Savings for Russian Regions for 1996



Note: the logarithmic transformation was used for both variables since the range of values is large in both cases (> 10:1). Before the transformation the variables were bunched up near the zero point, while the log transformation led to a more symmetric distribution. The least squares regression line (dotted) with r= 0.53 (t-value 11.18), and R^2 adjusted 0.63, and non-parametric (solid) regression line are overlaid. On margins: box-and-whisker plots, indicating interquartile range (box), median (a line inside a box), minimum value (end of line close to the zero point) – the smallest value, but not smaller than 1.5 times than the value for the first quartile,

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Russia by 1996, offsetting effect of dishoarding and 'capital shrinkage' in old industries against the growth of new investment was over.

[35] The composition of the variable is described in detail in section 4.6

[36] There is a great deal of uncertainty on the direction of causality in the ongoing debate in growth literature, thus it is plausible to assume that during the times of economic decline, initial investments were attracted to faster growing regions (Barro 1997, Barro and Sala-i-Martin 2003), rather than otherwise.

maximum value (end of line away from the zero point) – biggest value, but not bigger than 1.5 times value for the third quartile, and outliers.

As a part of a robustness test of the DMI variable, I regressed DMI variable against three measures of regional capital inflows, all calculated on the basis of Goskomstat data:

- total investments in non-financial assets minus total savings of population in the given region per capita, measured for the entire period, 1996-2001;
- physical growth of investments, measured for the entire period, 1996-2001; and
- private investments attracted, per capita, available only for the period 1999 – 2001.

4.5.2. Results of bi-variate regressions

The variable of DMI shows statistically significant association with the level of GRP per capita (see Table 4.1 below) in bi-variate regressions I run for each year between 1996-2001. The t-statistic never falls below 2.6, and the estimate of the slope is gradually increasing from -106.8 to -413.2 over time. This finding reinforces the hypothesis of the growing importance of the market institutions for economic growth: while in 1996 an upward shift by one place in ranking of the regions (from more market-oriented to less market-oriented) would cause a drop of 106 thousand rubles per capita, in 2001 the same shift would be associated with a drop of 413 thousand rubles.

In order to check the robustness of the statistical outcomes, I first run the regression analyses replacing the GRP per capita by the physical growth of GRP, growth of industrial output, and various investment estimates, and then run a mixed effect model for the evaluation of the long-term effect of the DMI variable on the growth of GRP and investments.

The results of the regression analysis estimating the effects of the development of market institutions on the physical growth of GRP and growth of industrial output were supportive of the hypothesis. Table 4.1 shows that the strength of association was high for both variables for all years, except for the growth of industrial output for the years 2000 and 2001. The effect on industrial growth displayed opposite to expected, though unstable, signs.

Table 4.1 Dependence of Real GRP and Industrial Output on the Development of Market Institutions in Russian Regions

(Independent variable is DMI)

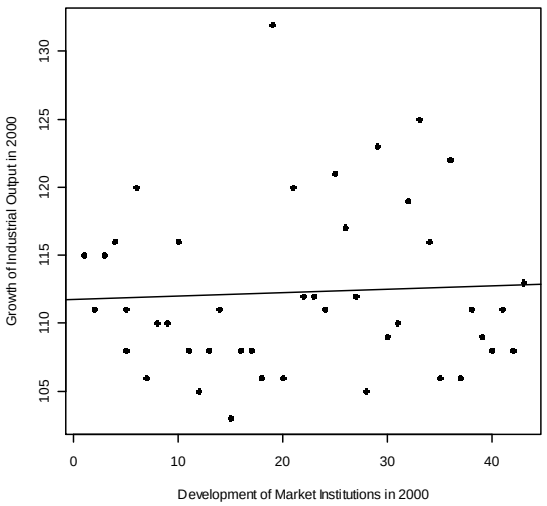
Dependent variables	1996	1997	1998	1999	2000	2001
(*i*) GRP per capita	-106.8	-112	-120	-225	-392	-413
t-statistics	-3.3	-2.9	-2.9	-3.1	-3.3	-2.6
R^2 adjusted	0.11	0.08	0.09	0.10	0.11	0.03
(*ii*) Real growth of GRP	NA	-0.05	-0.04	-0.08	-1.9	-1.4
t-statistics	NA	-1.9	-1.1	-1.9	-1.9	-1.4
R^2 adjusted	NA	0.03	0.003	0.03	0.03	0.01
(*iii*) Growth of industrial production	-0.06	-0.04	-0.04	-0.09	0.05	0.04
t-statistics	-1.6	-1.2	-1.4	-1.9	1.4	0.9
R^2 adjusted	0.02	0.005	0.01	0.03	0.01	0.001

The regression estimates of the models for the industrial output for years 2000 and 2001, conflict with the overall findings of this section. I suspected a non-monotonicity in the relationship between the DMI and growth of industrial output, which prompted me to analyze groups of regions separately, in accordance with their development of market institutions. I found that for 2001, the group of the market-oriented regions (ranking 1 through 44) did follow the main trend: the less developed the region with respect to market institutions, the slower the industrial growth, which is apparent in the downward slope of the regression line. The line for the year 2000 is almost flat, which shows that the impact of the DMI was close to zero in this group (not positive, but not negative either). For the regions with low development of market institutions, the relationship was the opposite: less developed regions demonstrated greater industrial growth.[37] Figure 4.3 below demonstrates this dichotomy.

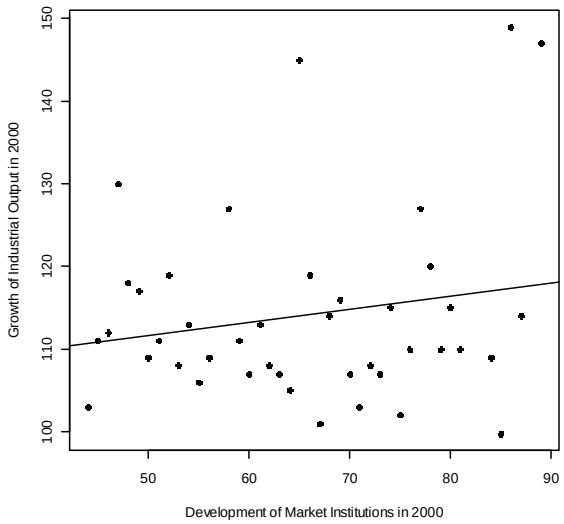
[37] This finding constitutes a puzzle which imply a hidden clustering in data, or, more probably, the deepening divergence between successful and backward regions (Dienes 2002, Golubchikov 2007).

Hence, the main finding of this section holds for the half of regions where market institutions were developed better than in the other half.[38]

Fig. 4.3 Relationship between the Development of Market institutions and Industrial Growth for Different groups of Regions for 2000 and 2001

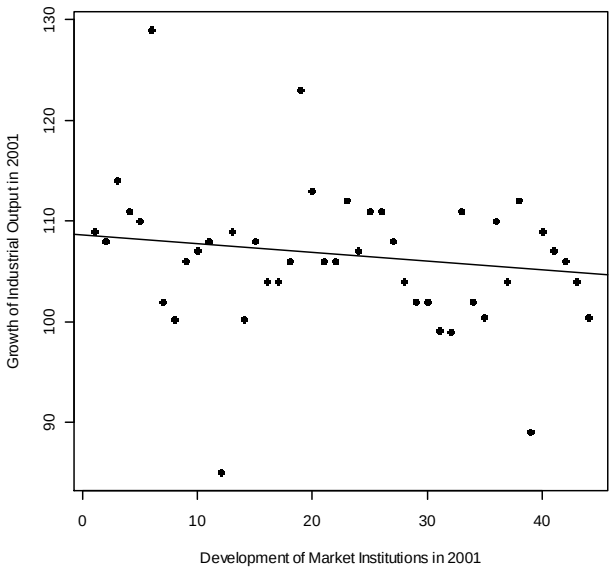


Regions with High development of Market Institutions (Ranking from 1 to 44),

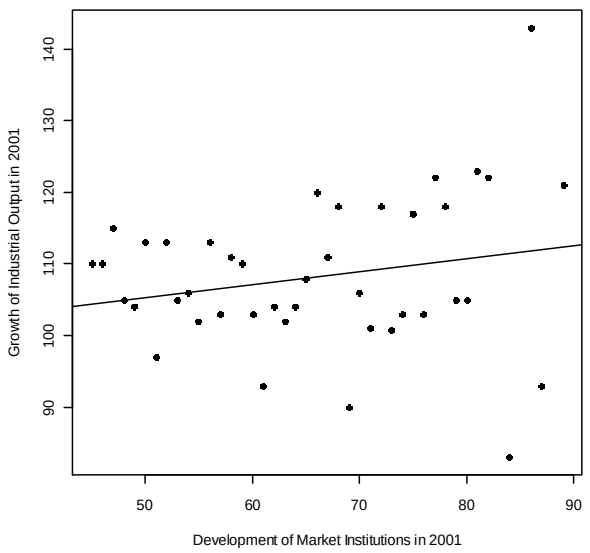


Regions with Low development of Market Institutions (Ranking from 45 to 88)

[38] The unstable statistical results for the models of industrial growth will be reasserted by further analysis using Bayesian Model Averaging, in the section 4.8.



Regions with high development of market institutions (Ranking from 1 to 44),



Regions with low development of market institutions (Ranking from 45 to 88)

Bi-variate regression analysis with these variables entering as dependent, and the DMI variable as independent, revealed that the level of the development of market institutions has a very weak impact on the flow of investments for all years (1996-2001), as shown in table 4.2 below.

Table 4.2 Dependence of Investments on Market Institutions in Russian Regions

(Independent variable is DMI)

Dependent Variables	1996	1997	1998	1999	2000	2001
(*i*) Investment minus savings	-2.61	27.5	-12.5	-2.1	93.3	19.9
t-statistics	-0.1	0.9	0.6	-0.1	0.9	0.2
R^2 adjusted	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
(*ii*) Physical growth of investments	0.03	-0.1	-0.13	-0.2	0.7	1.0
t-statistics	0.4	-1.6	-1.2	-0.1	1.5	1.8
R^2 adjusted	-0.01	0.02	0.01	0.00	0.02	0.02
(*iii*) Attracted Private Investment	NA	NA	NA	-0.02	0.05	-0.04
t-statistics	NA	NA	NA	-2.6	0.97	-0.6
R^2 adjusted	NA	NA	NA	0.07	-0.01	-0.01

This finding contradicts the result of previous analogous analysis that shows that market-oriented regions were associated with higher inflows of investment. Cai and Treisman (2005) calculated three different measures of net capital inflows for 1998, and the correlation between them and development of market institutions (incidentally, measured identically to mine) were positive and significant at $p<0.01$. Possible explanations for this incongruence between their study and my own is that in their analysis, the index of natural endowment was calculated slightly differently: it included additionally the measure of the geographical advantage; and not least, all measures for investments were calculated for 1998, but the measurement for market institutions was reported as of 1996.

The next stage in the analysis entails running the regression model that controls for these two variables (investments and natural endowments) important for economic performance. The next section thus assesses whether adding the development of market institutions improves the fit of the models displayed in the Table 3 in the Appendix.

4.6 Evaluation of DMI in multivariate models

It can be seen that investments increase as the ranking on market development decreases. Thus at small values of ranking (best in market development) we are looking at the GRP per capita for regions with large values of investments per capita. As well as the individual regressions reported above, which are made regardless of the level of investments and the level of initial endowment, I ran multiple regressions separately for each year, which produced estimates of the change in GRP with ranking when the flow of investment and initial endowment are held constant. Following the methodology suggested by Cai and Treisman (2005), the index of initial endowment is constructed of four parts, namely (1) an indicator of natural resource endowment, measured as the natural logarithm of the share of the region in the raw materials output as of 1995 (divided by mean) (2) an indicator of development of physical infrastructure, measured as the percentage of roads that were paved as of 1995, and the number of public buses per 1000 inhabitants as of 1995, (3) an indicator of the development of human capital, measured as the share of population with higher education as of 1995, and (4) the number of research and development organizations (for the full account on the calculation of the variable see Appendix, Table 1). All four variables were standardized and added together.

The regression estimation results shown in Table 4.3 below offer some support for the conjecture that market institutions can explain some variation in regional growth, even controlling the variables of the flow investments and pre-existing conditions. With the exception of the year 1998, the development of market institutions remains significant in the multivariate models, and is nearly significant for the years 2000 and 2001. The fit of the model improves consistently compared to the models omitting development of market institutions.[39]

;[39] Comparison of the Tables 1.3 and 3 in Appendix shows that the fit of the model is improved by an increment of 1 to 3 percent, which in itself does not refute the main finding of this section.

Table 4.3 Linear Regression Coefficients of Development of Market Institutions, Investments, and Initial Endowments, for the period 1996-2001. Dependent Variable: GRP per capita

Variables	1996		1997		1998		1999		2000		2001	
(i)Development of market institutions	-106.8	-52.9	-112	-84.5	-120	-10.5	-225	-144	-392	-141	-413	-181
	(-3.3)	(-2.4)	(-2.9)	(-3.3)	(-2.9)	(-0.3)	(-3.1)	(-2.0)	(-3.3)	(-1.6)	(-2.6)	(-1.7)
(ii)Investment		2.8		2.5		3.9		3.14		2.4		2.43
		(13.9)		(13.1)		(7.3)		(4.8)		(7.4)		(6)
(iii)Initial endowment, index		697		902		776		270		5635		7011
		(3.65)		(3.9)		(2.3)		(4.8)		(6.9)		(7.2)
(iv)Interaction between (i)and (ii)		0.03		0.04		-0.01		0.03		0.04		0.02
		(2.3)		(3.5)		(-0.7)		(1.5)		(2.3)		(1.4)
Interaction between (i)and (iii)		-11.3		-16.8		-47		-47		-99.9		-122
		(-1.8)		(-2.1)		(-2.5)		(-2.5)		(-3.7)		(-4.2)
R^2 adjusted	0.11	0.86	0.08	0.83	0.09	0.74	0.10	0.78	0.11	0.82	0.03	0.83

Notes: the first column for each year contains coefficient for the bivariate model, the second – multivariate. t-values in parentheses.

4.7 Time series – cross section analysis

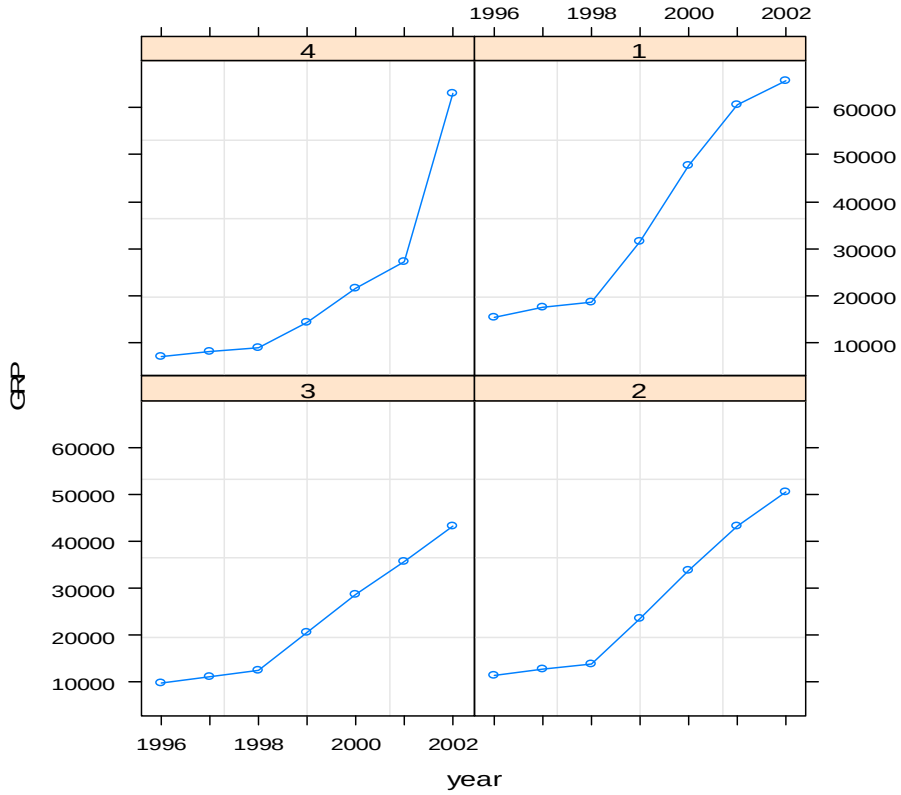
The structure of the available data led me to investigate the possibility of using time series - cross section analysis. The time series nature of the data creates the issue of pseudoreplication, violating the important assumption of standard analysis since measures of the same region taken annually will not have non-independent errors because the same structural features will be reflected in all the measurements across time. There are several techniques to handle the problem of pseudoreplication, including first, carrying out a separate analysis for each year; second, averaging away the pseudoreplication and basing the analysis on the mean values across the years; and third, calculating and reporting panel-corrected standard errors (PCSEs) (Beck and Katz 1995), which are particularly suitable for time series cross section data sets (TSCS). However, my data has some limitations for using time series cross section methods, since it represents a 'true' panel data set, where the number of units of observation is much larger than the number of time periods. In statistical terms, my model is closer to the repeated measures design rather than the TSCS. Therefore, in this case the only possibility remaining is the mixed-effects model.

The model specification is as follows. For simplicity, I have only one fixed effect – a four levels categorical variable, the level of development of the market in a region, coded in the following way: one – high (average rating for years 1996-2001 between 1 and 22.5), two – medium-high (rating between 22.6 and 44.2), three – medium-low (rating between 44.3 and 65.9), and four – low (between 66.0 and 88.3). Each treatment (level of DMI) contains approximately twenty-two replicates,[40] with each region measured over seven successive years. The response variable is the GRP per capita. The output of the mixed effect model is presented in Table 3 in the Appendix, where the random effects indicate that the year of measurement represents pseudoreplication within regions. The essential result is that the mean reduction in the GRP associated with the one item change in DMI (less developed institutions), is 1,014 rubles per capita, with t-statistics 2.02 (see the last line in the table).

After this, I grouped together the regions with the same level of market development, calculated averages for each group and ran the same model, but this time with only one replicate in each treatment. Below, in Figure 4.4 are presented four panels, one for each level of market development, and the lines display the growth of GRP. The panels show a resemblance between each other, with group 2 having the smallest mean value of GRP, and the group 4 the largest. Surprisingly, the least developed regions overtook groups 3 and 1, but this can be explained by the sharp increase of nominal GRP in the year 2002, which caused the average for this group to jump from 30,000 rubles per capita to over 60,000. An analysis omitting the year 2002 would clearly place group 4 in last position. One of the most plausible explanations for this lies in the effect of rising prices of oil and gas, which caused a faster appreciation of the gross regional product in these regions. Analysis has shown that between 1998 and 2001 the growth of oil prices (from $12 to $23) secured 60-75 per cent of the growth of the tax revenues from the oil industry to consolidated budget, which in turn, accounted for at least 80 percent of the total growth of budgetary revenues (Quan 2003). The oil-rich regions of the less developed group (4) immensely increased their GRP levels in 2002, not least due to the increase in oil prices.

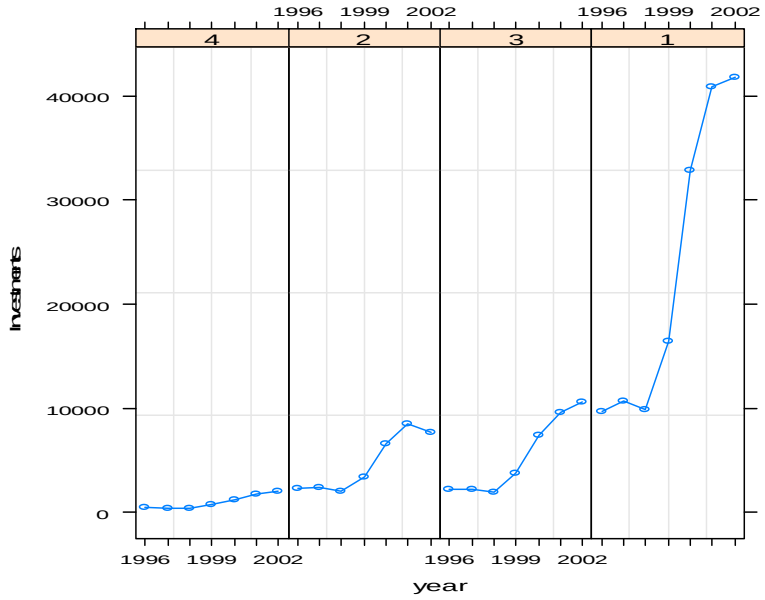
[40] The division between the treatment groups was done in such a way as to balance between the equality of numer of regions in each group and approximating the boundary values of DMI variable; hence the first group contains 22 regions, the second 20, and the last two 23 each.

Fig.4.4 Time – Series Plots for the Different Levels of Development of Market Institutions. Dependent Variable – GRP Per Capita.



I ran the replicated measurement model with investments minus savings as the dependent variable. Figure 4.5 below clearly demonstrates that high development of market institutions has a profound effect on the level of investments. The middle level groups (factor levels 3 and 2) have similar patterns of investment growth, sluggish before 1999 and then growing rapidly in 1999, with a decreasing rate of growth until 2002. The upper level group showed much faster rates of growth in years 1999-2001, stabilizing in 2002. The graph in Fig. 4 in the Appendix shows that even with the omission of the observation of the two oil-rich regions (Khanty-Mansiiskii and Yamalo-Nenetski), which could have had an extraordinarily strong pull on the line for group 1, the line for this group cardinally changes neither its shape nor its position in comparison to the lines for other groups.

Fig.4.5 Time-Series Plots for the Different Levels of Development of Market Institutions: Dependent Variable – Investments Minus Savings per Capita



4.8 Bayesian model averaging

The previous sections were focused around a single variable of market reform, testing the robustness of its regression estimates in variously specified models of economic growth. In doing so, I followed the pattern of previous research, which based the statistics on a single variable or a set of a few variables, designated to describe the scope of reform. The comparative advantages and drawbacks of different indicators of market reform have not been investigated consistently in previous work. This section fills this gap by testing the explanatory power of the different measurements of the market reform against the different measurements of regional economic development. First, I run separate bi-variate models for each pair of independent and response variables. Second, I run Bayesian Model Averaging for a selected set of dependent variables, and reported posterior probabilities from the best selected models.

Along with the variable of DMI I include several other variables associated with market reform in the related literature. As well as variables of large and small-scale privatization, and price liberalization, widely employed in the relevant research, I include two complex indices of market reform. The first is the IHS risk rating, the structure of which enabled authors to use it as a proxy for the level of privatization or a proxy of property rights protection (Sonin 1999), and second, the aforementioned Lavrov index of development of market reform

(Lavrov et al. 1997). The composition of Lavrov index is described in section 4.3 above. The risk rating of the region is developed by the Vienna Institute for Advanced Studies (IHS). It is computed as a weighted average of political, social, economic, as well as ecological risks in a given region. It also includes an evaluation of the experience of joint and foreign enterprises and previous foreign investments.

As a preliminary analysis, I run bi-variate models for all pairs of dependent and independent variables, the regression estimates summarized in the Table 4.4 below, where I report only the regression coefficients and corresponding t-statistics for the outcomes significant at $p<0.12$.

As the table shows, the variables of real growth of GRP, index of growth for personal income, and variable for the investment flow, with few exceptions, are not affected by the variables of market reform. Out of 18 bi-variate models considered (six for each year), the growth of income showed significant or nearly significant correspondence in only three. The same applies for the variable of real growth of GRP, and the variable for investments did not have any significant regression estimates for all the variables. Therefore I reduced the number of the variables, measuring the economic performance in the Russian regions to three: personal income and GRP, both corrected for the price index, and the percentage growth/decline in industrial production compared to the previous year.

Table 4.4 Regression Estimates for the Bi-variate models, Regressing to Different Measurements of Economic Performance

Independent Variables	Dependent Variables					
	Personal income, corrected	Growth of income	GRP per capita, corrected	Index of GRP growth	Growth of industrial production in real terms	Flow of investments
Large-scale Privatization						
Small-scale privatization						
DMI	-0.03(-2.4)	-0.1(-1.9)	-0.9(-3.5)	-0.1(-2.6)	-0.2(-1.6)	
Price Liberalization						
Lavrov Index	1.8 (2.5)					
HIS Index	-0.3(-1.5)					
1997						
Large-scale Privatization						
Small-scale privatization						
DMI			-1.0	-0.05		
			(-3.0)	(-1.9)		
Price Liberalization						
Lavrov Index	2.4		27	2.1	2.6	
	(2.6)		(1.6)	(1.6)	(1.7)	
HIS Index					-0.7	
					(-1.5)	
1998						
Large-scale Privatization						
Small-scale privatization						
DMI		-0.1	-0.6			
		(-2.3)	(-2.4)			
Price Liberalization						
Lavrov Index	1.4					
	(2.3)					
HIS Index		-1.4			-0.9	
		(-2.6)			(-2.0)	

Note: t-values in parentheses

The uncertainty regarding the form of the model, due to multiplicity of possible measurements of economic growth and regional progress in market reform, can be tackled using Bayesian Model Averaging (Bartels 1997). The essence of the method lies in the

evaluation of posterior probabilities of all possible models given the data, and finding the globally optimal model. I use this method in order to compare the explanatory power of the six independent variables of interest (DMI, HIS, small and large-scale privatization, Lavrov index and price liberalization). The other three variables - initial endowment, dummy variable for the region which belong to an industrial core of the national economy (Desai et al. 2003), the dummy variable for the republican status - are included into the set of potential regressors as control variables. The output is presented in Table 5 in the Appendix: the first three columns report the posterior probabilities that the variable is in a model, BMA posterior mean, and posterior standard deviation. The next five columns present the parameter estimates for the variables in the case they are selected in the five best models. The last four lines show the number of variables in each of these models, R squareds, BIC values, and the posterior models probabilities. I run BMA nine times, for each of three dependent variables and three successive years: 1996, 1997 and 1998. The substantive statistics is summarized below in Table 4.5: for each of the independent variables of interest, grouped according to years, I report corresponding posterior probabilities, parameter estimates of the model most favored by the BMA results, and the posterior probability of that model.

Table 4.5 Summary Table for the Nine Iterations of BMA for the Determinant of Regional Economic Performance

Independent variable	Dependent variable								
	Income			GRP			Industry growth in real terms		
	Posterior probability of the variable	β in the best model	Posterior probability of the best model	Posterior probability of the variable	β in the best model	Posterior probability of the best model	Posterior probability of the variable	β in the best model	Posterior probability of the best model
Lavrov's index									
1996	0.068	9.98	0.07	0.36	1.15	0.11	0.057	NA	NA
1997	0.130	21.2	0.06	0.39	1.54	0.15	0.62	3.5	0.20
1998	0.075	NA	NA	0.26	0.9	0.10	0.07	NA	NA
HIS									
1996	0.048	NA	NA	0.14	1.15	0.10	0.057	NA	NA
1997	0.049	NA	NA	0.14	NA	NA	0.038	NA	NA
1998	0.043	NA	NA	0.14	NA	NA	0.051	NA	NA
DMI									
1996	1.00	-1.6	0.42	0.086	NA	NA	0.60	-0.1	0.30
1997	0.76	-1.31	0.21	0.067	NA	NA	0.22	NA	< 0.05
1998	0.84	-0.83	0.34	0.066	NA	NA	037	-0.09	0.13
Price liberalization									
1996	0.074	NA	NA	0.075	NA	NA	0.056	NA	NA
1997	0.066	NA	NA	0.089	NA	NA	0.05	NA	NA
1998	0.061	NA	NA	0.067	NA	NA	0.29	-0.11	0.12
Small-scale privatization									
1996	0.052	NA	NA	0.065	NA	NA	0.056	NA	NA
1997	0.066	NA	NA	0.056	NA	NA	0.05	NA	NA
1998	0.061	NA	NA	0.067	NA	NA	0.18	0.08	0.09
Large-scale privatization									
1996	0.055	NA	NA	0.062	NA	NA	0.081	0.7	0.30
1997	0.052	NA	NA	0.056	NA	NA	0.195	-1.1	0.05
1998	0.04	NA	NA	0.077	NA	NA	0.021	NA	NA

The table provides several insights into the comparative explanatory power of the alternative estimates of the degree of implementation of market reform. Starting from the indicators of large-scale and small-scale privatization, the probability of the former variable appearing in

the models is very small, varying between 0.021 and 0.081, the only exclusion being the probability of its appearing in a model for the real growth of industry in 1997. In this model the variable of large-scale privatization could quite plausibly be included in the equation (with probability 0.195). However, the posterior probability of this model is extremely low, 5 per cent, which implies that the variable is not a good predictor of the real growth of industry in a region. This model was selected among the most probable for a given set of variables, however the selection of the variables in the model was sub-optimal, which is why the variable of large-scale privatization appeared in the fifth best model. The variable of small-scale privatization has an even smaller probability of featuring in any models selected by BMA: it varies between 5.0 and 6.7 per cent. As is the case with the variable of large-scale privatization, only in one BMA iteration, for the real growth of industry in 1998, does the variable's posterior probability stand out: it is 18 percent, and similarly to the case with large-scale privatization, this model has a particularly low posterior probability (9 per cent).

Popov's study (2001), mentioned in section 4.2, had a variable for small-scale privatization in its set too, in the form of the share of privatized enterprises in trade, public catering and services. One of the main findings of his paper is that the measure of market reforms (scope of small-scale privatization) is an important determinant for different patterns of income change across Russian regions. He claims that while it cannot be considered as an adequate predictor of the level of the regional GRP, industrial output, or investment, it does a fair job in predicting the level of the regional income level. Market reforms, in Popov's words, were 'redistributing income from worse performing and poorer regions to wealthier and better performing regions' (2001, 882). This finding contradicts the results of the BMA analysis in the present research. One of the most plausible explanations for this lies in the fact that the measurements for dependent variables differ: in Popov's paper, the level of income is measured as a ratio of personal income to GRP in 1996 as a percent of 1990, while in this study it is personal income corrected for the regional price index. The slower income growth between 1990 and 1996 in wealthier (in terms of income) regions could have produced deviant measurements for the same regions. Moreover, the ratio of personal income to GRP will overvalue the poorer regions, which receive larger central budgetary transfers relative to the level of GRP per capita. All these deviations in the measurement of the dependent variable explain, to a certain degree, the contradictory results. And the last, but not the least important argument is that the levels of statistical significance in Popov's output (2001, 880) are far from being satisfactory: in different model specifications t-statistics vary from 1.05 to 1.52.

Analogous inference can be drawn for the variable of price control, even though the power of this variable is somewhat greater: posterior probabilities vary between 5.0 and 8.9 per cent. Only for the model explaining real growth of industry in 1998 does the variable have greater probability (p=0.294). Even though this model has a higher posterior probability than the models which included variables of privatization, (12 per cent) it is still not very plausible. This result is in line with the study (Ahrend 2002) mentioned in section 4.2, which used these variables too (share of privatized and private economic activity and share of regulated prices). The low statistical capacity of the variable of price liberalization as one of the indicators of market reform in capturing interregional variation in economic performance is re-affirmed by the result of BMA: whichever variable one chooses as a measure for economic growth, neither privatization nor price liberalization (or price control) levels can plausibly explain it.

Moreover, the inspection of the BMA output in the Appendix shows that the pattern of industrial growth in 1998 is explained best of all by the grand mean of the sample. This means that the given set of predictors is superfluous in explaining industrial growth. Therefore, the variables of small-scale privatization and price liberalization (control), which appear as probable determinants of industrial growth for the year 1998, are in fact not among its determinants. The variable of large-scale privatization can also be safely discarded from the set, but for a different reason: even though it features (with probability 0.08) in a model explaining industry growth for the year 1996 (which has a posterior probability of 0.3), close examination of the tables in the Appendix shows that the relatively high probability of that model was due to the other variables, DMI among them).

The next variable, IHS, has a wider range of posterior probability, between 0.043 and 0.143, depending on the response variable: it has a better chance of appearing in the models explaining the variation in income between the regions than those for GRP or growth of industrial production in real terms. The probability of the IHS variable appearing as a relevant regressor in the equations explaining personal income is approximately 10 percentage points higher than in equations for GRP or industrial growth. However, the posterior probability of the models themselves is 0.1 or less, which leaves us with a good deal of uncertainty about the inclusion of this variable in the equations of economic growth. The models which include this variable do not appear in the set of models favored by BMA, except for one, due to extremely low posterior probabilities.

The next variable, Lavrov index, has a much better probability of appearing as a plausible explanator of the variables of economic growth. It features in the equations of economic growth evaluated in terms of income (for all years) and growth of industrial production (for the year 1997). The impact of the progress of market reform, measured as Lavrov index, captures the interregional variation in personal income in a very stable manner: the probability varies from 26.2 to 39.0 per cent. The probability of it appearing in the model specifications, plausibly explaining growth of industrial production, is less stable. But for the year 1997 it reaches a massive 62 per cent. This means that for that year, Lavrov index has a very good chance of being included in all relevant models, based on the given set of the variables. This finding is in line with Popov (2001), who found a strong statistical correspondence between the patterns of personal income change and the variable of Lavrov index. Whether the income change was specified as real income per capita in 1997, as a percentage change as compared to the 1990 level, or a ratio of personal income to GRP in 1996 as a percent of 1990, Lavrov index is highly significant or significant (t-statistics vary between 2.34 and 3.06). I employed yet another measurement method for estimating income (personal income per capita corrected for the price index), and the BMA outcome proves the robustness of Lavrov index in predicting the level of income.

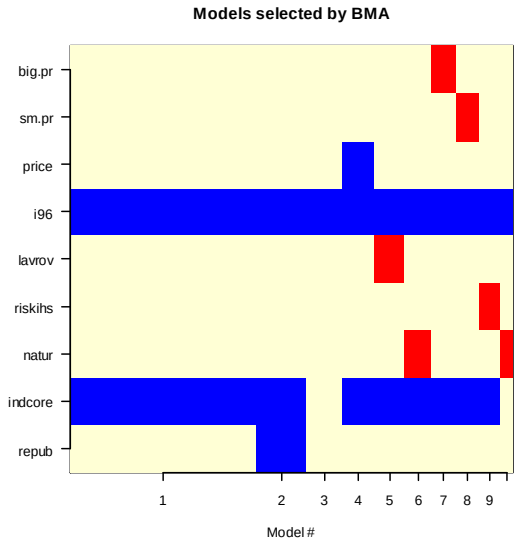
The last variable to consider is that of development of market institutions. The values for the probability of inclusion and posterior probabilities are vastly superior to the other variables of market reform. This is particularly apparent for the models having GRP as a response variable. For all years the probability of inclusion of DMI never falls below 75 percent, and for the year 1996, it can be asserted with complete certainty that DMI has to be included, if we are to explain the variation in GRP. The posterior probability of all these models is higher than for any of the models observed so far (with the exception of that explaining growth of industrial production for 1997). The index also shows a respectable level of posterior probability of inclusion in the models explaining growth of industrial production in real terms. However, as mentioned above, for the year 1998 none of the potential regressors, or any combination of them are better at explaining the growth than a simple grand mean. However, second best model includes only the DMI variable (except of intercept), which is only slightly less probable than the model containing only intercept value ($p=0.134$ vs. $p=0.192$).

Below, in Figure 4.6, I present a visual summary of the BMA analysis for GRP per capita as a response variable (Panel A, B and C are image plots for datasets for 1996, 1997 and 1998 years respectively): the x-axis of the image plots represents the models selected by BMA in

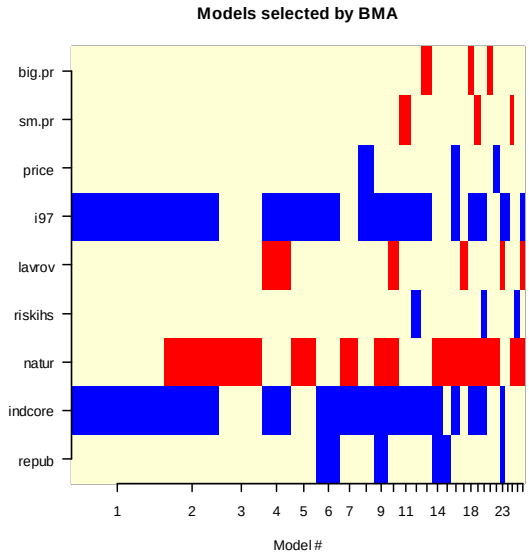
order of decreasing of their probability; the width of the column is proportional to its posterior probability. The y-axis corresponds to a regressor, and the corresponding colored rectangle denotes that the variable is in the model. The DMI variable, as well as the variable denoting the industrial core, are two principal determinants of the GRP, given the set of regressors.

Fig. 4.6 Image Plot for the GRP per Capita for Years 1996-1998

Panel A. Plot for 1996 year

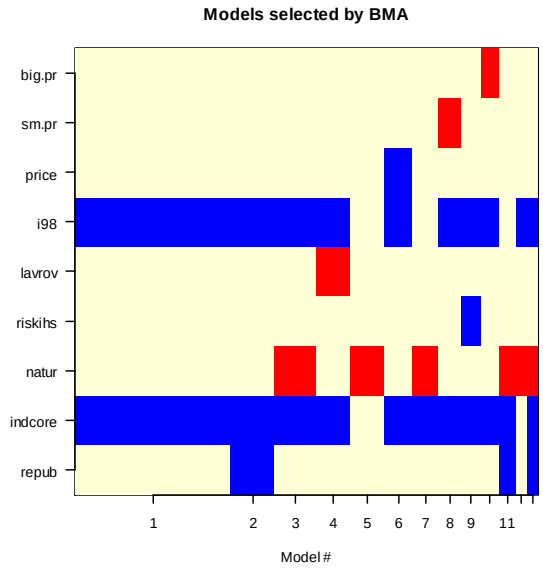


Panel B. Plot for 1997 year



o

Panel C. Plot for 1998 year



4.9 Conclusions

The debate on the possible impact of market reform on economic performance has produced a disappointing picture suggesting a negligible role for the progress of market reform among the explanatory factors in the equation of regional economic performance. Does this mean that the explanation of the variation in the regional performance focuses on the initial conditions in which the region found itself before the reforms?

In the course of the investigation I found that the degree of economic development measured in real terms and industrial production are not strongly associated with the initial wealth of each region. But more importantly, the degree of development of the market environment does matter, if one can overcome the multiple problems associated with the measurement methods. My research shows that most of the previously used methods of measuring market reform lacked construct validity or substituted the outcome for the cause. Most composite indicators of the business climate encapsulate too many variables, which have a tendency to cancel each other out. In many cases these include the growth of the gross regional product component and therefore cannot be used to analyze the effects of markets on economic growth, because of the endogeneity problem. However, the studies that measured a single aspect of reform, level of subsidization, price liberalization, or de-industrialization, run the risk of being biased in one way or another, since regional differences seriously confound interregional comparisons based on these variables.

Basing my research on the one of the measures of market development, namely the index of development of market institutions, I found that it is strongly correlated with GRP growth, even after controlling for the inflow of investments and initial endowments in natural resources, physical infrastructure and human capital. The statistical model, however, did not produce any evidence in favor of my hypothesis of the positive impact of the degree of development of market institutions on the growth of investments taken for each year separately.

As a way to capture the delayed effect of the development of market institutions, I employed a time series – cross section model for the analysis of the change in GRP and investments over the years 1996-2001, which is a novel approach in discerning the effect of market reform in the debate on the factors of regional economic growth. I ran replicated measurement analyses that have shown that the development of market institutions has a long term effect both on output level and investments inflow. The group of regions with the highest development of

market institutions demonstrated steady and consistent improvement of performance both in terms of growth of GRP and growth of investments per capita.

The Bayesian Model Averaging method assigned posterior probability to a set of possible predictors of regional economic performance (in terms of GRP, income and industrial growth), as well as to all possible models which can be specified by these variables. The most plausible model for each combination of dependent variable and year (nine iterations of BMA) was also estimated. These calculations revealed that the variable of development of market institutions is one of the best predictors of economic growth, measured at regional level. The posterior probability of the variable being in the model explaining patterns of gross regional product per capita varies between 100 and 76 per cent, depending on the period of the study.

The obtained results prove the indispensability of taking into account the degree of development of market institutions if we are to explain the variation in regional output. Its regression estimates are robust with respect to modifications of the measures of economic growth, and different specifications of the right hand side of the model equation.

CHAPTER 5: MARKET PRESERVING FEDERALISM AND SBC

5.1 Introduction

The argument popularized by theories of fiscal federalism holds that political and fiscal relations are closely connected. Garrett and Rodden (2003) argue to the contrary that the political and fiscal realms may have different sources of development and they may be driven by different processes. They claim that fiscal and political processes of decentralization of authoritative power and fiscal (re)centralization may often move in opposite directions.[41] Furthermore, Blanchard and Shleifer (2001) suggest that it is the very fact of the fiscal decentralization against the backdrop of political centralization that brought about 'market-preserving' federalism in China. The present research contributes to the debate by showing that neither the balance of flows between the levels of government nor the degree of (de)centralization of fiscal relations can reliably account for the differences in regional government performance, unless the conditions of hard or soft budget constraints a particular region experienced are taken into account.

In applying these theoretical outcomes to the case of Russia, it is worth noting that central government has always strived to play the role of residual claimant;[42] though at some point it decentralized political authority to its lower units, it never decentralized fiscal authority to the same degree. Tracing the history of Russian fiscal policies, the most striking fact is the *selectivity* with which the central government treated its constituents. Hence, the dynamics of fiscal relations may reveal important tendencies in center-periphery relations and illuminate some aspects of the behavior of the regional governments towards markets.

[41] The federal center may devolve formal political authority to sub-units by increasing their constitutional responsibilities and freedoms, setting up regional parliaments, and allowing direct elections for regional officials, while fiscal authority being concentrated at the federal level. There are several factors, both internal and external, which increase pressures towards fiscal (re)centralisation. For example the decentralisation of fiscal politics may become increasingly costly to the central government to hold a heterogeneous country together.

[42] Government as a 'residual claimant' is defined as one that appropriates surplus after all taxes are paid. In formal terms, regional governnments were granted the right to claim this surplus, but factually, Kremlin never stopped to struggle 'to maximise appropriation in order to distribute' (Burawoy 1996, 1107). In this work, though, the most important is its latter fuction, desire to re-distribute, and re-distribute unevenly and deliberatly.

The analysis of fiscal relationships, thus, can provide useful tools in the analysis of the differences in economic behavior across regions in federation. The first main hypothesis of the thesis, briefly outlined in the third Chapter, is that the softer the budget constraints for a particular region, the less the likelihood of a robust market institutional environment. Governments have very little incentive to improve their performance and develop their economies if their budgets are filled regardless of the level of taxes gathered in the region.[43]

This chapter starts with an overview of the theoretical background for the first main hypothesis. By applying Weingast's framework of market-preserving federalism, I argue that nation-level prerequisites for market-enabling federalism were in principle satisfied by 1996. However, the fulfillment of two prerequisites that are applied to the regional level has been questioned, and I discuss in detail the consequences of these conditions not being met for economic development at regional level.

The second section is devoted to the application of the bargaining game framework, from which I draw theoretical insights for the analysis of sources of the asymmetry of fiscal relations between the center and regions in Russia. By accounting for the differences in center-periphery relations, it provides a sound theoretical explanation for the evidence that those regions that had more bargaining power seized the opportunity to elicit more federal transfers, while those with less bargaining power were obliged to look downward and generate more of their own resources to fill their budgets. The next section provides more detailed justification for the satisfaction of one of Weingast's prerequisites of market-preserving federalism, namely the region's primary responsibility over the regional economy.

The last section constitutes the empirical core of the chapter. I start with analysis of theoretical preconditions for SBC, and then turn to the methodology of its measurement and

[43] This issue, though in reverse order, was scrutinised by Solnick in his work on Russian federalism (Solnick, 2000). Solnick's analysis assumes that the shape political institutions of the Russian federation was conditioned by the federal relations: the more independent sub-units got better treatment from the central government with regard to political and economic concessions made to them. The line of thought he puts forward is that the better the economic performance, the more taxes are gathered in the region, and the less the federal contributions in their budgets, the less region is dependent on the center. He revealed that those regions which were less dependent on the federal contributions to their budgets signed bilateral treaties earlier and the scope of the concessions made to those regions was considerably wider.

specific problems connected to this. Starting with the general description of the data and specification of the model, I present the construction of the independent variables. Special attention is paid to the core independent variable, SBC. In the last part of this section I present the four basic model specifications and outcome of the statistical processing of the data.

5.2 Theoretical framework: choice of independent variables

One of the key questions of federalism is where taxes are raised and where public money is spent. Which level of government has the final say on how the money should be spent is not only extremely important for federation integrity and the stability of federal institutions; it also has a direct effect on the behavior of Russian regional governments, generating incentives and creating constraints. The literature on Russian fiscal federalism can be divided into three broad streams. The first is a collection of normative outlooks on the Russian fiscal system (Lavrov 1997, Illarionov 1997, Sinelnikov 1995, Kadochnikov et al. 2002). These authors take a comparative approach to the Russian experience and attempt to develop normative criteria for the budgetary relationships in the newly emerging federal system. Summarizing the early experience of the Russian fiscal relations, they provided a theoretical background on which the modern fiscal system in Russia evolved.

The second stream comprises works devoted to a more general theme of federalism, and Russian federalism in particular. These works scrutinize the system of fiscal relationships as one of the arenas where center-periphery relations evolved and where the 'bargaining game' took place. Federalist theories have been extensively applied to the case of Russian regions, individually, in groups, or generally, explaining the (de)centralization of political and fiscal powers between the levels of the government. Lavrov et al. (1997), McAuley (1997), Gimpelson, Treisman and Monusova (2000) find budget relations to be one of the most feasible and accurate ways of measuring and explaining cross-regional disparities.

The third stream of academic works is concentrated on the issue of inter-budgetary transfers in the Russian Federation. The increased volumes of federal aid to the regions did not go uncommented by politicians and scholars, but more intriguing were the patterns of the transfers. The great variety in the volumes of the transfers granted to the individual regions provided rich empirical evidence for testing various theories (Treisman 1996, 1998, Popov 2001, Hanson 2000). While all authors agree that the Russian fiscal system deviated greatly from the ideal, several opposing explanations for this deviation have emerged. Among the

various explanations of the asymmetry of fiscal relations between center and provinces, most attention was given to the historical conditions when the federal government was forced to ensure regional political acquiescence by bailouts to disloyal (Treisman 1998) or economically independent regions (Solnick 2000).

The choice of Weingast (1995, 1997), Montinola, Qian, and Weingast (1995) as one of the most prominent analyses of the federation and markets can be justified as follows. The theoretical framework elaborated by Weingast has a profound analytical power in that it explains the political foundations for enabling markets both in developed and in nascent federations. Moreover, though the model is developed to provide analytical tools for comparative studies at national level, it also offers excellent clues for explaining differences of governmental performance at the sub-national level. For these reasons, this model seems to be the most appropriate choice for the purposes of the present research.

Weingast delineates five conditions of market-preserving federalism that include: (*i*) a hierarchy of governments with a delineated scope of authority (*ii*) the autonomy of each government is institutionalized in a manner that makes federalism's restrictions self-enforcing, (*iii*) the national government has the authority to provide national public goods in particular a common market and interstate commerce, (*iv*) all governments have hard budget constrains, and revenue sharing among them is limited, (*v*) the sub-national governments have primary authority over the economy within their jurisdictions: property law, civil law, etc.

The first condition is a minimal or necessary precondition for a federal system. The most salient condition (*iii*) requires the central government to be strong enough to enable coherence of the federal polity and ensure the common market, mobility of goods, labor and capital, etc. There is a dilemma: it should be at the same time a limited state, which has possibilities neither to intervene upon the limits once established, nor to compromise the principles it has committed to. The self-enforcing limitations of the state (*ii*) are not less important, because only to the extent that the state can not arbitrarily encroach upon rights of the constituents, could the constituents have stable expectations, which are crucial in many respects, particularly for investments. Unlimited political government holds the potential to destroy nascent market systems - the state should be strong enough to guarantee protection for the reward to efforts, but limited to a degree not to redistribute unfairly the wealth thus created

(North 1981, Bruszt 2000). These embodied limitations are in effect only if the transgressions from central government are prevented by the co-operative behavior of constituent units.[44]

Applied to the Russian case, Weingast's theoretical framework shows that these nation-level prerequisites for market-enabling federalism, namely the first and third (and to a lesser degree the second) conditions, are, by and large, in place. They establish a hierarchy between the levels of federation, enable the central state to provide common marketplace, and simultaneously secure the constituents from the central government to override them. Nevertheless, evidence shows that the satisfaction of the remaining two conditions of Weingast's model concerning the regional level of market-preserving federalism – namely hard budget constraints, and the primary regulatory responsibility of sub-national governments over the regional economy – are lacking (Ross 2000).

The region's primary responsibility over the regional economy is one of the most debated aspects of the Russian federalism. Desai, Frienkman and Goldberg (2003), while referring to Weingast's theory in their work, attribute the failure of market-preserving federalism solely to the insufficient fulfillment of the fifth precondition, particularly failure to delegate taxing authority to the regional level. By letting down the regional governments' aspirations to control and profit from regional entrepreneurship, they claim, the federal government created a 'market-subverting' type of federalism. In their work the lack of the fifth pre-condition is conceptualized as an obstacle in the way of competition among sub-units for attracting capital, labor and economic activity. In stating this, they explicitly refer to the fundamental mechanism of Weingast's theory: federalism will not preserve markets if regional authorities suffer from the lack of fiscal incentives to develop a sustainable source of tax revenues.[45]

It must be noted, however, that the degree of actual fiscal autonomy of regions was enough for this competition to take place, as in the second half of the nineties the regions were able to keep, on average, two thirds of the taxes raised in their respective territories, though the

[44] in other words, when co-operative environment made transgressions of the central government highly costly.

[45] In short, their line of reasoning is as follows: given the mobility of factor production among federation sub-units, those with more attractive menu of public policies such as level of taxation, social amenities, and better provision of other public goods have better chances for economic development, attracting investments and labor. Thus competition among the constituents of the federation will cause the regions with reliance on market institutions, ceteris paribus, to be better-off.

retention rates varied considerably. Following the demise of Soviet Union in 1991, the federal government faced massive problems with its expenditure responsibilities (Desai, Freinkman, Goldberg 2003). Regional governments used this as an excellent opportunity to grasp greater fiscal autonomy, while the federal government narrowly avoided suffocation of the federal budget (Shleifer and Treisman 2000). The weakened federal government did not have enough administrative power to halt this process of fiscal decentralization unilaterally seized by regions. Regional governments had enough regulatory authority at their disposal to allow local variations in regional control, a distinct menu of public policies, and had enough discretion to make distinct policy choices. This means that with some important qualifications this condition was satisfied. Section 5.5 gives a more detailed justification for the fulfillment of Weingast's fifth precondition.

Hence, the Russian political system approximates four out of the five characteristics of market-preserving federalism. The last condition regarding hard budget constraints, however, is by no means satisfied. This explains not only why federalism Russian-style is not market-preserving, but also provides an important analytical clue for understanding the differences in the economic performance between regional governments. Political choices made during the period 1990-1995 (Shevtsova 1996, Solnick 1996, Treisman 1996), led the central government to opt for *ad hoc* regulation and follow the politics of 'soft budget constraints', allowing many sub-units to run budget deficits. Hence revenue sharing between the levels of government and the accompanying inequality in fiscal re/distribution were pervasive.[46]

The idea that greater bargaining power is reflected in greater fiscal privileges has been stressed in the work of several scholars. Burawoy (1996) examining the regional budgets and the fiscal center-periphery relations, confirm that decentralization of the fiscal authority encourages regional government to *assume primary responsibility for economic development*. I will show that the limited ability of regional governments to elicit budget resources from the central government and bargain for fiscal concessions contributes to the market-oriented and

[46] Though analysts diverge with respect to the ultimate strategies of the central government, whether it was deliberate institutional choice or the occasional convergence of political decisions, all agree that the prevalence of '*bilaterality*' and selectivity, rather than universality in resolving federal problems was the dominant pattern of behaviour of the federal center during the period 1990-1995 (Stoner-Weiss 1997, Lapidus 1999, Solnick 1996)

developmental set of incentives. Moreover, if a government has the right to retain taxes after remittance to the center, it has even greater incentives to promote and support the efficiency of local economy. The regional governments, having fiscal autonomy and hard budget constraints will be prone to 'work out their own strategy of development' (1996, 1107).

The federal center in Russia, though it has given up the discretionary authority to collect and redistribute the profits earned at the company level, still strives to be the residual claimant at national level in that it takes resources from successful regions to bail out those with negative earnings. By following this redistributive logic, it makes the regional governments 'expend political energy trying to maximize what it obtains from the [center] and minimizing what it gives up' (Burawoy 1996, 1108). This pattern of behavior was pervasive in Russia during the first decade of transition, and those regional governments that possessed greater political and economic resources were more successful in extracting tax concessions from Moscow (Treisman 1996, 2000).

5.3 The bargaining game theory approach

In order to test the second hypothesis, which explains the degree of development of markets by the level of SBC, it is worth turning to some implications of bargaining game theory. The bargaining game approach is particularly useful within the historical institutional framework: differences in institutions are determined to a significant degree by differences in transitional bargaining processes. Federalism in the Russian case is not only, in Stepan's (2000) terms, a 'staying together' process, but also an outcome of the power struggle between the center and regions. During the mid-90s the federal center was regaining the power which was given to the constituent units during the power struggle at the federal level in 1991-1993. Solnick, too, asserts that the Russian federal institutional setting can be 'best understood not as a consequence of evolving constitutional norms or latent ethnic conflict, but rather as the product of ongoing political bargaining' (1995, 54).

In the case of Russia the bargaining game theory explains *why* and *how* the asymmetrical federation came about, why it become possible to have various sets of institutions in different sub-units, and how the specific path of federation building contributed to the specific political context (Lapidus 1999, Kahn 2000, Solnick 1996, 1998a, 1999, 2000).

The federal setting of the Russian federation, and the way it came about have a profound effect on the present institutional behavior. If we claim that political institutions are path-

dependent, we can not avoid the deduction that the particular path of federation-building brought about significant changes in institutions that in turn determine their performance. Accordingly, a further assertion would be that the sequence of federation-building matters. As noted by the academic literature on the issue, the devolution of powers to sub-units resulted neither in consolidating democracy, nor in better markets, nor yet in greater economic success. The sequence of federation-building prescribed by Yeltsin fits into Riker's framework of federation-building as a 'bargain' between the prospective sub-units. Russian Federation state-making involved first of all the devolution of authority to constituents, where they could grab as much authority as they could upheld, and only after that, consolidating some powers to the center. This sequence prevented the strong state from coming into being.

A separate branch of this approach is the bargaining game explanations to the *asymmetry of fiscal relations* between the center and regions discussed by Treisman (1996, 2001). He claims that the republics and those regions that could state credible threats to the central government enjoyed soft budget constraints. His analysis of the Russian regional fiscal relations fits accurately into Weingast's framework, according to which the hard budget constraint is the necessary precondition of market-preserving federalism.

Hence, a region that had better chances of winning a bargain with the center on fiscal issues instead of investing in regional economic development sought to 'retain control over its own territorial resources even if this meant concealing the amount it produces'. On the other hand, those regions that had less bargaining power with the center and could not pose a credible threat in order to fill in their budgets had to look downward and generate more of their own resources.

One may conclude that while *de-jure* federalism creates specific opportunities for robust markets, at the same time it sets dangerous traps that may undermine its own development. Federalism, to be market-enabling, has to possess a *set of interrelated market-preserving characteristics*, complementing and enhancing one another. Moreover, the study of federalism contains analytical challenges that may reveal *other explanatory factors* accounting for market success or failure, which may be either derivative, or independent from the federalist institutional setting. Hard budget constraints as a limitation on revenue-sharing between the levels can not be strictly applied to the whole sample of Russian regions. Some regions are too remote, backward and economically unviable on their own, and can only survive on federal subsidies. Revenue sharing streamlined in their direction is conducted via the Federal

Fund for Support to Regions (FFSR), designed specially to even out the economic and social inequality through equalizing transfers. However, Weingast's concept of soft budget constraints goes beyond this narrow interpretation: it labels the propensity and capability of the regional governments to remove or ignore the obligation to balance revenues and expenditures.[47] SBC conditions, therefore, encompass, a recurrent pattern of the extra-constitutional revenue-sharing between the levels, and are characterized by governments' stable expectation of a central bailout in the case of insolvency.[48]

Although the term explicitly points to a budget as the venue where this phenomenon is actualized, other indicators of SBC outside the realm of fiscal flows are also appropriate. Occurrences of bailouts and the rapid growth of regional public employment not corresponding to growth of public responsibilities can be used as measurements of SBC. Qualitative and quantitative analysis of these incidents can be used for this task: first, the existence of federal legal regulation on the procedure for granting tax concession to a given region, second, the existence of the individual concessions established by the decision of the President, third, the existence of the individual concessions established by federal parliament, the Duma, and fourth, the percentage of growth of public employment over the growth of the expenditure part of the regional budget.

5.5 De facto regional economic autonomy

The application of the concept of degree of development of market institutions separately for individual units invokes two doubts. First of all, is any consideration about a regional economic development that does not draw heavily on the influence of federal politics accurate? And second, a related question, is whether autonomy was detrimental or beneficial for the economic performance.

[47] According to Lavrov et al. (1997) in 1996, regional budget revenues had grown by 1.38, while tax revenues - by 1.43, the transfers and other revenue sharing between the levels of federation had grown by 1. 57 (55).

[48] Hence, the regions that had better chances to win a bargain with the center on the fiscal issues sought to 'retain control over its own territorial resources even if this means concealing the amount it produces'. On the other hand, those regions that had less bargaining power with the center and could not pose credible threat in order to fill in their budgets by central transfers, had to look downward and generate more of their own resources.

The Russian central government adopted a neo-liberal approach to the marketization of the economy. It was believed that it was enough to minimize state regulation of the economy and market institutions would then appear by default. As Polischuk notes, the institutional void, or the absence of robust institutional infrastructure of market not only failed to bring about missing market institutions but resulted in counterproductive, rent-seeking behavior becoming pervasive, and 'bad' equilibria being sustainable (1998). The liberal market paradigm, implemented on the national level, left the task of implementing market infrastructural institutions to the discretion of regional governments. It was predominantly regional governments that were supposed to re-regulate and correct the market's failures and provide the institutional environment that enforced protection of universal rights, and granted specific rights to agents. Recent studies on Russian regions recognize regional policies as autonomous by indicating the observation that regional authorities displayed substantial resistance to the liberal economic policies (Kirkow 1998, Hanson and Bradshaw 2000).

In general, the empirical evidence demonstrates that due to historical circumstances central politics had relatively weak influence over regional politics.[49] Partly this was the consequence of federalism. As Gel'man puts it, 'there is no evidence of consistency in federal policies toward regions, either nation-wide or toward particular regions' (1999, 9). Political independence of regions grew steadily from the early 90s, when the first ethnic republics claimed their sovereignty status, and became a wide-spread phenomenon after the 1995-1997 gubernatorial elections. Notably, decentralization of political authority was not an even process, the degree of independence among regions varied in accordance with their relative bargaining power.[50] All these tendencies have produced a pervasive conviction that regional developments are more subject to regional factors, rather than unifying political pressures

[49] For extended summary see Sperling (2000), McFaul (1995), Stoner-Weiss (2000), Remington (2008).

[50] This pattern finds its parallel in voting behaviour in national as opposed to regional elections. The voting behaviour in the national pools weakly correlates to regional voting behaviour, since regional issues rather than national ones are the most salient factors in voting (Slider 1997, Solnick 1998a). To win elections in regions it is important for candidates to express and verify their capability to bring improvements either through lobbying the federal government or introducing reforms that work (Berkowitz 1996, 1994a; Frienkman and Haney 1997), rather than demonstrate the party affiliation. Citizens of some regions can vote for the conservative parties in national elections and at the same time elect governors and administrations that introduce radical market-oriented reforms. Cited in Bradshaw and Treivish (2000).

from the center. Some authors even suggest considering the federal authorities as 'external' actors, influencing regional politics in a way similar to the international influence on national politics (Gel'man 1999, 9). Without fully supporting this viewpoint, it is clear that the differences in development/underdevelopment of market institutions in the regions are explained to a significant degree by differences in the behavior and attitudes of regional governments. As noted by Remington "[R]egimes at the regional level had substantial autonomy with which to respond to enormous national-level changes in the institutional environment' (2008, 7).

Another argument in favor of the relative economic autonomy of the regions stems from the political legitimacy of the regional governors and legislatures. In Russia, unlike in most transition countries, both chief executives at all levels (federal, regional, county and municipality), and deputies of regional legislatures are elected by the regional electorate.[51] This fact means that the regional governments are dependent for their survival on the local population, entrepreneurs and their preferences. The positive attitudes of the governors toward reform may be overridden by perception of costs and payoffs of reform by local business structures. For example, in the case of a relatively small region, specialized in one or two types of staple, and organized around one or two large enterprises, it would be politically prohibitive to close down such enterprises, even if market forces prescribed their immediate closure.

This was in fact often the case: regional legislatures passed laws that contradicted the federal Constitution in ways that deformed the markets in their regions by, for example, limiting the access of non-regional actors. A plethora of regulatory acts was passed on the regional level that limit labor mobility via residence permit systems (Andrienko and Guriev 2004, Klimanov 2000). Laws on restructuring judiciaries, restrictions regarding the functioning of the federal agencies in regions, declarations of regional ownership of natural resources all aimed at restricting the access of external actors. The second type of violations embraces the laws and regulations that directly contradict market rules: fixed prices, tariffs and taxes on goods entering regions, direct subsidies to loss-making enterprises, and tax privileges to selected enterprises.

[51] For overview see Matsuzato (2001) where he observes, that the share of total expenses for elections in GDP is the largest in the world (183).

To summarize, the arguments above justify the fulfillment one of Weingast's debatable preconditions, namely the region's primary responsibility over the regional economy. Russian regional governments in mid-nineties amassed enough regulatory authority to tailor a distinct menu of public policies and had enough discretion to make policy independent choices.

5.6 Data and results

The hypothesis to be tested, namely the unlikelihood of the regions that were able to extract conditions of soft budget constraints in fiscal center-periphery relations being market-oriented, requires a variety of data for construction of outcome variable, main independent variable and control variables. I test this hypothesis on a sample of 88 regions of the Russian Federation between 1996 and 2001.[52] The bulk of the data for independent variables came from the Russian Federation's State Committee of Statistics (Goskomstat), or as it is named nowadays, the Federal State Statistic Service (Rosstat). The data on the dependent variable (development of market institutions) is provided by a Moscow independent think tank RA Expert, and the rest of the comparative regional data is acquired from open publications in print and the Internet.

5.6.1 Description of independent variables

The first independent variable is the degree of SBC. The measurement methodology is described at length in section 5.6.4. I test the first main hypothesis, which emphasizes the softness of budget constraints in explaining the variation in DMI, against the alternative hypothesis that in the development of regional institutions the political attitudes of regional governments are more important. The effect of the regional government's compliance with the reformist political agenda of the Kremlin will be examined with respect to two sources, which will be the second and third independent variables. The second variable in the model pertains to the first source of political compliance, the political orientation of the regional governor. The regional governor's stance to the implementation of central reform could be associated with the support to Yeltsin and the party of power as the core advocates of such

[52] The sample excludes the Komi-Permyak autonomous okrug (KP AO). Permskaya oblast and KP AO were the first regions to merge in 2004; subsequently, Rossat retrospectively merged the data for these regions for earlier years too. This made the data unavailable for this region in Excel databases issued by Rosstat from 2004 onwards.

reform (Lavrov et al. 1997). As a proxy for the political attitude of the chief executive I introduce a dummy variable: 1 if a governor was a member or a supporter of the party of power, and 0 otherwise. The data is taken from a book (Lavrov et al. 1997) published as a product of a joint project by the Russian Union of Industrialists and Entrepreneurs (RSPP), Geographic Department at Moscow State University, Moscow State Bank and Expert Institute on the assessment of political and economic developments among Russian regions in 1995 and 1996.

The third independent variable describes the second source of political compliance with the Kremlin's reformist agenda, namely regional legislatures. The estimation conducted by the above team divided a sample of eighty-nine regional legislatures into three categories: conservative (12), center-oriented (51) and reform-oriented (26). The dummy variable for the reformist legislature was coded accordingly: it was set to 1 if the region falls into the last category and 0 otherwise.

It is worth mentioning that in two regions the second source was of crucial importance, as Mordovia and Dagestan were parliamentary republics that were empowered to appoint the regional executive. As the evidence shows, however, for the rest of the regions, the legislative powers were relatively weak against the powers of executive (Turovskii 2002). Therefore, I will separately test the hypothesis that in the event of political synergy between legislative and executive branches, market institutions are more likely to thrive. Hence, the third dummy variable is the combination of the other two: it takes up the value of 1 if both first and second dummies take the value 1, and 0 otherwise.

The last variable in the model, which I include as a control variable is the level of initial resource endowment. Structural explanations such as the endowment of regions with natural resources, an advanced industrial base, or a strong link with multinationals can serve as primary factors that predetermine the development of markets at regional level. This straightforward explanation seems quite convincing. Research conducted by Hanson and Bradshaw (2000), for example, shows that market and democratic development were the outcome of structural factors, using the ongoing polarization of the regions at the time as proof of this claim. In order to understand the complexity of the systemic economic developments in the regions, and assess the future prospect of the development of market institutions, it is therefore worthwhile to include degree of initial endowment with natural and human resources as an explanatory variable.

As noted by many analysts, the large proportion of variance in regional economic performance and market development can be accounted for by variation in the initial conditions, as natural, material and human resources were not distributed evenly (Ahrend 2002, Hanson and Bradshaw 2000, Treisman and Cai 2005). I have already used the comprehensive index of initial resource endowment in Chapter four, in keeping with Treisman and Cai. Their methodology is particularly appropriate for my analysis, since they found the index of initial endowment to be strongly associated with the development of market institutions (r =0.41). Their argument gives a structural explanation to the observation that poor regions were not willing to invest in market institutions because they were more financially constrained.[53] For this reason, by including it in the analysis I will be able to test the relative strength of these two alternative explanations of the development of market institutions. The next section provides a theoretical explanation of the possibility of SBC emerging in the Russian Federation.

5.6.2 Preconditions for SBC

5.6.2.1 Theoretical preconditions

Inman (2003) frames the main preconditions necessary for the softening of soft budget constraints in a formal game: the national authority's optimal strategy includes the decentralization of tax powers and provision of public goods to the lower level with the *ex ante* strategy of limiting the provision of additional aid. But because the voters of the regional politicians are at the same time the voters of the national politicians, this makes it preferable for the national authorities to infringe on earlier announced principles and grant unplanned financial resources if a region runs a budgetary deficit. Sub-national governments, in turn, would intentionally increase provision of public goods above optimum on expectations of additional national aid. Both of these conditions describe the structure of strategies of two agents conducive to SBC, but say little about the structural and institutional preconditions. Sinelnikov-Murylev et al. (2006) outlined a comprehensive list of preconditions for SBC for sub-national governments, which are presented below.

[53] Cai and Treisman notice, however, that it cannot explain why the regions that were better endowed initially spend relatively larger proportion of their expenditures on market environment, which leaves an open space for the discussion of other explanations, SBC being just one of them.

First, the condition of *fiscal vertical imbalances between the levels of the government* is a key institutional prerequisite. It is a situation when the devolution of expenditure obligations exceeds the degree of delegation of revenue powers. This imbalance creates the preconditions for SBC and also creates incentives on the part of sub-national government for extra-borrowing (Garcia-Mila, Goodspeed and McGuire 2002). The formal model described by them is based on the assumption that sub-national borrowing is financed by central government by raising the rate of national tax. But the amount of taxes borne by the regional taxpayer does not grow proportionally to the amount of financial aid, but at a diminishing rate. That makes the incentives for borrowing very attractive, because for the region as a whole, the tax price for additional borrowing diminishes with the amount of borrowing.

Second institutional prerequisite is the *lack of fiscal decision making capacity of the sub-national governments*. Even in a situation of perfect match between the revenue powers and expenditure obligations, the scope of the sub-national decision-making power in the sphere of taxation can be insufficient for budgetary independence. In a situation of financial difficulty the sub-national governments will have very limited institutional capacity to adjust to worsened circumstances. The lack of decision-making power prevents them from choosing their own revenue sources and tax rates finely tuned to the problem at hand. But even these two types of imbalances may be prevented from softening budget constraints if the "system of inter-budgetary transfers is not based on discretional decisions, but is in a framework of legislatively set and strongly enforced procedures" (Sinelnikov-Murylev et al. 2006, 27).

Hence, the third precondition for the emergence of SBC is the *lack of established procedures for granting intergovernmental financial aid.* Where transfers are allocated according to clear formulae and unambiguous criteria, the budget constraints remain hard. But in cases where these criteria are unstable and blurred, and there are no clearly defined procedures for granting financial aid, these criteria can be manipulated in favor of individual regions at the expense of others. "[S]ub-national authorities have the possibility to persuade the national authorities to provide additional funds in the framework of the national system of financial support" (Sinelnikov-Murylev et al. 2006, 29).

One of the most crucial prerequisites is the fourth in the list: *joint responsibility for provision of public goods*. In federal states it is common for the sub-national level of government to take responsibility for providing minimum social standards of living on their respective

territories. However, the expenditure mandates adopted at national level often stipulate that both levels of government bear joint responsibility for the provision of public goods. In this case, the electorate of the regions will hold accountable both levels of government in the case of failure to provide key public services. The federal government will find it increasingly difficult to harden budget constraints in the presence of legislative restrictions (Vigneault, 2005) on doing so.

The fifth precondition requires that there are substantial *information asymmetries*. Sub-national governments often have incentives to withhold or hide the information on the fiscal processes at their level from both the electorate and the national authorities. "Sub-national authorities on their own initiative often facilitate non-transparency of fiscal reporting" (Sinelnikov-Murylev et al. 2006, 31). By skillfully complicating the budgetary process and masking the real costs and benefits of certain fiscal policies, they can shift responsibility for the inefficiencies up to national level. This situation is a strong precondition for the national authorities to bail out the sub-national unit.

The sixth precondition is the importance of *political objectives of the national government,* conducive to the emergence of SBC. The central authorities are themselves inclined to grant SBC conditions for some regions as long as in exchange they receive other types of support, more important given the current political situation. These types of exchange are especially typical during electoral campaigns: the federal center often uses the SBC condition as a reward for the support of regional voters in competitive elections.

The seventh precondition is the *absence of limitation on sub-national borrowing*

It is a widespread policy practice for federal governments to introduce caps on the level of borrowings for subnational governments. If the opposite is the case, 'the probability of opportunistic behavior [on the part of subnational governments] is higher. ... [W]hen there exists an anticipation of additional financial aid provided by the national authorities in the case of financial problems... credit risks and associated costs are shifted on the national government. In this case, excessive borrowings not limited in any way may be very significant. (Sinelnikov-Murylev 2006, 33).

The specific structure of governments conducive to the emergence of SBC is the eighth precondition. In many federal states, the upper house of parliament is composed of

representatives from the sub-national units. Due to political lobbying and interregional cooperation, soft budget constraints can be legalized at the national level. The SBC conditions can be granted for individual regions in exchange for support for other policy decisions (Alesina and Perotti 1999, Rodden, 2002). The case of universal softening of budget constraints is more complicated, but even financially stable regions can be tempted to vote in favor of increasing additional financial support, as long as this increase is financed by an increase in the share of the federal center in shared taxes.

I will base my analysis on this classification in the next section, with only two additional preconditions, which seem to be missing from the list.

The ninth precondition requires *substantial heterogeneity between the regions*. Not every form of financial assistance for the sub-national unit indicates that budget constraints are softened for that agent. On the contrary, the horizontal imbalances are the justification for additional financial aid for backward regions.[54] But the extreme heterogeneity of the regions makes it difficult to evaluate a fair amount of transfers from the center, and therefore it can be considered as a precondition of SBC.

Heterogeneity between the regions has received relatively little attention in studies of federalist bargaining (Riker 1964, Ordeshook and Shvetsova 1997, Weingast 1997, Solnick 2000). The last two are exceptions: though Weingast only mentions that highly diverse sub-national units can be a source of the adverse exploitative outcomes, Solnick's work is based on the investigation of how heterogeneity between the regions forced the central government to concede uniformity in treating them. The asymmetrical institutions that emerged as a result did indeed help to hold Russia together in the short run, but in the long run they weakened the legitimacy of federal laws, undermined the protection of civil rights and prevented the potential economic benefits of federalism that would have stimulated the developments of markets. The asymmetrical granting of SBC conditions was a fundamental obstacle on the way to market-preserving federalism (Solnick 2000).

[54] The fiscal gap may be closed in a variety of ways, such as delegation of revenue-rising power, or upward transfer of expenditure obligations, but as noted by Bird (2002), the problem of mismatch between expenditures and revenuesis in most of the cases is solved by intergovernmental transfers from higher to lower level government.

The final, tenth precondition concerns *specific attributes of the median region/voter*, conducive for SBC. This precondition is closely related to the eighth, since it draws on the ability of regional leaders to access to nation-wide decision making. Each region has a representative(s) in the legislature, who conveys the interest of this particular region into the policy-making process. If the structure of the federation over-represents relatively poor, highly specialized regions (even if in terms of population they are in a minority), the structure of preferences of a median voter in the national legislature will be conducive to SBC.

5.6.2.2 Russian regions in 1996: Were these preconditions in place?

This section will demonstrate that the features of Russian fiscal system, the profile of the political institutions and the peculiarities of the political situations met all theoretical preconditions for the emergence of SBC.

It is worth noting that in the abovementioned classification, regional financial difficulties are described as an outcome of growth of expenditures (usually for the provision of public goods). In the Russian regions, as regards the period 1996, the budget deficit was more often a result of ineffective spending than just an increase in the volume of provision of public goods. Moreover, in many cases, it was caused by a shrinkage of revenues rather than a growth in expenditures. As noted by the Pinto et al. (2000), the major source of SBC in the 1990s was federal center's tolerance of regional tax arrears. However, these deviations do not affect adversely the applicability of these preconditions to the Russian regions.

First, the Russian case meets the condition of vertical imbalance perfectly. While Russian laws vest broad powers in the federal government, most of the obligations for provision of public goods are delegated to the regional level. Partly, this can be explained by the situation in 1992-1993, when regional budgets were not running a deficit, while the federal budget was deeply insolvent. It is understandable that in this situation the federal authorities pushed spending responsibilities down to the regional level. The early reform government believed that regional governments would be subject to self-imposed hard budget constraints. But

instead of that, because of the mismatch between rights and obligations, regional authorities acquired an 'informal right' to seek SBC to cover the deficit.[55]

Second, the precondition of the lack of decision-making power in the fiscal sphere is in place too. The degree of autonomy with respect to definition of tax bases and rates is quite low in the Russian case. By defining the levels of taxation and the rules for calculating the tax base, especially VAT and profit tax, the central government efficiently 'crowded out' the institutional capacities of the regional governments in this sphere. The regions experienced limited fiscal autonomy, and even though they had discretion over other tax bases and tax rates, their fiscal decision-making powers were restricted by the federal center. This limits the ability of regions to help themselves (Hanson et al. 2000, 104). The lack of flexibility in tax-related policy making diminished the capacity of the sub-national authorities to take full responsibility in cases where they ran a deficit. This imbalance also creates incentives for extra borrowing on the part of sub-national governments. Over the years they found various ways to spend more than they collected, issuing regional bonds, bills of exchange (veksels), and using tax-offsets and combinations of transfers from off-budget funds (Hanson et al. 2000, 110). The absence of laws and regulations introducing caps for a maximal amount of borrowing approximate the seventh precondition. Limited powers to levy taxes in their territories, coupled with an imbalance between rights and obligations, put the federal government under double pressure from the regional electorate and creditors of the regional governments, who were inclined to delegate the responsibility for solvency crises to the federal authority. These first two preconditions are in line with the argument of high likelihood of policy divergence in federal settings and particularly with respect to economic reform (Wibbels 2000, Prud'homme 1995). It is explained by the fact that electorates see federal, not regional government as responsible for macroeconomic performance and lack of proper provision of public goods. Because regional governments more often than not are protected from accountability for the overall macroeconomic situation, the soft budget constraints are particularly easy to elicit in times of macroeconomic instability, which was the case in 1996-1999.

[55] The vertical imbalances, for example were the alleged cause of the permanent deficit of the budget of the Saratov oblast, mounting to 6 percent of the revenue part (Abdulatipov, 2003).

Third, though Russian fiscal practices were becoming more routinized by 1996, even core tax ratios and formulae for the granting of financial aid were subject to frequent alterations. Art. 50 of the Budget Code, which states that the ratio of federal and regional shares in shared taxes are to be set stable for the period of at least three years, was constantly violated, as they were renegotiated annually, and in some years, semi-annually (Abdulatipov 2003).

Criteria for granting transfers from the federal level to the regional were not clearly defined from the outset; in large part, they were calculated on the basis of the transfers from previous years (Popov 2004).[56] Since 1994, the law on the federal budget identified a fixed amount of financial assistance to each region on the basis of the formula. But the parameters in the then existing formula were not based on objective calculations. For example, the expenditure need indicator was computed by indexing to the inflation level of the 1991 budgetary expenditures on the respective needs (Sinelnikov-Murylev et al. 2006). Thus allocation of planned financial assistance was based on characteristics endogenous to the regional governments' policy choices. These transfers were only part of the story, as unplanned federal transfers, the tax concessions and tax exemptions, which accounted to asymmetrical nature of the Russian fiscal relations, were granted in an absolutely arbitrary fashion.

Fourth, like in a majority of federal states, the federal and sub-national levels of government have joint responsibility for provision of key public services in territories. The bulk of the expenditure obligations for fulfillment of the social and economic policies is borne jointly by the federal and regional authorities. Especially troublesome for the regional governments is the situation with non-financed federal mandates. These mandates stipulate the amount of spending on the provision of public goods, without indicating corresponding sources of financing. The provision of financial aid for particular social groups constitutes a substantial part of those non-financed mandates: 150 federal laws, 40 of which dated back before 1992,

[56] Popov argues that in 2001 federal authorities manipulated the expenditure part of the formula of the transfers to make sure that formerly pro-Yeltsin voting regions, Moscow and AOs, could leave more taxes in the region and transmit less to the center, following the pattern in 1994-1999. The more the region was paying to the center in 1994-1999, the lower level of expenditure need was established, so that less taxes could remain on these territories. "(T)he indices for of budgetary expenditure for the 2001 RF budget were computed in such a way as to incorporate these actual pattern of transfers, i.e. to make sure that there is no need to alter the existing pattern of financial flows drastically"(Popov 2004, 7).

impose on regional governments, while it was at the discretion of the latter to find necessary revenue sources.[57]

The fifth requirement concerns the level of information asymmetry. Gilbert (2001, cited in Sinelnikov-Murylev et al. 2006, 35) investigated the informational asymmetry in relationships between the federal center and sub-national units in a framework of principal-agent model. He found that in the Russian case, the verification of the justifiability of the amounts of transfers a region is entitled to is very costly due to insufficient information transparency and an underdeveloped institutional environment. In their pursuit of the extra financial funds, the regional governments often provided the federal center with information deliberately distorted in their favor. Instead of accepting that the budget deficit was caused by ineffective spending, they tried to convince the federal center that objective factors were behind the expanded spending. One of the most cited examples is the case of Primorskii krai, where funds earmarked for financing the system of central heating of residential housing were used elsewhere. The consequent emergency situation, with several thousand lives at risk, was presented as a strong reason for bailing out the deficient budget (Enikolopov et al. 2002). In Sakha republic natural disasters such as river floods or other objective circumstances were used to back up applications for extra transfers (Kalitin 2003). The information costs vary from case to case, and in some regions it was too expensive for the federal government to closely monitor the real developments in the regions.

Sixth, the political situation in the early and mid-90s was particularly conducive to SBC. In 1992-1993, republics and some regions sought to build up their sovereignty at the expense of a weakened center. The parade of sovereignties starting from the case of Tatarstan in 1992 was followed by a sequence of bi-lateral treaties in 1994. These developments coincided with an increase in federal budget transfers to the regions from 1.7 to 3.8 per cent of GDP in the years 1993 and 1994. The presidential election in 1996 was a particularly pressing political issue. The end of 1995 and the first half of 1996 were marked by an unprecedented decline in the popularity of the central government in the eyes of the national electorate. The war in Chechnya and failure to provide economic stabilization were blamed on Yeltsin's inability to

[57] It has been proved by the Fund of the "Institute of the Urban Economics" that the amount of the payments exceeded the revenue part of the consolidated budgets by 70 percent, and would constitute 22 percent of GDP (Gigolov, 2000).

effectively fulfill his duties as a president. In January 1996, just six month prior to elections, Yeltsin's poll rating was as low as three percent (Aslund 2007, 165). With this level of unpopularity, the support of the regions was essential, which was achieved in most cases via the softening of budget constraints.

The seventh precondition, namely the absence of limitation on sub-national borrowing is effectively fulfilled as there is no documented evidence that the federal government in Russia introduced caps on the amount of borrowings by its constitutent regions. The eighth precondition, namely the particular structure of government mentioned above was also present, granting regional representatives access to national decision-making.[58] The rules of recruitment in the main legislator, lower house of the Federal Assembly, the Duma, allowed some degree of regional representation: half of the members (225 MPs) were directly elected from single seat territorial constituencies. The upper house of the Federal Assembly, the Federation Council, however, was considered the main channel of regional influence on national rule making. It is formed of two representatives from each region; for the greater part of the period under investigation, between 1995 and 2000, these two representatives were *de facto* the governor and leader of the regional legislature. The Federation Council had significant powers regarding the initiation and enactment of statutory laws (absolute majority of the chamber required), and constitutional amendments (three-quarters majority required). Regional representatives in the Federation Council have a significant say in the appointment and dismissal of the highest officials, presidential use of decrees and emergency powers, and changes in territorial structure, as well as questions related to impeachment.

As far as heterogeneity is concerned, the Russian federation is a paramount example of extreme heterogeneity among its constituents. The highly heterogeneous geographical, climatic, structural, demographic, economic, and infrastructural conditions of Russian regions makes it necessary for the federal government to make systematic efforts to even out economic and social inequality. These disparities are perpetuated as long as its citizens continue to reside in areas which are economically and climatically disadvantaged, and Russian evidence confirms that mobility of labor is extremely low by international standards (Andrienko and Guriev 2004). Leaving aside the reasons why they prefer not to move out of these areas, this creates a permanent pre-condition for the SBC, as federal budgetary revenues

[58] The rules described below in the papargaph apply to the period 1996-2001.

have to be continuously redistributed in favor of those regional governments whose territory contains these disadvantaged areas. This approximates the ninth requirement.

The next precondition is connected to the previous, as it is based on the heterogeneity of regions, but also requires a federal structure of central decision making, and that the financially less effective regions should outnumber their more effective counterparts. This pre-condition was particularly characteristic for Russian regions. The territorial patterns of economic development did not follow the logic of economic efficiency: they were the result of the pre-Soviet politics of occupation and control, and of the Soviet planning system, which allocated industries regardless of the costs and benefits. The highly centralized economic system provided parity of economic activities between regions via pricing and subsidizing, but when this system collapsed, the problem of economic integration at regional level became overwhelming. Icker and Ofer (2006) documented that the distribution of regions with regard to their economic efficiency is highly skewed toward less efficient ones, which means that the median voter would be unable to achieve economic viability without central financial aid. Since each constituent unit has an equal vote, the median voter votes for the revenue sharing and subsidies.

To sum up, the contribution of this section consists of the addition of two important items to the otherwise comprehensive and robust classification of preconditions of SBC for sub-national governments (Sinelnikov-Murylev et al. 2006): heterogeneity between the regions, and the attributes of the median region/voter that are conducive for the SBC.

Through the application of this taxonomy to the situation in Russia in the mid-nineties, I show that all the theoretical preconditions for the soft budget constraints outlined in section 3.6.3.1 were indeed in place. Such economic outcomes as slow economic growth, capital flight, and lack of investment are produced by incentives embodied in the softness of budget constraints. The combination of the almost clandestine tax-sharing agreements and unclear rules for the federal budget transfers made it nearly impossible to achieve trust and agreement between the regions and the center. No clear division of responsibilities between the levels of the government was drawn, and these responsibilities did not correspond with the revenue-raising powers. With these boundaries blurred, and the level of responsibilities not matched with powers to levy taxes, it was more rational for regions with greater relative bargaining power not to look downward to generate their own resources, but to lobby the central authorities for

tax benefits and transfers. Tracing the history of Russian fiscal policies, what is most striking is the selectivity with which the federal government treated its constituents.

The federal Tax Ministry collected revenue from regions, and a fixed percentage of core taxes were transmitted to the federal budget. But these rules were by no means uniform, and several regions forced the federal center to concede more preferential rates. Occurrences of bailouts, as well as the existence of federal legal regulation on the procedure for granting tax concession to regions, point to the fact that central government took resources from some regions and bailed out others. Any region that stood a better chance of winning a bargain with the center rather than investing in regional economic development sought to "retain control over its own territorial resources even if it means concealing the amount it produces" (Burawoy 1996, 1108).

5.6.3 Measurement of SBC

The SBC is a recurrent pattern of additional revenue-sharing between levels where regions have stable expectations of a central bailout in the event of insolvency.[59] However, in several analyses the very fact of additional central aid is translated as an event of SBC. Sinelnikov-Murylev et al. (2006) among other different effects of SBC mention that the SBC condition creates the false impression on the sub-national authorities that the fiscal price of the provision of public goods has been reduced, when in fact it has not.[60] The underestimation of the fiscal price leads to an increase in the provision of public goods to above the optimal level in the next period. They note that the SBC is closely connected to the 'fiscal illusion' which 'emerges in the event of inadequate information, when regional authorities misunderstand the purpose for which financial assistance is allocated, or when voters assume that the relative price of public benefits goes down when financial assistance is provided'(Sinelnikov-Murylev

[59] The working definition of the SBC, outlined in the section: "Hard budget constraint limits revenue sharing and equalization among governments, especially soft grants... Soft budget constraint labels the capability of sub-national governments to remove/ignore obligations to balance revenues and expenditures (Montinola, Qian and Weingast 1995).

[60] The additional financial aid will cause the budget constraint line to shift, but the inclination angle remains intact, thus the fiscal cost per one unit of public benefit will stay constant. However, the shift of this line will create 'fiscal illusion', when the regional governments underestimate the true fiscal price of the increased expenditures.

et al. 2006, 40). Even though they clarify that they understand SBC as 'the situation emerging only as a result of a region's opportunistic behavior,' in the previous passage they conflate two notions by confusing the cause and outcome. SBC granted to a region is portrayed as an unintentional 'lucky' outcome for the sub-national authorities, who are tricked into believing that the fiscal price for any type of expenditure is reduced, and therefore they are better off increasing expenditures.

This example, which is just one among many, shows that the measurement of SBC is a complex issue. From the definition above it is clear that regional governments under conditions of SBC base their policy decisions about expenditures and borrowings on stable expectations (or lack thereof) of a central bailout, rather than considerations of balancing of costs and benefits of such policies *per se*. Therefore, in order to measure the degree of softness of budget constraints, it is necessary to identify whether the regional governments have these stable expectations. This task is very difficult to carry out, since directly observing such expectations is virtually impossible. In the following section I evaluate the various ways of developing indirect indicators of SBC in order to design a complex index that is appropriate and applicable to the Russian case. Thus, the rest of this section will describe estimation methods potentially useful for the research.

The first observable indicator is whether a regional budget is deficient: regions that for several reasons secured themselves SBC conditions usually ran a significant *budgetary deficit*. This was not just the result of a lack of effort to make ends meet, but in fact often deliberate on the part of regional governments. The soft budget constraints create incentives for regional governments not to avoid, but to seek budgetary deficit, so that the undeniable reasons for applying for prolongation of SBC conditions are securely in place. However, budget deficit alone cannot be used as an indicator of SBC, since structural factors may seriously confound on the measurement.

The most straightforward and easily observable indicator of SBC could be the *balance of budgetary flows (Lavrov balance)*. This is a per capita difference between the total revenues in the region and federal subventions on the one hand, and transfers and loans to regional and local authorities in an individual region on the other. The arithmetic mean of the balance of budgetary flows will be positive since federal taxes that are remitted from the regions are the revenues for the federal budget. In other words, as Popov (2004) puts it, 'the average region is certainly a donor vis-à-vis the federal government'. In 1996 the average balance of budgetary

flows from the regions to the center was 1086 rubles per capita (Lavrov et al. 1997, 268) which amounted to 8% of national GDP, or the average per capita income for 1.5 months (Popov 2004). However, a quick glance at the figures reveals that the variation was enormous, from +14,320 rubles per capita in Khanty-Mansiiskii Autonomous Oblast to - 3,406 rubles in Evenkiiskii Autonomous Oblast. According to this criterion, net recipients and net donors of the federal budget can be distinguished.

This straightforward dichotomy, however, does not yield a one-to-one dichotomy between regions experiencing soft or hard budget constraints. Several factors can be confounding, first and foremost, the structural differences between the regions stemming from economic centralization and unfortunate geographical factors. Russian GDP is produced in a minority of regions: according to Goskomstat, the top ten regions in 2001 produced about 42 percent of the country's total GDP.[61] On the other hand, a number of regions are small, remote and backward in economic terms, and dramatically lack the human capital to pursue an independent economic and fiscal policy. Regions vary enormously with respect to the development of their industrial base, modernity, and living standards. In the foreseeable future, the majority of poor regions will not cease to be net recipients of the federal budget, whatever stance towards marketization their governments adopt. Yet, apart from the economic diversity, regions in Russia also diverge in terms of the policies their governments have adopted to deal with the consequences of economic crisis. Observations show that the patterns of economic development/backwardness have not been duplicated in patterns of market-supporting/opposing governmental behavior. This criterion then is not effective in isolation and investigation of other SBC measures that are responsible for suppressing market-orientedness is necessary.

It would be insufficient to rely only on direct federal transfers without taking into consideration tax revenue-sharing regulations.[62] In 1996 alone, more than 100 extra-constitutional fiscal documents were signed toward such regions as Tulskaya oblast, Buryatia, Sakha, Dagestan, Komi, Kareliya, Kabardino-Balkaria, Tyva, Udmurtia, Kalmykia,

[61] Goskomstat Rossii: Goskomstat Yearbook for 2001. Regiony Rossii in 2001 pp.20-21

[62] Due to difference in the structure of tax collections, these rules, if applied correctly, would lead to different portion of total revenues, which each region can retain, but on the top of that, some regions negotiated specific ratios for these shared taxes (Popov, 2005).

Karachaevo-Cherkessia, Tymenskaya and Kaliningradskaya oblast, Kemerovskaya, Samarskaya oblast, and Primorskii krai (Lavrov et al. 1997). As noted above, taxes are composed of two main categories: those whose revenues are allocated to one level of government; and those whose revenues are shared between both federal and regional governments. The division of revenues in the latter category is regulated by several laws, but the actual division differs significantly from what is prescribed by the law. The analysis of such disparities can yield useful insights into the nature of center-periphery fiscal relations in general, and SBC conditions in particular. For example, comparative analysis of the *share of the regional taxes in total tax collections* helps to identify those regions that were capable of forcing the federal center to sign fiscal arrangements entitling them to retain larger tax shares (up to 100% in case of the Sakha republic), in contradiction to the general regulations. However, this estimation is also not free from the influence of confounding factors. The first alternative explanation is that arrears on shared taxes grew faster at federal level due to the fact that regional governments had a possibility to attain their share of receipts via offsets with regional enterprises, while the federal government did not (or rather was not willing to accept).[63] Second, according to the regulation concerning the functions of the Federal Fund for Support of the Regions (FFSR), the federal share of receipt on VAT was, in several cases, allowed to stay in a region as an offset to an equalization transfer.

During the period 1995-1998, macroeconomic policies of the central government aimed at reducing hyperinflation led to enormous payment arrears and pervasive non-monetary payments. This situation forced regional governments to run tax arrears, both at regional and federal levels (Klimaniv 2000, Aslund 2008). Nevertheless, patterns of distribution of these arrears were deviant: economically backward regions usually run fewer arrears to federal than to regional level or equally. Being major recipients of the federal budget, they depended on federal government to a significant degree. Therefore, as net beneficiaries of the central re-distributive programs, they were better off paying their taxes to the federal budget without arrears, and lobbying for larger transfers. More successful regions could finance their budgets without federal loans and transfers, and their strategy was different with respect to arrears:

[63] For a convincing discussion of this issue see Sherbakov (2002, 79-98).

running tax arrears to the federal budget reduced their contribution to federal programs.[64] This pattern is clearly visible in the *share of the accumulated debt to the federal budget in total tax debt*.

In the light of the above, I now outline an index of SBC as follows. Consider the variables we would like to measure to evaluate SBC. The budget constraints will soften as the budget transfers (BT) grow, so a value of transfers must be placed in the numerator of any divisions in the formula for SBC. I measured BT as amount of federal funds that were transferred to the regions via all main channels (transfers from FFSR and other federal programs as budgetary subventions). If we want the budget constraints to harden with the level of the tax collections in the region (TC), we must put this variable in the denominator. This resembles one of the widely used indicators of asymmetry of inter-budgetary relations, namely the ratio of *inter-budgetary transfers to the tax collections*. This indicator is arithmetically close to the indicator of Lavrov balance, but uses division instead of distraction. However, for the purposes of the analysis it seems beneficial to adjust this index by the level of fulfillment of tax obligation of the region calculated as a ratio of the ideal tax collection per capita (ITC) and the actual tax collections per capita for that particular region. In this case the formula will be:

$$SBC_{it} = Standardized\ (BT_{it}/TC_{it}) + Standardized\ (ITC_{it}/TC_{it}) \qquad (i = 1,\ldots, N, t = 1996,\ldots, 2001) \textit{(5.1)}$$

Where SBC_{it} denotes the level of development for region *i* for year *t*.

The interpretation in this case will be closer to the concept of SBC. A value of more than 1 of the second ratio in the formula indicates that this region failed to remit the amount of taxes that it is able to collect, given the objective conditions and tax compliance of the regional enterprises and government. The final formula is a sum of standardized values of these two ratios.

[64] Tax remittance patterns were used elsewhere as an estimation of the relative political and economic resourcefulness of the regional government. Zubarevich, for example states that the more independent is the region/governor, has more incentives to remit less tax to the center, and leave more tax in the region. See http://pubs.carnegie.ru/

In order to evaluate the value of the ideal tax collections per capita, we should multiply the average tax collections per capita (ATC) by the level of tax potential (LTP) of the region. The concept of tax potential has attracted the attention of various authors (Batkibekov, Lugovoy, Kadochnikkov, Sinelnikov-Murylev, Trunin 2000, Popov 2004). In his article, Popov (2004) overviewed several different methods (accounting for regional differences in per capita GRP, industrial structure, the ratio of all tax proceeds to the tax base in the Russia), to find that all methods "yield results that are very consistent with the ranking of the regions by their GRP per capita". Statistical analysis showed that the index of tax potential of the region used by the Russian Ministry of Finance to calculate transfers from FFSR for the year 2001 is strongly correlated with the GRP per capita (R^2= 0.98) (Popov, 2004). Hence the formula for the ITC will look as follows:

$$ITC_{it} = TC_t * GRP\ per\ capita_{it} / GRP\ per\ capita_t \quad (i = 1,\ldots, N,\ t = 1996,\ldots, 2001) \qquad (5.2)$$

Where ITC_{it} denotes the ideal level of tax collections for region *i* for year *t*.

Two possible modifications to construction of the variable of SBC are presented in the appendix to this chapter. While the first amends the formula by adding expenditure term, thus better adjusting the measurement to the concept of SBC, the second shifts the distribution of the variable close to normality by using logarithmic transformation of its component parts.

5.6.4 Measurement of political variables in the sub-period 1998-2001

The economic crisis of 1998 was a major turning point in Russian development that rejuvenated the economy and prompted a remarkable recovery. While between 1991 and 1998 Russian real GDP fell by 42.6 per cent, or 6.6 per annum, the trend was reversed between 1998 and 2005. During these years the economy grew by an unprecedented 6.8 percent per annum (Golubchikov 2007). The data sample for the time-series model with time boundaries 1996-2001, can therefore be justifiably divided into two distinct phases, before and after the crisis. However, some variables available for the 1997-1998 years are not easily available for the later period. The lack of relevant data for the second period will therefore cause incongruent model specifications for the models illustrating the two periods. First, to capture the reformist nature of the legislature is not an easy task in itself, and this was made even

more difficult by the fact that the exact methodology of the procedure of the coding for year 1996 was not made available by the authors.[65] This means that even if relevant data on the basis of which one might construct the index of the reformist orientedness of the regional legislatures had been available, methodological compatibility between the two data samples would be compromised. Second, several methodological problems arose in connection with the coding of the governors' (lack of) political affiliation. The nature of these problems is discussed at some length below.

The problem with the measurement of the political attitude of governors in the second electoral cycle lies in their unclear political preferences. If we take into account individual politicians, we observe the erratic character of their political preferences over time. It is a common feature that they changed their affiliations over their political careers several times, which is not abnormal *per se*, given the unstable party system, which was the case in the 90s in Russia (Glubotskii and Kynev 2003, Kynev 2007). On the rough political landscape of the 1990s, parties rose and fell, merged and split constantly, until eventually a single dominant party formed itself in the early 2000s. The problem was not that individual political affiliations or observable political preferences were changing over time, but that they changed too frequently. For the first sub-period (1996-1997), I used figures published by Lavrov et al. (1997), which are reliable data collected by the Russian Union of Industrialists and Entrepreneurs, Geographic Department at Moscow State University, the Moscow State Bank and the Expert Institute. Not only is this period quite short, but it conveniently coincides with the first electoral cycle: during 1996 and first half of 1997 almost all the governors, Yeltsin's appointees, were replaced by popularly elected governors (in sixty-four out of sixty-eight non-republic regions), and twelve out of twenty-one republican presidents (six were elected in 1998, one in 1995, and two regions remained parliamentary republics). As will become clear from the discussion below, during the first period a *single* party, NDR was reputed as a party of power.

For the second period (1998-2001), however, it was problematic to find a reliable measure that would accurately indicate governors' political preference. First, being twice as long, this period encapsulates the end of the first and the beginning of the second cycle of executive elections. In the event that a governor was not re-elected, the coding decision has to be made

[65] The data was published only for 1996 year (Lavrov et al. 1997), and of the project did not have a follow up.

whether to consider the political affiliation of the former or the latter governor. And even if the governor was re-elected, which happened in more than half of regions (forty-six), this would not mean that they kept their affiliation (if they had one) throughout the period 1998-2001. Second, in the years 1998-1999 the problem of indication the party of power proved to be especially difficult, as it will be explained below.

As far as the first dilemma is concerned, for practical reasons I coded the party affiliation for the *newly elected* governor, since gubernatorial elections that took place in the vast majority of regions between 1998 and 2001 served as a litmus test for revealing political preferences. I coded the dummy according to the party which nominated or supported the elected executive. However, a practical solution to the second problem was not possible to find for the following reasons. 1999 was the year of the formation of the later omnipotent 'Edinaya Rossia' party. Its predecessor, 'Edinstvo' was officially registered on October 15, 1999 under the category of an 'interregional movement'[66] as a counterbalancing political movement to then powerful party OVR (Fatherland - All Russia) in the run for the Duma seats.

At the end of September, a Russian minister of emergency situations, Sergei Shojgu, accepted an offer from Nazarov (governor of Chukotskaya AO) to head a new electoral movement, which was publicly supported by President Yeltsin and Prime Minister Putin.[67] In fact, thirty-two governors who were in an initial party list joined the party under pressure from Shabdurasulov, the head of the presidential administration, and from Putin in person (Panorama n.d.), with some of them declaring that their support for Edinstvo would not prevent them from running for other party lists, where they constituted the top of the party list (i.e. Aman Tuleev, the governor of Kemerovo oblast, was a number four in the Communist

[66] Its unofficial dubbing "Medved'" (The Bear) originates from the acronym of its full name: *me*zhregionalnoe *dv*izhene *ed*instvo.

[67] It is worth mentioning a confusion in the most of the Russian media, that mistook a group of the 39 governors that signed a declaration expressing their dissatisfaction with the way electoral campaign was held in Russia, and plead for fair electoral practices, for the founders of Edinstvo. The initiators of the declaration were governors of Kalinigradskaya, Kurskaya, Belgorodskaya and Tverskaya oblast, Primorskii and Stavropolskii kraj, Chukotskii AO, and Altai republic. At the same time Nazarov initiated a new electoral block, which was very well received by the Presidential administration as the Kremlin was eager to find a viable opposition to Otechestvo. However, the governors that signed Declaration did not want to be associated with the new electoral block, a fact which they announced publicly.

party list). Throughout the period 1999-2001, as the party gained credibility and popularity, more and more governors were willing to affiliate themselves with it. What is more important, in December 2001, the new party of power merged with OVR, Fatherland - All Russia, its political rival for the preceding two years.

All these developments made it hard to develop clear cut rules for the coding of "Party of Power", because during the period 1998-2001 three parties could be equally reasonably considered as party of power: Chernomyrdin's NDR (*Nash Dom Rossia*), *Edinstvo* and *Edinaya Rossia.* However, this was not the biggest problem for the coding. The biggest problem was that in many cases the governor ran for a seat under the banners of different parties, on occasion political rivals. The table in the appendix shows that twenty-five governors or thirty percent of all elected, were elected due to the support of two (in sixteen regions), three (in five), four (in three), or five (in one region) parties. Among those governors who were supported by more than one party, seventeen were supported by Edinstvo as well. The decision has to be made whether to consider these governors to be affiliated with the party of power. The second problem was whether to make a distinction between OVR as an opposition party and OVR as the party of power, as within the period of consideration, it re-positioned itself from being a clear rival to the party of power, to being a component part of it.

I decided not to code a governor as affiliated with the party of power if they were supported during elections by other parties as well. If I were to decide otherwise, it would include in the list governors Vinogradov, Lubimov, Tkachev, Egorov who for a long time were supporters of the opposition parties, KPRF and Yabloko. However, I decided to include in the list the governors who belonged to the OVR party list and won their seats in 2001, when it drifted politically and organizationally close to the party of power.

5.6.5 Models specification and estimation results

Several models will be employed for testing the hypothesis in question. In order to explain regional variation of data on the development of market institutions I fit multiple linear regression models to the cross-regional or time-series cross-regional data. Different specifications allow a better model fit given the structure of the data, i.e. I employ multi-level techniques to take care of irregularities in the error term.

I start with simple bi-variate and multivariate regression models. The formal regression equation is as follows:

$$DMI_i = ß_0 + ß\boldsymbol{X} + \varepsilon_i \qquad (i = 1,\ldots, N, j=1,\ldots,K) \qquad (5.3)$$

Where DMI_i denotes the level of development of market institutions for i^{th} region, where the lower value represents higher development of market institutions, i.e. 1 denotes the region with the highest level of development of market institutions; $ß_0$ –an intercept**,** ß - vector of coefficients, consisting of one, in case of bi-variate, and *k* elements, in case of multivariate regressions, **X** is the matrix of *k* explanatory and control variables, and ε is a random disturbance term for regions $i = 1,\ldots N$.

The second model specification inserts two- and three-way interaction terms into the above mentioned equation:

$$DMI_i = ß_0 + ß_j\boldsymbol{X} + \varepsilon \qquad (i = 1,\ldots, N, j=1,\ldots, K+L) \qquad (5.4)$$

DMI_i denotes the level of development of market institutions for i^{th} region, $ß_0$ –an intercept, ß - vector of coefficients *k* explanatory and control variables and *l* interaction terms between two or three variables, and **X** is the matrix of *k+l* variables.

The grouping of regions into 12 economic-administrative districts can be taken into account by modeling variation among these districts. Therefore, in the third specification I introduce an additional level into the linear regression. A formal mathematical description of the first level of the model is as follows:

$$DMI_i = \alpha_{j[i]} + ß\,\boldsymbol{X}_i + \varepsilon_i \qquad (i = 1,\ldots, N, j = 1,\ldots, 12, g = 1,\ldots, K) \qquad (5.5)$$

where DMI_i - denotes the development of market institutions in region *i* , *j[i]* codes a group membership; in this case it denotes the district category for a region *i* , α_j - intercept for j^{th} district, **X** is the matrix of *k* variables, and ε_i is a random disturbance term for regions $i = 1,\ldots N$.

The second level of the model is represented by the following formula:

$\alpha_j \sim N(\mu_a , \sigma_a^2)$

μ_a - overall mean, σ_a^2 – variance of the district-level errors.

The model will estimate standard deviations σ_a for unexplained variation between districts, and standard deviation σ_y for unexplained variation between regions within districts. The

hierarchy of two levels of variation, σ^2_a and σ^2_y is explicit: the former will be at the lower of the two levels, designated to be the first level, and the former is at the higher level, called level two.

The last, fourth specification is applied to a much larger sample, which includes the data for several years and for the same number of regions. In this case I again use a multilevel regression model, but instead of modeling spatial dependence in the model's errors, it will model temporal dependence.

As mentioned in Chapter four, one of the most appropriate model specifications in this case would be the repeated measures model: it specifies the multiple observations on objects through the period of time in terms of individual *profiles*. While each profile has the qualities of a time-series model, it usually consists of far fewer time points. Any single observation will not be independent from observations taken from the same profile. This type of time dependence is similar to the spatial dependence for observations made in geographically close locations. The formal model can be stated as follows:

$$DMI_{it} = \alpha_i + ß\mathbf{X}_{it} + \varepsilon \qquad (i = 1,\ldots, N, j = 1,\ldots, K, t=1,\ldots, T) \quad (5.6)$$

Subscript *i* denotes the regional dimension, and *t* denotes the temporal dimension of the data. DMI_{it} denotes the development of market institutions in region *i* in the year *t* , *i* codes a group membership, in this case the region category, α_i denotes the intercept for i^{th} region, **X** is the matrix of *k* variables for the region *i* in year *t*, and ε is a random disturbance term.

The second level models variation across regions:

$\alpha_i \sim N(\mu_a , \sigma_a^2)$

μ_a - overall mean between regions, σ_a^2 – between regions variance.

5.6.5.1 Bi-variate and multivariate models

I begin with the strongest result in table 5.1 below: the SBC is a better predictor of the development of market institutions than the dummies of the political orientation of the executive, legislature and executive-legislative synergy. In a bivariate model the variation in the variable of the softness of the budget constraints alone explains 14 percent of variation in the dependent variable. If controlled for the degree of initial endowment, even though the

estimate for the effect size shrinks from 4.95 to 2.8, it is still statistically significant (t-statistics 2).

Table 5.1 What Explains the Development of Market Institutions?(Model for Year 1996).

Dependent variable – Development of Market Institutions

Independent variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Soft Budget Constraints	4.95	2.8							3.0	
	(3.6)	(2.0)							(2.2)	
Executive's political orientation: Party of Power			-11.4	-7.6					0.4	
			(-2.0)	(-1.6)					(0.1)	
Legislative orientation towards market: Reformist					-18.9	-11.9			5.9	
					(-3.3)	(-2.3)			(0.5)	
Executive-legislative synergy. Kremlin-oriented executive and reformist legislature							-22.0	-15.1	-19.7	
							(-3.6)	(-2.8)	(-1.5)	
Control variable										
Initial Endowment		-5.0		-4.5		-4.3		-4.1	-4.4	-4.8 (-5.8)
		(-3.7)		(-5.2)		(-5.2)		(-4.9)	(-3.2)	
R^2adj	0.14	0.22	0.04	0.30	0.09	0.32	0.12	0.35	0.26	0.28

Note: t-values in parentheses

The third and fourth models represent the estimation of the effect of the executive's political orientation. Out of eighty-eight governors, fifty-six were party members or supporters of the 'Our Home is Russia'.[68] A favorable attitude to the party of power was significantly associated with the development of market institutions (t-statistics 2.0), which is an expected outcome. However, a very low level of the R squared implies inadequate explanatory power of this model. This means that this model provides no better prediction for the value of the DMI than the general mean value of DMI for all the regions. Models four and nine reinforce this finding: the effect of this independent variable is not statistically significant once the

[68] If one were to conduct similar analysis on the basis of data for 2009, the lack of variation in data would pose a problem to the analysis: out of 83 governors 76 are the members of the United Russia and most of them are member of the High Council of the party.

control variable of initial endowments is included (t-statistics 1.6), and is completely washed away in a full model (t-statistics 0.1).

The estimates for the impact of legislative positive attitude to the reforms on the development of market institutions (models 5 and 6) show much more stable parameters of statistical significance: the massive t-statistic of the bi-variate model (3.3) and the effect size of the dummy for the reformist legislature (-18.9) suggest that the regions with reformist parliaments were on average 19 points up in the ranking of the other regions in terms of the development of market institutions. Even controlled for the level of initial endowments, the regression coefficient is statistically significant (t-statistics 2.3), and the effect size remains large, -11.9. The last model was remarkably effective in capturing the highest level of the total variance in the dependent variable – 32 percent, as compared to other tri-variate models.[69] However, as with the previous variable, the effect of the reformist legislature proved to be insignificant, given the level of SBC: t-statistic dropped to 0.5 in a full model.

The last variable, namely the estimations for the executive-legislative synergy, as can be seen in the models seven and eight, produce highly statistically significant results. Not only does it have the biggest effect size in both bi-variate and tri-variate models, but the significance level of the variable is higher than the corresponding parameter estimates for the other two variables. In the event that in a given region a governor has a party of power affiliation, and the legislature is oriented toward market reform, the region is expected to be 22 points higher up in the ranking than otherwise would be the case. The effect of this coincidence fades away, however, once the variable of the SBC is taken into account. The estimates of the full model suggest that if the SBC is held constant, the effect of reformist synergy is not statistically significant (t-statistics falls to 1.5).

The ninth column displays the coefficients of regression, and corresponding test statistics of the model including all the variables discussed above. The model estimates for the full model show that if we hold the budget constraints constant, the effect of the political variables will

[69] The possible interpretation of the lower estimate for the model two, which includes SBC, as compared to the model eight: even though the SBC, standing alone in the model, explains greater shrare of the variance in DMI, then the variable of executive-legislative synergy, it correlates to a greater extent with the control variable, which leads to a gretaer common area of variance, explained by both variables, in the total variance in DMI, and subsequently, greater share of unexpalined variance.

be washed away completely. Among the potential predictors of the development of market institutions, SBC is the only significant one, and the level of initial endowments is statistically significant in a full model too. The softness of budget constraints is by far the most influential among the four hypothetical predictors, as well as the control variable of the initial endowments.

The last column, column ten, suggests that the index of initial endowments is a very reliable predictor of the development of market institutions, and has an even more massive effect on the dependent variable than SBC (t-statistics 5.8 vs. 3.8). The R squared, which is 0.28 for a bi-variate model, would appear to suggest the superiority of Hanson and Bradshaw (2000) and Treisman and Cai's (2005) hypothesis over mine. However, as the regression diagnostics will show, this model has certain pitfalls. Further analysis will show that the strength of the explanatory power of the index of initial endowment is considerably diminished with the introduction of interaction terms, an additional level in the error term, and especially after an influential outlier is removed from the sample.

To present an interim summary, the hypothesis of the positive impact of a Kremlin-oriented governor, reformist parliaments and synergetic action of the reformist legislature and party of power governor was supported only by the bi-variate models: models three, five and seven all show that the parameters for the pertaining variables produce statistically significant estimates. However, inclusion of the control variable lowered the t-statistics to a considerable degree for the variable for executive, and, importantly, the addition of the variable of the SBC caused the effects of all variables to disappear.

5.6.5.2 Linear regression model with interactions

Does the finding from the last model reject the importance of the political variables given the level of SBC? In order to check further how much influence political preferences of executive or legislature exert on the development of market institutions I included interaction terms into the model. Their introduction is justified because it can reveal whether the effect of softness of budget constraints on development of market institutions is the same for the regions with differing degrees of loyalty of the regional executive or legislature. The interaction between SBC (continuous variable) and the dummy for the executive affiliation with party of power or reformist legislature, or both (categorical variable) can be interpreted as analysis of co-

variance, a separate slope and intercept of the regression line for each factor level of the categorical variable.

The inclusion into the model of interaction terms reveals that among other two- and three way interactions only the dummy for the synergetic action of the two branches of the government has a statistically significant interaction with the SBC, a result that will be discussed at length below.

The first column of the table presents regression coefficients and corresponding t-values of the full model, including two-way interaction terms. The parameter estimates for this model show that none of the political attitude variables and their interactions with SBC are statistically significant. For the purposes of parsimony it is better to reduce the number of variables to a minimum set which can still adequately explain the variation in response variable. The smaller the number of variables, the more degrees of freedom are saved, and the less danger of multicollinearity, which renders the regression estimates unstable. Using the stepwise method of deletion of variables with smallest t-statistics, and simultaneously checking for the loss of explanatory power, I arrived at the minimal adequate model, which includes only four variables, namely SBC, dummy variable for Kremlin-oriented governor and reformist legislature, interaction term for SBC and the latter variable, and variable of initial endowment, which together explain 40 percent of total variance in the dependent variable. In order to check whether the simplification of the model was statistically legitimate, I compare two models (see Table 6 in the Appendix).

The output shows that the simplification was justified, because the probability of the null hypothesis, that the two models are not substantially different, is 0.86. The minimal adequate model has marginally larger unexplained variance (residual sums of squares is 20224 vs. 19822) but it saves four degrees of freedom. In order to compare the explanatory power of different specifications of the model, it is advisable to also to turn to another estimate, the so-called 'penalized likelihood' Akaike Information Criterion, which is calculated as

$$AIC = -2*\text{log-likelihood of the model} + 2(p+1) \qquad (5.7)$$

where p is the number of parameters in the model.

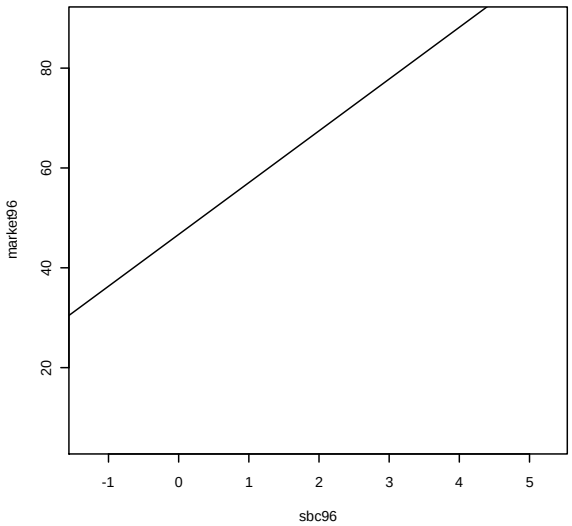
AIC is designed to penalize superfluous overparametrization as it adds 2(p+1) to the deviance for each extra parameter. While on its own it is of little help, it is useful for comparisons

between models run on the same database and type of formula: the smaller the AIC, the better the fit, given restrictions of parsimony. Comparison between the full model and minimal adequate model (427 vs.421, see Table 5.2) adds more justification to the decision to keep the latter model as the one fitting the data best.

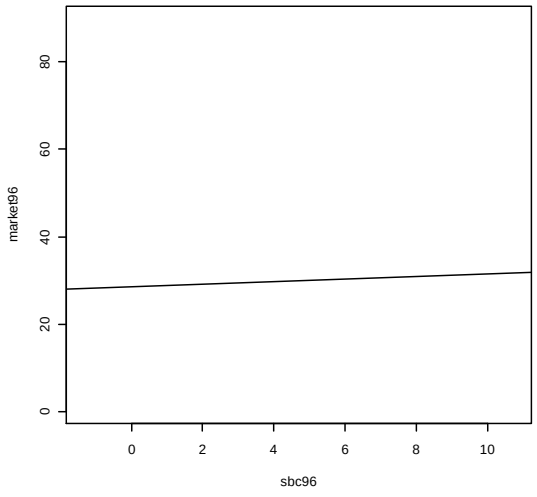
Figure 5.1 below depicts the interaction effects between SBC and synergetic combination of Kremlin-oriented governor and reformist legislature. The main finding that is supported by these figures is that among the group of regions with both Kremlin-oriented governor and reformist legislature, the effect of SBC on the (under) development of market institutions was much less pronounced. The almost horizontal line in panel B, with the slope 0.28, suggests that that even in the case of softening of budget constraints, the governments of the second groups are likely to continue to invest in development of market institutions.

Fig.5.1 Interaction Effects for the Linear Regression Model

Panel A. The regression line for the group of regions where dummy for "executive-legislative synergy" is set 0. y= 46.6+ 10.4 x



Panel B. The regression line for the group of regions where dummy for "executive-legislative synergy" is set 1. y=28.5+ 0.28x



To summarize, the models with interaction terms demonstrate a strong association between the soft budget constraints condition and the development of market institutions in the region. In addition, the dependent variable is closely correlated to the index of natural endowments, which is an expected outcome. There are also statistically significant negative associations

between the variable of development of market institutions and the interaction term between the SBC and synergetic combination of Kremlin-oriented governor and reformist legislature. In the event of the synergetic combination, the likelihood of SBC negatively affecting the development of market institutions in the Russian regions is almost negated.

5.6.5.3 Fitting multilevel structure

As is commonly the case with observational data in the social sciences, the random sampling principle is not possible to follow; therefore my database of the Russian regions should be checked for hidden dependencies. One possible deviation from the independency of errors is connected to the geographical structure of the federation. Values close together in space are likely to be dependent, which presents one of the commonest sources of pseudo-replication.

The territory of Russian Federation is divided into eleven economic districts.[70] This division, set up in 1997, based on geographic proximity and similarity of industrial specialization, was used by Gosplan (Soviet Ministry for Planning) for the purposes of economic planning and forecasting. Aggregation of data according to these districts is still used in many official records, especially in statistical reports, though in recent years it has started to be replaced by division by federal district, introduced by Putin's administration. While they have neither political nor economic cohesion, regions of the same economic district are geographically close and still share some similarities in economic structure, and therefore can stand for an additional level in a spatial hierarchical design. Any individual observation may not be independent from observations taken from geographically close locations. In other words, measurements taken from the same district may have non-independent errors because the peculiarities of the district will be common to all the regions in that district. If the importance of the administrative districting is consequential, we can expect a different error variance for each different spatial scale. The rationale for using the two-level model is that if the geographical location is important in any way, the multi-level model will help to circumvent

[70] To be more precise, twelve districts, as the Kaliningrad oblast is a district on its own. This occurred due to the fact that in Soviet times it was a part of the Baltic economic region.

pseudoreplication.[71] If the opposite is true, and regions belonging to the same district do not bear any resemblance attached to the geographical location, then the estimates for the variance will show it. In this case, the introduction of multilevel modeling will not be justified.

There are seven fixed effects in this model, namely the soft budget constraints effect and other variables included in the full model. The last term in the model's formula fits random variation between the administrative districts; there is no separate term for the random effects within districts. The variation between individual regions that are nested within districts is by default treated as random. The model answer two types of question: what is the effect of the soft budget constraints and other fixed effect variables on the dependent variable, and are the differences between the administrative districts greater than region-to-region variation within districts would lead us to expect? The first panel in R output shows the estimates of variance and covariance parameters for the random effects in the form of standard deviations and variations. The second panel represents the regression coefficients of the fixed effects, given the specified error structure. The estimation results from both panels are presented in the last two columns in the Table 5.2 below.

[71] Pseudoreplication usually occurs in situations when the observations are made in locations of close proximity, or when they are taken from the same object on different time points, and they suggest that the model has far more degrees of freedom than there is in reality, which in turn, leads to biased estimates.

Table 5.2 Single-level Model Versus Multi-Level Model (Models for Year 1996). Dependent variable – Development of Market Institutions

	Full model (linear)	Minimal adequate model (linear)	Full model (linear multilevel)	Minimal adequate model (linear multilevel)
Independent variables	(1)	(2)	(3)	(4)
SBC	7.2	9.0	8.4	9.4
	(2.6)	(4.5)	(3.0)	(4.8)
Executive's political orientation: Party of Power	0.1		1.6	
	(0.1)		(0.3)	
Legislative orientation towards market: Reformist	6.3		2.9	
	(0.6)		(0.3)	
Executive-legislative synergy. Kremlin-oriented executive and reformist legislature	-21.8	-15.8	-19.8	-16.4
	(-1.7)	(-3.3)	(-1.7)	(-4.6)
Interaction - SBC: Executive political orientation: Party of Power	4.1		2.2	
	(0.9)		(0.5)	
Interaction – SBC: Reformist orientation of the regional legislatures	1.5		1.9	
	(0.1)		(0.2)	
Interaction – SBC: Kremlin oriented executive and reformist legislature	-13.2	-9.5(-3.8)	-12.9	-9.9
	(-1.1)		(-1.1)	(-4.2)
Controls				
Initial Endowment	-3.7	-4.0(-3.3)	-3.6	-3.8
	(-2.8)		(-2.7)	(-3.1)
R^2adj	0.37	0.40		
Between-district variation			46.3	51.3
Within-district variation			272.8	254.9
AIC	427	421	637.1	613

Note: t-values in parentheses

The estimation results of multilevel modeling (the last two columns in the Table 5.2) advise against the introduction of a hierarchical structure for a model for 1996. The estimates for between-district variation show that it explains less than 17 (16.8) percent of the total variation in models three and four. The variations among regions are nested within and contribute to the variance between administrative districts. In our case, the variation between

districts is not greater than would be expected from differences between regions alone, therefore it seems an redundant complication to introduce an additional level. [72]

The parameter estimates for the SBC in multilevel models are even more stable than in the initial model: the t-statistic rises from 2.6 to 3.0 in a full model, and from 4.5 to 4.8 in a minimal adequate model. The slope of the regression line (in the dimension of SBC) is steeper in the multilevel models: 9.0 and 9.4 as against 7.2 and 8.4 in single-level model. Importantly, the regression coefficients and corresponding test statistics for all the variables, including SBC, in the multi-level model closely resemble the estimates of the initial, non-hierarchical model. The standard check for the significant differences between the two last (multi-level) models shows that they are not significantly different (See Table 7 in the Appendix), which motivates me, for the sake of parsimony, to keep the latter, minimal adequate, model.

5.6.5.4. Time-series analysis of the development of market institutions

As a next step I introduce an additional file of relevant data, which extends the time period up to 2001. Linear regression models which were run for 1996 will be replicated for the subsequent five years. If we use all the data from the six years as a single sample, we will have 528 observations (minus lines with missing data). Without taking into account the time-series structure, the models will violate the principle of independency of error terms and produce a lot of spuriously significant results, as with five hundred degrees of freedom it is very easy to 'spot' a significant difference.[73] One of the ways to avoid this is a multi-level

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[72] If we take into account the mean number of regions in a district (N=8), the district effect on the mean of a district that is chosen at random will be 61 percent. This number is calculated according to a formula: *SD²of between groups variation/(SD²of between groups variation + SD² of within group variation/number of observations in a group),* or 51.3/(51.3+254.9/8). If the design is not balanced, the number of observations equals an average number among the groups, the within-district component will still have a relatively strong contribution (39 per cent) as compared to between-district component (61 per cent). These calculations are designed to find the confidence intervals in experimental studies, for example, to define the probability interval of the development of market institutions in a new region in a given district. But this is far beyond the purposes of this study, even if we do not deny the feasibility of the premise.

[73] For example, the degree of the softness of budget constraints will have superficially blown up t-statistics of 12, and some variables will prove statistically significant, which in reality they are not, for example, p-statistics for the variable political affiliation of the governor will be -2.557. In reality, the effect of this variable is not significant, which will be shown farther in the chapter.

modeling technique that handles the data that depart from the independent error structure. Repeated measures of the variable made on the same region will have non-independent errors because structural features will be reflected in all the measurements for that region. As a result, they will be temporally correlated with one another. In these models, this structure is captured by the hierarchy of variation: variation at higher level includes the variation in lower levels.[74] Multilevel modeling makes it possible to make inferences and predictions on the different levels of hierarchy, as multiple error terms ensure predictive accuracy.

[74] In statistical terms, the hierarchy is 'numbered' in the opposite direction: 'higher' levels are nested within 'lower' levels, i.e., region will be a lower level in model, level 1, as compared to higher level of municipality, which will be level 2.

Table 5.3 Estimates of Repeated Measurements Models. Dependent Variable – Development of Market Institutions

	Repeated Measurements Model (full sample: years 1996-2001) Random effects = years, regions	Repeated Measurements Model (sample of years 1996-1998) Random effects = years, regions	Repeated Measurements Model (sample of years 1998-2001) Random effects = years, regions
(1)	(2)	(3)	(4)
Independent variable			
SBC	-0.2 (-0.4)	2.5 (2.7)	1.7 (2.7)
Control variable			
Natural Endowment	-5.6 (-4.6)	-4.9 (-4.4)	-4.8 (-4.0)
Between-groups variation	6,500,000	368,000	4,200,000
Within-groups variation	42.64	68.79	23.25
AIC	3097	1218	1945

Note: t-values in parentheses

The inspection of table 5.3 suggests that if we take a sample for the entire period of the study, the estimates of the mixed effects model will discard the hypothesis of the importance of the soft budget constraints in explaining the variation in the development of market institutions: the estimate does not have a statistically significant effect, test statistics as low as 0.4. One plausible explanation of the puzzle lies in the different mechanisms that were employed over time to elicit SBC conditions. If the group of regions that experienced SBC during some period between 1996 and 2001 was different from the group of regions that were experiencing it in another period within the same interval, the repeated measurements model will weaken the effect of SBC on the dependent variable.

The model can therefore be checked for the different phases in the course of development of markets in Russian Federation. One of the major turning points in Russian economic development was the economic crisis of 1998, which can be justifiably identified as a clear-cut point for the division. Accordingly, I split the whole period into two sub-periods: the first covering the years 1996-1998, and the second covering the years 1998-2001, and reiterate the

same linear mixed-effect model separately.[75] The important estimates are presented in Table 5.3 above. Table 5.4 below represents the iterations for the extended multilevel model, which includes two additional terms: a dummy variable for executive political orientation, and an interaction term for executive political orientation and SBC. The reasons why I restricted the range of political variables to just these two is explained in the section 5.6.4. From the columns 3 and 4 in the Table 5.3 and columns 2 and 3 in the Table 5.4, it is clear that the effect of the soft budget constraints remains significant for both time periods. The estimates for the second period are somewhat weaker both in terms of effect size (1.4 vs. 4.2) and statistical significance (2.0 vs. 3.5), which support the hypothesis of the diminishing the importance of the hard budget constraints for the development of market institutions.

Table 5.4 Estimates of Repeated Measurements Models with Political Orientation Variables. Dependent variable – development of market institutions

(1) Independent variables	Model for 1996-1998 (2)	Model for 1998-2001 (3)
SBC	4.2	2.2
	(3.5)	(2.6)
Executive political orientation: Party of Power	-5.2	-4.5
	(-2.8)	(-0.9)
Interaction - SBC: Executive political orientation: Party of Power	-1.1	-1.3
	(-1.1)	(-1.0)
Control variable: Natural Endowment	-4.3	-4.7
	(-4.1)	(-3.9)
Between-groups variation	3,400,000	4,051,000
Within-groups variation	70.9	23.0
AIC	1653	1940

Note: t-values in parentheses

5.6.6 Model diagnosis

The next step entails checking for the adequacy of the model and its conformity with model assumptions, namely normality and independence of errors, and homogeneity of variance. The regression diagnostics (see Appendix, section 5.1.3) reveal that the assumptions of normality of errors and homogeneity of variance are violated. The next section 5.6.6.1 and

[75] The first sub-period is characterized by a steady decline in production, and a rise in tax, wage and inter-enterprise arrears. The second period was the years of financial collapse and subsequent resurgence of the Russian economy.

sections 5.1.4 and 5.1.5 in the Appendix offer various ways to remedy the misspecified models.

5.6.6.1 Remedies to the misspecified model: deletion of influential points

One of the possible explanations for the non-normal distribution of errors is the presence of one or more outliers that have a noticeable effect on the parameter estimates of the model, distorting the distribution of errors and enlarging the residual standard error. In order to locate these points I use one of the known methods in identifying these influential points, namely measure of leverage. The value of leverage can be calculated for every point, using the following formula

$$Leverage = (1/n) + (x_i - x_{mean})^2 / \Sigma (x_j - x_{mean})^2 \qquad (5.8)$$

The influential point is the one that has a leverage value higher than (2p)/n, where p is the number of parameters in the model. Not every outlier can be a high leverage point, as those observations that are close to the middle of the range exert much less pull on the regression line than observations at the extreme ends. Examination of Figure 5.2 below, which plots the standardized residuals against leverage, attention is drawn to points 63 and 32, the latter having an extraordinarily large leverage, which implies that it is an influential point in determining the form of the regression line. The examination of the raw data indicates that the thirty-second point is an observation for Ingushetia and the sixty-third for the Altai Republic. The observed data for both regions pull the regression line downwards, but the power of the Ingushetia is much stronger, since the residual is much larger (the observed value of DMI is four standard deviations higher than fitted value), and it is closer to the maximum value of the range than the observation of the Altai republic (the values of the variable of SBC for the Altai Republic and Ingushetia are 5.2 and 10.7 respectively).

On one side, the leverage power of Ingushetia is explained by the fact that the value of SBC is overvalued due to extremely high level of equalizing federal transfers. They accounted for as much as 79.3 percent of the revenue part of the regional budget, the second highest in the Russian Federation after the Chechen Republic (89.8 percent). Ingushetia is one of the 'traditional' recipients of the federal budget, which established itself in this role from the first years of its creation. This republic was portrayed, on the basis of official statistics, as one of the most underdeveloped corners of the federation, accounting only for 0.02 percent of GNP, which desperately needed the federal transfers to support its 'poor' population. The

abnormally low income levels per capita are, however, misleading, because of the downshifting effect of demographic and cultural factors: the exceptionally high rates of the natural population growth (between 1989 and 2002 years the population of Ingushetia more than doubled from 186 to 469 thousand),[76] and the high official unemployment rates due to traditional structure of employment, where the majority of the female population is occupied in households. Thus, the methodology for evaluating the softness of budget constraints described in section 5.6.3 was not sufficiently protected against this kind of regional peculiarity that grossly overestimates the level of softness of budget constraints, as in the case of Ingushetia.

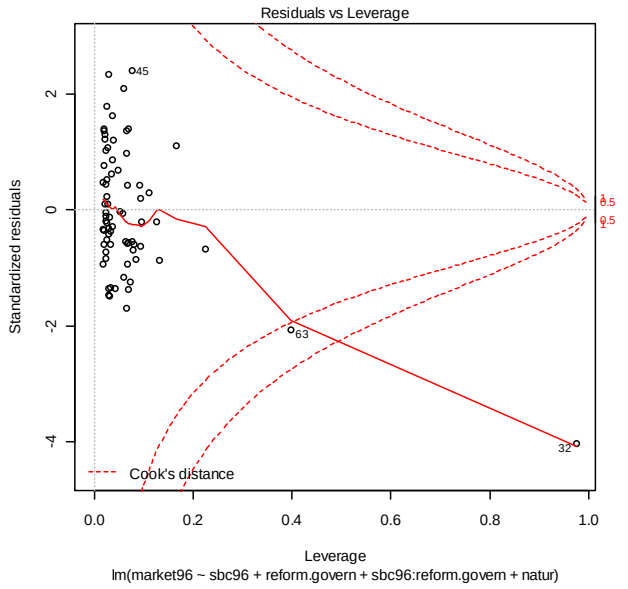
On the other side, the high leverage of the region is determined by the extraordinarily high level of the variable of DMI, given the softness of the budget constraint. The development of market institutions was indeed higher than in the neighboring regions, or any other region structurally close to it. DMI was facilitated by the establishment of the so-called "zone of economic favor', closely resembling an off-shore zone, in 1994. It was the first zone of such type to de facto operate on the territory of the modern Russia (Kosikov and Kosikova 2001). This status was granted by the federal government according the Government Decree No. 740 of 19 June 1994, which allowed the regional government to exercise freedom in setting the level of taxes below that nationally prescribed, at the expense of the federal budget. For example, the profit tax was reduced from 35 to 13 per cent. The favourable tax regime allowed businesses in Ingushetia to keep 80 per cent of their revenues. These privileges invigorated economic activities in the republic: during the period 1994-1999,[77] 7000 new enterprises were registered on its territory. The influx of capital from other Russian regions and abroad made it necessary to establish both physical and market infrastructure for the increased entrepreneurial activities, especially since the necessary financing was made available: registration fees alone accounted for 90 billion rubles in the first nine months of functioning of the zone. This prompted the development of banks, financial organizations, and

[76] Because the Ingush republic as an independent subject of federation was established in 1992, the population for the year 1989 was calculated as the sum of the three administrative districts of the Checheno-Ingushskaya republic, which later constituted the Ingush republic. http://atlas.socpol.ru/graph/3_9.pdf, assessed 6 December 2008.

[77] The Economic Zone itself functioned until July 1997, after which its rights were passed to the Center of the Development of Entrepreneurship.

the first and the only offshore center on the territory of Russia, International Business Center "Ingushetia"[78]. The security of the investors's property rights was warranted by the decrees and resolutions enacted by the Ingush Republic, such as the "Law on investment activity in Ingushetia". The decision to exclude this region from the main body of data hence appears reasonable: the extraordinarily high level of transfers was accompained by an extremely low level of tax collection, which together created an exceptionally high level of the softness of budget constraints. On the other hand, it was the federal center's active help towards this republic that prompted the development of market institutions, which otherwise would not be the case.

Fig.5.2 Standardized Residuals vs. Leverage for the Linear Regression (Minimal Adequate Model with Interaction Term)



* Red dotted lines denote Cook's distance which is a combination of residual and leverage in a single measure. This distance evaluates the degree of change in the model associated with the deletion of this residual.

[78] The International Business Center was regarded as an off-shore institution of federal importance. It was created in 1994 by a federal Law No. 16-FZ 30.01.1996 "On center of International Business "Ingushetia".

One of the empirical solutions to the problem of the lack of goodness of fit diagnosed by the above tests would be to delete the influential observation and perform the models on a smaller sample. Thus I run the linear full and minimal adequate models for this smaller sample.

The findings are reported in Tables 3-6 in the Appendix, and can be summarized as follows. The regression diagnostics show that the models run on the sample without Ingushetia have considerably better fit (See Fig.9 in the Appendix and the second, lower half of the Table 3 in the Appendix). In the linear model without the interaction terms (Table 4 in the Appendix), the variables for the legislative reformist attitude display very similar regression estimates. However, in the minimal adequate model including the interaction term, the coefficient of regression for the dummy variable denoting Kremlin-oriented executive and reformist legislature has an opposite-to-expected sign (Table 5 in the Appendix), but given the low level of test statistics, the independence of the DMI variable and the reformist synergetic attitude seems reasonable. However, the interaction effect between SBC and the latter variable shows both opposite to the expected sign and statistical significance. That means that in a sample without Ingushetia, the regions for which the synergy dummy is set to 1 are more likely to lose the incentives to develop market institutions with softening of budget constraints. This finding contradicts the theoretical expectations stated in section 5.6.1. However, it is important to stress that the regression estimates for SBC did not lose either its statistical or scientific significance in any of the models when the observation of Ingushetia was taken out of the model (Table 3-6 in the Appendix).

The next step involves checking the model for goodness of fit after the model transformations that were performed for the full sample. Table 5.3 below demonstrates the parameter estimates and t-statistics for both samples: minimal adequate models (columns 1 and 2), hierarchical models (columns 3 and 4), the polynomial models (columns 5 and 6), and asymptotic models (columns 7 and 8). Pair-wise comparison of R squareds indicates that the fit of the models increases substantially with the deletion of the influential point. Comparison of the Akaike Information Criterion suggests the same inference with the exception of the first model. The comparison also detected an interesting tendency: the deletion of Ingushetia from the sample led the SBC variable to increase both in effect size and statistical significance, consistently for all models. The variable of initial endowment, in contrast, loses its importance, both in terms of parameter estimate and significance, in all models. It is also important to note that the models run on a smaller sample have higher R-squareds compared

to samples with Ingushetia: it changes from 40 to 53 percent in minimal adequate linear model, and from 40 to 54 percent in minimal adequate polynomial model.

Examination of the variance parameters presented in Table 3 in the Appendix reveals that for a smaller sample the error variance was also consistently decreased in all model specifications. The models excluding Ingushetia behave properly as far as the constancy of variance is concerned, though different tests show different results for the different model specifications. It may be concluded that for the sample including Ingushetia, the best fitting model will be linear hierarchical, while for the model without Ingushetia the linear polynomial model may be considered the best fit.

Table 5.3 Comparative Statistics for Samples with and without Ingushetia (Models for Year 1996). Dependent variable – Development of Market Institutions

	Minimal adequate model (linear)		Minimal adequate model (linear multilevel)		Minimal adequate model (polynomial)		Non-linear asymptotic regression	
Samples	With Ingushetia	Without Ingushetia	With Ingushetia	Without Ingushetia	With Ingushetia	Without Ingushetia	With Ingushetia	Without Ingushetia
SBC	9.0 (4.5)	9.4 (5.3)	9.4 (4.9)	9.8 (5.6)	6.1 (4.3)	6.4 (5.2)	a=67.4 b=10.2	a=74.1 b=16.2
Executive-legislative synergy.	-15.8 (-3.3)	15.3 (1.9)	-16.4 (-3.5)	13.2 (1.7)	-11.2 (-3.2)	10.6 (1.8)	c=1.4	c=1.1
Interaction – SBC: executive-legislative synergy	-9.5 (-3.8)	26.9 (3.3)	-9.9 (-4.2)	24.9 (3.1)	-6.4 (-3.7)	19.2 (3.3)		
Controls								
Initial Endowment	-4.0 (-3.3)	-3.1 (-2.8)	-3.8 (-3.1)	-2.9 (-2.7)	-2.9 (-3.3)	2.2 (2.9)		
R^2adj	0.40	0.53	NA	NA	0.40	0.54		
Between-district variation			51.3	36.1				
Within-district variation			254.9	200.3				
AIC	629.7	602.7	613	584	577.4	550.9	624.9	604.8

Note: t-values in parentheses

5.6.7 Conclusion

The above results can be summarized as follows. The development of market institutions was very likely to be predetermined by fiscal relationships: regions experiencing the SBC condition were less likely to develop market institutions than those regions with hard budget constraints. Nonetheless, the test does not lend much support to the hypothesis regarding the contributory role of the political attitude of the executive or legislature, or the combination of

the two in the equation. The development of market institutions is far less sensitive to the political stance of the government. In general, for the 1996, the model with the best explanatory power is the multivariate hierarchical linear OLS model with four predictors: SBC, initial endowment, the dummy for the Kremlin-oriented executive and reformist legislature, and interaction term between the latter variable and SBC. The regression estimation results proved that the hypothesized importance of the political affiliation of the governor was supported only in a bi-variate model, but with the inclusion of other variables the estimates for this variable become far less convincing. The same, with a certain degree of confidence, can be said about the variable of legislative orientation to market reform.

The parameter estimates for the multi-level model closely resemble the findings of the single-year model. The comparison of the parameter estimates between one-level and hierarchical model, as well as the between- and within- district variation in the latter model lead me to question the rationality of introducing the additional level in the error term. However, analysis revealed that the introduction of a hierarchy of levels improved the model fit to the data which included an influential outlier.

These patterns were re-evaluated using different regression diagnostics, with the purpose of testing the statistical reliability of the estimates. The assessment is instrumental in that it reveals violations to the assumption of normality of errors for the linear model with four predictors, found earlier in the analysis to have the best explanatory power given restrictions of parsimony. The search for important outliers pointed to the Ingush republic, which has also proven to possess considerable leverage power. The omission of the observation for Ingushetia substantially improved the fit of the models, at the same time preserving the homogeneity of variance and significantly normalizing the distribution of errors. Deleting this region from the analysis changed the sign and significance of the regression estimates for the variable of political synergy between the two branches. What is more important, the estimation results for the variable of SBC remained robust in all models. Pair-wise comparison also revealed an important tendency: the estimates for SBC were improved both in slope estimates and statistical significance, while the opposite happens to the estimates for the variable of the initial endowment in all models. I keep and report the estimates for both samples, including and excluding the observation for Ingushetia, as they are best explained by different specifications. The sample excluding Ingushetia can be best modeled as a polynomial linear multivariate model with four predictors, outlined in the preceding

paragraph, while the data from the sample including Ingushetia shows a better fit if the hierarchical spatial model with the same four predictors is applied.

The remarkable differences in the profiles for Russian regions between the years 1996-2001 which were revealed using the repeated-measurement model, point to a considerable variety in the development of market institutions both between and within regions.[79] This model, while accounting for both dimensions of variance, reaffirmed the importance of the variable of the SBC as a reliable predictor of the development of market institutions. Even though the model for the full period casts doubt on the strength of the explanatory power of the SBC coefficient, the splitting of the period into two sub-periods confirmed the hypothesis. However, the relative statistical and scientific significance of the SBC in the equation should be diminished, which is a subject to future investigation beyond the scope of this thesis.

However, it was not possible to replicate the model with political orientation variables to the years 1998-2001 due to the lack of relevant data. Apart from the methodological infeasibility of creating a dummy for regional legislatures for the second period, some difficulties arose in the coding of the executives' affiliation. Even though the publicly open resources were mostly available for recognizing the governors (lack of) political affiliation at any given time, the highly volatile character of party membership and the tendency on the part of governors to split loyalty between different, sometimes rival parties, rendered the task of finding clear-cut rules for recognizing governor's party of power affiliation overwhelming, especially when only very few governors' party affiliation was stable for the whole four-year period.

The models specifications call for several lines of improvement, including those connected to the measurement of the SBC variable (outlined in section 5.6.5), and the political attitude of both the executive and legislative branches, as well as the search for possible omitted variables that can add a meaningful component to the analysis of the development of market institutions. Finally, it is worth mentioning that the use of formulae in the models is limited in the sense that regression predictions are only valid for the data which was used to derive the equations, and therefore reflect sample biases that affected the data. However, robust and stable regression estimates for the SBC variable in all model specifications run in this study

[79] Moreover, in a many regions the development over the years shows ascent and descent of the values of the dependent variable, which does not mean the retrograde development of market institutions, but their slower than average development.

suggest a wider application of this finding of the model. The trials with different levels of aggregation, different combination of variables, deletion of the influential outlier, introduction of interaction terms, and time-series structure did not seriously diminish the robustness of the parameter estimates for the SBC.

The findings in this chapter reveal the hazards of SBC in center-periphery relations. The situation where the institutions of center-periphery relations emerged as an outcome of conflict and accommodation between Kremlin and autonomous regional governments, however, has ceased to exist. Regional governments, with Putin's recent reforms, diminished in relevance as powerful actors. Their ability to credibly threaten the center was effectively limited by the system of appointed regional executives. However, the nature of the allocation of the resources from the center has not fundamentally changed, only this time the story repeats itself with big business. Asymmetric deals have not ceased to characterize the economic environment in Russia, but this time they are struck between the Kremlin and big companies rather than regional governments. The preferential treatment of selected companies (AvtoVaz, Rosneft', Rostekhologii) perpetuates the SBC as a recurrent pattern in Kremlin's economic relationship with its agents (Nemtsov and Milov 2009). The mechanisms of eliciting SBC, whether they are a result of paternalistic relationships between Putin and his closest allies, or are an outcome of a bargain, are an interesting subject which deserves a separate analysis, which lies beyond tasks of the present work.

CHAPTER 6: DETERMINANTS OF SOFT BUDGET CONSTRAINTS

The understanding of how the soft budget constraint was achieved is of analytical interest for two main reasons: the analysis can shed light on the plausibility of two theories of intergovernmental transfers: first, that the federal center was biased in favor of politically challenging regions, and second, that the threat of political disrupt was perceived more credible than threat of economic disruption. The second reason is that the findings of the chapter may help in designing intergovernmental budgetary institutions in a way that makes the effort on the part of regional government to reach the desirable level of SBC too costly to pursue.

Even though the political and economic developments between 1992 and 1996 caused some variables to lose their explanatory power, the theory underpinning the construction of core variables and model specification can be left intact. However, it would be interesting to add more variables to the ones used in Treisman's work, to give more attention to aspects of the regional threat to disrupt, distinct for the period 1995-1996. The main focus of the subsequent analysis will be concentrated on the role played by public employment in center-periphery bargain, and how it helped to boost the bargaining power of individual regions.

The diversity in the degree of softness of budget constraints among Russian regions is striking. The analysis of the distribution of data on SBC would be more informative if accompanied by the analysis of its component parts. Hence, I proceed with the descriptive statistics on the distribution of transfers per capita, tax collection per capita and degree of tax effort, as well as SBC. The summary is presented in Table 6.1, which is organized as follows: the columns denote the mean of the regions' values, the standard deviation, maximum and minimum values of the variable, the coefficient of variation.[80] All variables without exception show a very high degree of variation, with the coefficient of variation exceeding 100 per cent.[81]

[80] A measure of variation calculated as a standard deviation, divided by a mean.

[81] For the index of SBC the coefficient of variation is not informative: since the index was compiled as a sum of standardized values, its density distribution is close to zero, and hence the coefficient of variation takes abnormally high values, as 24.5, or 24500 percent.

The transfers per capita variable has a coefficient of variation of 118 per cent. On average, a regional citizen received 581 rubles in transfers from the center: least lucky were citizens of Lipetskaya oblast, who got only 25 rubles, while those of Koryakskaya AO and Evenkiiskii AO benefited the most, with 4,500 and 3,280 rubles in federal subsidies respectively. The distribution of data for tax collections across regions varies to the same degree: while Ingushetians collected only 27 rubles per capita, citizens of oil-rich Yamalo-Nenetskii and Khanty-Mansiiskii regions collected 14,760 and 11,100 rubles per capita respectively. The mean value for tax collections of 1,650 rubles and standard deviation of 1,903 produce a coefficient of variation of 115 per cent. The degree of tax effort measured as the ratio of ideal value of tax collection to the value of factual tax collections varies even more: the coefficient of variation is a sheer 139 per cent. While the average regional government made a tax effort equivalent to approximately half what it would be able to collect in ideal circumstances, the government of Moskovskaya oblast collected 500% of the value of Ideal Tax collections, Ingushetia collected as little as 6% of the value of Ideal Tax collections, Altai republic collected only 7%, and Chukotka 8% of the ideal value.

Table 6.1 Cross-regional Differences in SBC and its Components

Variable	Mean	Standard Deviation	Min.	Max.	Coefficient of Variation,%
Transfers per capita in 1996, thousand rub.	0.581	0.688	0.026	4.5	118
Tax collections per capita in 1996, thousand rub.	1.65	1.903	0.027	14.76	115
Ratio of ideal tax collections to real tax collections	2.132	2.968	0.21	17.25	139
SBC index	-0.073	1.788	-1.338	10.75	NA

6.1 SBC Predictors

6.1.1 Lobbying capacity of regional governments: early signing of bi-lateral treaties

Treisman's work (1996, 1999) contributes to the growing literature applying the bargaining game theory to the specific aspects of political and economic processes in Russian Federation. Numerous authors have utilized bargaining game theory in an attempt to explain why regions in the Russian Federation have been allotted dissimilar sets of rights and obligations in the course of federal state-building. They model center-periphery negotiations into 'co-optation' (Laitin 1991), 'transgression' (Solnick 1998a), or 'appeasement' (Treisman 1998) bargaining

frameworks. Among other determinants of bargaining power, such as time preferences, risk acceptance, presence of alternative policies and coalitions, intensity of relative preferences, sequence of moves, etc., the most utilized by authors appear to be *credibility of threats*.

Treisman demonstrates that in the early 1990s challenging central government, either by sovereignty declaration, public voting, or mass strikes, paid off better than complaisance as far as the net budgetary flows[82] were concerned. He found several variables explaining the level of fiscal federal appeasements to be statistically significant, such as regionally concentrated mass strikes, popular vote against Yeltsin, and such estimator of credibility of secessionist threats as signing of sovereignty declaration in 1990. Total federal transfers to the regions along with federal off-budget fund spending accounted for about 29% of GDP in 1994 (Freinkman and Titov 1994) In 1992 federal transfers constituted 10% of regional revenues; by 1994 their share was 19%. Treisman measured these variables for the year 1992. Hence hypothesis 3 follows:

Those regions more capable of posing credible threats to disrupt were more likely to be granted SBC conditions. I will test this hypothesis as a series of five subordinate sub-hypothesis, each having a different variable of threat as a predictor of the SBC.

The probability of outright defection by 1996 was virtually equal to zero (Treisman 1999, Turovskii 2003). In spite of this, I include the variable of disruptive threat into the analysis for other reasons. The danger was not that some regions would declare independence and seek to separate because of non-Russian ethnic identity, but rather that a few adamant national leaders might act as detonators of wider insubordination and would undermine the center's capacity and credibility by creating precedents of defection. The situation with Tatarstan was especially troublesome: the republic asserted its sovereignty and at the same time boycotted the Russian Constitution. A bi-lateral treaty was invented as a special institution framing Tatarstan within the boundaries of the Russian Federation. It was designed as an exclusive contract between the Moscow and Kazan', granting exceptionally wide powers and lavish tax

[82] Treisman uses the term 'net allocations' or 'net federal/central transfers', however the method of calculations identical to the above mentioned net budgetary flows (Lavrov's balances), 'per capita transfers to the regions net of tax payments to the center' (Treisman 1996, 308).

and other concessions.[83] Later, bi-lateral treaties were signed with forty-six Russian regions, however, only powerful troublemakers were able to sign them as early as 1994 and 1995.[84]

Accordingly, to test the applicability of Treisman's theory for the data on 1996, some alterations are necessary; for example, the importance of the fact that a region claimed its sovereignty status in 1990 for the degree of credibility of region's secessionist threat had considerably faded by 1996. I thus replace it with the aforementioned estimate that captures this aspect of bargaining power in the lobbying game, namely *'early signing of bi-lateral treaties'*, assigning highest code value to the regions who signed them as early as 1994 (see Table 1 in the Appendix). Therefore, sub-hypothesis 3.1: *The earlier the bi-lateral treaties were signed (if ever), the softer budget constraints are likely to be: the coefficient of regression should be positive.*

6.1.2 Lobbying capacity of regional governments: vote against Yeltsin in presidential elections

The next sub-hypothesis says that the federal center discriminated between regions on the basis of the voting patterns of the regional electorate. The greater the opposition to Yeltsin, measured as a proportion of regional popular vote against Yeltsin in the first round of presidential elections in June 1996, the greater likelihood of transfers and tax concessions in that region. As in Treisman's work, the predictive power of the proportion of votes for Yeltsin was compared with that of margin of victory (defeat) in each region. Since these two variables are highly correlated (one is a part of the other), they are included into two separate models (see Table 6.4). If Treisman's arguments were correct, we would expect that the presidential administration would try to give fiscal support to hostile regions.

[83] These bi-lateral treaties, '*Dogovory o razgranichenii predmetov vedenija i polnomochii'*, signed between federal and regional authorities, and connected to them agreements (*soglashenia*), signed between respective ministries encompassed special arrangements across wide range of policy areas, such as inter-budgetary relations, higher education, division of the state property, commerce, customs. *Soglashenia* granted more tangible material and jurisdictional privileges then the bi-lateral treaties, the latter focused more on symbolic and political concessions.

[84] For example, Tatarstan and Bashkortostan were potentially disruptive as catalysts of pan-Turkism; North Ossetia, Kabardino-Balkaria, Krasnodar were potential incubators of a Caucasus independence block,

Sub-hypothesis 3.2 *The smaller the proportion of regional electorate who voted for Yeltsin in presidential elections in 1996, the more likely the region to enjoy SBC.*

With respect to the second variable, namely margins of victory (defeat), there may be several explanations, depending on the sign and significance of the first variable:

> if the popular vote against Yeltsin is negatively regressed, but at the same time the margins of his victory are more significant and negatively regressed with SBC, that means that "net transfers were used strategically in an attempt to increase Yeltsin's support in regions where a small number of additional votes might make a large difference to future electoral outcomes (Treisman 1998, 313).

The same logic applies to the case when the vote against Yeltsin was positively regressed but less significant, while the margins of defeat are negatively correlated with SBC and more significant, which means that transfers were used strategically, but failed to gather even a small number of additional votes.

The positive sign of the regression coefficient of the margins will have two opposite explanations depending on the sign of the popular opposition against Yeltsin: if the sign was negative for the first variable, then that means the most loyal regions were rewarded with SBC. The positive sign will report the opposite tendency, that SBC was used to pacify the most potentially hostile and recalcitrant regions.

6.1.3 Lobbying capacity of regional government: vote for left-wing parties in Duma elections

As an additional measure of the voting patterns of the regional electorate, I include the vote for left-wing parties in elections to the national legislature occurred previous to the study year. Among the parties which passed the threshold, there was only the Communist Party of the Russian Federation (22.7 percent of vote), but in the ballot list there were several left-wing parties that attracted a considerable number of votes: Union of "Communists"-"Labor Russia"-"For the Soviet Union" (4.53 percent of vote on party-lists), the Party of the Workers Self-Government (3.95 percent), Agrarian Party of Russia (3.78 percent), Trade Unions and

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geographically close to rebellious Chechnya; Sverdlovsk and Orenburg oblasts were core participants of the 'Urals republic'.

Industrialists of Russia (1.55 percent), etc. The variation of the proportion of the left-wing votes was wide, from 8.5 percent in Ingushetia to 59.9 in North Ossetia. Hence, sub-hypothesis 3.3: *The greater the opposition to the center, measured as a proportion of regional popular vote for opposition parties in Duma elections, the more likely are the conditions for SBC to be granted to the region.*

6.1.4 Lobbying capacity of regional governments: inflated public employment

Insofar as far as the threat to "disrupt central priorities if regional demands are not met," the *de-facto* threat described by Treisman was in many cases replaced by a potential threat; for example, Gimpelson et al. (2000) argue that greater fiscal transfers were connected to the higher public employment.

Russian regions exhibit a wide variation in the level of *public employment;* in 1995 the lower and upper limits of the range were 16 per cent for the Tyumen' and Vologda oblasts, and 30 per cent for Tyva republic. These figures represent the share of education, art and science; health care and sport; and social protection (Goskomstat Yearbook, 1996). The public employment trends can be reasonably judged as being the outcome of the particular regional policy decisions, because most of public employment had been created in institutions subordinated to regional governments and funded from the regional budget.

In the 1990s Russia experienced a rapid large-scale process of privatization; as a result, employment in state-owned enterprises dropped from four-fifths of total employment in 1990 to one third in 1998. Against this backdrop, the figures for the public employment appear especially contradictory and irrational: the actual number of employees in healthcare, sport and social protection and public administration between 1992 and 1998 went up by 1.415 million (Gimpelson et al. 2000). These figures were accompanied by correspondingly increasing trends for wage arrears in public sector. Even though this can also be attributable to irresponsible, ineffective and incompetent budgeting by the federal center, the alternative explanation, based on the lobbying game of center-periphery relations has been framed in several works. Gimpelson et al. (2000) and Gimpelson and Treisman (2002) provide evidence that regional governments deliberately inflated public employment and used the potential militancy of public employees in lobbying for more federal aid. Moreover, they methodically delayed payment of wages in these sectors, even when earmarked funds had become available, in order to invigorate such militancy. The variable of the change of employment in

the public sector in previous to study year should have a positive association with softening of budget constraints.

Sub-hypothesis 3.4*: The faster the growth of public sector in the region, the more likely SBC conditions are to be granted to that region.*

The measurement of public employment raises the issue of timing. The process of subtraction of SBC from the federal government described above takes some time. The magnitude of public unpaid public sector which could pose a credible threat to disruption could only be built gradually by first hiring public employees and then delaying their payments for several months. Therefore I included into the analysis a lagged dependent variable, to capture the idea that the growth of public employment in 1995 affected the conditions of hard or soft budget constraints in year 1996.

6.1.5 Administrative status

Ethnic republics in Russia have had a different administrative status and political relationship with the center from non-ethnic republics. Ethnically defined regions in many culturally plural societies are granted autonomy in educational and linguistic policy areas. In the Russian case ethnic republics obtained greater rights and privileges not only in these traditional spheres, but also in spheres of regulation of customs, commerce, and fiscal relationship etc. (Solnick 2000). Due to the Soviet tradition of granting some self-government rights to ethnic republics, Russian republics had longer experience in exercising self-governments institutions. This and also the fact that republics were the first Russian regions to publicly elect their governors (presidents) made them capable of exerting greater amounts of pressure on federal administration than their non-ethnic counterparts. Therefore, *ceteris paribus*, republican status should be inductive for the softening of budget constraints.

Sub-hypothesis 3.5: *republican status was helpful in lobbying for SBC conditions, and it should be associated with them more strongly.*

6.2 Control variables

6.2.1 Access to decision-making

Treisman used a variable of the access of regional representatives in parliamentary decision making: the number of regional representatives in key parliamentary committees and

commissions pertaining to budgetary allocations (1996). In the Russian Duma at that time that was the Committee on Budget, Taxes, Banks and Finances, consisting of 43 members. I code the variable as 1 if a regional representative was a member of this committee in 1996, and 0 otherwise. If the regression coefficient for this variable has a positive sign, it indicates that the parliamentary deputies were likely to indulge in pork-barreling politics.

6.2.2 Population size

This variable is included to test the hypothesis of the bargaining power based on the magnitude of the possible disruptive actions. Central government is more likely to grant SBC conditions if faced with threats from the more populous regions, which can cause more massive disruptive actions than their small counterparts.

6.2.3 Economic need: structural backwardness

The examination of the determinants of the SBC would be incomplete without 'supply side' factors, driving intergovernmental allocation of budgetary resources. Many poor backward regions were not able to meet hard budget constraints because of socio-economic structural factors. The 'economic need' hypothesis states that those regions that had less natural resource base, industrial wealth and tax base were prime candidates for relaxing the hardness of budget constraints. The idea that regions should be allocated financial aid in order to equalize living standards has much scholarly support. In a variety of studies the allocation of Russian federal grants is associated with such variables as per capita income change, unemployment, aged housing, change in population and employment (Freinkman and Haney 1997, Popov 2001, Hanson 2000, Thiessen 2006).

I include four variables that capture the regional 'need' for softening the budget constraints. Among Russian regions, a few are small, remote, backward in economic terms, and dramatically lacking in human capital to pursue independent economic and fiscal policy. Regions vary enormously with respect to the development of their industrial base, modernity, and living standards. For some considerable time to come, a majority of poor regions, such as Ingushetia, Tyva, Koryaksky, Chukotsky, Aginsky-Buryatsky okrugs will be recipients of the federal budgetary aid. The first measure is *per capita gross regional product* in 1996, and if it is correct that SBC are 'supplied' to 'neediest' regions, the expected association between this predictor and the outcome variable should be negative.

6.2.4 Economic need: share of state in regional economy

The failure in 1995-1996 to translate tight money into the elimination of SBC on producers can be attributed to the close link between governors and managers of large enterprises in the regions via hidden subsidies (non-monetary settlements, growth of arrears in both tax and energy payments). By 1996, the privatization process was in its final stage: the major method of privatization was no longer voucher privatization, but cash sales of shares and cash auctions, while mass privatization was over. Many of the enterprises which were still in state hands were low-profit and often insolvent, and remained un-privatized mostly because of the lack of potential buyers.[85] Other state-owned enterprises were less profitable since they supported social infrastructure and provided key public services at regulated prices. The greater share of the state in industrial production in the regional economy put pressure on the federal government to 'alleviate need', and redistribute resources to the benefit of those regional governments with less 'ability to pay' (Treisman 1996, 312).

6.2.5 Economic need: share of federal property

Closely connected to the previous variable is that of the relative share of the federal property in regional economy. The reason why SBC conditions were imposed on regions with a higher density of federal property is the protracted responsibility of the federal state towards federal enterprises inherited from the old Soviet system. In the Soviet economy, the state created a system of strategically important enterprises, which operated under SBC from the outset and throughout their lifetime. The state distorted prices at both ends of such an enterprise by fixing low prices of input goods and high prices of output. The state not only set favorable prices for such enterprises, but provided them with needed resources, if they were scarce, and guaranteed the purchase of their end product, even if it was in low demand. Even as late as 1996, the state continued to support these noncompetitive but strategically important enterprises. Their failure would trigger catastrophic social problems, such as explosion of unemployment and ruin of social infrastructure and benefits provided by such enterprises. Both failures would bring enormous social tensions that the federal state could have found difficult to bear.

[85] Majority of them were insolvent, either because they were operating with obsolete equipment, obsolete labor force, or because their managers made them insolvent via asset stripping and diversion of profits.

In the Soviet-type economy, financing of health care, pension payments, education, housing, and communal services were borne by the state, and in many cases strategically important enterprises shouldered a substantial part of these expenditures. They continue to fulfill quasi-state functions of social support to the employees and their families, especially in housing, pension payments and communal services. In addition to this they were socially obliged to absorb redundant labor force, for which funds were put aside specifically for the purpose of maintaining additional workers. As noted by Sinelnikov-Murylev et al, the federal enterprises that "have to fulfill such obligations, will seek different privileges from the state, like tax preferences, deferrals and exemptions, budget subsidies, low interest credits, abolition of restrictions of monopolistic activities… [D]istortions existing in the tax system … were caused by the states seeking to maintain their presence in the economy in this form to assist the enterprises trying to meet social obligations" (2006, 14).

6.2.6 Economic need: low net profit

To interpret this result, it is worth making brief reference to the basic features of interregional fiscal relations. According to the Basic Principles of Taxation Law, the most important taxes are shared between the levels of the budgetary system, and the majority of the revenues at both federal and regional levels in 1996 came from shared taxes. The Table 6.1 shows the breakdown of the core taxes between the levels of the government as well as structure of the tax collections on the federal and regional levels.

Table 6.2 Official Sharing Rates of Revenue from Taxes and Share of Taxes in Budget Revenues

Taxes	Sharing rate		Share in total tax revenues, %	
	Federal	Regional	Federal	Regional
VAT	75	25	46.5	16.5
Profit tax	37	63	14.9	25.2
Excises	50-100	50-100	20.7	3.2
Personal income tax	10	90	2.3	20.2
Export import duties	100	0	10.4	0
Property tax	0	100	0	14.2
Other taxes			5.2	20.7

Source: Regiony Rossii: Finansovye Aspecty Razvitiia 1997

These figures emphasize the importance of profit tax for the regional budgets; in 1995 the share of this source in total tax collections was as high as 40%. Even though in 1996 this share dropped to 25.2%, it still accounted for the largest contribution to the regional budgets.

Decline in the profits of the regional enterprises has a direct negative effect on the tax collections in this region, which created 'supply side' pressure on federal government to redistribute transfers to their benefit. If the state continued to redistribute resources away from more profitable regions, the regression coefficient will have a negative sign.

6.2.7 Economic need: development of social infrastructure

Treisman (1996, 311) argues that most of the Western indicators of regional need are poorly suited to the Russian case, and suggests using three indicators of social need especially appropriate to capture Russian variability between the regions: underdevelopment of the social infrastructure, urban-rural mix and the profits per capita. I include two of these in my analysis, since in my view the urban-rural mix is somewhat duplicative of the indicator of the development of the social infrastructure.[86] Profits per capita indicator is equivalent to the above mentioned net profit indicator; below is the description for the indicator of development of social infrastructure.

Using the same methodology as in Treisman's work in constructing the variable of underdevelopment of the social infrastructure, I constructed a measure of development of social infrastructure, based on the values of four variables: average housing space per capita in 1996, the number of doctors per ten thousand inhabitants in 1996, the number of hospital beds per ten thousand inhabitants in 1996, the number of land telephone lines per hundred urban families in 1996.

In order to economize on degrees of freedom, I compiled these variables into a single index. Using the method suggested by Treisman, I compiled a weighted sum of these terms. In order find weights for each measurement I ran factor analysis, and used factor loadings as weights, presented below in Table 6.3.

[86] Treisman argues that rural areas were disadvantaged in terms of inadequate electrification and transportation, which can be fairly well approximated by the index of social infrastructure, since all four variables, composing the index will capture the urban-rural dichotomy.

Table 6.3 Weights for the Index of Social Infrastructure Development

Variable	factor loadings
Average housing space per capita in 1996	0.368
The number of doctors per ten thousands inhabitants in 1996	0.517
The number of hospital beds per ten thousands inhabitants in 1996	0.248
The number of land telephone lines per hundred urban families in 1996.	0.997

6.3 Results of the regression analysis

I run simple bi- or multivariate regression models, which are described as follows:

$$SBC_i = ß_0 + ßX + \varepsilon_i \qquad (i = 1,\ldots, N, j=1,\ldots,K) \qquad (6.1)$$

Where SBC_i denotes the level of SBC for i^{th} region, $ß_0$ –an intercept, ß - vector of coefficients with *k* elements, **X** is the matrix of explanatory and control variables, and ε is a random error. The results are shown in columns 1 to 11 of Table 6.4.

First, I find the impact of each regressor on the variable of SBC separately, without controlling for other variables. Second, I run multivariate regressions, with eight or nine regressors, the first (two) regressor(s) representing each explanatory hypothesis in turn, and seven control regressors. Third, a full model with all explanatory and control variables together is performed, the estimates for which are shown in the last column in the Table 6.4.

Table 6.4 What Explains Softer Budget Constraints in Russian Regions?

(Dependent variable is index of SBC)

Models	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Growth of the share of the public employment in total employment, between 1994 and 1995	55.52	33.9										32.0
	(3.1)	(2.9)										(2.7)
Wage arrears, due 11.1996	0.07	0.03										0.02
	(5.07)	(2.9)										(1.7)
Vote for Yeltsin in a second round 1996,%			0.042	0.013								0.02
			(2.48)	(1.6)								(1.2)
Vote for the left parties in Duma					-0.03	-0.001						0.01
					(-1.3)	(-0.01)						(0.7)

elections in 1995												
Margins of victory (defeat) in presidential elections,%						0.02						
						(2.3)						
Administrative status							1.5	0.69			0.4	
							(3.4)	(2.6)			(1.3)	
Early signing of bilateral treaties									-0.75	-0.2	-0.24	
									(-2.4)	(-0.9)	(-1.2)	
Controls:												
Net profit of regional enterprises, thousands rub. per capita		-0.0003		-0.0004		-0.0004		-0.0005		-0.0004	-0.0003	
		(-1.7)		(-2.2)		(-2.3)		(-2.7)		(-2.0)	(-1.7)	
Index of development of social infrastructure		0.002		0.0003		0.0004		0.0004		0.003	-0.0007	
		(0.5)		(0.6)		(0.8)		(0.9)		(0.6)	(-0.2)	
Regional representative in Duma's Commission		0.09		0.15		0.14		0.15		0.15	0.19	
		(0.4)		(0.6)		(0.4)		(0.6)		(0.6)	(0.8)	
Share of federal property in a region		0.09		0.1		0.08		0.1		0.08	0.13	
		(1.2)		(1.1)		(0.9)		(1.3)		(0.9)	(1.5)	
Share of state enterprises in regional industrial production		0.23		0.31		0.33		0.28		0.32	0.2	
		(2.0)		(2.5)		(2.6)		(2.3)		(2.6)	(1.8)	
Population		-0.0003		-0.0004		-0.0004		-0.0003		-0.0003	-0.0003	
		(-2.7)		(-2.9)		(-2.7)		(-2.2)		(-2.7)	(-2.6)	
GRP per capita		0.0001		-0.0001		-0.0001		-0.0001		0.0001	0.0001	
		(0.2)		(-0.9)		(-0.3)		(-0.06)		(0.04)	(0.2)	
Constant	-2.27	-1.5	-2.3	-1.3	0.8 (1.2)	-7.7	-0.24	-0.5	-1.2	0.4	-0.6	-2.5
	(-5.9)	(-1.8)	(-2.5)	(-1.4)		(-0.7)	(-1.1)	(-2.1)	(-1.4)	(1.4)	(-0.6)	(-1.6)
R^2 adjusted	0.38	0.57	0.07	0.44	0.01	0.42	0.06	0.13	0.47	0.06	0.42	0.58

Note: t-values in parentheses

A number of interesting results emerge as a result of the regression analysis. The most puzzling is the effect of voting behavior on the regional electorate on the SBC: the effect of the pro-Yeltsin vote, contrary to expectations, was favorable to the softening of budget constraints, but as for the vote to the national legislature, the expected pattern is observable. Regions which cast a greater proportion of their votes for the leftist parties were rewarded more than their counterparts. However, the first trend is much stronger: the regression coefficients for the votes in presidential elections are statistically significant, or close to it, in

any of the models where the variable was present. In models three the t-statistic exceeds two and in the minimal adequate model the estimated effect is highly significant (t-value 3.3). Compared to this, the parameters of the variable of vote to the Duma are more fragile: not only are the estimated effects on SBC of each percentage point cast in favor of the opposition party half as much (in a full model), but it is not statistically significant in all of the models: the t-statistic never exceeds 1.3. Moreover, as later investigation will show, the interaction between the vote for leftist-parties and the growth of public employment bolsters the argument in favor of the 'rewarding political loyalty' thesis.

The effect of the pro-Yeltsin vote on SBC conditions is quite stable: even if all controls are included, the residual effect of the votes for Yeltsin in presidential elections is nearly significant (t-statistic 1.6). Moreover, as model seven shows, the sign and significance of the variable of margins of victory (t-statistics 2.3 and positive sign) indicate that this pattern was reinforced: the most loyal regions (with greater margins) were rewarded with softer budget constraints.

The hypothesized effect of the variable of 'early signing of bi-lateral treaties' is clearly rebutted by the data. Contrary to expectations, the earlier the region signed the treaty, the *less* likely it is that it was granted SBC conditions. The result is highly significant (-2.4) in the bi-variate model and remains so even when controlled for the republican status (t-statistics -2.53), however the effect loses its significance once controls are included (-0.9). How can this be explained? In his later book, Treisman (1999) united several indicators under the umbrella concept of 'protest activity', namely the vote against Yeltsin and his allies, sovereignty declarations, separatist gestures, failure to support in moments of crisis. These activities enabled region leaders to make credible threats to disrupt central priorities if regional demands were not met (Treisman, 1999). However, by 1996 the federal center was different from what it was in 1993.[87] In 1992-1994 the key concerns of the center were defusing the

[87] In the years 1992-1994, instances of 'protest activity' were numerous: Sverdlovsk governor E. Rossel declared a new Ural's republic in November 1993, Tatar president M. Shaimiev publicly declared his republic's sovereignty, and three-quarters of the population either rejected, boycotted or failed to reach quorum on the national referendum on the Constitution in late 1993. The regional elections 1993-1994 were disappointing for the presidential administration, as in early 1993 his appointees lost to the KPRF in elections in Orel, Smolensk, Penza, Chelyabinsk and Briansk oblasts (Vishnevsky, 1994, 8). By the 1996 such instances of obstructive measures ceased from the political agendas even most powerful regions.

defective momentum of those regions which employed a repertoire of declaring their provinces autonomous, refusing to remit taxes, claiming natural resources, suing federal institutions in courts, withholding grain supplies or refusing to send conscripts to serve in the army. But by 1996 the powers of the center were more consolidated, and the regions were not able to pose a threat to obstruct institutional rules without considerable costs. The center's attitude changed from appeasing politically recalcitrant regions to rewarding loyal ones. This new attitude of the central government also explains why there was no correlation between opposition parties and SBC conditions. If the presidential administration had had the intention of rewarding the regions which pleased it by pro-central voting in Duma elections, it would have faced difficulties in identifying them.

The results of the Duma elections were very disappointing for the central government: the party of power, "Our Home is Russia" came only third with 10.3 percent, while its old rival, KPRF, came first with 22.7 percent (99 seats), which together with votes won in single-member districts 14.3 percent (58 seats) formed a basis for a red-brown parliamentary majority for the next four years. [88] Without having a solid electoral base, it would be far from optimal for the central authorities to base the rewarding principle on the share of pro-government votes in the Duma elections. To take into consideration the voting patterns for the Duma elections would be understandable, had the center adopted the strategy of pacifying troublemakers, but it proved to be unfeasible when the strategy was the opposite, namely to appease loyal regions.

The evidence supporting the hypothesis of difference in bargaining power due to administrative status and size is mixed: one would normally expect both republican status and the size of the region in terms of population to have positive effect on the likelihood of receiving SBC conditions, but this was in fact only partially supported. The data suggest that the role of administrative status was important in softening of budget constraints, but not the size of the unit. Model seven demonstrated a highly significant positive effect of republican

[88] The fragmented party system of Russia prevented the votes for other left parties from being represented in the Duma. A considerable share of votes was cast in favor of them among the regions, with median share of 33 percent and standard deviation of 12 percentage points, while for the party of power the variation was between 28.6 (Tatarstan) and 4 percent (Chukotka)[88]; the median vote was only 8 percent (standard deviation being 6 p.p.). With a voter turnout of 64.4 percent, the proportion of the regional electorate who were actively supporting Our Home is Russia in the Duma elections shrank to 4.5 percent.

status on the SBC conditions (3.4), and it remains high when all the supply side controls are included (t-statistics 2.6 in model nine). The estimated effects of this variable also remain significant, though to a lesser degree (1.6), in a final minimal adequate model. The effect of the population size is quite robust: in all models the t-statistic is well above two, reaching a massive 3.9 in the minimal adequate model. But the sign of the estimated effect is the opposite of what was expected. This means that the big regions did not play their importance card in a bargain with the center. In fact, the relatively small regions were more likely to receive SBC conditions than their more populous counterparts. However, this can be confounded by the fact that most of the small regions are located in the north of the country with harsh climatic conditions. Out of 34 regions with a population equal to one million inhabitants or less, two-thirds (21 regions) were northern regions, which suggests that geographic disadvantages rather than the size of population made them prime candidates for receiving SBC. This evidence is hardly conclusive, however, and is open to further research.

Among the control variables, measurements of the presence of representative in Duma commission, social infrastructure, and gross regional product all fail to explain interregional variation in the level of SBC.

The variable of the pork-barrel politics was one of the Treisman's variables for 'access to bargaining'.[89] The significance of this variable in defining the level of SBC was not supported empirically: the fact that a region has a representative in the Commission on Budget, Taxes, Banks and Finances did not have any statistically significant effect on the SBC level. The possible explanation could be that actual access to decision making cannot be measured by the formal signs of access, i.e., by the event of permanent representative in presidential administration, or in parliament's budget committee. My research shows that the parliament channel was not effective for eliciting fiscal privileges.[90]

[89] Additional measures of 'access' used by Treisman were visits by senior officials, and permanent representative under the President or Russian Council of Ministers, which were omitted in this study due to the lack of data.

[90] This finding is in line with the arguments made by the chair of the upper house in 1992-1993 Ramazan Abdulatipov, who noted that lobbying via this channel was largely ineffective. Based on his experience, he stressed that the complicated process of getting legislation passed made it difficult for deputies to sneak in benefits for their region. He also noted that contacts necessary to elicit SBC were informal rather than formal.

Evidence in favor of the 'economic need' hypothesis is far less clear. While the development of social infrastructure and gross regional product failed to have any visible impact on SBC, the level of state industrial production, share of the federal property and net profits of enterprises in the region all did show significant association with the level of SBC. It can thus be stated that the redistributive pattern of net federal transfers followed the logic of the 'neediest benefit most' to a certain degree. This finding is in line with the results reported by Kuznetsova et al. (1999), and Popov (2001), who also found evidence to show that transfers from FFSR had an equalizing effect. The federal center, to some extent, was doing what it was supposed to do, 'redistributing income from relatively [wealthy] regions to poorer, and from better performing to worse performing' (Popov 2001, 876). The government undertook a mission to mitigate differences in income, and actually mitigated them.

The *net profit* of regional enterprises forms a base for the tax, which accounts for a larger part of revenue compared to any other tax in regional budgets. The low-profit regions had a relatively smaller base for this tax, which in turn created the need to compensate this gap in budgetary revenue. The federal willingness to fill this gap is evident from the significance of the corresponding variable in regressions: the t-statistic drops below two only in the full model and in the model with variables of public employment. The level of the *federal property* has a stable but much less significant effect (t-statistics vary between 1.5 and 0.9), however, it is present in the minimal adequate model with a nearly significant estimate (1.7).

As the data suggest, among the control variables, the share of state enterprises in industrial production is the second best predictor of the level of SBC, after population size. The share of state enterprises in industrial production in the minimal adequate model demonstrates a strong effect on SBC conditions (t-value 3.7), and the corresponding regression coefficient bears the expected sign.

The minimal adequate model, which is shown in the last column in the Table 6.5 below, represents the final form of the equation. It is derived from the full model (exposed in the column beside it) by step-wise deletion of least significant terms.

Table 6.5 What Explains Softer Budget Constraints in Russian Regions? Full and Minimal Adequate Models. (Dependent Variable is Index of SBC)

	Full Model	Minimal Adequate Model
Growth of the share of the public employment in total employment, between 1994 and 1995	32.0	66.8
	(2.7)	(4.3)
Wage arrears, due 11.1996	0.02	
	(1.7)	
Vote for Yeltsin in a second round of presidential elections in 1996,%	0.02	0.04
	(1.2)	(3.3)
Vote for the left parties in Duma elections 1995	0.01	
	(0.7)	
Administrative status	0.4	0.57
	(1.3)	(1.6)
Early signing of bilateral treaties	-0.24	
	(-1.2)	
Controls:		
Net profit of regional enterprises, thousands rub. per capita	-0.0003	
	(-1.7)	
Index of development of social infrastructure	-0.0007	
	(-0.2)	
Regional representative in Duma's Commission	0.19	
	(0.8)	
Share of federal property in a region	0.13	0.19
	(1.5)	(1.7)
Share of state enterprises in regional industrial production	0.2	0.6
	(1.8)	(3.7)
Population	-0.0003	-0.0004
	(-2.6)	(-3.9)
GRP per capita	0.0001	
	(0.2)	
Constant	-2.5	-2.9
	(-1.6)	(-4.0)
R^2 adjusted	0.58	0.54

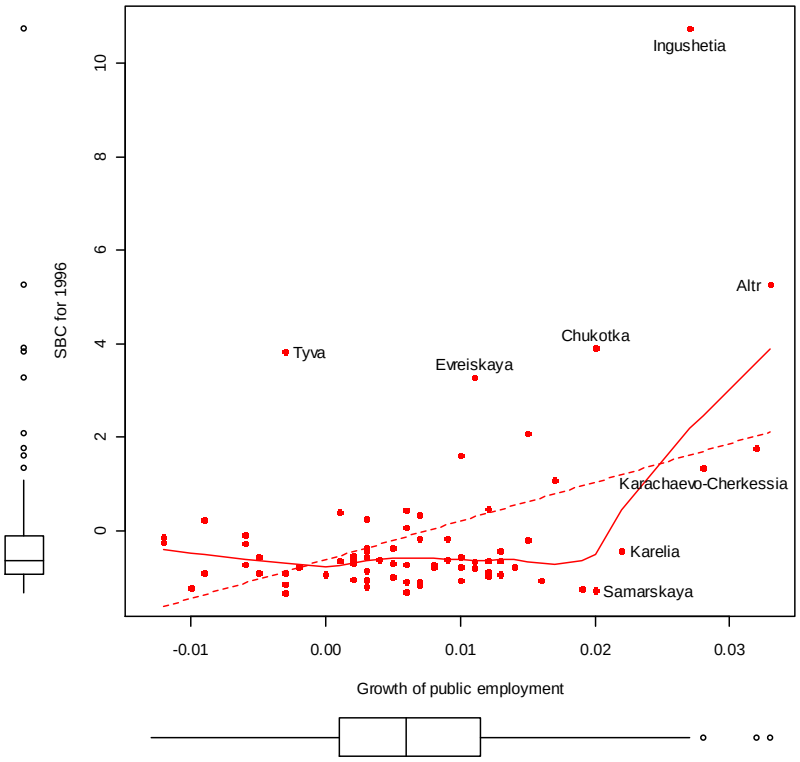
Note: t-values in parentheses

Each deletion was tested using F test, and was validated if the variable to be deleted does not significantly improve model. The minimal adequate model consists of only six variables, the variable of share of the public employment in total employment being the most influential. This is the most important result in all model specifications: in 1996 the higher rate of growth

of public employment in the previous year very reliably predicts the rising transfers and loans from the federal center relative to collected tax. By 1996 regional governments continued to seek ways of boosting their capacity vis-à-vis the center, as a "capacity to harm the other party without conferring excessive harm on oneself" (Elster 1992, 175). As demonstrated by the statistical analysis, inflation of public employment was a more stable bargaining chip in the center-periphery game than Treisman's factors, because it indicated a permanent threat of public upheaval in the case of under-financing of the region. This variable, together with the variable of accumulated wage arrears accounts for the 38 percent of the total variation in the level of SBC, - more than any other of alternative explanations (republican status and bi-lateral treaties together account for 24 percent, and the voting patterns account only for 6 percent). Moreover, in the minimal adequate model the effect of the growth of the public employment is even more impressive, with massive t-value of 4.3.

This result supports the hypothesis of the causal relationship between public employment and SBC: "Governors may have consciously chosen to boost… local education, health and administrative payrolls in the hope of attracting greater federal financial aid' (Gimpelson et al. 2000, 25). Public employees were effectively 'hostages' who were used in fiscal bargaining with the federal center. One of the key mechanisms of the softening of budget constraints was the mounting up of wage arrears in public establishments. The accumulation of overdue wages made the sector prone to strikes and facilitated their spread across the economy. The federal authorities were vulnerable in the bargaining game against those regions who could threaten them with a likelihood and scale of strikes whose magnitude depended on the level of public employment. The undercurrent of this game as a game of subtracting conditions of SBC is supported by the fact that those transfers earmarked for alleviating wage arrears were, more often than not, not used for that purpose (Gimpelson et al. 2000, Enikolopov et al. 2002). It was in governors' interests, and they had the means, to keep some arrears unpaid, but instead invest part of the proceeds in inflating the public sector even more. Figure 6.1. below graphically demonstrates the pattern of association between the SBC and public employment variables.

Fig.6.1. Dependence of the Soft Budget Constraints Index on the Growth of Public Employment for the Russia's Regions, 1996



Sources: Goskomstat Rossii

Notes: Growth of public employment between 1994 and 1995 in percentage points. The least squares regression line (dotted, regression coefficient 82.57, t-statistics 4.17) and non-parametric (solid) regression line are overlaid. On margins: box-and-whisker plots, indicating interquartile range (box), median (line inside a box), minimum value (end of line close to the zero point) – the smallest value, but not smaller than 1.5 times than the value for the first quartile, maximum value (end of line away from the zero point) – biggest value, but not bigger than 1.5 times value for the third quartile, and outliers.

6.4 Model diagnostics

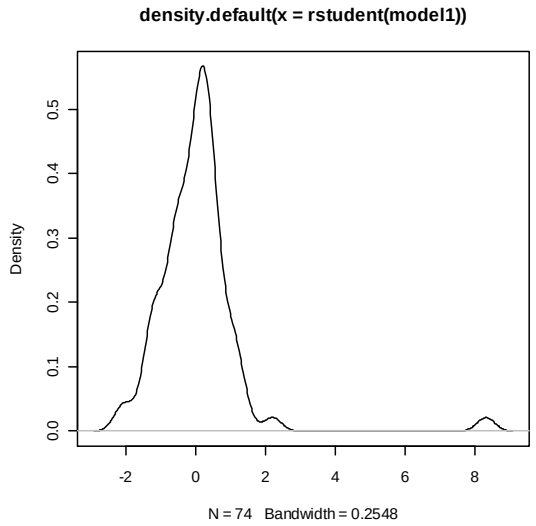
The model diagnostics will proceed in the following order: firstly, the normality of error term will be examined, then the model will be tested for heteroscedasticity and influential outliers. Finally empirical remedies will be suggested for improving the fit of the model.

6.4.1 Normality of errors

The distribution of the residuals as a way to discover the distribution of errors may be done in several ways: first, a non-parametric density histogram, presented in Fig. 4.3. The histogram

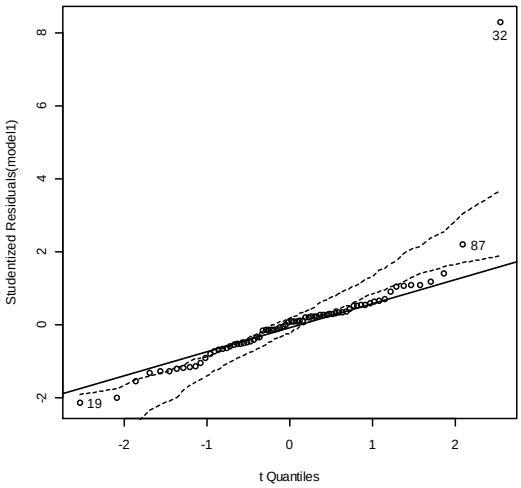
clearly diagnoses deviation from the normality of the distribution of errors in the minimal adequate model, while the main body of the errors approximates the normal distribution, slightly leptokurtic in character, the small hump in the area around the ninth standard deviation indicating the presence of the outlier(s).

Fig. 6.2 Non-parametric Density Estimates for the Distribution of Studentized Residuals in the Minimal Adequate Model (Linear Regression with Six Predictors).



The next graph, a quantile-quantile plot of studentized residuals against t-distribution (Fig. 4.4), illuminates the tail behavior of the residuals: it is positively tailed, which can be corrected by transforming the response variable, but the exact power is better found using the method described below. While visualizing deviation from normality as does the previous graph, it also localizes the observations that differ abnormally greatly from the fitted values. As in the previous chapter, the outlying observation (32nd) is the one for Ingushetia. The abnormally high degree of softness of budget constraint was caused by the imperfection in the suggested measurements of SBC, which caused overvaluation of the degree of SBC for that republic.

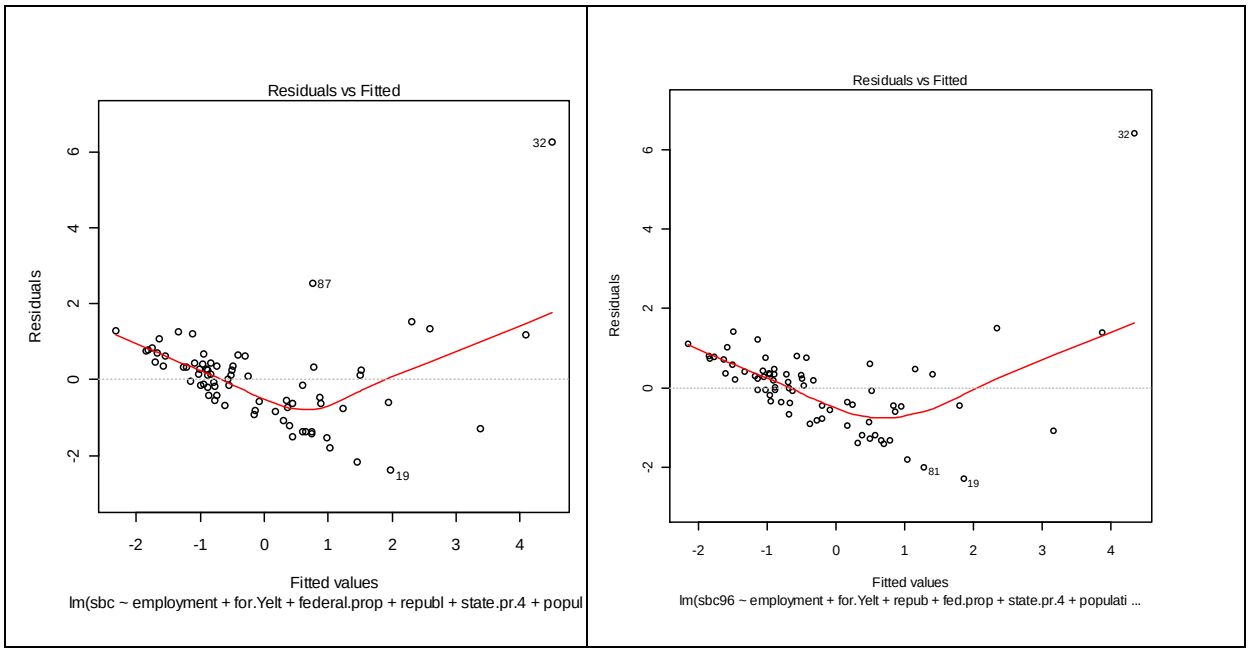
Fig. 6.3 Quantile-comparison Plot for the Distribution of Studentized Residuals from the Minimal Adequate Model (Linear Regression with Six Predictors)



6.4.2 Homoscedasticity

The homoscedasticity requirement demands that the residuals should display constant variance regardless of the level of the value of residuals. Along with visual ways of diagnosing heterogeneity of variance by plotting the standardized residuals against fitted values, see Figure 6.4, I used the Breusch-Pagan test (1979).

Fig. 6.4 Plot for the Residuals vs. Fitted values for the Minimal Adequate Model (Linear Regression with Six Predictors)



The shape of the scatter resembles a funnel, a clear sign of heteroscedasticity. This diagnosis is supported also by the Breusch-Pagan test, which shows that the residuals are homogeneous with the probability of less than 0.0001 (see Table 6.5 below, first column).

6.4.3 Remedies to the misspecified model

6.4.3.1 Introduction of an additional hierarchical level

In the same way as in chapter five, I suspect non-independency of errors, and try to circumvent the problem by introducing an additional error term. By adding a variable vector that indicates an economic district to which an observation belongs, I run a mixed-effect model in order to weigh the estimates for between-district variation against those of variation within districts. In this case they show that the former explains about 7.5 per cent of total variation (1.39516 and 0.11317 respectively). Similarly to the previous model, variation between economic districts is not greater than would be expected from differences between regions alone, and therefore the introduction of an additional level to the model as a remedy does not seem reasonable. Importantly, none of the parameter estimates and test-statistics differ substantially from the ones in the non-hierarchical model: see Table 2 in the Appendix.

6.4.3.2 Variable transformation

The tests for heteroscedasticity revealed that for the basic linear regression model with six predictors (found to be a minimal adequate model specification), non-constancy of variance poses a serious problem. One of the typical ways to stabilize the variation in residuals is a power transformation of the response variable. As the previous test of normality of errors suggest, the model is likely to benefit from a shift down the ladder of the powers for the response variable. The exact power can be found using the Box-Cox transformation procedure built in the R environment. Using it I found a value for lambda that maximizes the likelihood of the model, given the data. The value is close to -1.8 (see Fig. 6 in the Appendix), which gives the following look to the model's formula:

$$(SBC^{-1.8}-1)/-1.8 = ß_0 + ß_j\boldsymbol{X} + \varepsilon \qquad (i = 1,\ldots, N), (j=1,\ldots,K) \qquad (6.1)$$

where SBC denotes the level of development of soft budget constraints, $ß_0$ –an intercept, $ß_j$ - vector of coefficients, $\boldsymbol{X}$ is the matrix of k explanatory and control variables, and ε is a random error term for regions i = 1,…N.

The regression estimates of the polynomial model with the Box-Cox transformation revealed that only two of them are statistically significant: those for employment and population. When I ran the same regression with these two variables only, the fit of the model significantly improved (heteroscedasticity test 5.2 against 11.6), while the proportion of explained variance decreased only by 3 per cent: R squared adjusted 0.66 and 0.69 respectively for models with two and six predictors).

The next strategy in trying to stabilize error variance involves using weighted least squares (WLS) instead of ordinary least squares. The value of public employment was the most significant regressor in all the previously specified models, and there is a high chance that the error variance is proportional to the level of employment. Therefore a reasonable move would be to fit the model weighing each observation inversely in proportion to the level of the growth of public employment.[91] Since the program returns an error message for negative values, I added 0.015 to each value of the employment change, so as to offset the minimal value of the growth [-0.013] (which is 1.3 per cent reduction in public employment).

Running the model with WLS brought the following results: the explained variance decreased from 54 to 50 per cent and, most importantly, the target was not achieved in that heteroscedasticity was not reduced, the Breusch-Pagan test remaining 22.7 (p=0.0001), as in OLS model, therefore the hypothesis of the proportionality of the error variance and the value of the growth (decline) of public employment was not supported by the data.

The next step is to use the method suggested by White (1980) and introduce heteroscedasticity-consistent standard errors. In this test, the F tests for the heteroscedasticity-consistent variances for voting for Yeltsin, republican status, and share of state enterprises in industrial production lost considerably in statistical significance (see Appendix, Table 4). Therefore, it seems reasonable to leave only three or even two predictors in the model. The estimates for the two models, with three and two regressors, show that these models lost approximately half of the explanatory power compared to the one with six predictors. However, the model with three predictors (employment, federal property and population) is the one, where the fit of the model complies with the requirement of homogeneity of variance, Breusch-Pagan test is not significan at level 0.1.

[91] The procedure is presented in Fox (2002, 209)

Table 6.5 summarizes the results of regression diagnostics for the six models in question, together with the slope estimates for the two predictors of the SBC, the change in public employment and vote for Yeltsin in the presidential elections, which were chosen in accordance to two main sub-hypothesis.

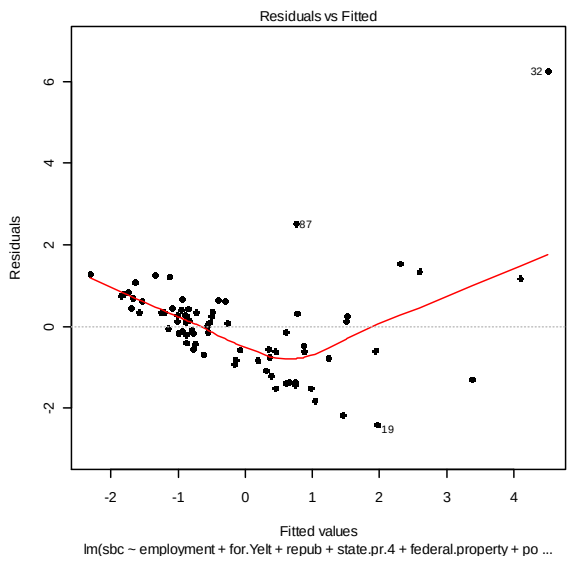
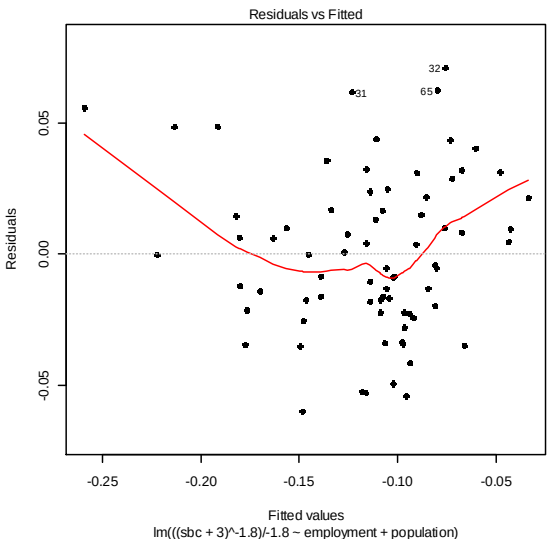
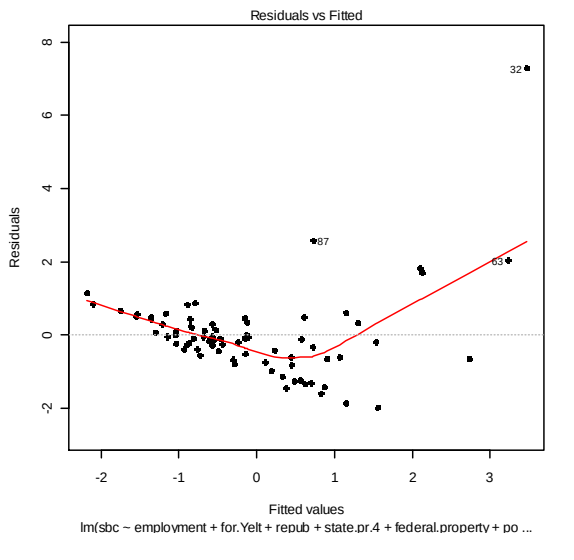
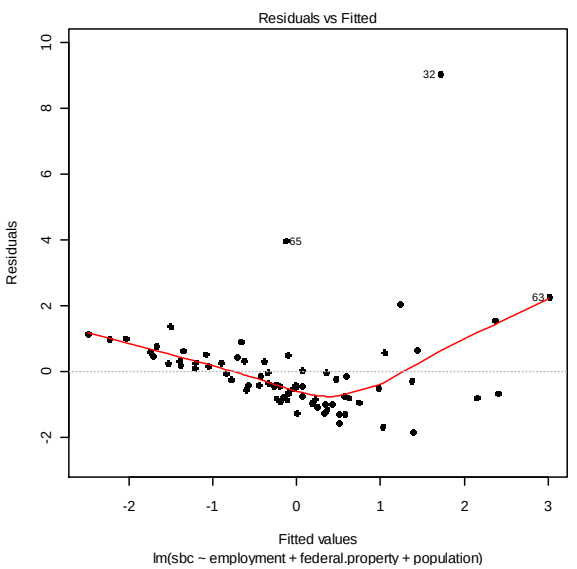
Table 6.5 Regression Diagnostic Estimates for Six Different Model Specifications

	OLS with six predictors	Polynomial OLS with six predictors	**Polynomial OLS with two predictors**	WLS with six predictors	**OLS with three predictors**	OLS with two predictors
Model	(1)	(2)	**(3)**	(4)	**(5)**	(6)
Regression coefficients for	66.8	1.1	**1.2**	43.9	**80.1**	74.8
Employment	(4.3)	(2.9)	**(3.1)**	(3.7)	**(4.3)**	(4.1)
Regression coefficients for Voting	0,04	0.0004	**-**	0.03	**-**	-
	(4.3)	(1.3)		(3,2)		
Breusch-Pagan homoscedasticity	22.7	11.6	**5.2**	22.7	**5.6**	6.3
test	(0.001)	(0.07)	**(0.07)**	(0.001)	**(0.13)**	(0.04)
AIC	247.9	-305.2	**-300.8**	220.85	**272.2**	272.4
Residual standard Error	1.22	0.03	**0.03**	7.34	**1.46**	1.47
R adj	0.54	0.69	**0.66**	0.55	**0.34**	0.33

Note: t-values in parentheses

The next four plots (on Figure 6.5) give a comparative overview on the scatter of the residuals vs. fitted values for the four most plausible models at hand: basic linear regression with six predictors, which was arrived at by step-wise deletion of variables, using *anova* operand; the polynomial model arrived at using Box-Cox power transformation of the response variable, weighted least squares (WLS) regression with six predictors, and the basic linear regression with three predictors (three other regressors were eliminated from the model as their heteroscedasticity corrected standard errors were too big). It is clear that the best two shapes of the scatter are present for the polynomial regression with two predictors, and basic regression with only three regressors. The decision as to which is better in describing the data on Russian regions depends on the selected priorities: if one prioritizes the reliablity of t-statistic and predictive power of the model, then the best model would be the basic regression with three predictors. If priority is given to the model with the highest explanatory power, then the polynomial regression would be the best choice. What is clear from the comparison of parameter estimates in all models is that the employment variable is one of the best predictors: it has the largest t-statistics in all models, but one: in polynomial regression the population level is the best predictor of the level of SBC.

Fig. 6.5 Heteroscedasticity Diagnostics for the Four Different Model Specification

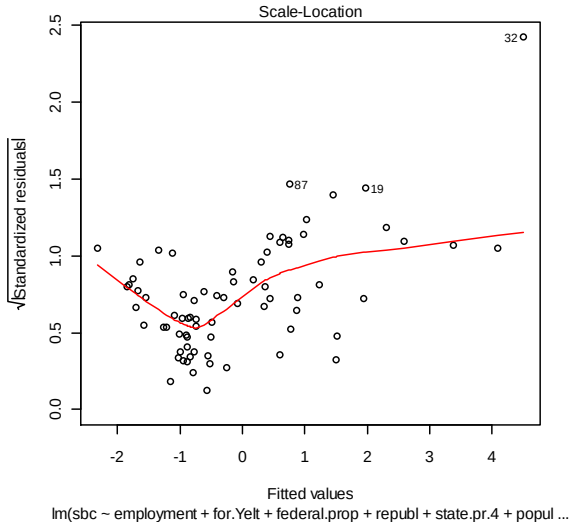
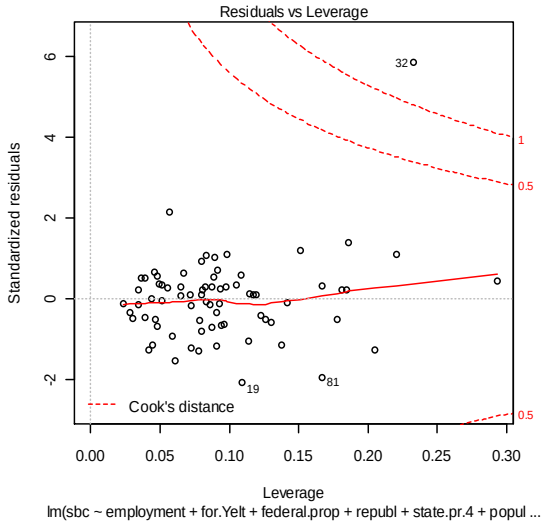
Panel A. Minimal adequate linear regression model	Panel B. Polynomial regression with two regressors
	
Panel C. Weighted least squares (WLS) regression with six regressors	Panel D. Linear regression model with three predictors
	

6.4.3.3 Removal of high-leverage points

The problem of lack of goodness of fit is often circumvented by identifying influential observation(s), justifying their isolation from the data set, and running the model on a reduced data set. Following this logic, I identified the troublesome observation using the graph that

plots fitted values vs. residuals, which localizes observations with largest residuals, and residuals vs. leverage plot, which identifies points with highest leverage (the formula for leverage was described earlier, in section 5.6.6.1) (Panel B on Figure 6.6)

Fig.6.6 Diagnostic Plots for Identifying Influential Points

Panel. A. Fitted values vs. Residuals for basic OLS regression with six predictors	Panel. B. Leverage vs. Residuals for basic OLS regression with six predictors
	

Both graphs identify observation number 32 as a highly influential point, which happen to be the same as in the previous chapter, due to the overvaluation of the level of SBC for that region. As the explanation of the rationale for excluding it is presented in section 6.6.6.1, I proceed straight to the description of regression estimates and regression diagnostics for the models for a sample without Ingushetia.[92]

Table 6.6 below reports results of regression diagnostics for the six models in question, together with the slope estimates for the two potential predictors of the SBC which were run for a smaller sample without the observation for Ingushetia.[93]

[92] The Fig. 2 in Appendix shows that with the deletion of observation 32, other points became outliers: 86, 62, 64. However, they are not very influential points: even though they contribute to increasing of error mean square, thay do not distort the regression equation.

[93] I identified the set of regressors which has unacceptable level of heteroscedasticity corrected standard errors; it was different from the one identified for the full sample in that it excuded the variable for vote for Yeltsin,

Table 6.6 Regression Diagnostic Estimates for Six Different Model Specifications (Sample without Ingushetia)

	OLS with six predictors	Polynomial OLS with six predictors	**Polynomial OLS with two predictors**	WLS with six predictors	**OLS with four predictors**	OLS with two predictors
Model	(1)	(2)	**(3)**	(4)	**(5)**	(6)
Regression coefficients for	47.5	0.98	**0.9**	30.7	**51.7**	45.1
Employment	(4.2)	(2.6)	**(2.5)**	(3.3)	**(4.3)**	(3.7)
Regression coefficients for Voting	0.02	0.0003	-	0.02	**0.02**	-
	(2.1)	(0.9)		(2.8)	**(2.1)**	
Homoscedasticity test	25.5	11.7	**4.6**	25.5	**9.5 (0.05)**	9.1
	(0.001)	(0.07)	**(0.10)**	(0.001)		(0.01)
AIC	193.5	-302.4	**-301.9**	180.7	**201.8**	207.7
Residual standard Error	0.85	0.03	**0.03**	5.7	**0.90**	0.97
R adj	0.55	0.68	**0.66**	0.52	**0.48**	0.42

Note: t-values in parentheses

The findings reported in the table above and in Table 3 in Appendix show that the same six models run on the sample without Ingushetia have a somewhat better fit as far as the heteroscedasticity problem, predictive power, and the level of explained variance are concerned. All regressions run for the sample without Ingushetia consistently exhibit smaller error variance, smaller AIC and larger explained variance in the response variable. The difference in the share of explained variance due to the omission of only one observation is especially noticeable in the case of the model whose regression estimates are statistically significant after the heteroscedasticity correction of standard errors is taken care of (model 5). This model, the basic linear regression model with four predictors, explains 48 per cent of the total variance in the response variable, which is much more than the analogous model run on a full sample (33 per cent). This improvement cannot be due only to the additional variable, as the two identical models (model 6), performed on different data sets, produce markedly different results: the one for the full sample explains 9 per cent less variance than the regression run on the reduced sample.

However, for a sample without Ingushetia, the polynomial regression model (3) exhibits the best behavior of residuals, and also explains a greater share of variation than any other model.

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hence the model that was specified regarding the heteroscedasticity corrected standard errors includes four (not

While the model with six predictors (2) explains an even larger share of variance, it should be treated with caution, as its residuals show a degree of inconsistency of variance.

If one compares R squareds between analogous models run for the full and reduced samples, in all but one model (2) the share of explained variance increases by two or more percentage points with the deletion of the influential point. The exclusion of Ingushetia caused the variable of public employment to decrease both in effect size and statistical significance, consistently for all models, but so they do for its hypothetical rival, the variable of political loyalty to Yeltsin. In all cases, though, the estimates for the variable of employment are robust: the test-statistics never falls below 2.5, which cannot be said for the variable for political loyalty: in polynomial specification, and in the models after the heteroscedasticity correction of standard errors is taken into account, the variable is not statistically significant.

The variable of population, in contrast, increases its statistical significance in all models run on a reduced sample, but it is important to note that the regression coefficient for the variable is relatively small in comparison to variable of public employment. [94]

For the sample without Ingushetia, the best fitting model is polynomial with two predictors, while for a sample including Ingushetia two models: polynomial with two predictors and basic linear regression with three predictors may be chosen as best fit; the best predictor in all

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three) regressors.

[94] The level of the regression estimate of the population variable should not be underestimated. The difference between employment and population will not be so striking if we convert the employment variable from its initial format, which is percentage change in public employment (0.013 would mean increase by 1.3 per cent), to the format of the population variable, which is thousands of persons. The change of the variable of employment by one point, would mean growth by from 45.5 thousands to 5million 207.7 thousands depending on the region, with a median value of 590 thousands, the increase by one point in population variable mean increase by one thousand inhabitants. Therefore we should multiply the regression coefficient by 590 in order to bring the two into comparable scale. Even if we multiply the greatest value of the slope for this variable, which is 0.00058 (in OLS with three or four regressors) by 590, the regression coefficient for population would be 0.342, which is much smaller than the one for the employment (80.1, or 51.7 in these models). And even if we multiply the coefficient by 5207, the value will be 3.02, which is still smaller by one order than the coefficient for employment.

models (with and without Ingushetia) is the level of growth/decline of public employment, if we look for both statistical significance, and magnitude of the effect size.

6.5 Discussion

The analysis of the effect of public employment on SBC conditions for the 1996 year invites further longitudinal analysis. Although the lack of available data makes it impossible to run the same analysis for the subsequent years 1997 and 1998, the data for 1999 suggests that after the financial crisis, regions could no longer use inflated employment and wage arrears in their bargaining game with the federal authorities. Table 6.7 below presents the results of bivariate regression analysis and shows that the regression estimates had become very low, and were no longer statistically significant (t-statistics 0.51 vs. 4.17). The goodness of fit of the models dropped from 18 percent to a fraction of a percent (0.01).

Table 6.7 Decline of the Association between the SBC and Public Employment

	1996	1999	2000	2001
t-value	4.17	0.51	1.74	1.85
β	82	1.67	4.47	2.57
constant	-0.62	-0.14	-0.55	-0.09
R^2 adjusted	0.18	0.01	0.03	0.07

This can be partially explained by the bureaucratic reform that was started in August 2001 by Putin. He signed a directive setting up a Commission, the main task of which was to streamline the state bureaucracy. The list of tasks included ensuring meritocratic advancement, predictability and transparency of promotions, setting up a system of qualification categories, improving the system of pay scales and rewards, and – most relevant for the present discussion – reducing inflated employment. However, the idea of de-bureaucratizing the economy appeared on the presidential agenda much earlier: already in spring 1998 Yeltsin pledged to reduce the size of bureaucratic staff by half (Brym and Gimpelson 2004). Even though his ideas were scarcely implemented, outright inflation of the public sector would have sharply contradicted the presidential agenda. More importantly, the possibility of accumulating unpaid salaries was reduced, as in 1996 central government made a great effort to reduce wage arrears.

Table 6.8 Share of the Budgets in the Socially Oriented Expenditures (1998-2001)

	Federal budget		Regional budget	
	1998	2001	1998	2001
Social services, total	17	27	83	73
Education	13	19	87	81
Public health	9	12	91	88
Social work	56	52	44	48

The year 2002, according to the Center of Fiscal Policy, was the year of greatest level of federal re-distribution activities, when the share of federal transfers to regions reached a peak of 3.3 per cent of GDP (rocketing by 2.5 per cent in three years). This steep growth can be partially explained by the implementation of federal law on increase of the payment to public sector.[95] This concentration of the financial resources on the federal level was associated with an increase of the expenditures for the federal budget. The ratio between the federal, on one hand, and regional and municipal expenditures reached 50:50 and stabilized at this level. However, on the revenue side the ratio is imbalanced: 64:36 in favor of federal budget in 2005. The centralization of the resources led to the deterioration of the fiscal autonomy of the regions: in 2001 regional taxes covered less than 40% of the regional budgetary expenditures and only about 13% of the municipal budgets (Klimanov 2000). The regions have become more and more dependent on the federal help, while the share of federal transfers in regional budgetary revenues has grown from 10 per cent in 1999 to 16-17 in 2001-2004.

6.6 Conclusion

A wide range of studies of Russian fiscal federalism have proved that there is indeed evidence that the federal center tried to placate those regions that opposed it with greater fiscal transfers. Regions that voted for leaders that challenged the federal center, as has been documented, were granted softer budget constraints than their more loyal counterparts. But if in the early 1990s regions which possessed political resources for threatening the federal government were more successful in extracting tax concessions from Moscow, there is little evidence that this continued to drive fiscal appeasement in mid 1990s.

[95] During 2004-2006 the financial transfers to the regional budgets stabilized on the level 13-14 per cent of the expenditure part of the federal budget.

The main claim of this chapter is that the newly collected datasets and more complex models support Treisman's argument that in the mid 1990s this trend was replaced by a bias in favor of politically loyal regions. My analysis shows that the main benchmark for distinguishing on the basis of voting was the level of electoral support for Yeltsin in 1996 presidential elections: regions less loyal to the incumbent president were punished with harder budget constraints.

The important finding of the chapter is that the credibility of threats to disrupt economic integrity of the country continued to be widely used by Russian regions in the mid-1990s. For this reason I preserved Treisman's theoretical underpinning and the construction of variables in my analysis. However, I found that new mechanisms were employed in order to elicit the conditions of SBC from the center. The second finding of the chapter is that inflated and underpaid (or rather wage-delayed) public sector was used as a powerful trump in bargaining for the softer budget constraints.

My analysis explains why Treisman's choice of variables, applicable to inter-budgetary relation in the early 1990s, does not account for the interregional variation in budget transfers in later periods. The level of growth of public employment had become a stable chip in bargaining with the center because it implied a threat of public upheaval in the case of hardening of budget constraints. As I have shown, this variable possesses substantial explanatory power, accounting (together with a variable of the wage arrears) for about 40 percent of the total variation in the level of SBC. This result supports Gimpelson et al. (2000) Gimpelson and Treisman's (2002) hypothesis of the causal relationship between public employment and SBC whereby governors were able to soften budget constraints by accumulating wage arrears for public employees. Gimpelson *et al.* argue that larger federal transfers (not regional revenues from other sources) were strongly associated with larger public employment, and that between 1995 -1998 public employment is a better predictor of transfers then vice versa. My analysis adds to their findings by evaluating the explanatory power of the variable of growth of public employment against the other plausible explanations for SBC, which were not discussed in their research.

The federal authorities were more likely to yield in the bargaining game against those regions who could threaten them with a likelihood of strikes, the magnitude of which depended on the growth of public establishments. Any conclusions offered here need to be tempered by the methodological limitations of analysis: first and foremost, the data processed in the course of the analysis have relatively low information content.

Moreover, the peculiarities of the political situation in mid-1990s in Russia and the short span of the period under investigation mean that precautions are warranted as regards the theoretical contribution of these findings. The expansion of public sector employment is not always an intentional action on the part of regional governments to gain SBC conditions. The growth in numbers may also be explained structural factors such as growth of population. Even if it was an intentional policy of the regional government it would not always lead *de facto* to softening of budget constraints: the nature of economic and political situation of 1996 was particularly conducive of the SBC. The presented reinterpretation of the relationship between the growth of public employment and SBC is present in specific circumstances of nascent markets, with its imbalances, which permitted long spans of wage arrears, budgetary deficits, and large uncontrolled sums of the inter-budgetary transfers to be transmitted.

CHAPTER 7: CONCLUSION

North rightly recognized that it is hard to develop durable, socially desirable institutions. In his words, "[w]e simply do not know how to create efficient political markets. The interface between the economics and politics is still in a primitive state in our theories, but its development is essential if we are to implement policies consistent with intentions" (1997, 16). The goal of the present research has been to contribute to the development of this interface.

The story of marketization in the Russian Federation is one of wide variations in the level of success or failure of individual regions to secure the necessary market institutions. While some regional governments in Russia were more supportive in establishing a market, leading to the consolidation of the economic institutions of a robust market, others behaved in a distinctly more predatory way, stimulating rent-seeking behavior on the part of other actors and hindering the marketization of the economy. The reasons for this variation have proved hard to pinpoint, and have prompted extensive debate amongst scholars, who have attempted to explain the phenomenon using different variables. In contributing to this debate, the present research has sought to shed new light on the problem of the lack of robust market institutions by addressing the role of growth in promoting the institutions of federalism.

Chapter two provided the foundation for the subsequent empirical analysis by summarizing the relevant findings from previous work, drawing on three bodies of academic literature (studies of market making states, studies of federalism, including theories of fiscal federalism, and studies of soft budget constraints) which provided a framework for the ultimate objective of the thesis. The empirical literature on transition has extensively observed the impact of policy choices on economic growth, viewing these policy choices as exogenous to economic performance and institutional settings. This attitude overemphasizes the importance of the progress of reform measures vs. institutional capacity/change measures. As Roland has pointed out, it is more important to understand the more general conditions, such as initial endowment with natural, human and infrastructural capital, or development of democratic institutions, that motivate or constrain these policy choices. A new strand of research emerged that sees economic performance as function of growth-promoting political and economic institutions (Campos 2000, Roland 2002). However, very limited work has been undertaken on the factors that lead to the emergence of these institutions. My study adds to this debate by

exploring first the link between the development of market institutions and economic performance, and second, the link between institutions of center-periphery relations and the development of market institutions.

In addition to the above, the novelty of the present research lies in quantifying the relative impact of policies, initial conditions and institutional development. The statistical outcomes in Chapter four confirm the hypothesis of importance of initial endowments for economic growth. What is new in this debate is that the empirical models recognized the explanatory strength of the institutional variable against the policy variables, especially in the long run (time-series 1996-2001). The point I make in the fourth chapter is that economic growth is indeed dependent on the progress of market reform. But in order to discern this link, research should focus less on measurement of policy reforms, such as the level of privatization, price liberalization, and the level of subsidization, and look more attentively at the level of development and stability of market institutions in a region. The analysis in Chapter four has proved that these institutions are important for the alignment of the incentives of government officials and regional citizens.

The lesson the Russian economic transformation has taught us is that it is not enough to recognize conceptually the role of institutions and declare their importance in policy recommendations at the federal level, but that their development also depends on the situation at the regional level. The fact that some regions developed infrastructure and market institutions in a jurisdictional competition to attract capital, while others made visibly little effort to develop a growth-promoting market infrastructure, reflects the deviant political and economic incentives the regional governments were experiencing. Policy choices were made under the influence of economic circumstances that governments faced, fiscal being one of the strongest, and were informed by the reality of the center-periphery relations.

Building on the institutional explanations of economic growth, and the results of previous empirical analyses on the Russian regions, in Chapter five I identified the specific conditions that made regional governments promote the development of market economies in their territories. Hitherto, insufficient attention has been paid to the fiscal determinants of the behavior of regional governments, and in the present work this gap is bridged by showing that fiscal center-periphery relations can reveal important aspects of the behavior of regional governments. Thus the findings in chapter five constitute a significant contribution to the growing literature on Russian fiscal federalism. Drawing on insights from Weingast's theory

and empirical tendencies in Russian center-periphery relations, I have shown that the mechanism of market-preserving federalism does not work for all Russian regions. The selective allocation of SBC to individual regions created a situation where market institutions were highly developed in some regions but not in others.

The second generation literature on fiscal federalism does not assume that all governments are naturally benevolent, but that they can become so given the incentives.[96] The present research extends this area of study by providing empirical evidence that such economic outcomes as underdevelopment of market institutions were produced by a concrete set of incentives. Russia's political institutions did create powerful incentives, but the logic of those incentives led rational regional governments to adopt behavior detrimental to the market. The value added of my research as regards this second generation fiscal federalism literature lies in providing empirical evidence that demonstrates the importance of the incentive problem for the behavior of regional governments. The second point is that economic reform needs to be supported by reform in center-periphery institutions, which in the Russian case induced rent-seeking, counterproductive behavior on the part of the regional governments. The empirical analysis in the fifth Chapter thus reveals that the patterns of variation in the development of market institutions in Russian regions are consistent with the central argument of the dissertation.

The analysis of fiscal flows can disclose some tendencies and identify indicators that are useful for the task of measuring SBC. The present research brings together the debate on determinants of transfers and tax arrears and evasions in Russia by accounting for both of them using the concept of SBC. The volume of transfers from the center, on its own, communicates relatively little about the real degree of growth-impeding distortion in center-periphery fiscal relations. Not only the center's willingness to bail out by 'giving out' funds, but also its tolerance regarding regions' 'withholding' large amounts of due taxes determine the softness of budget constraints.[97] A tax-evasive attitude is conventionally quantified by the

[96] Though it should not be necessary to assume 'malevolent' government, as described in the work of Buchanan and Brennan (1980)

[97] Tax evasions were a pervasive feature throughout the nineties (Black et al. 2000, Shleifer and Treisman 2000, Ponomareva and Zhuravskaya 2004). Ponomareva and Zhuravskaya (2004), based on evidence from 73 regions during 1997-1998 show that tax arrears were not only due to objective reasons, such as the lack of liquidity, but

amount of tax arrears, measured as tax obligations that have not been fulfilled. However, such an approach overlooks a very important component of tax evasion, namely non-established tax obligations that would be levied on the revenues concealed from the federal authorities. The method of measurement of SBC suggested in this thesis captures the degree of tax evasion by calculating the share of the tax that a given region is able to collect, but has failed to remit. The method of compiling an SBC index, however, calls for further research. One way of improving it would be to adjust it not only with regard to the region's 'under-remittance' of taxes but also the region's budgetary overspending. Due to exceptionally wide interregional diversity, the costs of providing equal levels of public welfare differ enormously; therefore in calculating the level of SBC one should use individually estimated 'ideal' budgetary expenditure level as benchmark against which to measure real expenditure level. Chapter five has as dependent variable the degree of development of market institutions, and not economic growth. However, as chapter four has amply demonstrated, there is a strong association between DMI and varying measures of economic growth. Therefore, the model in Chapter five can be regarded as a building block in the explanation of regional differences in economic performance.

Understanding factors that drive and limit the SBC in federal fiscal relations is important, since central governments in nascent democratic federations will have to cope with overwhelming pressure from powerful economic actors. The final part of the thesis, Chapter six, addresses the question why SBC conditions vary across the Russian Federation. It also contributes to the literature on Russian fiscal federalism, but in a different way than the Chapter five. The rationale behind the allocation of central transfers in Russian Federation has attracted the intensive attention of academics and policy-makers alike, as the great variation in volumes of such transfers, and the puzzling patterns of their allocation offered rich data for analysis. I have shown that these transfers were in fact a function of political bargaining game between the central and regional government and demonstrated how SBC conditions were achieved. As I have shown, the particularity of the Russian situation in the mid-nineties

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also the result of the region's greater bargaining power and the higher tension between it and the federal center. Cai and Treisman (2004) have demonstrated that regional governments lowered the regional enterprises' burden of federal taxes by protecting them from tax collectors. These studies communicate the important message that the tax evasions, at least in the magnitudes seen in Russia during the nineties, would not be possible without the active role of regional governments.

supplied some regions with greater bargaining power, which motivated them to obtain beneficial distributional outcomes in the form of specific institutions, SBC among them. This part of the work reveals how institutional choice in the period of political instability and legal vacuum can be set into the bargaining zero-sum game. The contribution of this work lies in answering the question as to what exactly boosted the bargaining power of the region in its pursuit of privileges in fiscal sphere, that certain Russian regions used the credibility of threats to disrupt the economic integrity of the country as an opportunity to elicit more federal transfers.

The bargaining approach was applied to a case of institutional choice: federational institutions can be recognized as by-products of bargaining between power-seeking actors who can behave strategically. According to the distributive theory of the emergence of institutions (Knight 1992, 41), such institutions as SBC emerged out of power imbalances, in an attempt to maximize self-interest, rather than calculations on collective benefits. The present research also adds to our understanding of how the distribution of powers between the levels of government asymmetrical federalism Russian type came about.

In sum, the present research contributes to the comparative political economic literature on regional governments by identifying the political factors that account for differences in regional governmental performance in asymmetrical federations in the period of transition. While a largely unanswered question still hangs in the air, namely how good institutions can be promoted, this thesis offers some partial answers to it.

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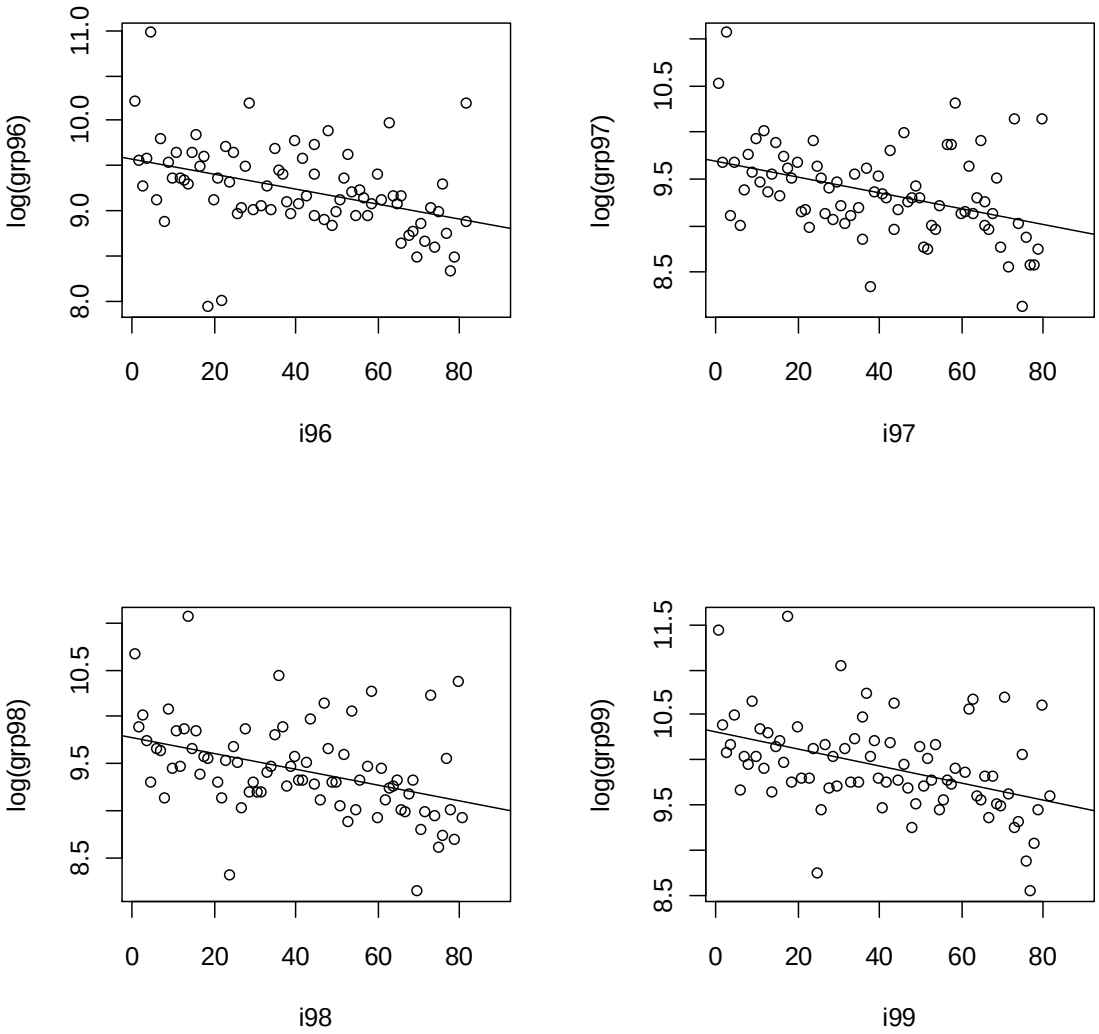
APPENDIX

Appendix to chapter 4[98]

Fig.4.1 Log Gross Regional Product Growth and Development of Market Institutions Russia's regions(the greater the value, the less developed). Each year from 1996 to 1999 separately. [y-axis- log of GRP, x-axis- index DMI]



[98] Data: N=87 in most regressions, excluding two regions: Komi-Permyak AO and Chechen republic

Fig.4.2 Gross Regional Product Growth and Growth of Industrial Production of Russia's regions. [y-axis- annual growth of GRP, x-axis- annual growth of industrial output]

Each year from 1997 to 2001 separately.

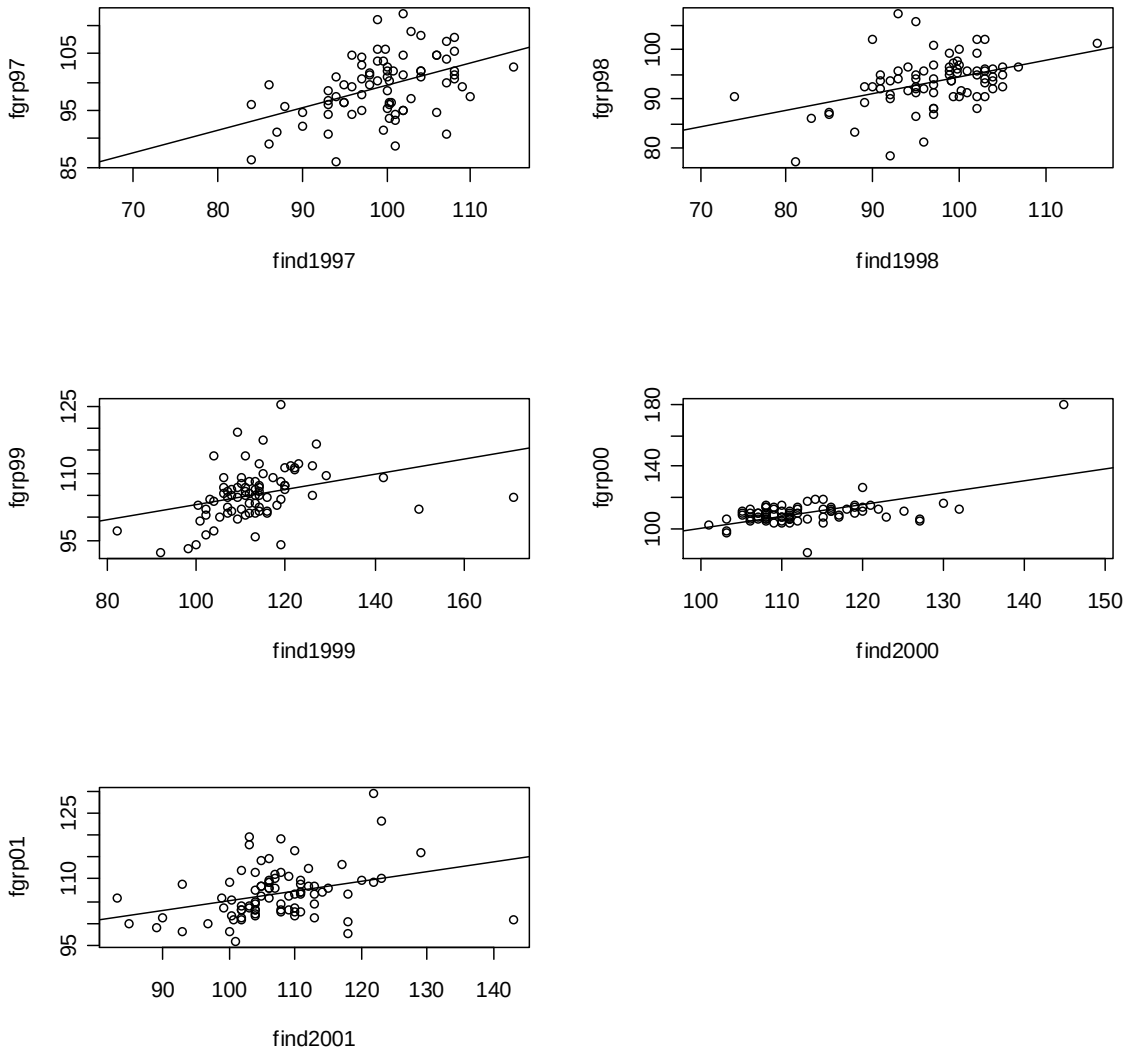


Table 4.1 Are Real GRP and Industrial Output Dependent on the Initial Endowments in Russian Regions? (Independent variable is Index of Initial Endowment)

Dependent variables	1996	1997	1998	1999	2000	2001
(i)Real GRP		0.5	-0.01	0.11	-0.2	-.01
t-statistics		2.2	-0.04	0.4	-0.5	0.1
R^2adjusted		0.05	-0.01	-0.01	-0.01	-0.01
(ii)Industrial Output	0.2	0.3	0.1	0.5	-0.2	-0.3
t-statistics	0.6	1.2	0.2	1.2	-0.8	-0.8
R^2adjusted	-0.01	0.01	-0.01	0.01	-0.01	-0.01

Table 4.2 Components of Index of Initial Endowment

	Index of Initial Endowment	Components of the Index of Initial Endowment				
		Share of higher educated population	Number of R & D institutions	Percentage of paved roads	Natural logarithm of natural resources	Number of public buses per 1000 of population
Белгородская область	-0,74381	0,789087	-0,14312	-1,284046693	-0,64244	0,536708861
Брянская область	-0,45416	-0,3245	-0,15223	0,729571984	-0,64244	-0,064556962
Владимирская область	-1,39882	-0,70312	-0,134	0,778210117	-0,64244	-0,697468354
Воронежская область	-0,23568	0,098664	0,066545	0,622568093	-0,64244	-0,381012658
Ивановская область	-0,85683	-0,27996	-0,12489	0,60311284	-0,64244	-0,412658228
Калужская область	-0,30174	0,544098	-0,10665	0,690661479	-0,82731	-0,602531646
Костромская область	-2,77699	-0,25768	-0,38924	-1,011673152	-0,64244	-0,475949367
Курская область	0,614887	0,900445	-0,17958	0,252918288	-0,64244	0,283544304
Липецкая область	-0,79573	-0,90356	-0,24339	0,710116732	-0,64244	0,283544304
Московская область	1,003726	0,967261	1,060164	0,252918288	-0,64244	-0,634177215
Орловская область	-0,97227	-0,56949	-0,17958	0,642023346	-0,64244	-0,22278481
Рязанская область	-0,96657	0,076392	-0,17958	0,60311284	-0,64244	-0,824050633
Смоленская область	-0,72364	0,120935	-0,23428	0,76848249	-0,64967	-0,729113924
Тамбовская область	-2,13114	-0,34677	-0,21604	-0,418287938	-0,64244	-0,507594937
Тверская область	-1,82076	-0,94811	0,002735	0,544747082	-0,88089	-0,539240506
Тульская область	1,334087	-0,50267	-0,12489	0,661478599	0,700167	0,6
Ярославская область	0,064534	0,83363	-0,15223	-0,068093385	-0,64244	0,093670886
г. Москва	12,59651	5,154343	7,57794	0,856031128	-0,64244	-0,349367089

Республика Карелия	-2,80198	-0,74766	-0,32543	-0,515564202	-0,64244	-0,570886076
Республика Коми	0,449799	-1,01492	-0,27985	-0,63229572	1,650289	0,726582278
Архангельская область	-2,12743	0,143207	-0,25251	-0,963035019	-0,64244	-0,412658228
в том числе Ненецкий АО	0,172457	0,143207	-0,43482	0,447470817	0,555842	-0,539240506
Вологодская область	-4,66076	-0,83675	-0,33455	-2,402723735	-0,64244	-0,444303797
Калининградская область	-0,19852	-0,19087	-0,21604	0,856031128	0,01818	-0,665822785
Ленинградская область	-0,98088	-0,43586	-0,23428	0,554474708	-0,64244	-0,22278481
Мурманская область	-0,18813	-0,65857	-0,17958	0,369649805	-0,12975	0,410126582
Новгородская область	0,070081	-0,70312	-0,3619	0,671206226	-0,64244	1,106329114
Псковская область	-0,52672	-0,90356	-0,33455	0,817120623	-0,64244	0,536708861
г. Санкт-Петербург	6,970667	3,55078	3,840474	0,856031128	-0,64244	-0,634177215
Республика Адыгея	-1,49684	-0,85902	-0,42571	0,856031128	-0,46561	-0,602531646
Республика Дагестан	0,935661	1,568597	-0,24339	0,564202335	-0,03476	-0,918987342
Республика Ингушетия	-1,46264	0,855902	-0,44394	-1,021400778	-0,82029	-0,032911392
Кабардино-Балкарская Республика	0,317034	0,455011	-0,31632	0,758754864	-0,64244	0,062025316
Республика Калмыкия	-2,7489	0,588641	-0,37101	-3,112840467	-0,20052	0,346835443
Карачаево-Черкесская Республика	-0,82624	-0,12405	-0,41659	0,544747082	-1,08224	0,251898734
Республика Северная Осетия - Алания	1,226731	1,34588	-0,34366	0,836575875	-0,64244	0,030379747
Чеченская Республика				0,573929961	-0,00715	-2,72278481
Краснодарский край	1,699564	-0,25768	0,221513	0,846303502	0,51095	0,378481013
Ставропольский край	0,885944	0,143207	-0,10665	0,593385214	0,099044	0,156962025
Астраханская область	0,776774	-0,07951	-0,19781	-0,087548638	0,668227	0,473417722
Волгоградская область	-0,89658	-0,54722	0,075661	-1,157587549	0,575597	0,156962025
Ростовская область	2,819115	0,455011	0,704649	0,252918288	-1,471093	-0,064556962
Республика Башкортостан	0,367537	-0,99265	0,431176	-0,554474708	1,326524	0,156962025
Республика Марий Эл	-0,61175	-0,12405	-0,3619	0,612840467	-0,64244	-0,096202532
Республика Мордовия	-1,55197	-0,01269	-0,38013	-0,642023346	-0,64244	0,125316456
Республика Татарстан	3,113598	-0,56949	0,449407	0,661478599	1,529162	1,043037975
Удмуртская Республика	-0,03569	-0,50267	-0,24339	0,30155642	-1,042996	-0,634177215
Чувашская	-1,13491	-0,6363	-0,23428	0,379377432	-0,64244	-

Республика						0,001265823
Пермский край	0,569658	-0,43586	-0,05196	-0,009727626	1,163406	-0,096202532
Кировская область	-1,80375	-0,85902	-0,25251	-0,175097276	-0,64244	0,125316456
Нижегородская область	1,054892	0,120935	0,385597	0,749027237	-0,64244	0,441772152
Оренбургская область	1,0545	-1,05947	-0,3072	0,408560311	1,539189	0,473417722
Пензенская область	-0,9284	-0,05724	-0,20693	0,671206226	-1,71392	0,378481013
Самарская область	2,219322	0,076392	0,157703	-1,215953307	1,082193	2,118987342
Саратовская область	0,165131	-0,41359	0,148587	0,535019455	0,276123	-0,381012658
Ульяновская область	-0,3727	-0,21314	-0,26162	0,60311284	-0,62637	0,125316456
Курганская область	-4,13791	-1,03719	-0,3072	-2,149805447	-0,64244	-0,001265823
Свердловская область	1,304222	-0,39131	0,823154	0,116731518	0,66198	0,093670886
Тюменская область	0,794097	-0,45813	0,112124	-2,529182879	2,784475	0,884810127
Ханты-Мансийский АО Югра	-1,7637	-3,7098	-0,37101	-0,194552529	2,354699	0,156962025
Ямало-Ненецкий АО	5,268382	-3,7098	-0,41659	0,79766537	2,585714	6,011392405
Челябинская область	0,864047	-0,59176	-0,06108	0,836575875	0,966382	-0,286075949
Республика Алтай	-3,00041	-0,90356	-0,41659	-0,46692607	-0,64244	-0,570886076
Республика Бурятия	1,568984	1,390423	-0,28897	0,13618677	0,807293	-0,475949367
Республика Тыва	-2,42226	-1,41581	-0,38924	-0,437743191	0,043329	-0,22278481
Республика Хакасия	1,234823	-0,01269	-0,42571	0,856031128	1,039978	-0,22278481
Алтайский край	-3,25636	-0,14633	-0,1887	-0,272373541	-1,88821	-0,760759494
Красноярский край	3,645379	0,455011	0,057429	0,437743191	1,683803	1,011392405
Таймырский (Долгано-Ненецкий) АО		-3,7098			-1,05033	-2,72278481
Эвенкийский АО		-3,7098		0,856031128	-0,45435	-2,72278481
Иркутская область	-1,17878	0,210022	-0,08842	-0,593385214	-0,64244	-0,064556962
в том числе Усть-Ордынский Бурятский АО	-6,66651	-3,7098	-0,45305	0,16536965	-0,64244	-2,026582278
Кемеровская область	4,438096	-0,52494	-0,02461	0,856031128	2,170862	1,960759494
Новосибирская область	0,017617	0,900445	0,750228	-1,536964981	-0,06318	-0,032911392
Омская область	-2,65944	-0,36904	-0,08842	-2,159533074	-0,64244	0,6
Томская область	0,523365	1,546325	0,030082	-1,906614786	0,949775	-0,096202532
Читинская область	0,107167	-0,30223	-0,3619	0,60311284	1,277038	-

						1,108860759
в том числе Агинский Бурятский АО	-7,68879	-3,7098	-0,45305	0,642023346	-1,88821	-2,279746835
Республика Саха (Якутия)	-0,30175	-0,21314	-0,27985	-1,060311284	1,284463	-0,032911392
Приморский край	1,946317	0,210022	0,020966	0,564202335	1,215683	-0,064556962
Хабаровский край	0,291131	1,457238	-0,17958	-0,758754864	0,37476	-0,602531646
Амурская область	0,803184	0,432739	-0,37101	0,680933852	0,852928	-0,792405063
Камчатская область	-0,50331	0,299109	-0,33455	-0,583657588	-0,64244	0,758227848
в том числе Корякский АО	-11,8201	-3,7098	-0,45305	-3,570038911	-1,36445	-2,72278481
Магаданская область	3,528265	0,789087	-0,37101	0,856031128	0,356691	1,897468354
Сахалинская область	-0,37879	-0,45813	-0,39836	-0,807392996	0,87496	0,410126582
Еврейская автономная область	-2,04678	-1,72762	-0,44394	0,76848249	-0,64244	-0,001265823
Чукотский автономный округ	-1,06103	-1,5	-0,44394	0,846303502	0,132812	-0,096202532

Table 4.3 Are GRP Dependent on Investments and Initial Endowments in Russian Regions? (Dependent variable is GRP per Capita)

Independent variables	1996	1997	1998	1999	2000	2001
(i) Investments minus Savings	3.1	2.9	3.6	4.0	2.4	2.9
(ii) Initial Endowments	593	810	827	1982	3727	4790
R^2 adjusted	0.84	0.81	0.74	0.77	0.80	0.80

Table 4.4 Are GRP Dependent on DMI? R output for Mixed Effect Model (Repeated Measurement)

Linear mixed model fit by REML
Formula: GRP ~ DMI + (year | region)

Groups	Name	Variance	Std.Dev.	Corr
region	(Intercept)	3.0163e+14	17367483.2	
	year	7.5729e+07	8702.3	-1.000
Residual		3.7115e+07	6092.2	

Fixed effects:

	Estimate	Std. Error	t value
(Intercept)	7725.7	1286.0	6.008
DMI	-1014.0	500.7	-2.025

Fig.4.3 Time-Series Plots for the Different Levels of Development of Market Institutions: Dependent Variable – Investments Minus Savings per Capita (without two oil-rich regions)

for the group 1: average DMI for the period less than 22.5 = 22 regions
for the group 2: average DMI for the period between 26 and 44,2 = 20 regions
for the group 3: average DMI for the period between 44.5 and 65 = 23 regions
for the group 4: average DMI for the period between 66 and 88,3 = 23 regions

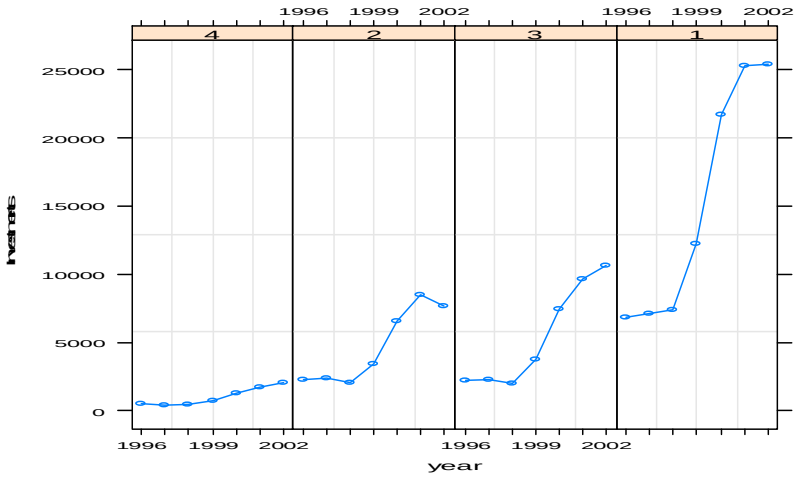


Table 4.5 Output of BMA analysis (9 iterations)

Dep.Var =Income.correced

34 models were selected
Best 5 models (cumulative posterior probability = 0.49):

	p!=0	EV	SD	model 1	model 2	model 3	model 4	model 5
Intercept	100.0	5.96730	1.1182	6.81	6.17	5.08	5.33	5.82
big.pr	6.2	-0.00200	0.0717	.	.	.	.	.
sm.pr	6.5	0.00032	0.0037	.	.	.	.	.
price	7.5	-0.00113	0.0059	.	.	.	.	.
i96	8.6	-0.00094	0.0053	.	.	.	.	.
lavrov	35.6	0.37656	0.6173	.	.	1.15	.	0.92
riskihs	14.3	-0.03138	0.1017	.	.	.	.	.
natur	100.0	0.65330	0.1306	0.63	0.68	0.63	0.74	0.60
icore	75.8	-1.17825	0.8639	-1.77	-1.32	-1.36	.	-1.72
repub	36.1	-0.46091	0.7500	-1.40	.	.	.	-1.16

nVar	3	2	3	1	4
r2	0.423	0.388	0.420	0.346	0.443
BIC	-28.83	-28.67	-28.46	-27.92	-27.16
post prob	0.128	0.118	0.106	0.081	0.055Dep.

Var = grp.corrected
10 models were selected
Best 5 models (cumulative posterior probability = 0.76):

	p!=0	EV	SD	model 1	model 2	model 3	model 4	model 5
Intercept	100.0	158.0597	18.743	162.05	165.66	137.55	167.31	151.28
big.pr	5.5	0.1494	1.397	.	.	.	.	.
sm.pr	5.2	0.0055	0.065	.	.	.	.	.
price	7.4	-0.0215	0.116	.	.	.	-0.29	.
i96	100.0	-1.1249	0.269	-1.16	-1.06	-1.09	-1.15	-1.14
lavrov	6.8	0.6786	4.078	.	.	.	.	9.98
riskihs	4.8	0.0010	0.830	.	.	.	.	.
natur	8.8	0.2440	1.247	.	.	.	.	.
indcore	89.2	-30.9046	15.999	-34.10	-39.03	.	-34.46	-33.85
repub	11.5	-2.2182	7.985	.	-19.33	.	.	.

nVar	2	3	1	3	3
r2	0.265	0.282	0.187	0.273	0.272
BIC	-14.76	-12.17	-11.43	-11.29	-11.12
post prob	0.420	0.115	0.079	0.074	0.068

Dep.Var = industry.real.growth
18 models were selected
Best 5 models (cumulative posterior probability = 0.61):

	p!=0	EV	SD	model 1	model 2	model 3	model 4	model 5
Intercept	100.0	89.72261	3.017	91.519	87.507	89.734	90.457	87.485
big.pr	8.1	0.06353	0.336	.	.	0.729	.	.
sm.pr	5.6	-0.00022	0.011	.	.	.	.	.
price	5.6	0.00056	0.013	.	.	.	.	.
i96	60.4	-0.06015	0.059	-0.099	.	-0.097	-0.096	.
lavrov	5.7	-0.02728	0.521	.	.	.	.	.
riskihs	5.7	0.00781	0.159	.	.	.	.	.
natur	7.4	0.01846	0.157	.	.	.	.	0.486
indcore	7.6	0.12845	0.737	.	.	.	1.478	.
repub	6.2	-0.04859	0.667	.	.	.	.	.
nVar				1	0	2	2	1
r2				0.068	0.000	0.076	0.074	0.017
BIC				-1.011	0.000	2.639	2.800	3.027
post prob				0.299	0.181	0.048	0.045	0.040

1997

Dep.var = income.corrected
29 models were selected
Best 5 models (cumulative posterior probability = 0.53):

	p!=0	EV	SD	model 1	model 2	model 3	model 4	model 5
Intercept	100.0	7.72049	1.4044	8.26	6.80	7.13	8.97	5.69
big.pr	5.6	0.00072	0.0837	.	.	.	.	.
sm.pr	5.6	0.00063	0.0047	.	.	.	.	.
price	8.9	-0.00172	0.0086	.	.	.	.	.
i97	6.7	-0.00074	0.0058	.	.	.	.	.
lavrov	39.0	0.57207	0.8627	.	1.54	.	.	1.48
riskihs	13.7	-0.03748	0.1275	.	.	.	.	.
natur	100.0	0.87525	0.1684	0.90	0.84	0.98	0.84	0.93
indcore	75.3	-1.48624	1.1029	-1.79	-1.84	.	-2.29	.
repub	22.3	-0.30629	0.7263	.	.	.	-1.56	.
nVar				2	3	1	3	2
r2				0.394	0.428	0.349	0.419	0.380
BIC				-29.42	-29.40	-28.35	-28.32	-27.72
post prob				0.147	0.146	0.086	0.085	0.063

Dep.Var = grp.corrected

27 models were selected
Best 5 models (cumulative posterior probability = 0.54):

	p!=0	EV	SD	model 1	model 2	model 3	model 4	model 5
Intercept	100.0	170.0028	38.594	200.18	179.87	116.51	177.49	142.36
big.pr	5.2	0.0959	1.660	.	.	.	.	.
sm.pr	5.0	0.0034	0.077	.	.	.	.	.
price	6.6	-0.0208	0.132	.	.	.	.	.

i97	75.6	-0.8446	0.599	-1.31	-0.97	.	-1.27	-0.66
lavrov	13.0	2.4371	8.501	.	.	.	21.20	.
riskihs	4.9	-0.0283	1.069	.	.	.	.	.
natur	54.9	5.0551	5.600	.	6.51	12.39	.	9.68
indcore	74.4	-34.3558	25.313	-50.72	-40.07	.	-50.04	.
repub	13.9	-3.3270	10.961	.	.	.	.	.

nVar	2	3	1	3	2
r2	0.229	0.262	0.167	0.249	0.202
BIC	-11.14	-10.11	-9.59	-8.79	-8.50
post prob	0.205	0.122	0.094	0.063	0.055

dep.var. = inusry.real.growth

28 models were selected
Best 5 models (cumulative posterior probability = 0.48):

	p!=0	EV	SD	model 1	model 2	model 3	model 4	model 5
Intercept	100.0	93.33639	3.292	90.9	96.1	93.5	94.8	95.8
big.pr	19.5	-0.18464	0.468	.	.	.	.	-1.1
sm.pr	6.2	-0.00157	0.010	.	.	.	.	.
price	5.0	-0.00020	0.010	.	.	.	.	.
i97	21.5	0.01022	0.025	.	.	.	.	.
lavrov	62.4	2.04199	1.946	3.5	.	2.6	.	2.8
riskihs	3.8	-0.00730	0.090	.	.	.	.	.
natur	8.7	0.02510	0.128	.	.	.	.	.
indcore	100.0	5.88441	1.493	6.3	5.1	5.2	6.0	5.4
repub	51.2	1.88089	2.211	4.0	.	.	3.0	.

nVar	3	1	2	2	3
r2	0.263	0.156	0.197	0.194	0.236
BIC	-10.2	-8.6	-8.0	-7.7	-7.5
post prob	0.203	0.092	0.070	0.061	0.054

1998

Dep.var. = income.corrected
29 models were selected
Best 5 models (cumulative posterior probability = 0.54):

	p!=0	EV	SD	model 1	model 2	model 3	model 4	model 5
Intercept	100.0	5.49357	0.9440	5.53	6.07	4.67	4.76	5.31
big.pr	7.7	-0.01297	0.0846	.	.	.	.	.
sm.pr	6.3	0.00019	0.0031	.	.	.	.	.
price	6.7	-0.00040	0.0041	.	.	.	.	.
i98	6.6	-0.00039	0.0037	.	.	.	.	.
lavrov	26.2	0.22030	0.4562	.	.	0.90	.	0.71
riskihs	14.2	-0.02630	0.0869	.	.	.	.	.
natur	100.0	0.56018	0.1132	0.58	0.54	0.54	0.64	0.51
indcore	80.6	-1.14099	0.7508	-1.22	-1.61	-1.25	.	-1.57

repub	36.6	-0.42398	0.6761	.	-1.19	.	.	-1.00

nVar		2	3	3	1	4
r2		0.382	0.415	0.409	0.335	0.431
BIC		-27.96	-27.81	-26.95	-26.62	-25.52
post prob		0.162	0.150	0.097	0.083	0.048

Dep.var. = grp.corrected
13 models were selected
Best 5 models (cumulative posterior probability = 0.67):

	p!=0	EV	SD	model 1	model 2	model 3	model 4	model 5
Intercept	100.0	128.0343	23.416	138.82	141.73	127.44	125.19	82.06
big.pr	4.0	0.0454	1.000	.	.	.	.	.
sm.pr	4.7	0.0072	0.062	.	.	.	.	.
price	6.1	-0.0167	0.098	.	.	.	.	.
i98	83.5	-0.6401	0.373	-0.83	-0.72	-0.63	-0.80	.
lavrov	7.5	0.9446	4.514	.	.	.	12.59	.
riskihs	4.3	-0.0656	0.778	.	.	.	.	.
natur	30.2	1.7285	3.143	.	.	3.47	.	7.99
indcore	90.2	-32.3001	15.765	-37.01	-41.27	-31.49	-36.61	.
repub	15.4	-2.9986	8.903	.	-17.96	.	.	.

nVar		2	3	3	3	1
r2		0.216	0.234	0.233	0.229	0.136
BIC		-9.82	-7.27	-7.14	-6.81	-6.77
post prob		0.337	0.094	0.088	0.075	0.073

Dep.Var. = inusry.real.growth

23 models were selected
Best 5 models (cumulative posterior probability = 0.61):

	p!=0	EV	SD	model 1	model 2	model 3	model 4	model 5
Intercept	100.0	18.3946	3.947	17.342	20.787	19.428	11.514	22.476
big.pr	2.2	0.0030	0.146	.	.	.	.	.
sm.pr	18.0	0.0125	0.033	.	.	.	0.078	.
price	29.4	-0.0303	0.057	.	.	-0.106	.	-0.098
i98	36.6	-0.0306	0.049	.	-0.086	.	.	-0.080
lavrov	7.0	-0.0452	0.755	.	.	.	.	.
riskihs	5.1	-0.0267	0.192	.	.	.	.	.
natur	5.2	-0.0018	0.124	.	.	.	.	.
indcore	3.9	-0.0237	0.462	.	.	.	.	.
repub	7.1	-0.1399	0.856	.	.	.	.	.

nVar		0	1	1	1	2
r2		0.000	0.046	0.044	0.037	0.083
BIC		0.000	0.719	0.950	1.461	2.041
post prob		0.192	0.134	0.119	0.092	0.069

Appendix to Chapter 5[99]

5.1 Model diagnosis

This section is devoted to the examination of the methodology for obtaining and evaluating the main independent variable, SBC, and the adequacy of the regression models.

5.1.1 Modifications on the variable of SBC: adding an additional term for budgetary overspent

The evaluation of budgetary flows can be complemented by other variables to develop a comprehensive indicator of the redistribution of resources between the levels of the government. Extra-budgetary flows and redistribution of property rights can additionally be taken into account in order to gain a fair picture of the relationships between the center and periphery.

Another possible way of improving the index of SBC for the purposes of the present research would be adjust it not only with respect to the region's tax potential (revenue side) but also with region's budgetary need (expenditure side). Tax-generating potential in the oil-rich Tyumen oblast' (and its sub-parts, Khanty-Mansiiskii and Yamalo-Nenetskii AOs) is higher than in backward Tyva or Evenkiiskii AO, simply because oil production generates a greater tax base, and this was captured in the SBC index. The cost of providing the standard level of public goods in Evenkiya is higher than in Tyumen' oblast. In an ideal type situation, when the transfers are completely impartial, transparent and fair, in order to provide equal living standards, transfers should not be equal; they must differ substantially, being closer to the positive extreme in the first case, and to the negative extreme in the second. Therefore, in comparing the budgetary flows between these two regions, both sides have to be adjusted. Analogously to the revenue side adjustment, we place the level of actual budgetary expenditure (BE) in the numerator, and the level of ideal budgetary expenditure (IBE) in denominator. The greater the ratio, expressing the budgetary overspent, the softer the SBC. The formula would look as follows:

*Index of SBC = Standardized (BT/TC) + Standardized (ATC*LTP/TC)+ Standardized (BE/IBE) (5.1)*

In order to perform this, it is necessary to calculate the ideal level of budgetary expenditure per capita (IBE), which is in line with the calculation of ITC, the average budgetary expenditure (ABE) of regional governments per capita multiplied by the level of expenditure need (LEN). This formula draws heavily on the concept of Ideal Transfers per capita developed by Popov (2004), which he defines in such a way that "ideal transfers are the difference between taxes that the region is able to collect, given the objective conditions in this particular region, the average Russian level of tax rates and tax compliance, and

[99] Data: N=73 in all regressions, excluding sixteen regions, due to missing data: Komi-Permyak AO, Chechen republic, Nenetskii AO, Khanty-Mansiiskii AO, Yamalo-Nenetskii AO, Tajmyrskii AO, Evenkiiskii AO, Ust-Ordynskii AO, Aginskii AO, Korjakskii AO, Evrejskaya AO and Chukotskii AO, Lipetskaya and Tyumenskaya oblasts, Moscow and S.Petersburg cities.

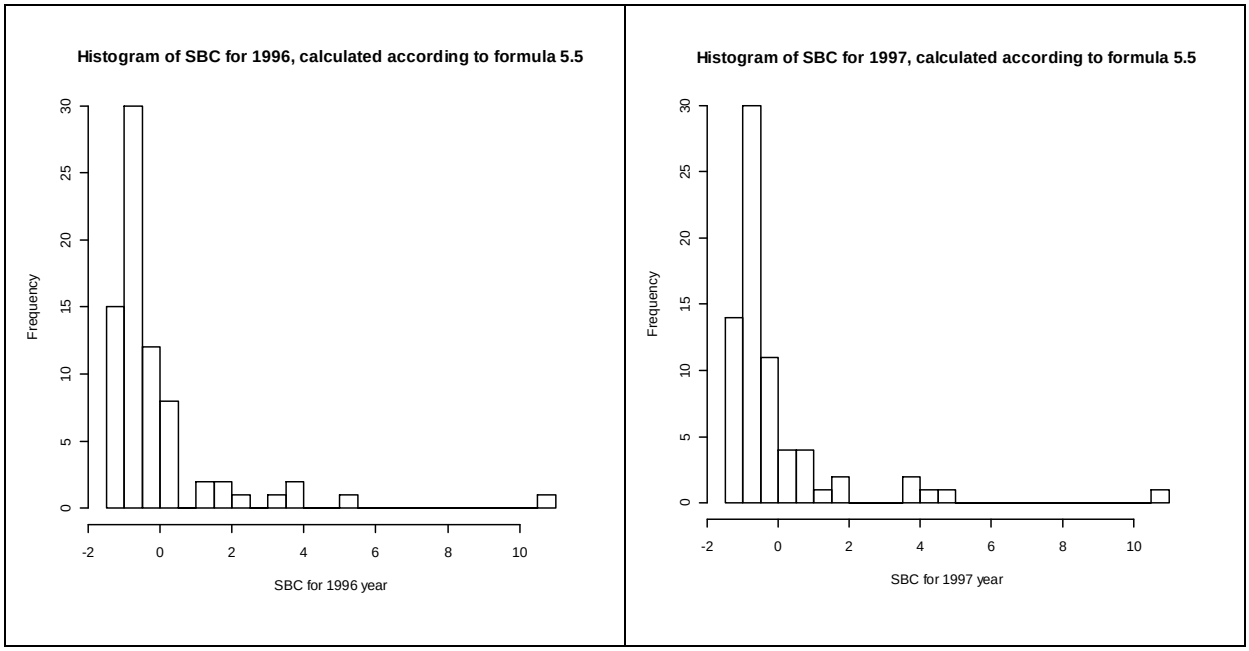
expenditure that the regional government should make in order to ensure the provision of the average Russian level of public services to local inhabitants" (Popov 2004). But in his calculations ideal transfers are not compared to real transfers, in keeping with the purposes of his study. Here my formula differs from Popov's as he is not concerned with SBC.

The main limitation at this point is the lack available data for evaluating the level of expenditure need. The most straightforward approach would be to compare consumer price indices among the regions. But regional variations in the cost of basic consumer goods only roughly approximate regional differences in cost of provision of public goods. One would need to take into account the cost of living, which would include distance from Moscow and/or major sea ports, development of infrastructure, climatic conditions, and demographic structure. These variables greatly influence regional budgetary expenditures, since subsidies for housing eat up major part of total regional government spending: proportion vary between 20 and 50% (Popov 2004, Kadotchnikov, Lugovoi and Trunin 1999). Education and health and social care spending are also major items in regional budgetary spending; therefore, such variables as average income per capita, age and urban/rural structure of the population can contribute to the formula for the level of expenditure need.

5.1.2. Transformation of component parts of the variable of SBC

One of the problems with the data lies in the non-normality of distribution of the main independent variable, SBC. The two panels below show that the histogram is positively skewed for both the un-standardized and standardized variations of the variable.

Fig. 5.1 Histograms of frequency distributions of SBC



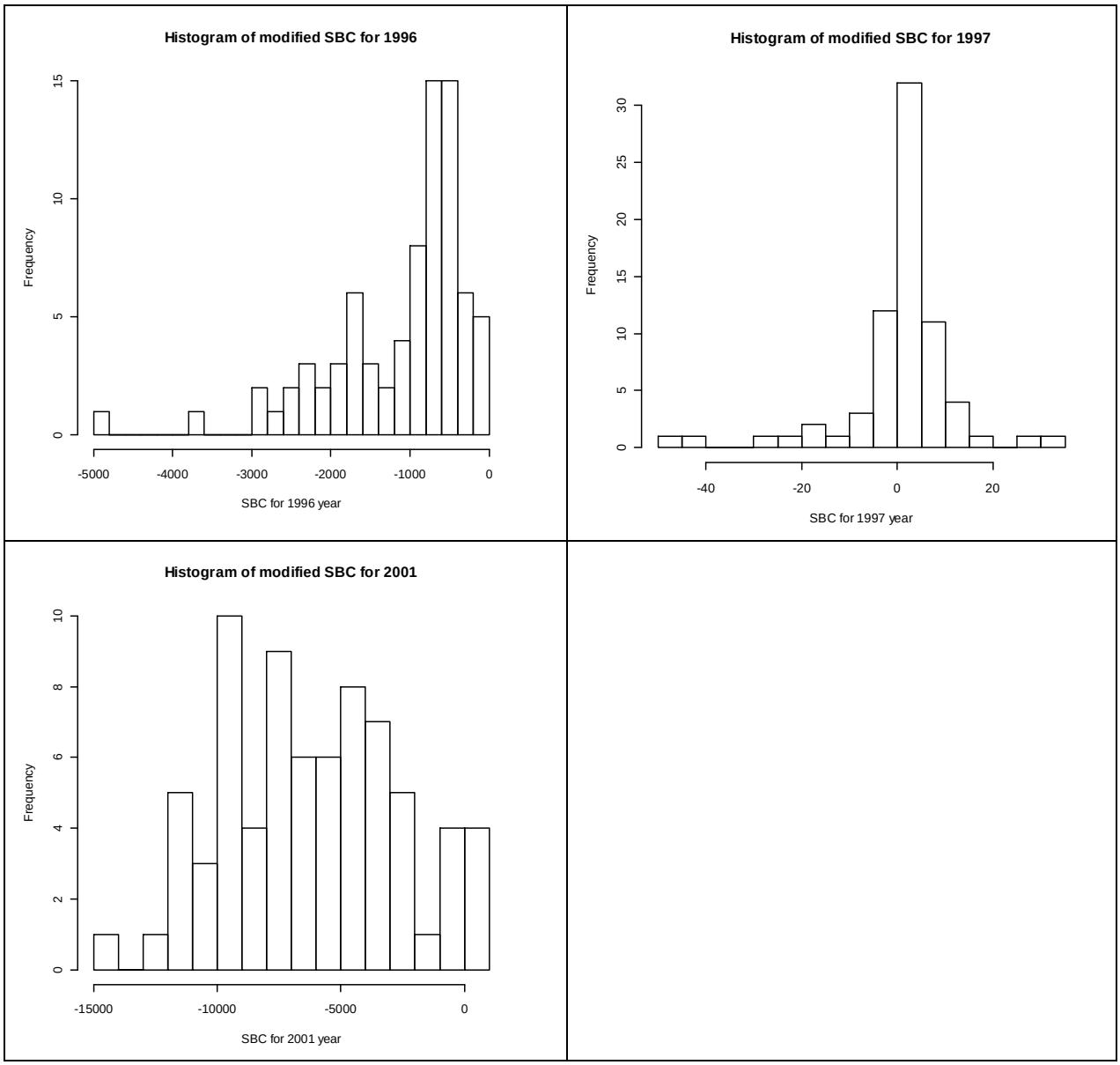
This problem may be resolved if we use the following formula for the construction of the variable:

$$SBC = (BT/TC) + (IT/TC) - (BT/TC) - (IT/TC) \qquad (5.2)$$

The two panels below show the distributions for the thus modified variable of SBC. The frequency distribution for the year 1977 is almost normal, if we ignore several outliers, and the distribution for 1996 is somewhat improved compared to the unmodified version. The

distribution of the variable of SBC for 2001 follows a bell-shape distribution with rather thick tails, which is typical for the t-distribution with degrees of freedom lesser than 30. I ran selected models, specified in Chapter 5, replacing the variable of SBC with the modified one and found that the estimates remained basically the same (see Table 5.1, columns 2-6). This proves that the regression estimates have some degree of robustness, especially for the variable of SBC.

Fig. 5.2 Histograms of frequency distributions of modified SBC



Another possibility is a logarithmic transformation of the component parts of the variable of SBC before summing them up.

$$SBC = log(BT/TC) + log(IT/TC) \qquad (5.3)$$

The following panels show that the distribution of component parts after log transformation has improved greatly, and that the distribution of SBC variable has become close to normality. The next step would be to check whether these transformations changed the regression estimates. Columns 7-10 of table 5.1 show that the SBC variable performs even more strongly than in the models with untransformed SBC.

Fig 5.3 Histograms of frequency distribution of component parts of the SBC formula after log transformation

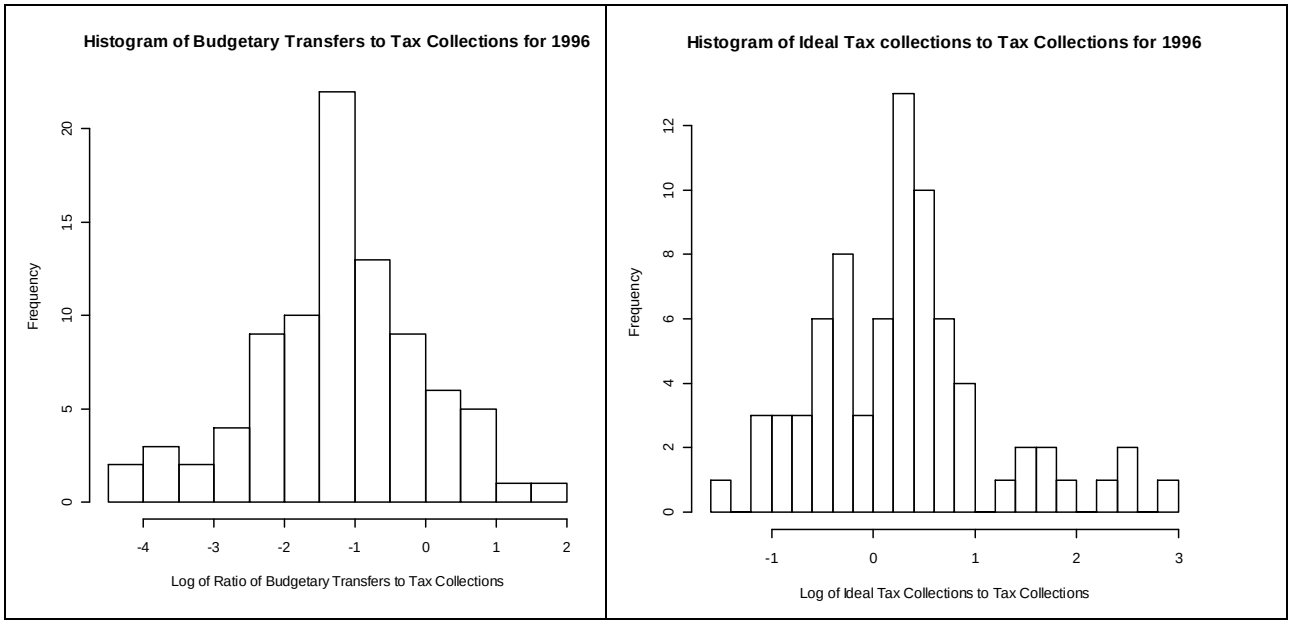


Fig 5.4 Histogram of frequency distribution of SBC after log transformation

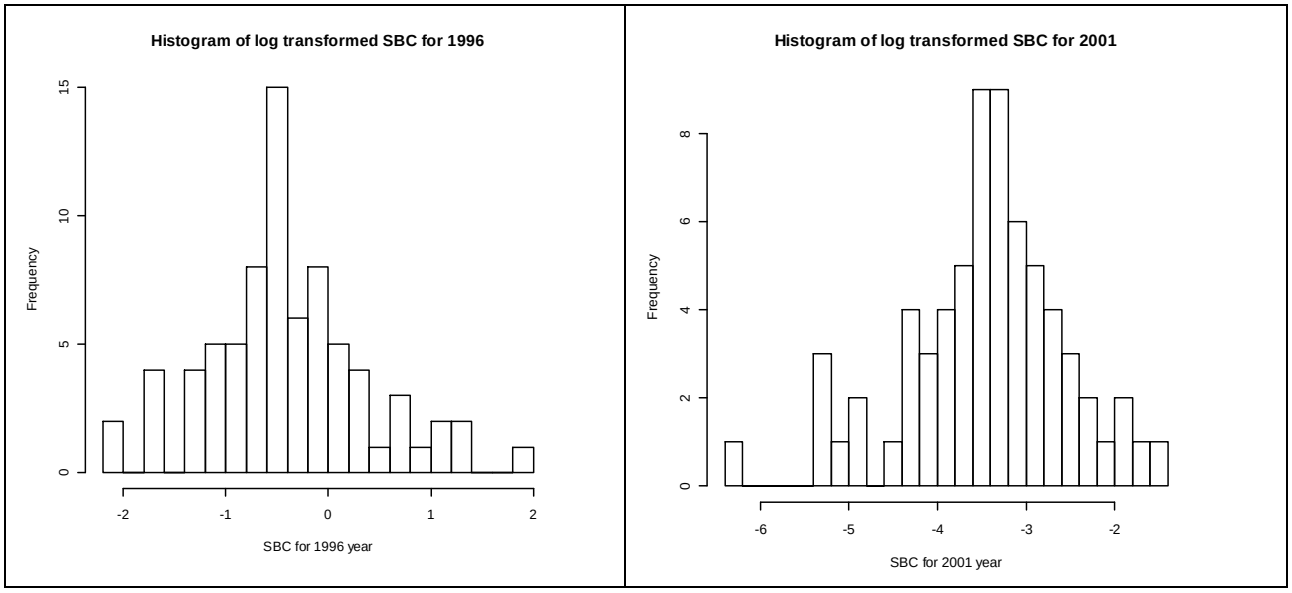


Table 5.1 Regression estimates for the selected models with different methods of construction of variable of SBC

	With SBC modified according to formula 5.2 on p. 207					With SBC, log-transformed according to formula 5.2 on p. 208			
Independent variables	Bi-variate for 1996	Multivariate for 1996	Bi-variate for 1997	Multi-variate for 1997	Multivariate for 2001	Bi-variate for 1996	Multi-variate for 1996	Bi-variate for 2001	Multivariate for 2001
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Soft Budget Constraints	0.02	0.02	0.8	0.8	0.01	16.9	18.0	16.2	16.4
	(6.8)	(6.2)	(3.8)	(3.9)	(3.1)	(6.4)	(6.6)	(7.2)	(7.2)
Executive's political orientation: Party of Power		0.01		-1.3	-0.2		-3.1		2.7
		(0.2)		(-0.2)	(-0.03)		(-0.8)		(0.7)
Legislative orientation towards market: Reformist		5.4		-21.1			-2.2		
		(0.6)		(-1.0)			(-0.1)		
Executive-legislative synergy. Kremlin-oriented executive and reformist legislature		-13.6		17.8			8.4		
		(-1.2)		(0.8)			(0.5)		
Control variable									
Initial Endowment	-0.5	-0.2	-1.7	-2.1	-3.3	-3.14	-2.6	-0.9	-0.9
	(-0.5)	(-0.3)	(-1.3)	(-1.4)	(-3.1)	(-2.6)	(-2.1)	(-0.8)	(-0.7)
R^2adj	0.52	0.52	0.25	0.25	0.24	0.49	0.48	0.49	0.49

Note: t-values in parentheses

Table 5.2 Political Affiliation of the Governors in the Russian region in the Second Electoral Cycle

Region	Governor	Year of election	Non-partisan	Supported by party of power.	Supported by another party	Supported by several parties
Belgorodskata oblast	Savchenko*	1999	0	1(NDR)	0	0
Bryanskaya oblast	Lodkin*	2000	0	0	0	1(KPRF, NPSR)
Vladimirskaya oblast	Vinogradov*	2000	0	0	0	1(KPRF, NPSR, Edinstvo, Otechestvo)
Voronezhskaya oblast	Kulakov	2000	1	0	0	0
Ivanovskaya oblast	Tikhonov	2000	0	0	1 (KPRF)	0
Kaluzhskaya oblast	Artamonov	2000	0	0	0	1(NPRS, Edinstvo)
Kostromskaya oblast	Shershunov*	2000	0	0	1(KPRF)	0
Kurskaya oblast	Mikhajlov	2000	0	0	1(NPSR)	0
Lipetskaya oblast	O.Korolev	1998	0	0	0	1(KPRF, Yabloko)
Moskovskaya oblast	Gromov	2000	0	0	1(Otechestvo)	0
Orlovskaya oblast	Stroev*	2001	0	0	1(KPRF)	0
Ryazanskaya oblast	Lubimov	2000	0	0	0	1(KPRF, NPSR, Otechestvo, Edinstvo)
Smolenskaya oblast	Prokhorov	1998	0	0	1(KPRF)	0
Tambovskaya oblast	Betin	1999	0	0	0	1(NDR, Edinstvo)

Tverskaya oblast	Platov*	2000	0	1(Edinstvo)	0	0
Tulskaya oblast	Starodubtsev*	2001	0	0	0	1(KPRF, APR)
Yaroslavskaya oblast	Lisitsyn	1999	0	0	0	1(Edinstvo, Otechestvo)
Moscow city	Luzhkov*	1999	0	0	1(Otechestvo)	0
Karelia	Katanandov	1998	0	1 (NDR)	0	0
Komi	Torlopov	2001	0	0	1(Yabloko)	0
Arkhangelskaya oblast	Efremov*	2000	0	0	0	1(Otechestvo, Edinstvo, SPS)
Nenetskaya oblast	Butov*	2001	0	1(Edinstvo)	0	0
Vologodskaya oblast	Pozgalev	1999	0	1(NDR)	0	0
Kaliningradskaya oblast	Egorov	2000	0	0	0	1(Yabloko, Otechestvo, Edinstvo)
Leningradskaya oblast	Serdyukov*	1999	1	0	0	0
Murmanskaya oblast	Evdokimov	2000	1	0	0	0
Novgorodksaya oblast	Prusak*	1999	1	0	0	0
Pskovskaya oblast	Mikhailov*	2000	0	1(Edinstvo)	0	0
S. Petersburg	Yakovlev	1999	0	0	0	1(OVR, KPRF)
Adygeya						
Dagestan	Magomedov	1998	0	0	0	0
Ingushetia	Aushev*	1998	1	0	0	0
Kabardino-Balkaria						
Kalmykia	Ilumzhinov	1995	0	1 (Edinstvo)	0	0
Karachaevo-Cherkessia	Semenov	1999	1	0	0	0
S.Ossetia	Dzasokhov	1998	0	0	1 (Narodovlastie)	0
Chechnya						
Krasnodarskii Kraj	Tkachev	2000	0	0	0	1(KPRF, APR, Otechestvo, Edinstvo, NPSR)
Stavropolskii krai	Chernogorov*	2000	0	0	0	1(KPRF, NPSR)
Astrakanskaya oblast	Guzhvin*	2000	0	0	0	1(Otechestvo, Yabloko, SPS)
Volgogradskaya oblast	Maksyuta*	2000	0	0	1(KPRF)	0
Rostovskaya oblast	Chub*	2000	0	1(Edinstvo)	0	0
Bashkortostan	Rakhimov*	1998	1	0	0	0
Marii El	Markelov	2000	0	0	0	1(LDPR, Edinstvo, Yabloko)
Mordovia	Merkushin*	1998	1	0	0	0
Tatarstan	Shaimiev*	2001	0	1(Otechestvo)	0	0
Udmurtija	A.Volkov	2000	0	0	0	1 (Otechestvo, leftist parties)
Chuvashia	Fedorov*	2001	1	0	0	0
Permskaya obalst	Trutnev	2000	0	0	0	1(Yabloko.

						SPS)
Kirovskaya oblast	Sergeenkov*	2000	0	0	1 (Otechestvo)	0
Nizhegorodskaya oblast	Khodyrev	2001	0	0	1(KPRF)	0
Orenburgskaya oblast	Chernyshev	1999	0	0	1(APR)	0
Penzenskaya oblast	Bochkarev	1998	1	0	0	0
Samarskaya oblast	Titov	2000	0	0	1(SPS)	0
Saratovskaya oblast	Ajatskov*	2000	0	1	0	1(NDR, Edinstvo)
Ulyanovskaya oblast	Gorjachev*	2000	1	0	0	0
Kurganskaya oblast	Bogomolov*	2000	0	0	0	1(KPRF, Edinstvo, Otechestvo, NPSR)
Sverdlovskaya oblast	Rossel*	1999	0	1(NDR)	0	0
Tumenskaya oblast	Sobyanin	2001	0	0	1(Yabloko)	0 (Latyshev)
Khanty-Mansiiskii AO	Filipenko*	2000	1	0	0	0
Yamalo-Nenetskii AO	Neelov*	2000	1	0	0	0
Chelyabinskaya oblast	P. Sumin*	2000	0	0	0	1 (NPSR, Edinstvo)
Krasnoyarskii kraj	A. Lebed	1998	0	0	1 (RNRP)	0
Evenkiiskii AO	Zolotarev	2001	1	0	0	0
Taimyrskii AO	Khloponin	2001	0	0	1(Yabloko)	0
Respublika Altaj	Lapshin	2002	0	1 (ER)	0	0
Buryatia	Potapov*	1998	0	0	1(KPRF)	0
Tyva	Oorzhak*	1997	1	0	0	0
Khakassia	Aleksej Lebed*	2000	0	0	0	1(Otechestvo, NPSR)
Altaiskii kraj	Surikov*	2000	0	0	1 (NPSR)	0
Irkutskaya oblast	Govorin*	2001	1	0	0	0
Ust-Ordynskii AO	Maleev*	2000	0	0	1(Otechestvo)	0
Kemerovskaya oblast	Tuleev*	2000	0	0	0	1(KPRF, Edinstvo)
Novosibirskaya oblast	Tolokonskii	2000	1	0	0	0
Omskaya oblast	L.Polezhaev*	1999	0	1(Edinstvo)	0	0
Томская область	Kress*	1999	1	0	0	0
Chitinskaya oblast	Geniatullin*	2000	0	0	1 (NPSR)	0
Aginskii Buryatskii AO	Zhamsuev*	2000	0	0	0	1 (NPSR, Otechestvo)
Sakha	Shtyrov	2002	1	0	0	0
Primorskii kraj	Nazdratenko	1999	0	1(Edinstvo)	0	0
Khabarovskii kraj	Ishaev*	2000	0	1(Edinstvo)	0	0
Amurskaya oblast	Korotkov	2001	1	0	0	0
Kamchatskaya oblast	Mashkovtsev	2000	0	0	1(KPRF)	0
Koryakskii AO	Loginov	2000	1	0	0	0
Magadanskaya oblast	Tsvetkov*	2000	0	0	0	1(NPSR, Edinstvo)
Sakhalinskaya oblast	Farhutdinov*	2000	0	0	0	1 (Edinstvo, Otechestvo,

						Yabloko)
Evrejskaya AO	N.Volkov*	2000	1	0	0	0
Chukotskaya AO	Abramovich	2000	1	0	0	0

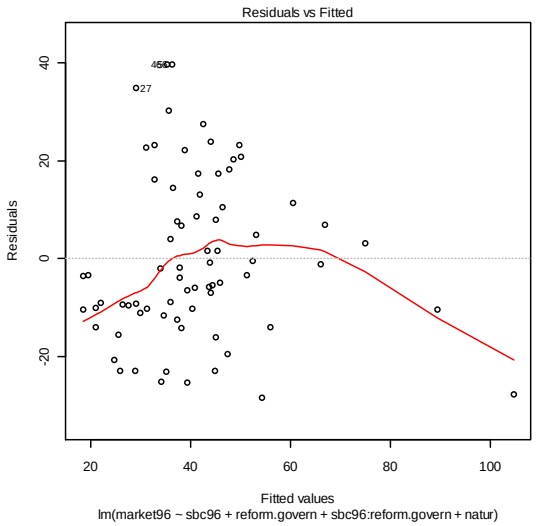
Source: Authors calculations

5.1.3 Regression diagnostics

The next step is the analysis of the validity of the assumptions on which the regression analysis was built. The procedure of verification of these assumptions includes a search for systematic trends in the goodness of fit. Residuals (observed less fitted values) should display homogeneity of variance. Heterogeneity of variance, even though it does not produce biased parameter estimates, affects the variance of the regression parameters, which in turn produces an unreliable t-statistic. This causes the resulting regression estimates to be inefficient and seriously damages the predictive power of the model, therefore the model should be re-specified using established remedies.[100] The most widely used formal tests that check for the homogeneity of variance are Levene's test (1960), White's General test (1980) and the Breusch-Pagan test (1979). In the present research, I use the first and the third of these for practical reasons, as these tests are built into the R program. In addition I use the score test for non-constant variance, which tests the H_0 that error variance is constant against the alternative that the error variance increases or decreases with a change in the fitted values, or with a change in the linear combination of predictors.

Figure 3.2 below represents the visual assessment of the homogeneity of variance, plotting the standardized residuals against fitted values.

Fig. 5.5 Residuals versus Fitted Values for the Linear Regression (Minimal Adequate Model with Interaction Term)



The scatter of the residuals against fitted values does not have a funnel shape, which is good news, but on the basis of this scatter it is hard to decide whether the variance is indeed

[100] Another possible solution is to use White's corrected errors. This method produces standard errors for t-statistics on the basis of robust variance-covariance matrix

homogeneous. In Table 5.3 the first column represents the values for the Levene's (p-value 0.46) and Breusch-Pagan's (0.74), and score test (0.8) which indicate that the so far best fitted model (linear regression with interaction terms, minimal adequate), satisfies the assumption of homoscedasticity. However, it would be interesting to investigate how the level of homoscedasticity changes with different model specifications, and whether the trade off between simplicity and better fit is justified. The second column in this table represent the values and the corresponding p-values for the hierarchical model, which shows that the additional level in the design was beneficial in increasing the homoscedasticity of residuals: the probability of the constant variance increased in all three tests: Levene's - 0.56, Breusch-Pagan's -0.91, and score test 0.98. The next two subsections will further investigate the possibility of improving the fit of the model.

5.1.4 Remedies to the misspecified model: variable transformation

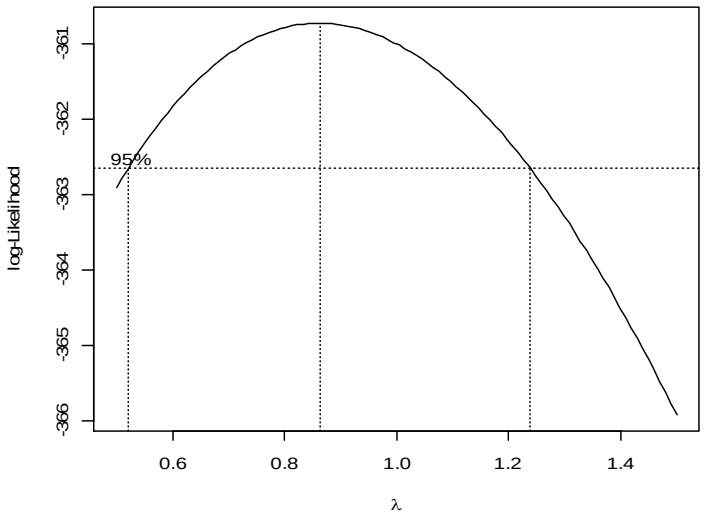
It is well known that a simple transformation of the variables in the equation can produce significant improvements in model performance. In statistical modeling of observational data it is often the case that the error structure and functional form of relationship are unknown, hence the optimal transformation of the response variable is not readily envisaged. When the adequate theory for transformation is not available, a common method is to try out different transformations on the variable, such as logarithms, antilogs and reciprocals. Subsequently, to select the optimal transformations, one of the goodness-of-fit measure tests (Kolmogorov-Smornov, Chi-square) is employed.

Another possibility would be to use the Box-Cox transformation, which offers a more advanced empirical solution to this problem of low goodness of fit. According to this method, the specified set of predictors is fitted to a response variable which takes the following form:

$$\frac{y^{\lambda}-1}{\lambda} \qquad (3.1)$$

The Box-Cox transformation offers a method of finding the value of lambda that maximizes the likelihood of the model given the data. The plot in Fig. 3.4 visualizes the log-likelihood of the model given data against the range of possible values of lambda.

Fig 5.6 Log-likelihood of the Model Versus Lambda



The plot suggests that the likelihood is maximized when $\lambda = 0.9$; therefore, after the transformation of the response variable, the new model formula will look as follows:

$(DMI^{0.9}-1)/0.9 = ß_0 + ß_j\mathbf{X} + \varepsilon \quad (i = 1,\ldots, N), (j=1,\ldots,K) \quad (4)$

Where DMI denotes the level of development of market institutions, $ß_0$ –an intercept, $ß_j$ - vector of coefficients, $\boldsymbol{X}$ is the matrix of k explanatory and control variables, and ε is a random disturbance term for regions i = 1,…N. The parameter estimates of the new model with the Box-Cox transformation of the formula are presented in Table 3.

5.1.5 Remedies to the misspecified model: fitting asymptotic exponential function

As shown by the preceding analysis, the SBC is the most reliable predictor in the formula of the development of market institutions, hence another possible improvement to the model specification involves the search for the adequate formula that will best describe the relationship between these two variables. Plotting the soft budget constraints variable against the variable of market development produces a scatterplot that departs significantly from linearity. One of the possible solutions would be fitting non-linear regression, in the expectation that it will be significantly better at describing data.

The above-outlined polynomial regression was based on the transformation of the response variable, with which I made an attempt to linearize the initially curvilinear relationship between the explanand and explanators. The difference between the Box-Cox transformation and non-linear modeling is in that the latter fits relationships that cannot be linearized by the transformation of dependent or independent variables. The preliminary step to the non-linear modeling involves a search for the possible function that can potentially describe the data better than the linear model. The investigation of the range of different non-linear functions and their curves led me to conclude that the best candidate would be a 3-parameter asymptotic exponential function, described by the formula:

$$Y = a - be^{-cx} \quad (5)$$

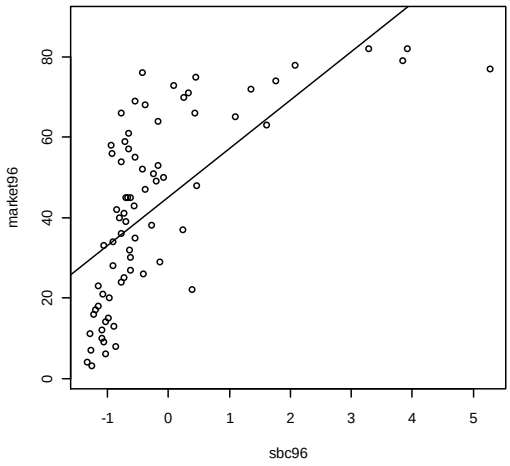
The non-linear modeling package in R produced following estimates for the coefficients a, b and c.

	Estimate	Std. Error t
a	67.4003	4.6866
b	10.1934	4.2816
c	1.3921	0.3147

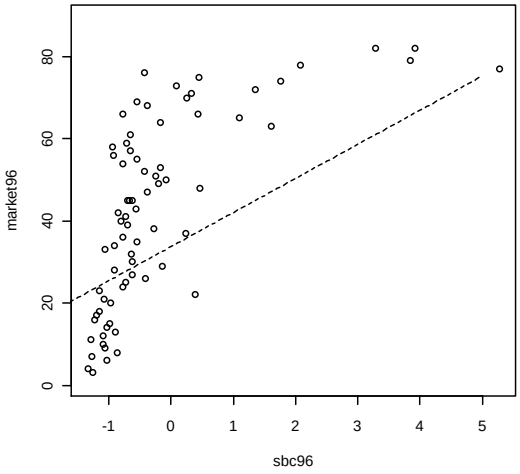
All the parameters appear to be significantly different from 0 at $p<0.05$, which imply that this model fairly well describes the data. Fig.3.5, Panel C represents the scatterplot and the added line of fitted values for the asymptotic exponential function $DMI = 67.5-10.2 * e^{-1.4*SBC}$, and for comparative display, the plots for the bi-variate linear model with raw data (panel A), bi-variate model after power transformation of data using Box-Cox method (Panel B) are also presented.

Fig. 5.7 Plots of Linear, Polynomial and Asymptotic Exponential Functions

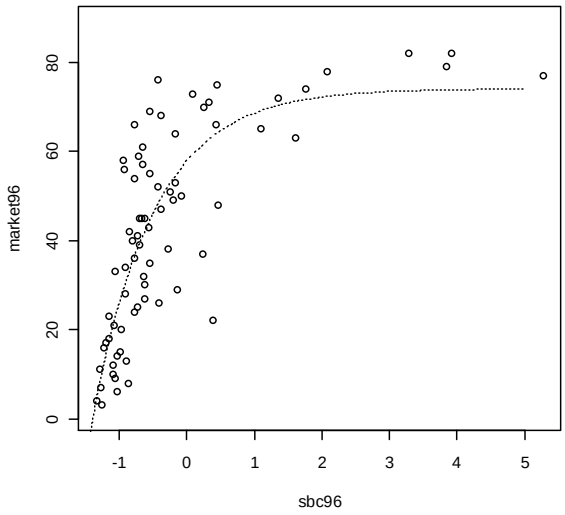
Panel A. Bi-variate linear function



Panel B. Polynomial function



Panel C. Asymptotic exponential function



The asymptotic transformation seems to offer an improvement to the goodness of fit of the model with respect to SBC, but because we are comparing models that have both a single variable and a linear combination of variables as explanators, it is necessary to use formal tests. As comparisons using the *anova* operand or the AIC criterion are not possible for these three models, I turn to the description of error term, and its variance. Table 2 shows that the residual standard error is increased compared to the polynomial transformation, and Levene's test indicates that the variance is much less homogeneous than in the other model specifications (0.26 against 0.45, 0.46, or 0.56 for other models).

The interim conclusion with regard to model transformations is as follows. Introducing the transformation of the response variable (Box-Cox transformation) into the linear multivariate model with interaction terms increases the proportion of the variation explained by the model, as well as the Akaike Information Criterion. It also leads to a substantial increase in the linearity of relationship between the response and explanatory variables. The formula

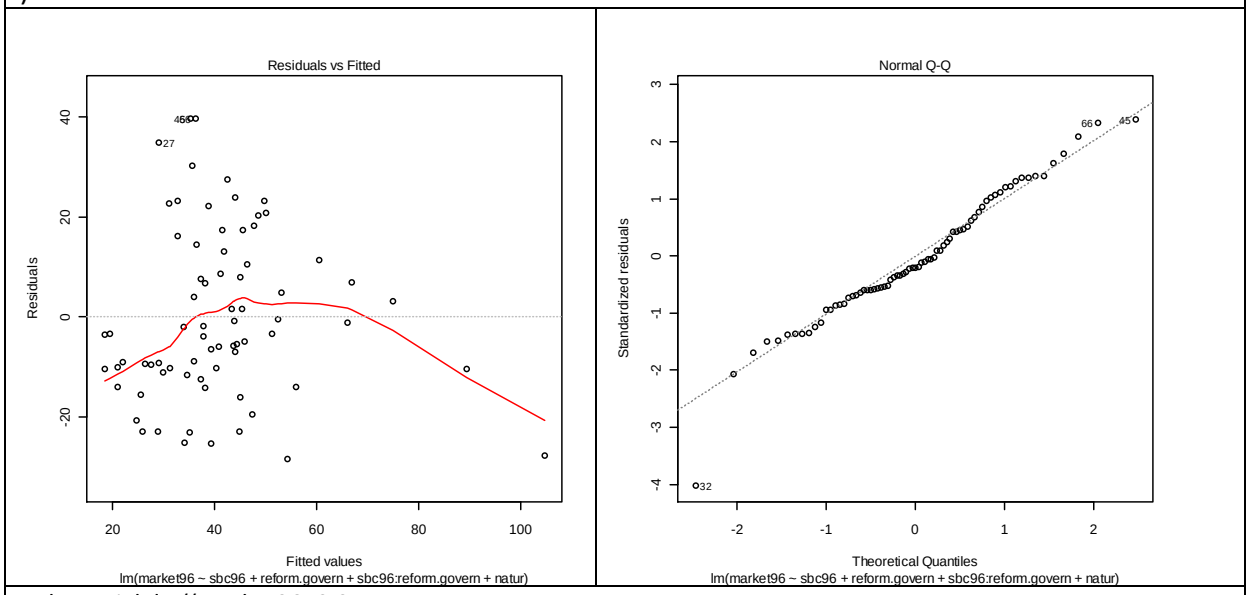
transformation next tested, namely the asymptotic model, has a visual fit superior to that of the linear models, a fact that may be important for predictive purposes. However, the residual standard error and the heteroscedasticity of the model are both increased, which is a strong argument against using this model specification. The introduction of the exponential term would also not be rational because of the corresponding loss of simplicity of the scientific interpretation. The choice of fitting curvilinear relations compromises the principle of parsimony, as with three parameters (a, b and c) involved in the description of the relationship between SBC market development, it is difficult to arrive at straightforward scientific conclusions.

5.1.6 Check for normality of errors

The common assumption of the normally distributed errors lies in the basis of the ordinary least squares regression analysis, therefore the second after the check of homoscedasticity will be the check for normality of errors. Among alternative ways of assessments of the deviation from normal (Gaussian) distribution, such as the Shapiro-Wilk test, I use normal quantile plots, or quantile-quantile plots, which display the observed ranked samples from the data distribution against a similar number of ranked quantiles that are expected if the data were from a normal distribution. The usefulness of this graph is in its ability to indicate the outlier on the plot. In the ideal case, when the distribution is normal, the graph approximates a straight line. The departures from the normal distribution are easy to spot by eye: they are show up as sorts of non-linearity. The plot presented in the Fig. 5.8 below reveals that the errors in the model are not from the normal distribution. The section 5.6.6.4 in the body of the thesis offers some empirical solutions to this problem.

Fig. 5.8 Regression diagnostics for the models including Ingushetia:

lm(market96~sbc96+reformist.government+reformist.government:sbc96+initial.endowment)



Polynomial: lm((market96^0.9-1)/0.9~sbc96+reformist.government+reformist.government:sbc96+initial.endowment)

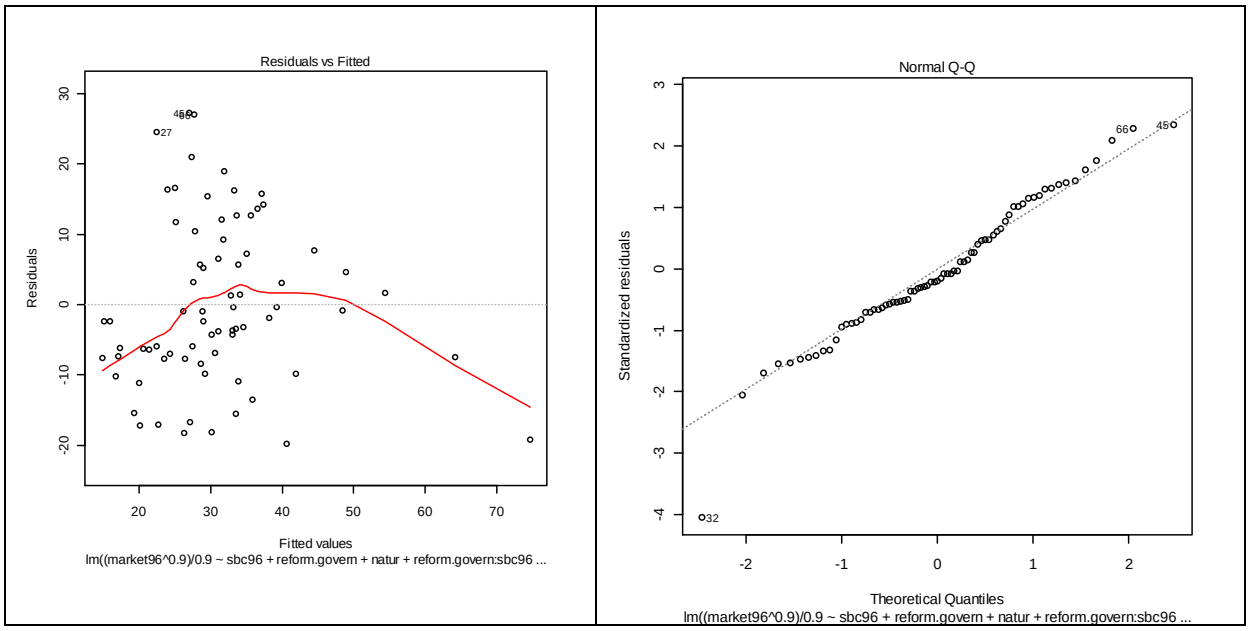


Table 5.3 The Homoscedasticity Tests Estimates for Models including and excluding Ingushetia

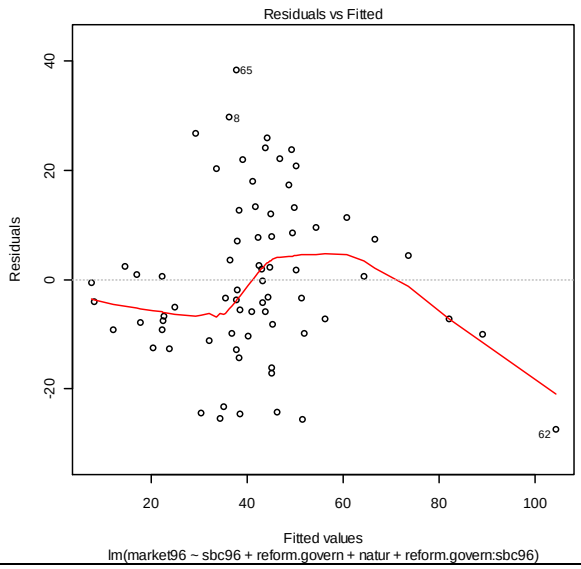
	Linear	Linear Hierarchical	Polynomial	Asymptotic Exponential
Sample with Ingushetia				
Breusch-Pagan test*	1.47 (0.74)	**1.47(0.91)**	1.67(0.79)	NA
Score test*	0.06 (0.8)	**0.012 (0.98)**	0.01(0.91)	NA
Levene test*	0.53(0.46)	**0.3(0.56)**	0.59(0.45)	1.21 (0.26)
Residual Standard Error**	17.25 (68)	NA	**12.05(68)**	15.1 (72)
Sample without Ingushetia				
Breusch-Pagan* test	2.9(0.54)	**2.9(0.71)**	2.56(0.63)	NA
Score test*	0.68(0.41)	0.68(0.41)	**0.52(0.47)**	NA
Levene test*	0.06(0.8)	**0.001(0.96)**	0.02(0.89)	0.04(0.84)
Residual Standard Error**	15.17 (67)	NA	**10.58 (67)**	13.93(71)

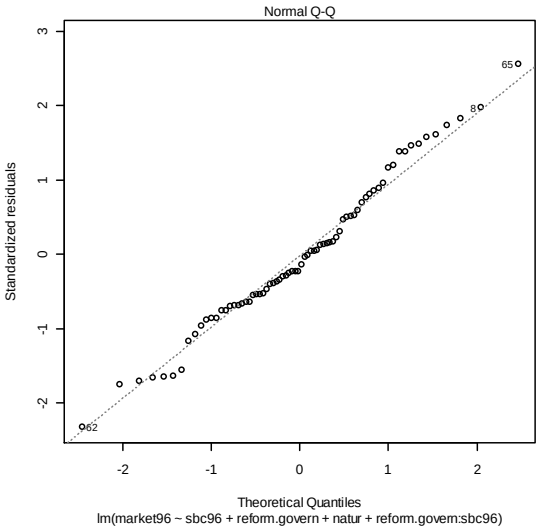
* p-values in parentheses
** degrees of freedom in parentheses

*** score test for non-constant variance tests the H_0 that error variance is constant against the alternative that the error variance changes with the level of the response (fitted values), or with a linear combination of predictors.

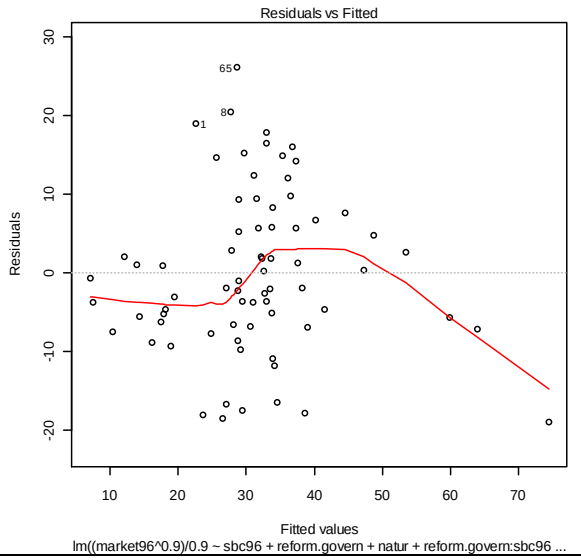
Fig.5.9 Regression diagnostics for the models, excluding Ingushetia:

lm(market96~sbc96+reformist.government+reformist.government:sbc96+initial.endowment)





Polynomial: lm((market96^0.9-1)/0.9~sbc96+reformist.government+reformist.government:sbc96+initial.endowment)



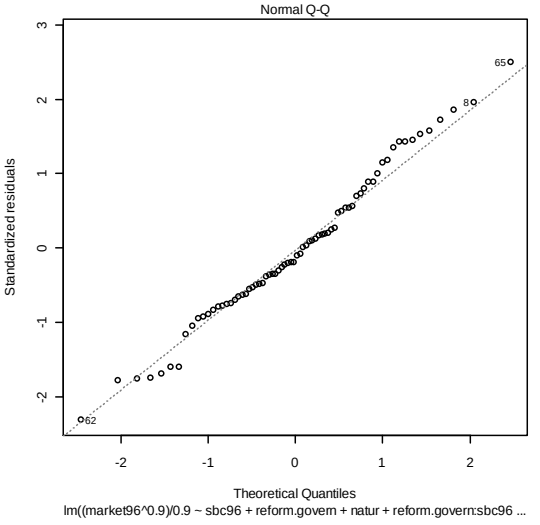
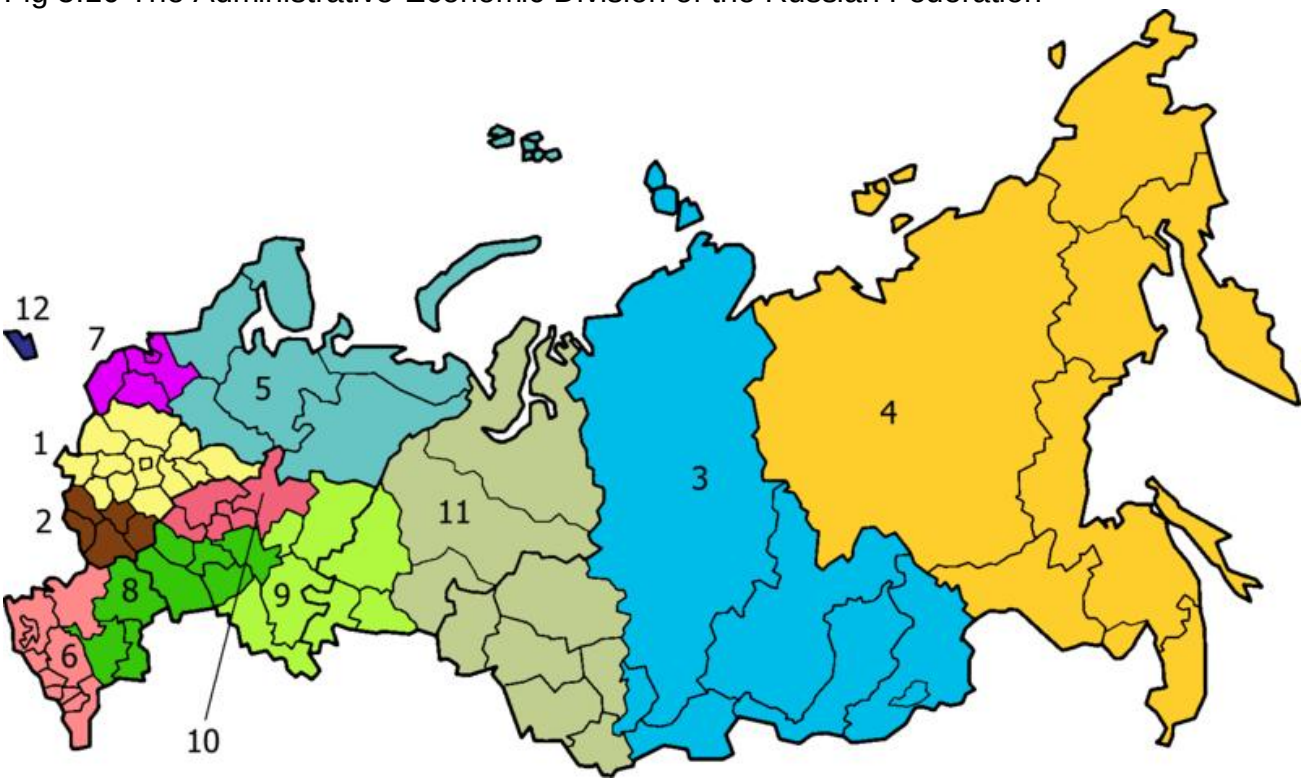


Fig 5.10 The Administrative-Economic Division of the Russian Federation



1. Tsentralnyi (Central)
2. Tsentralno-Chernozemnyi
3. Vostochno-Sibirskii
4. Dalnevostochnyi
5. Severnyi
6. Severo-Kavkazskii
7. Severo-Zapadnyi
8. Povolzhskii
9. Uralskii
10. Volgo-Vyatskii
11. Zapadno-Sibirskii
12. Pribaltiiskii

Table 5.4 Summary Table for the Models Run for a Sample Excluding Ingushetia
Dependent Variable: DMI

	Full model with interactions (linear multivariate)	Minimal adequate model (linear multivariate)	After Box-Cox transformation	Non-linear asymptotic regression	Full model (linear multi-level)	Minimal adequate model (linear multilevel)
Independent variables	(1)	(2)	(3)	(4)	(5)	(6)
SBC	**7.3 (2.9)**	**9.4 (5.3)**	**6.4 (5.2)**		**8.2 (3.4)**	**9.8 (5.6)**
Executive's political orientation: Party of Power	7.4 (0.7)				0.6 (0.1)	
Legislative orientation towards market: Reformist	-0.1 (-0.1)				6.2 (0.7)	
Executive-legislative synergy. Kremlin-oriented executive and reformist legislature	8.7 (0.7)	**15.3 (1.9)**	10.6 (1.8)		7.9 (0.7)	**13.2 (1.7)**
Interaction - SBC: Executive political orientation: Party of Power	4.6 (1.3)				3.2 (0.9)	
Interaction – SBC: Reformist orientation of the regional legislatures	2.3 (0.2)				1.5 (0.1)	
Interaction – SBC: Kremlin oriented executive and reformist legislature	22.7 (1.7)	**26.9 (3.2)**	19.2 (3.3)		22.9 (1.7)	**24.9 (3.1)**
Controls						
Initial Endowment	**-2.7 (-2.3)**	**-3.1 (-2.8)**	**2.2 (2.9)**		**-2.7 (-2.3)**	**-2.9 (-2.7)**
R^2_{adj}	0.52	0.53	0.54			
Between-district variation					23.4	36.1
Within-district variation,					217.2	200.4
AIC	608	602.7	550.9		569	584

Note: t-values in parentheses

Table 5.5 The Bi-variate and Multivariate Models Run for a Sample Excluding Ingushetia
Dependent Variable: DMI

Independent variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Soft Budget Constraints	**12.1 (7.6)**	**10.9 (5.9)**							**10.4 (5.4)**
Executive's political orientation: Party of Power			-11.0 (-1.9)	-6.9 (-1.4)					-0.8 (0.2)
Legislative orientation towards market: Reformist					**-18.5 (-3.1)**	**-10.9 (-2.1)**			5.8 (0.6)
Executive-legislative synergy. Kremlin-oriented executive and reformist legislature							**-21.6 (-3.4)**	**-14.0 (-2.6)**	-11.6 (-1.0)

Control variable									
Initial Endowment		**-3.8 (-3.2)**		**-4.5 (-5.3)**		**-4.4 (-5.3)**		**-4.2 (-5.0)**	**-3.5 (-2.9)**
R^2adj	0.44	0.46	0.03	0.31	0.09	0.33	0.12	0.35	0.45

Note: t-values in parentheses

Table 5.6 Repeated Measurements Model for a Sample Excluding Ingushetia. Dependent Variable: DMI

	Repeated Measurements Model (full sample: years 1996-2001) Random effects = years, regions	Repeated Measurements Model (sample of years 1996-1997) Random effects = years, regions	Repeated Measurements Model (sample of years 1998-2001) Random effects = years, regions
Independent variable	(2)	(3)	(4)
SBC	**2.5 (3.4)**	**9.8 (7.0)**	**2.6 (3.6)**
Control variable			
Natural Endowment	**-5.1 (-4.6)**	**-3.4 (-3.5)**	**-4.4 (-3.9)**
Between-groups variation,	0.85	0.000024	0.00012
Between-groups variation	3,400,000	98.1	17.1
Within-groups variation,	37.1	70.6	23.8
AIC	2991	1162	1912

Note: t-values in parentheses

Table 5.7 R Output for Comparing Two Models

```
                Res.Df    RSS       Df  Sum of     Sq  F
           Pr(>F)
full model         64        19821.8
min adequate model 68        20224.3   -4 -402.5      0.3249
0.8603
```

Table 5.8 R Output for Comparing Two Models

```
        Df     AIC    BIC        Df   Pr(>Chisq)
mod12   7    629.58  645.62
mod13   11   637.14  662.34      -4    0.9788
```

Appendix to Chapter 6[101]

Table 6.1 Signing of Bi-Lateral Treaties, Codes

Date	*Code*	*Region*	*Date*	*Code*	*Region*
1994			*13.06*	*1*	*Leningrad oblast*
15.02	*3*	*Republic of Tatarstan*	*13.06*	*1*	*Tver oblast*
01.06	*3*	*Republic of Kabardino-Balkaria*	*29.11*	*1*	*Altai krai*
03.08	*3*	*Republic of Bashkortostan*	**1997**		
1995			*04.07*	*1*	*Vologda oblast*
23.03	*2*	*Republic of North Ossetia*	*04.07*	*1*	*Saratov oblast*
29.06	*2*	*Republic of Sakha*	*04.07*	*1*	*Bryansk oblast*
11.07	*2*	*Republic of Buryatia*	*04.07*	*1*	*Chelyabinsk oblast*
17.10	*2*	*Republic of Udmurtia*	*04.07*	*1*	*Magadan oblast*
1996			*01.08*	*1*	*Samara oblast*
12.01	*1*	*Sverdlovsk oblast*	*30.10*	*1*	*Kirov oblast*
12.01	*1*	*Kaliningrad oblast*	*30.10*	*1*	*Murmansk oblast*
30.01	*1*	*Orenburg oblast*	*30.10*	*1*	*Yaroslavl oblast*
30.01	*1*	*Krasnodar krai*	*30.10*	*1*	*Ulyanovsk oblast*
20.03	*1*	*Republic of Komi*	*30.10*	*1*	*Astrakhan oblast*
24.04	*1*	*Khabarovsk krai*	*01.11*	*1*	*Krasnoyarsk oblast*
19.05	*1*	*Omsk oblast*	**1998**		
27.05	*1*	*Irkutsk oblast*	*20.05*	*1*	*Amur oblast*
27.05	*1*	*Republic of Chuvash*	*20.05*	*1*	*Voronesh oblast*
29.05	*1*	*Sakhalin oblast*	*20.05*	*1*	*Ivanovo oblast*
31.05	*1*	*Perm oblast*	*20.05*	*1*	*Kostroma oblast*
08.06	*1*	*Nizhegorodskaya oblast*	*20.05*	*1*	*Marii-El oblast*
11.06	*1*	*Rostovskaya oblast*	*16.06*	*1*	*Moskow city*
13.06	*1*	*S. Petersburg city*			

Notes: Irkutsk oblast signed a bi-lateral treaty together with its sub-territory, which is also an independent region, Ust-Ordynsk Autonomous Okrug (AO). The same applies to Perm oblast with Komi-Permyak AO and Krasnoyarsk oblast with Taimyr and Evenk AO.
Source: Solnick (2000)

[101] Data: N=74 in all regressions, excluding fifteen regions: Komi-Permyak AO, Chechen and Kabardino-Balkarskaya republic, Nenetskii AO, Khanty-Mansiiskii AO, Yamalo-Nenetskii AO, Tajmyrskii AO, Evenkiiskii AO, Ust-Ordynskii AO, Aginskii AO, Korjakskii AO, Lipetskaya and Tyumenskaya oblasts, Moscow and S.Petersburg cities.

Fig.6.1 Profile for the transformation parameter λ in the Box-Cox model applied to the basic OLS regression (six regressors)

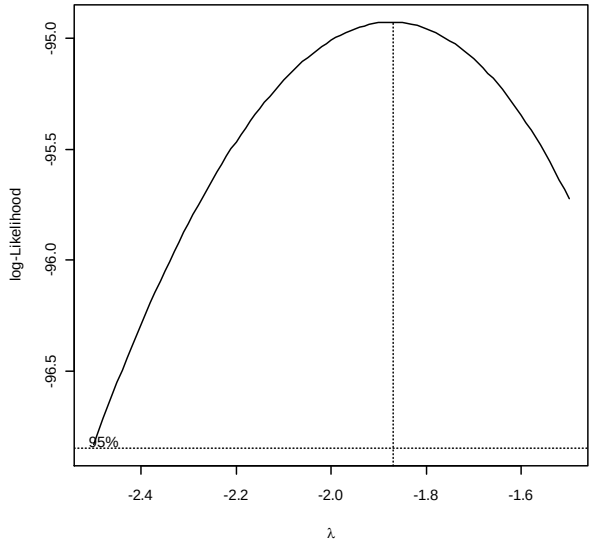


Table 6.2 Regression estimates for the multi-level model

	Estimate	Std. Error	t value
(Intercept)	-3.0886489	0.7523272	-4.105
Employment	64.2520229	15.4766035	4.152
for.Yelt	0.0449802	0.0130068	3.458
repub	0.5229640	0.3672352	1.424
state.pr.	0.5301037	0.1477676	3.587
federal.property	0.1643514	0.1181784	1.391
population	-0.0004898	0.0001244	-3.936

Table 6.2 What Explains the Level of SBC: Comparative statistics for a samples with and without Ingushetia (models for year 1996). Dependent variable – SBC

Models	Basic OLS with six regressors		Polynomial with six regressors		Polynomial with two regressors		WLS with six regressors		Basic OLS with three (four) regressors		Basic OLS with two regressors	
Samples	With Ingushetia	Without Ingushetia	With Ingushetia	Without Ingushetia	With Ingushetia	Without Ingushetia	With Ingushetia	Without Ingushetia	With Ingushetia	Without Ingushetia	With Ingushetia	Without Ingushetia
Employment	66.8 (4.3)	47.5 (4.2)	1.1 (3.0)	0.9 (2.6)	1.2 (3.1)	0.9 (2.5)	43.9 (3.7)	30.8 (3.3)	80.11 (4.4)	51.7 (4.3)	74.8 (4.1)	45.1 (3.6)
Vote for Yeltsin	0.04 (3.3)	0.02 (2.1)	0.0004 (1.3)	0.0004 (0.9)	-	-	0.03 (3.2)	0.02 (2.8)	-	0.02 (2.1)	-	-
Administrative status	0.57 (1.6)				-	-	0.5 (1.9)	0.35 (1.7)	-			
Controls:												

Federal Property	0.19 (1.7)	0.005 (1.7)	0.00005 (1.7)	0.005 (1.7)	-	-	0.15 (1.9)	0.12 (2.0)	0.19 (1.4)	0.21 (2.5)	-	-
Population	-.00048 (-3.9)	-0.00005 (-5.8)	-0.00 0031 (-10.6)	-0.00003(-10.8)	-0.00 0032 (-11.1)	-0.00 0032 (-11.5	-0.00 05 (4.9)	-0.00 05 (-6.3)	-0.00 058 (-4.2)	-0.00 058 (-6.6)	-0.00 057 (-4.1)	-0.00 056 (-6.0)
R^2_{adj}	0.54	0.55	0.69	0.68	0.66	0.66	0.50	0.52	0.34	0.48	0.32	0.42

Note: t-values in parentheses

Table 6.3 Heteroscedasticity consistent and common ANOVA (type II tests) estimates for the basic OLS model with six regressors.

Response: sbc

	Df	F	Pr(>F)
Employment	1	8.5178	0.004784 **
for.Yelt	1	2.9981	0.087967 .
repub	1	2.7704	0.100691
state.pr.	1	3.4026	0.069517 .
federal.propert	1	4.1657	0.045193 *
population	1	26.091	2.908e-06 ***

Response: sbc

	Sum Sq	Df	F	Pr(>F)
Employment	27.278	1	18.357	5.99e-05 ***
for.Yelt	15.760	1	10.60	0.0017702 **
repub	3.928	1	2.6435	0.1086717
state.pr.	20.121	1	13.540	0.0004671 ***
federal.propert	4.274	1	2.8764	0.0945317 .
population	23.309	1	15.686	0.0001837 ***

Table 6.4 Heteroscedasticity consistent and common ANOVA estimates for the basic OLS model with six regressors (without Ingushetia)

Response: sbc

	Df	F	Pr(>F)
Employment	1	7.0532	0.00991 **
for.Yelt	1	4.1604	0.04538 *
repub	1	2.1775	0.14480
state.pr.	1	2.2803	0.13580
federal.proper	1	4.6766	0.03420 *
population	1	21.5210	1.708e-05 ***

Response: sbc

	Sum Sq	Df	F value	Pr(>F)
Employment	13.223	1	17.9429	7.212e-05 ***
vote for Yelt	3.368	1	4.5697	0.03625 *
repub	1.876	1	2.5459	0.11536
state.pr.	5.850	1	7.9378	0.00638 **
federal.proper	4.255	1	5.7737	0.01909 *
population	25.379	1	34.4391	1.562e-07 ***

Fig. 6.2 Regression diagnostic plots for the sample without Ingushetia, basic OLS model

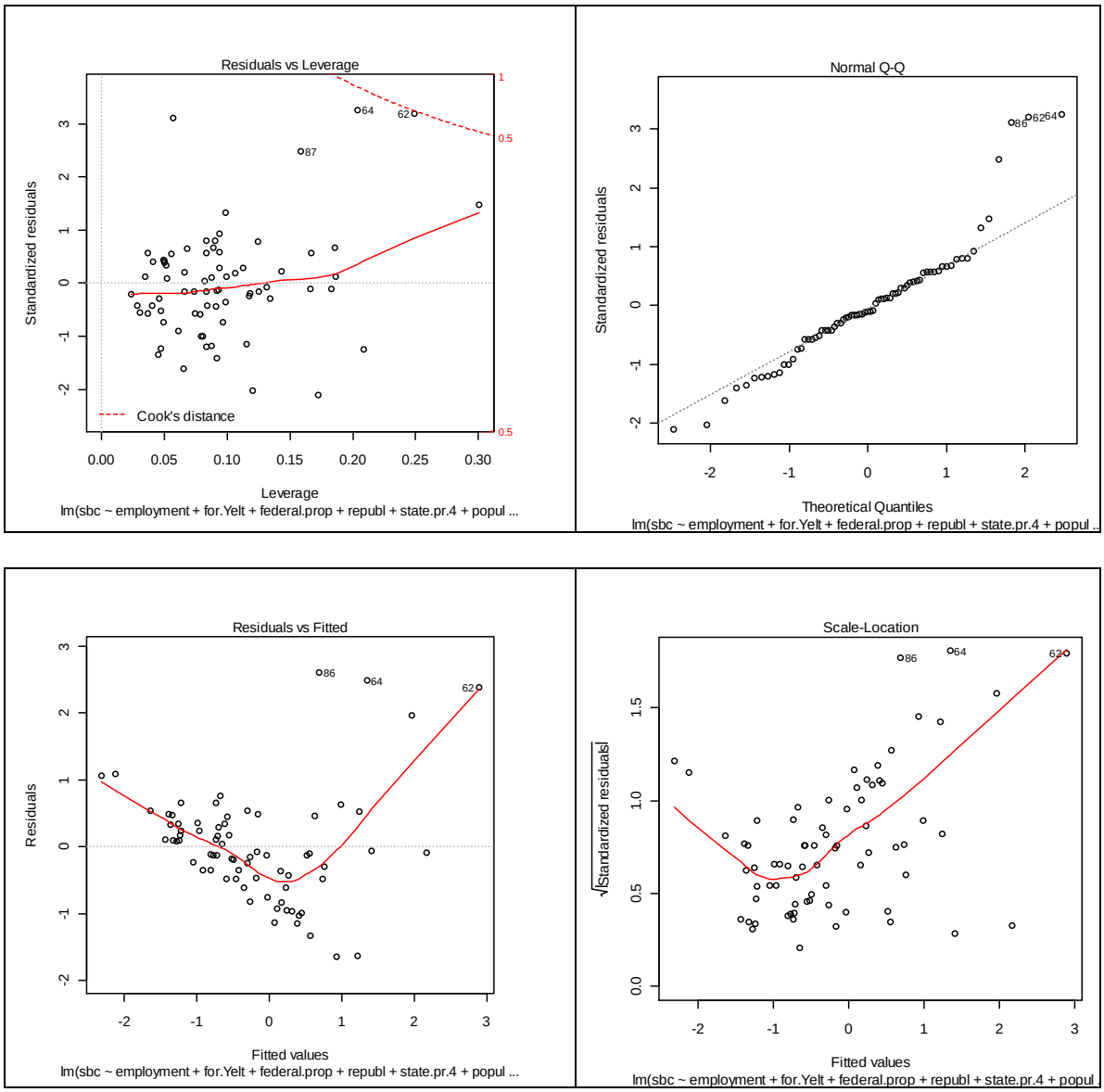


Fig. 6.3 Standardized residuals vs. fitted values plots for the models run on a sample without Ingushetia

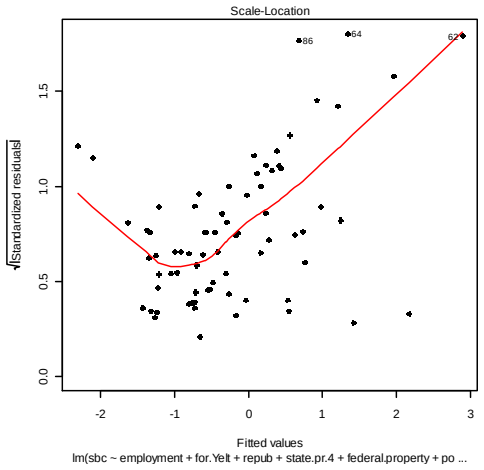
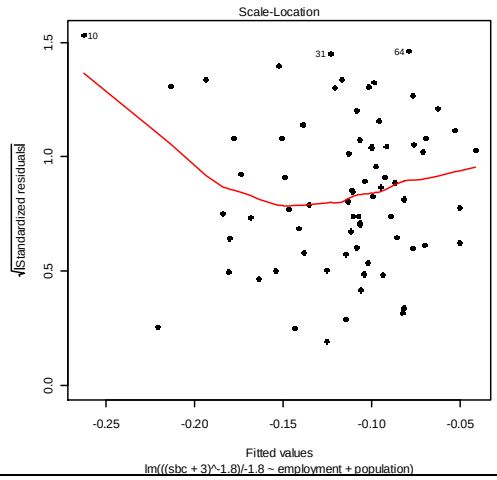
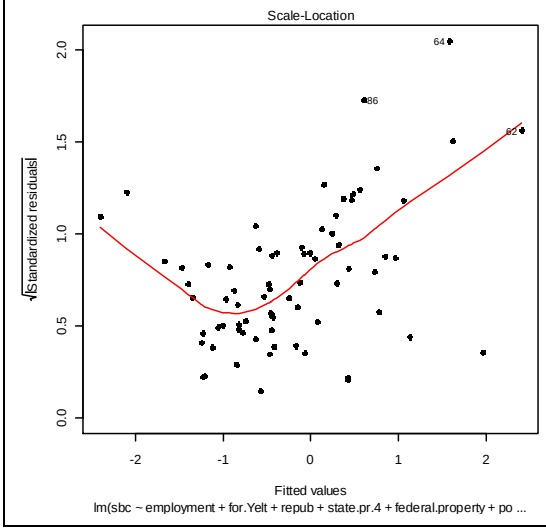
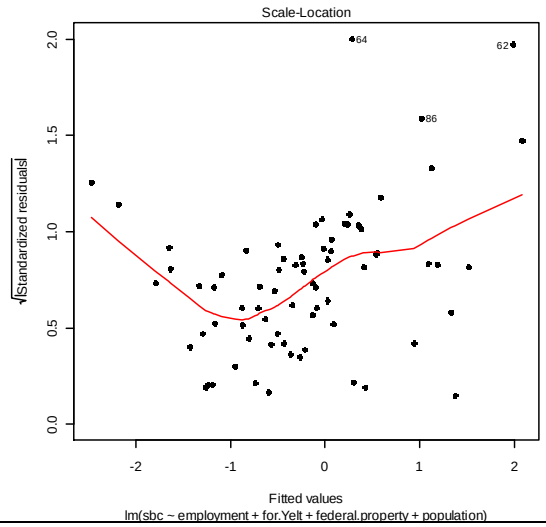
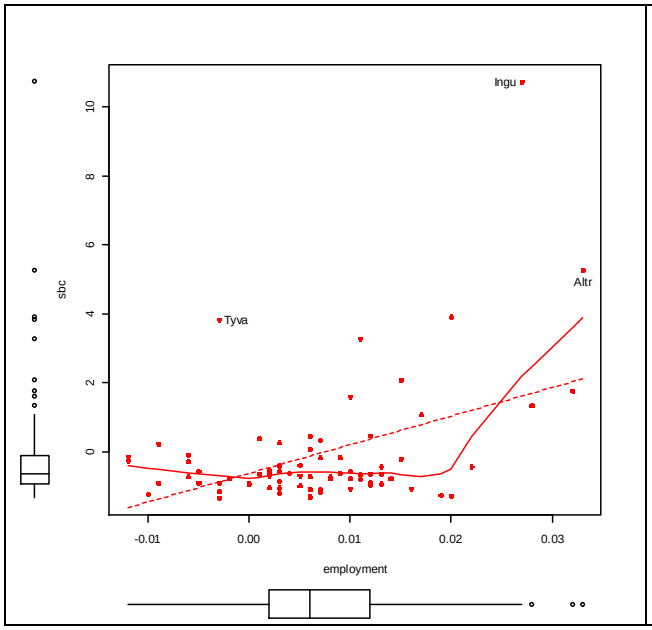
Minimal adequate OLS model	Polynomial OLS with two regressors
	
Weighted least squares (WLS) regression with six regressors	**Model with four response variables**
	

Fig.464 Employment vs. SBC scatter plot for a sample with(panel A) and without (panel B) Ingushetia

Panel A



Panel B