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AN IMPACT OF DIFFERENT REGULATORY REGIMES ON THE EFFECTIVENESS OF PUBLIC PROCUREMENT[5]

The reform of budget-sector entities enables us to compare the impact of different types of public procurement regulations in budget and autonomous organizations in Russia. Such analysis is important in light of the critical discussion of the effects of current procurement regulation (94-FL), as well as taking into account the introduction of the Federal Contract System in 2014.

Using the difference-in-differences methodology, we shall consider public procurements of two national universities in 2011–2012. All procurements of the first university were regulated by the 94-FL requirements. Procurements of the second university were regulated by the 94-FL until June 2011. Later this university introduced its own Procurements Provision. A comparative analysis of procurements of these organizations enables us to estimate the impact of the different types of regulations on the effectiveness of public procurement, as measured by the level of competition and price decline in public tenders, as well as the timely execution of procurement contracts.

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Introduction

The efficient organization of public procurements is an important task both for developed countries (Klemperer 2002) and developing countries (Dlamini and Ambe 2012), and constitutes part of their economic activity. This is connected with the fact that public procurements account for some 10-15 percent of GDP in the first group and approximately 20 percent in the second group (Lewis and Bajari 2011; Ohashi 2009).

The 2005 reform of the public procurement system, connected with the adoption of Federal Law 94-FL "On the Placement of Orders for Supply of Goods, Fulfillment of Works, Provision of Services for State and Municipal Needs", was aimed at preventing abuses by officials of government customer organizations and enhancing competition during the process of selecting suppliers. These objectives have been emphasized many times in statements by government representatives and reports of the Federal Antimonopoly Service (Artemyev 2006; RFAS 2012). The tools used for attaining those objectives consisted of strict and detailed regulation of government order placement procedures with a focus on selecting suppliers on the basis of lowest price and restricting the use of any qualitative criteria for evaluating bids. Active introduction of the practice of selecting suppliers via auctions was also supposed to boost competition (due to limiting the use of requests for quotations and tenders).

All these measures stimulated the growth of competition in the sphere of public procurement, but at the same time an analysis of the practice of applying 94-FL demonstrated that they led to a shift of corruption to other stages of the procurement cycle (planning and delivery) and generated numerous problems in fulfilling contractual obligations (HSE policy paper 2010). Subsequent and more detailed empirical studies showed that the problems with executing contracts (delays in fulfilling obligations or failure to execute them in full volume) occur more frequently in cases when the legislation restricts customers to apply qualification and business reputation criteria in process of choosing suppliers (Yakovlev, Demidova, and Balaeva 2013).

It should be noted, however, that this situation of excessively rigid regulation in the sphere of public procurement is not unique for Russia (Tadelis 2012). A broad survey of public procurement effectiveness in countries of the European Union conducted in 2011 that covered 5,500 government customers and 1,800 suppliers from 30 countries showed that procurement procedures in the private sector are on the whole evaluated as more flexible and more efficient when compared to the public sector. At the same time, the level of competition at auctions is lower in the private sector (PwC 2011). One of the factors of this competition decrease is the reputation of suppliers being taken into account. This creates a certain degree of inequality

among the bidders, but at the same time it is conducive to better immediate procurement outcomes and creates long-term incentives for new potential suppliers to take part in tender procedures (Spagnolo 2012). It should also be mentioned that the effectiveness of procurement procedures in the private sector does not lead to losses in quality during the execution of the contract, but allows it to remain at a comparative level with the public sector (Roodhooft and Abbeele 2006).

Discussions concerning the consequences adopting 94-FL in Russia resulted in a critical revaluation of approaches to procurement regulation. Specifically, the concept of the Federal Contract System (FCS), a draft law that was submitted to the State Duma (parliament) in 2012, envisages the spread of regulation to the contract planning and implementation stages with a simultaneous widening of the spectrum of procurement procedures that can be used by government customers. Considering the experience of 94-FL enforcement, it is apparent that the creation of FCS will take more than one year. At the same time, new approaches to procurement regulation are in practice already being applied now (before FCS formation), in part within the framework of reforming budget sector organizations.

Public sector reform in the Russian Federation envisages the introduction of different types of public sector organizations, including public institutions and enterprises, state budget-funded agencies, and autonomous organizations (Federal Law from 03 Nov 2006 N 174-FL "On Autonomous Organizations", edited on 03 Dec 2012). According to the rule established for the latter type of public sector organizations, their procurements shall not fall within the scope of 94-FL if the autonomous organization's supervisory board adopts a special provision regulating the procurements of this autonomous organization.[1] Such provisions were presumed to include procurement procedures and supplier selection mechanisms that take into account the specifics of a particular autonomous organization. Such implementation of "FCS elements" provides a good opportunity for comparing the consequences of applying old and new public procurement regulations, which constitutes the subject of this work.

Applying the difference-in-differences methodology (Ohashi 2009) and using the analytical approach proposed by (Yakovlev, Demidova, and Balaeva 2013), this article analyzes the procurements of two budget sector universities during the period of 2011–2012. One of these organizations, which is a budget-sector institution, conducted its procedures in accordance with the provisions of 94-FL during the entire period under survey. The other organization, which is an autonomous organization, also conducted its procurements in accordance with 94-FL until July 2011, but afterwards adopted and enforced its own procurement provision. The comparison

[1] This provision was later prescribed by Article 2 of Federal Law 223-FL from 18 July 2011 "On the Procurement of Goods, Works, and Services by Some Types of Legal Entities."

of these two organizations enables us to assess the impact of the shift to new regulation forms on the main public procurement effectiveness parameters, including the level of competition at auctions, economizing by price decreases at auctions, and execution of contracts.

The material of the article is organized in the following way: Part 1 offers a brief description of both organizations under review and the main changes in procurement procedures of the autonomous organization as a result of adoption of its own procurement provision; Part 2 contains a descriptive analysis of procurement data in both organizations during the period of 2011–2012; Part 3 builds on this analysis to formulate the main hypotheses and methodology of econometric research; Part 4 presents the results of regression analysis; and in the conclusion we present the main findings and recommendations for economic policy.

1. General Institutional Characteristics, Procurement Rules, and Procedures Used by the Organizations under Review

Our analysis is based on procurement data from two large public sector organizations for the period of 2011–2012. Both of the considered organizations are national research universities. Organization No.1 is a major university in Moscow, while Organization No.2 is a large regional Russian university. The scopes of their activity, which is represented by the number of contracts and their value, are comparable, although there are differences in the procurement structure.

The procurement activities of each of the compared organizations have their own specifics. Being an autonomous public institution, Organization No.1 enforced its own procurement provision in July 2011. At the same time, during the entire period in question, Organization No.2 remained a state budget-funded institution whose procurements were regulated by 94-FL.

There are many differences in procurement regulations under 94-FL and the procurement provision of Organization No.1. We shall highlight the most important ones. 94-FL actually provides for only four procurement methods, including tenders, auctions, requests for quotations, and single-source contracting, whereas the Provision on the Procurement of Goods, Works, and Services for the Needs of Organization No.1 envisages a wider selection of procurement methods and some changes in their application terms. They include, among others, the following procedures (including in electronic form): open single-stage tenders, open single-stage tenders with prior qualification, open two-stage tenders, open tenders with rebidding, open auctions, requests for quotations, single-source contracts with a supplier (executor, contractor), including direct contracts; and procurements under simplified procedures.

The latter procurement method deserves special attention, as it accounts for a considerable share of Organization No.1's contracts. Organization No.1 may use simplified procedures to make procurements in amounts not exceeding RUR 300,000, and information about the demand for goods, works, and services for the needs of the customer department is communicated to suppliers (executors, contractors) whose data are included in the annually compiled Organization's Suppliers List.[1] The simplified nature of the procedures consists not only of restricted participation, with only those suppliers included in the list being admitted to auctions, but also in lesser amounts of required documents and shorter timelines for placing orders. This is a competition-based procedure, and the participant offering the lowest bid becomes the winner. Such an approach for renewing contracts can prove to be quite efficient from a theoretical point of view (Dalen, Moen, and Riis 2006).

As compared to 94-FL, the procurement provision of Organization No.1 extends the possible grounds for single-source contracting. Along with implementing a set of procedures, more focus is made on requirements for the supplier in order to raise the quality of fulfilling contract concluded with Organization No.1 as the customer. In addition to this, a number of procedures (e.g. open tenders, auctions, requests for quotations) set certain restrictions on dumping: If a procurement contender's bid contains an offer of a 25 percent decrease or more in the starting price of a contract, then it shall present a relevant substantiation. On the one hand, this condition restricts price competition, but on the other hand it reduces the risk of concluding a contract with an incompetent supplier. Moreover, expert control over the substantiation of the starting prices by customer departments was introduced in some priority procurement areas (including construction jobs, computer hardware procurements, security and fire alarm equipment), contributing to significant cost-savings before the start of the auction.

Therefore, Organization No.1's adoption of its own procurement provision should presumably have an impact on both the competitiveness of procurement prices and on the quality of contract execution. These assumptions will be confirmed in the course of further analysis.

[1] The List is compiled at the beginning of the year in three stages. First of all, suppliers with previous experience of fulfilling orders for this organization whose performance was satisfactory are included in the List. Stage two involves the placement of an electronic advertisement for any company interested in further participating in supplies under the simplified procedures and specializing in particular procurement areas to submit its reputation and qualification validation. At stage three, an additional invitation may be published for interested suppliers to participate in procedures for procurement areas with less than three contenders participating in the bids.

2. Inputs for Analysis and Comparison of the Main Procurement Parameters

The data set used for this analysis included the bulk of contracts concluded by both organizations in 2011–2012. This information was provided to us in the form of electronic tables by specialists in the procurement departments from both organizations, with the permission of their superiors. It should be mentioned at the same time that, as a result of the integration of the Ministry for Economic Development's database of orders and the register of government contracts formed by the Federal Treasury, all the data used by us became available at the portal www.zakupki.gov.ru.

The procurement information provided to us included the following initial data:

- procurement method (request for quotations, open auctions, electronic auctions, tenders, simplified procedures, single-source contracting);
- quotation, tender, or auction number;
- contract subject;
- type of procured goods (works, services) based on the economic classification of budget expenditures;
- procurement budget (according to the tender documentation information card);
- name and code of the customer structural department in whose interest the procurement was made;
- number of bids filed for competition/lot, including the number of bids admitted for consideration, as well as the number of bidders in the auction;
- winner's quoted bid;
- name of the supplier (executor, contractor);
- contract number;
- contract (agreement) conclusion date;
- contract (agreement) execution period;
- information on actual payments under the contract (time and amount).

In addition to the existing classification of goods, works, and services in the database, we also introduced another classification of procurements for purposes of further survey, based on provisions of the institutional economic theory. This classification includes "search goods",

"experience goods", and "credence goods", and results from objective differences in quality evaluation opportunities.[1]

In addition, as Organization No. 1 has adopted its own procurement provision, a relevant variable reflecting this event was entered in the database.

Taking into account the available empirical data characteristics, the effectiveness of procurement procedures for the considered public organizations can be estimated along such parameters as the share of orders (by the number of contracts and their value) placed through competition procedures, the competition at auctions, and the price decrease during the auction. Contract execution issues can be measured on the basis of delays in fulfilling obligations (share of contracts with delays in execution and average duration of such delays).

To characterize the procurement activities of both organizations, it should be noted that despite the similarity in their profile and academic status, their procurement volumes differ, but are still comparable. We reviewed 1,656 contracts with a total value of 4.146 billion rubles concluded by Organization No. 1 during the period in question, and 1,335 contracts with a total value of 1.196 billion rubles concluded by Organization No. 2. The sample did not include contracts concluded with a single-source supplier of utility services (heat and electric power supply, water supply, sanitation, etc.). These contracts were excluded from the survey as in their case there is no point in analyzing price decreases and compliance with terms of obligation fulfillment. It should also be mentioned that two specific especially large construction contracts were also excluded from the analysis of procurements for Organization No.1 in order to avoid bias in econometric evaluations.

The number of contracts concluded by Organization No.1 and Organization No.2 in 2011 and 2012 remained approximately at the same level and was slightly above 800 contracts annually for the former and 650 contracts annually for the latter organization (see Table 1). The average value of one contract in these organizations varied more substantially, totaling some 2.5 million rubles in Organization No.1 and 0.9 million rubles in Organization No.2. The values of these indicators practically did not change during the two years in question.

[1] See Nelson (1970) and Darby and Karni (1973), and also Tirole (1988). The quality characteristics of the first group of "search goods" can be set prior to the contract conclusion and checked at the point of delivery. Cement or stationery are examples of such goods. The quality characteristics of the second group of "experience goods" can be set before the conclusion of the contract, but generally they can be checked only at the time of consumption, i.e. after the contract has been concluded. Such goods include food products or heating line repair jobs. Finally, the qualitative characteristics of the third group of "credence goods" often cannot be set by the customer independently even in the process of using the purchased goods, works, and services and fulfillment of the contract. The evaluation of the quality of such goods generally requires special expert assessment. Examples of "credence goods" include medical or educational services. In accordance with this classification, different procurement procedures are recommended for different types of goods.

Table 1

Number of contracts concluded by Organization No. 1 and Organization No. 2 in 2011–2012 and their total value

Organization	Contract conclusion year	Number	Total value (RUR million)	Average value (RUR)
Organization No. 1	2011	818	2,067.44	2,527,435.50
	2012	838	2,068.87	2,468,824.00
Organization No. 2	2011	681	597.81	877,843.13
	2012	654	598.63	915,337.31

The monthly dynamics of changes in the number of concluded contracts in both organizations is characterized with a strongly pronounced seasonal nature – the number of concluded contracts increased in the period from October to December. For example, approximately 7–8 percent of the total amount of contracts concluded in the period in question falls in December for Organization No. 1, while this figure stands at some 11–13 percent for Organization No. 2 (see Fig. 1 and 2). However, the dynamics of change presented in terms of value for Organization No. 2 are less season-based.

Figure 1

Distribution of contracts concluded by Organization No. 1 by the number of contracts and value per month, %

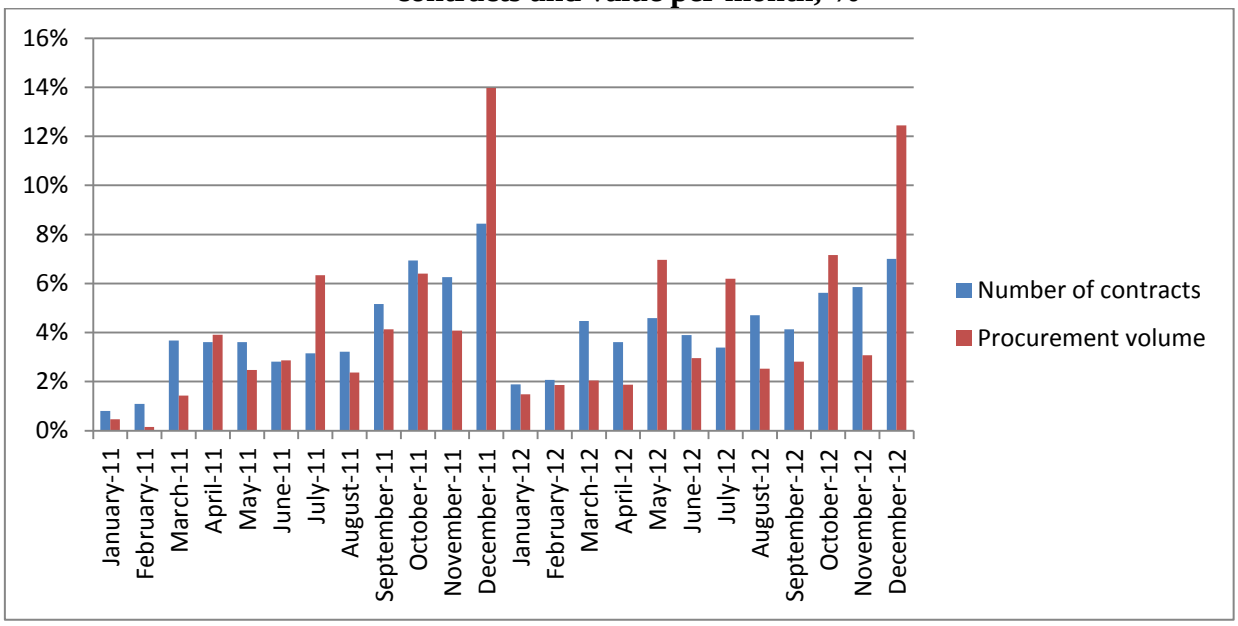
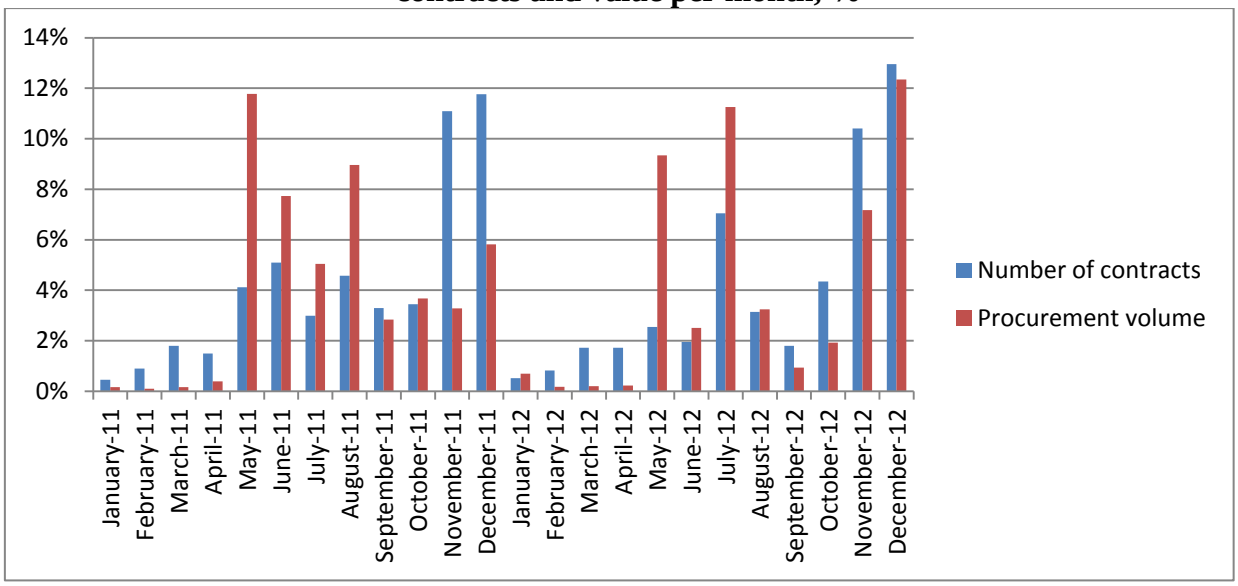


Figure 2

Distribution of contracts concluded by Organization No. 2 by the number of contracts and value per month, %



In Organization No. 1, 29 percent of contracts concluded accounts for goods (11 percent of the procurement value), 5 percent for works (18 percent of the procurement value), and 66 percent for services (71 percent of the procurement value) (see Table 2). In Organization No. 2, 61 percent of contracts concluded accounts for goods (89 percent of the procurement value), 6 percent for works (5 percent of the procurement value), and 33 percent for services (6 percent of the procurement value) (see Table 2).

Table 2

Distributions of contracts by the type of procurements: goods / works / services

Parameters	Goods		Works		Services	
	number	%	number	%	number	%
Number of contracts concluded						
Organization No.1	481	29	87	5	1090	66
Organization No.2	816	61	78	6	441	33
Total value of concluded contracts and deals (procurement budget), RUR million						
Organization No.1	448.72	11	758.83	18	2931.50	71
Organization No.2	1061.25	89	59.71	5	75.47	6

The largest share of procurements both in terms of quantity and in terms of value for both organizations falls within the broad category of experience goods, and the smallest category in terms of value is search goods for Organization No. 1, and credence goods for Organization No. 2 (Table 3).

Table 3

Distribution of contracts by type of procured goods: search / experience / credence goods

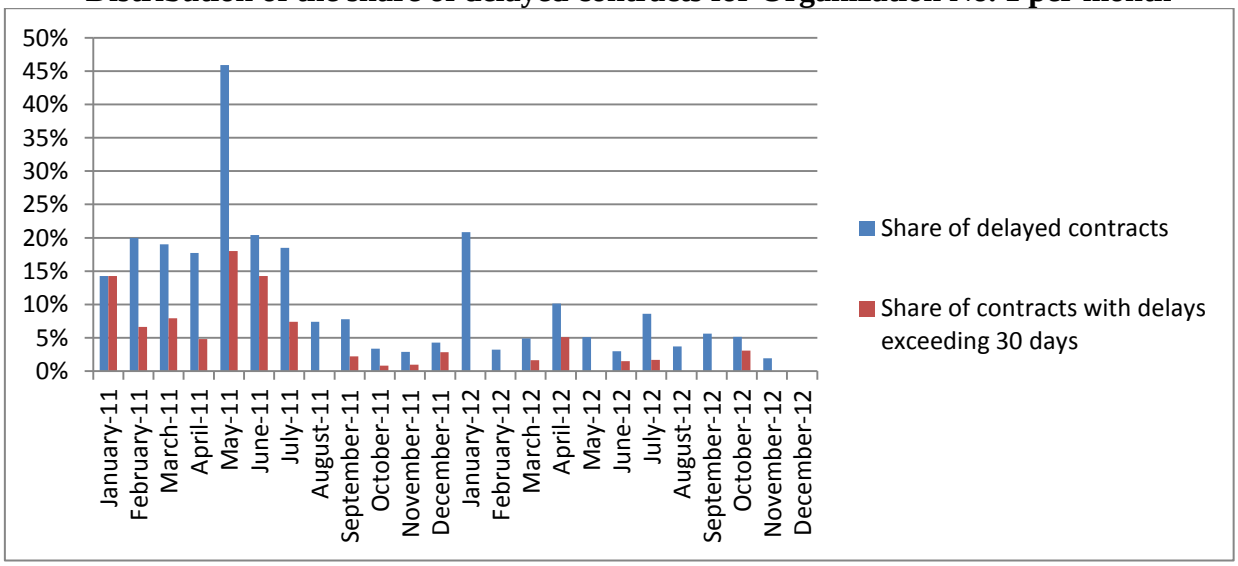
Parameters	Search goods		Experience goods		Credence goods	
	number	%	number	%	number	%
Number of contracts concluded						
Organization No.1	472	28	1058	64	128	8
Organization No.2	296	22	787	59	252	19
Total value of concluded contracts and deals (procurement budget), RUR million						
Organization No.1	375.21	9	2946.24	71	817.60	20
Organization No.2	80.59	7	1091.96	91	23.88	3

Further analysis was conducted with account for Organization No. 1's implementing its own procurement provision in July 2011. The database for this organization is divided accordingly into two parts: before and after July 2011. A descriptive analysis is also made separately for each of these two periods. As Organization No. 2 remained a budget organization during 2011–2012 and its procurements were carried out in accordance with 94-FL, analysis of this organization will be conducted simultaneously for the whole sample.

The situation with delayed contracts undoubtedly underwent better changes in Organization No.1. Before August 2011, contracts with delays in execution accounted for about 15–20 percent of all concluded contracts, while in the subsequent period they accounted for only 3–7 percent (except two "problem" months in May 2011, which saw 46 percent of contracts delayed, and January 2012, which had 26 percent of contracts delayed contracts) (Figure 3).

Figure 3

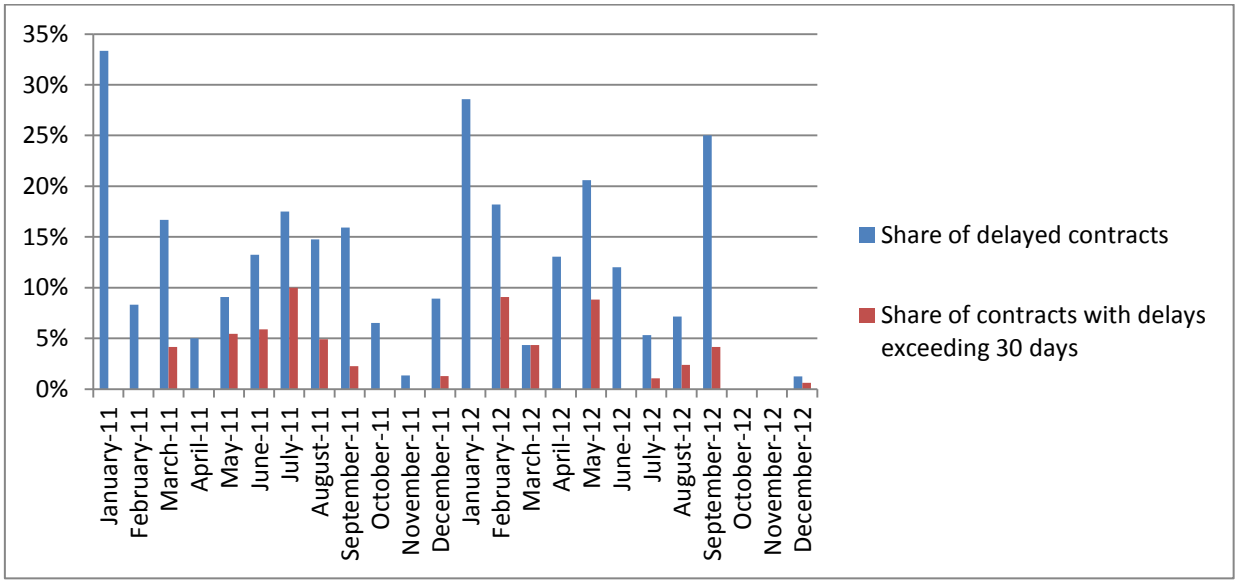
Distribution of the share of delayed contracts for Organization No. 1 per month



The situation with delays in Organization No. 2 was rather stable during the entire period (Figure 4). With the exception of three problem months, the share of delayed contracts was approximately 10–20 percent or less.

Figure 4

Distribution of the share of delayed contracts for Organization No. 2 per month



During the two years under survey, Organization No.2 used four types of procurement procedures: single-source contracting, requests for quotations, open tenders, and electronic auctions. Tenders were used only twice for sufficiently large contracts. Organization No.1 used the same types of procedures before the introduction of its own procurement provision. It is noteworthy that from the point of view of volumes (both in terms of quantity and in terms of value, presented as a percent) the characteristics of these procedures in both organizations are comparable. For example, 30 percent of procurements of Organization No.2 were made from a single source (7.8 percent of the overall value), and 19 percent of the procurements of Organization No.1 were made by the same method (8 percent of the overall value) (Table 4). The largest share of procurements of both organizations was made through electronic auctions: 44 percent for Organization No.1 (81 percent in terms of value), and 50 percent for Organization No.2 (90 percent in terms of value).

After Organization No.1 adopted its own procurement procedure the number of forms of procurement procedures it used increased, adding to the list of procedures open auctions, electronic quotations, simplified procedures, and direct contracts. The simplified procedure turned out to be the most popular method of procurement, with 27 percent of all procurements were made through this procedure, but as it was applied only to contracts of small value, it

accounted for a mere 2 percent of the total value of all contracts concluded in the period from July 2011 to December 2012 (Table 4). Another procurement procedure spread widely after Organization No.1 enforced its own procurement provision is single-source contracting. These procurements accounted for 26 percent of contracts and 49 percent of the overall value. Procurements of a sufficiently high value are also often made through open auctions, accounting for 15 percent of the total quantity of procurements and 30 percent of the overall value.

Table 4

Distribution of contracts by the procurement method

Parameters	Organization No. 1 (94-FL)				Organization No.1 (own Procurement Provision)				Organization No.2			
	Num.	%	RUR mln	%	Num.	%	Num.	%	Num.	%	Num.	%
Open tender	12	4	35.8	6	43	3	195.4	5.5	2	0.1	4.5	0.4
Open auction	0	0	0	0	209	15.5	1062	30	0	0	0	0
Electronic auction	131	44	475.4	81	16	1	150.6	4	668	50	1070.4	89.5
Request for quotations	99	33	26.3	5	339	25	185.6	5	265	19.9	27.1	2.3
Electronic request for quotations	0	0	0	0	27	2	15.3	0.5	0	0	0	0
Simplified procedure					363	27	84.1	2				
Single-source contracting	59	19	46.5	8	354	26	1737	49	400	30	94.2	7.8
Direct contract					6	0.5	126	4				

A comparison of competition procedures in Organization No.1 and Organization No.2 during the period when their procurement activities were regulated by 94-FL shows that the degree of competitiveness of procurements in both organizations was at an average level – the tender procedures of both organizations involved, as a rule, about two bidders (Table 5). Only one bidder participated in the tenders of Organization No.1, which suggests a total lack of competitiveness during the period under survey. However, price decreases were observed as a result of tenders – by 11 percent on average. An analysis of the tendering procedure used by Organization No.2 is of no interest due to the insufficient size of the sample. The most significant price decrease was achieved at electronic auctions (28 percent in Organization No.1, and 15 percent in Organization No.2). However, the price decreased more frequently in the process of requesting quotations (for Organization No.1 this comprised 88 percent of all contracts concluded through requests for quotations, while for Organization No.2 this number is 90 percent).

It should be mentioned that when the organizations under consideration acted within the framework of 94-FL the share of contracts executed with delays was approximately at the same level in respect to all procurement procedures: 26–33 percent for Organization No.1 and 8 percent for Organization No.2. The average period of delays in both organizations was some 40 days.

After Organization No.1 adopted its own procurement provision the situation with delays significantly improved – the maximum share of delayed contracts did not exceed 11 percent for contracts concluded through electronic auctions (Table 5). At the same time, the competitiveness of the procedures dropped to an average of 1.5–1.9 bidders. The amount of economizing due to price decreases at tenders also diminished; the share of procedures where price decreases were registered went down insignificantly in cases of requests for quotations (from 88 percent to 80 percent) and, on the contrary, increased in cases of electronic auctions (from 61 percent to 69 percent).

Table 5

Comparative characteristics of procurements via competitive procedures

Organization	Procurement method					
	Tender	Open auction	Electronic auction	Request for quotations	Electronic request for quotations	Simplified procedure
Average contract value (RUR thou)						
Organization No.1 (94-FL)	2985		3629	266		
Organization No.1 (own Procurement Provision)	4545	5094	9414	547	568	231
Organization No.2	2273		1602	102		
Average number of bidders						
Organization No.1 (94-FL)	1		2.41	2.30		
Organization No.1 (own Procurement Provision)	1.23	1.51	1.69	1.59	1.89	1.59
Organization No.2	1		1.53	2.43		
Share of tenders with price decreases (%)						
Organization No.1 (94-FL)	75		61	88		
Organization No.1 (own Procurement Provision)	63	48	69	80	96	77
Organization No.2	100		37	90		
Average price decrease (%)						
Organization No.1 (94-FL)	11		28	13		
Organization No.1 (own Procurement Provision)	7	13	3	8	7	8
Organization No.2	4		15	13		
Share of contracts with delays in execution (%)						
Organization No.1 (94-FL)	33		31	26		
Organization No.1 (own Procurement Provision)	2	3	0	9	11	1
Organization No.2	0		8	8		
Average delays in execution (days)						
Organization No.1 (94-FL)	11		47	36		
Organization No.1 (own Procurement Provision)	95	29	0	16	31	1
Organization No.2	0		38	44		

The most significant price decreases (over 30 percent) were registered in cases of electronic auctions for Organization No.1 (94-FL) (24 percent of contracts were concluded by this method) and in cases of requesting quotations for Organization No.2 (9 percent of contracts) (Tables 6 and 8). Following the transfer of Organization No.1 to its own procurement provision the scope of price decrease became much less significant, and the price of the contract over all

procedures began to decrease, as a rule, by not more than 5 percent of the starting price (Table 7).

Table 6

Distribution of contracts by scope of price decrease at auction, depending on the procurement method (Organization No.1, 94-FL)

Level of decrease	Procurement method					
	Tenders		Electronic auctions		Requests for quotations	
	number	%	number	%	number	%
No decrease	3	25	51	39	11	12
(0,2] % decrease	1	8	8	6	32	32
(2,5] % decrease	2	17	5	4	11	11
(5,10] % decrease	3	25	4	3	8	8
(10,20] % decrease	2	17	16	12	11	11
(20,30] % decrease	1	8	16	12	14	14
Over 30% decrease	0	0	31	24	12	12
Total	12	100	131	100	99	100

Table 7

Distribution of contracts by scope of price decrease at auction, depending on the procurement method (Organization No.1, own procurement provision)

Level of decrease	Procurement method											
	Tenders		Open auctions		Electronic auctions		Requests for quotations		Electronic Requests for quotations		Simplified procedure	
	Num.	%	Num.	%	Num.	%	Num.	%	Num.	%	Num.	%
No decrease	16	37	108	52	5	31	65	19	1	4	82	22
(0,2] % decrease	8	18	29	14	7	44	105	31	11	41	95	26
(2,5] % decrease	5	12	15	7	2	13	46	13	3	11	59	16
(5,10] % decrease	7	16	15	7	1	6	53	16	6	22	36	10
(10,20] % decrease	5	12	18	9	1	6	36	11	3	11	57	16
(20,30] % decrease	2	5	13	6	0	0	17	5	3	11	28	8
Over 30% decrease	0	0	11	5	0	0	17	5	0	0	6	2
Total	43	100	209	100	16	100	339	100	27	100	363	100

Table 8

Distribution of contracts by scope of price decrease at auction, depending on the procurement method (Organization No.2)

Level of decrease	Procurement method					
	Tenders		Tenders		Tenders	
	number	number	number	number	number	%
No decrease	0	0	419	63	21	8
(0,2] % decrease	1	50	76	11	56	21
(2,5] % decrease	0	0	17	3	33	13
(5,10] % decrease	1	50	25	4	37	14
(10,20] % decrease	0	0	56	8	53	20
(20,30] % decrease	0	0	36	5	37	14
Over 30% decrease	0	0	39	6	24	9
Total	2	100	668	100	261	100

3. Main Hypotheses and Methodology of Empirical Study

An analysis of changes in the autonomous institution's procurement procedures as compared to 94-FL and a comparison of the main procurement parameters of the two public institutions under survey leads to the formulation of the following hypotheses:

1) The autonomous institution's procurement provision introduces new procedures for selecting suppliers on the basis of business reputation criteria (e.g., a "simplified procedure", with the placement of orders among suppliers formerly successful in meeting their obligations under contracts with this public institution). We therefore assume that transferring to the institution's own procurement provision would lead to a relative ***decrease in competition at auction.*** This means that the number of auction participants in competitive procedures at Organization No.1 will drop after the adoption of its own procurement provision.

2) To prevent "dumping" the autonomous institution's procurement provision introduces requirements for the supplier to provide additional substantiation of its capability to execute the order with adequate quality in the event of a more than 25-percent price decrease as compared to the starting price. Therefore, we assume that after Organization No.1 transfers to its own procurement provision ***the price at the auction will decrease less significantly.*** In some procurement areas this may also be a consequence of expert control of the substantiation of starting prices by customer departments envisaged by the in-house regulations of Organization No.1.

3) A wider use of qualification and business reputation criteria by Organization No.1 after the transfer to its own procurement provision should stimulate the lowering of default risks under the concluded contracts. Therefore, we assume that after Organization No.1 transfers to its own procurement provision ***the average period of delays in fulfillment of obligations will decrease,*** as well as the share of contracts where such delays occurred.

We will test the formulated hypotheses on the basis of previously proposed and piloted methodological approaches to analyzing auction price decreases and overall procurement effectiveness, as well as contract execution problems (Yakovlev, Demidova, and Balaeva 2013; PwC 2011). Our regression models will use the following dependent variables:

- the number of bidders participating in competitive procurement procedures;
- contractual price decreases as a result of auctions (% of starting price);
- period of delays in contract execution (days).

Using relevant control variables, we included in our models the procurement method (quotations, auctions, tenders, simplified procedures, and single-source contracting), the type of procured goods based on the "works/goods/services" and Nelson-Darby-Karni classifications, the procurement budget (or the contract value for hypothesis 3), the contract period, order placement quarter, and the quarter of its delivery. The regressor for the number of bidders will be added to models characterizing the factors of auction price decreases, and the regressor for auction price decreases under relevant contracts will be added to the models that analyze delays in contract execution. In the latter model, in cases of single-source contracting, the auction price decrease is accepted as zero. As all dependent variables are continuous, the analysis will use linear regression models evaluated by the least-squares method. To address the problem of heteroscadecticity of disturbances in the estimated models, we used White estimators for standard deviations (as more robust but consistent ones). As the budget of the bid (contract value) is included as an independent factor in all models under review and its value is by several orders of magnitude greater than the value of dependent variables, the hypothesis concerning the inclusion of this factor in logarithmic form was accepted on the basis of the Box-Cox test. As already mentioned above, Organization No.2 used tenders quite seldom. In order to avoid inconsistent estimates of coefficients before a relevant factor, these observations were excluded from all models. A full list of variables used in the regression analysis and their descriptive statistics are presented in Tables P1 and P2 in the Appendix.

The effect of Organization No.1 adopting its own procurement provision will be estimated on the basis of the difference-in-differences methodology (Ohashi 2009). The main points of the difference-in-differences methodology are as follows. Two similar objects (in our case, Organization No.1 and Organization No.2) and two periods of time (in our case, before and after Organization No.1 adopted its own procurement provision, with both objects operating in identical conditions in the first time period) are selected. In the second period of time, the first object was subjected to certain treatment, and the second object was not. If we are interested in the change of some parameter for the first object in the second period of time as compared to the first period, the difference can be connected both with the treatment effect and with a change in external conditions not related to the specified treatment. The survey of the second object is aimed precisely at helping us understand whether there has been a change in external conditions, and, if there has been, to estimate this change. Assessment of the treatment effect for the first object by the difference-in-differences method consists of the following: comparing the values that characterize the changes in the second period as compared to the first one in the parameter of interest for the first and second objects, and their difference, yields the treatment effect for the first object (the change effect isolated from external conditions).

4. Results of Regression Analysis

The results of estimation models characterizing the level of tender competition are presented in Tables 9 and 10.

To estimate the treatment effect, a dummy variable was included in all models – the indicator of effect for Organization No.1's own procurement provision (the second half of 2011 and the whole year of 2012; we additionally will check whether it is possible to equate the three half-year periods comprising the corresponding time intervals).

According to the presented data, Organization No.1's adoption of its own procurement provision led to a decrease in the number of bidders – the relevant coefficient in models 3 and 4 is negative and is significant the 1% level. At the same time, the dummy variable reflecting Organization No. 1's introduction of its own procurement provision is insignificant for Organization No.2. These results confirm hypothesis 1 formulated above. The levels of R^2 in the estimation results are quite low. It can be dealt with heterogeneity of procurements. Unfortunately, data constraints do not enable us to estimate the same models for any single procurement good. In order to control the types of procurements, we use different classifications, but regardless it does not cover all varieties and specifics of goods.

Table 9

Estimation results for competitiveness model in Organization No.1 for non-single source procedures

Model number		Model 1	Model 2	Model 3	Model 4
Model type		Linear	Linear	Linear	Linear
Procurement description	Set of variables included in the model	Dependent variable		Dependent variable	
		Number of bidders	Number of bidders	Number of bidders	Number of bidders
Type of procured good according to the Nelson - Darby - Karni classification	Search goods	Reference category			
	Experience goods		0.033		0.041
	Credence goods		-0.266**		-0.321***
Type of procurement according to the standard Russian classification	Goods	Reference category			
	Works	0.41**		0.392**	
	Services	-0.03		-0.026	
Method of procurement	RFQ	Reference category			
	Tenders	-0.570***	-0.587***	-0.721***	-0.718***
	Open Auction	-0.301***	-0.323***	-0.323***	-0.348***
	Electronic auctions	0.198	0.170	-0.008	-0.048
	Simplif. procedures	-0.029	-0.023	0.039	0.044
Period of procurement	1 – 2 quarter 2011	Reference category			
	3 – 4 quarter 2011	-0.561***	-0.561***		
	1 – 2 quarter 2012	-0.574***	-0.617***		
	3 – 4 quarter 2012	-0.375***	-0.408***		
Quarter of delivery	I	Reference category			
	II	0.256*	0.238*	0.229*	0.213
	III	-0.059	-0.099	-0.054	-0.087
	IV	-0.059	-0.097	-0.028	-0.046
Contract duration (days)	Days	$-1.2*10^{-4}$	$-2.9*10^{-4}$	$-2.1*10^{-4}$	$-4*10^{-4}$
Logarithm of the budget of the bid	Thousand rubles	0.081*	0.109**	0.117**	0.146***
Procurement Provision adopted in Organization 1	Procurement Provision			-0.674***	-0.709***
P-value test of equality periods of procurement		0.01	0.01		
R^2		0.10	0.10	0.10	0.10
Number of observations		1239	1239	1239	1239

*, **, *** - the coefficient is significant at 10 percent, 5 percent, or 1 percent, respectively

Table 10

Estimation results for competitiveness model in Organization No.2 for non-single source procedures

Model number		Model 5	Model 6	Model 7	Model 8
Model type		Linear	Linear	Linear	Linear
Procurement description	Set of variables included in the model	Dependent variable		Dependent variable	
		Number of bidders	Number of bidders	Number of bidders	Number of bidders
Type of procured good according to the Nelson - Darby - Karni classification	Search goods	Reference category			
	Experience goods		-0.152		-0.154
	Credence goods		-0.753***		-0.657***
Type of procurement according to the standard Russian classification	Goods	Reference category			
	Works	0.746**		0.764**	
	Services	-0.187*		-0.188*	
Method of procurement	RFQ	Reference category			
	Tenders	Excluded			
	Open Auction	Absent			
	Electronic auctions	-0.913***	-0.829***	-0.914***	-0.827***
	Simplif. procedures	Absent			
Period of procurement	1 – 2 quarter 2011	Reference category			
	3 – 4 quarter 2011	-0.124	-0.107		
	1 – 2 quarter 2012	0.573	0.658*		
	3 – 4 quarter 2012	-0.030	-0.042		
Quarter of delivery	I	Reference category			
	II	0.168	0.217	0.422*	0.519**
	III	0.048	0.150	0.07	0.187
	IV	-0.127	-0.087	-0.240*	-0.204
Contract duration (days)	Days	0.0022***	0.0020***	0.0026***	0.0025***
Logarithm of the budget of the bid	Thousand rubles	-0.0066	0.0017	0.0043	0.0139
Procurement Provision adopted in Organization 1	Procurement Provision			0.135	0.168
P-value test of equality periods of procurement		0.13	0.12		
R^2		0.16	0.14	0.15	0.13
Number of observations		929	929	929	929

*, **, *** - the coefficient is significant at 10 percent, 5 percent, or 1 percent, respectively

An analysis of price decreases for competitive procedures shows that the introduction by Organization No.1 of its own procurement provision did not impact the decrease of auction prices (models 11 and 12 in Table 11). The coefficient of the dummy variable reflecting the Organization No.1's adoption of its own procurement provision in similar models calculated for

Organization No.2 (see Table 12) is also insignificant. These findings partially agree with hypothesis 2.

Table 11

Estimation results for price reduction models (in percent) for Organization No.1

Model number		Model 9	Model 10	Model 11	Model 12
Model type		Linear	Linear	Linear	Linear
Procurement description	Set of variables included in the model	Dependent variable		Dependent variable	
		Price reduction	Price reduction	Price reduction	Price reduction
Type of procured good according to the Nelson - Darby - Karni classification	Search goods	Reference category			
	Experience goods		2.80***		2.68***
	Credence goods		2.72*		2.59*
Type of procurement according to the standard Russian classification	Goods	Reference category			
	Works	0.631		0.327	
	Services	3.038***		2.93***	
Method of procurement	RFQ	Reference category			
	Tenders	2.33*	2.76**	2.34*	2.79**
	Open Auction	2.39**	2.47**	2.57**	2.65**
	Electronic auctions	4.03**	4.02**	3.93**	3.94**
	Simplif. procedures	-0.718	-0.718	-0.48	-0.47
Period of procurement	1 – 2 quarter 2011	Reference category			
	3 – 4 quarter 2011	-1.90	-1.98		
	1 – 2 quarter 2012	-0.18	-0.156		
	3 – 4 quarter 2012	-2.13	-2.16*		
Quarter of delivery	I	Reference category			
	II	1.32	1.48	1.55	1.72
	III	2.27**	2.45**	1.67	1.85 *
	IV	3.43***	3.67***	2.47***	2.68***
Number of bidders	Number of bidders	6.79***	6.74***	6.75***	6.70***
Contract duration (days)	Days	-0.0003	0.0004	0.00056	0.0013
Logarithm of the budget of the bid	Thousand rubles	-1.07**	-1.20***	-1.07**	-1.212***
Procurement Provision adopted in Organization 1	Procurement Provision			-1.39	-1.38
P-value test of equality periods of procurement		0.053	0.045		
R^2		0.42	0.42	0.42	0.42
Number of observations		1239	1239	1239	1239

*, **, *** - the coefficient is significant at 10 percent, 5 percent, or 1 percent, respectively

Table 12

Estimation results for price reduction models (in percent) for Organization No.2

Model number		Model 13	Model 14	Model 15	Model 16
Model type		Linear	Linear	Linear	Linear
Procurement description	Set of variables included in the model	Dependent variable		Dependent variable	
		Price reduction	Price reduction	Price reduction	Price reduction
Type of procured good according to the Nelson - Darby - Karni classification	Search goods	Reference category			
	Experience goods		-0.20		-0.213
	Credence goods		-4.13*		-4.46*
Type of procurement according to the standard Russian classification	Goods	Reference category			
	Works	-2.05*		-2.03*	
	Services	1.50		1.49	
Method of procurement	RFQ	Reference category			
	Tenders	Excluded			
	Open Auction	Absent			
	Electronic auctions	-.182	-1.22	-0.28	-1.32
	Simplif. procedures	Absent			
Period of procurement	1 – 2 quarter 2011	Reference category			
	3 – 4 quarter 2011	-0.055	-0.431		
	1 – 2 quarter 2012	-2.65	-2.77		
	3 – 4 quarter 2012	-0.72	-0.946		
Quarter of delivery	I	Reference category			
	II	1.60	1.22	0.811	0.446
	III	0.815	0.825	0.846	0.833
	IV	-0.593	-0.250	-0.097	0.185
Number of bidders	Number of bidders	4.83***	4.70***	4.77***	4.65***
Contract duration (days)	Days	0.018**	0.022***	0.017**	0.021***
Logarithm of the budget of the bid	Thousand rubles	-0.772***	-0.777***	-0.810***	-0.811***
Procurement Provision adopted in Organization 1	Procurement Provision			-1.13	-1.38
P-value test of equality periods of procurement		0.25	0.34		
R^2		0.35	0.34	0.34	0.34
Number of observations		929	929	929	929

*, **, *** - the coefficient is significant at 10 percent, 5 percent, or 1 percent, respectively

The analysis of delays in public procurement contracts shows that Organization No.1's enforcement of its own procurement provision resulted in a decrease in delays by 7 days on average (see Table 13). At the same time, the effect of enforcement by Organization No.1 of its own procurement provision in models for Organization No.2 is insignificant. Therefore, the results of regression analysis for both organizations do not contradict hypothesis 3. The problem

of a low R^2 level in the models can be due to specifics of procurement goods, as well as contract specifics. The latter may include prepayments, financial provisions, and other guaranteeing requirements for the supplier, which we do not control for here.

Table 13

Public procurement contract delay models: estimation results for Organization No.1

Model number		Model 17	Model 18	Model 19	Model 20
Model type		Linear	Linear	Linear	Linear
Procurement description	Set of variables included in the model	Dependent variable		Dependent variable	
		Delay	Delay	Delay	Delay
Type of procured good according to the Nelson - Darby - Karni classification	Search goods	Reference category			
	Experience goods		1.24		1.15
	Credence goods		1.12		1.10
Type of procurement according to the standard Russian classification	Goods	Reference category			
	Works	20.00***		20.67 ***	
	Services	-0.432		-0.489	
Method of procurement	RFQ	Reference category			
	Tenders	1.01	-0.406	0.8889	-0.267
	Open Auction	-1.574	-0.422	-1.671	-0.507
	Electronic auctions	3.354	3.52	3.372	3.603
	Simplif. procedures	-0.964	-1.16	-1.430	-1.864
	Single-source	2.450	2.60	2.569	2.692
Period of procurement	1 – 2 quarter 2011	Reference category			
	3 – 4 quarter 2011	-6.82***	-6.26***		
	1 – 2 quarter 2012	-10.08 ***	-11.29***		
	3 – 4 quarter 2012	-8.39 ***	-9.32 ***		
Quarter of delivery	I	Reference category			
	II	1.68	1.26	1.66	1.05
	III	0.002	-0.92	0.311	-0.577
	IV	-4.22	-5.80*	-3.12	-4.28
Number of bidders	Number of bidders	1.63	2.19	1.61	2.17
Contract duration (days)	Days	-0.017**	-0.020***	-0.018***	-0.023***
Logarithm of the budget of the bid	Thousand rubles	0.969	0.981	0.896	0.919
Price reduction	Percent of price reduction	0.053	0.028	0.051	0.025
Procurement Provision adopted in Organization 1	Procurement Provision			-7.17 ***	-7.68 ***
P-value test of equality periods of procurement		0.12	0.01		
R^2		0.13	0.09	0.12	0.08
Number of observations		1415	1415	1415	1415

*, **, *** - the coefficient is significant at 10 percent, 5 percent, or 1 percent, respectively

Table 14

Public procurement contract delay models: estimation results for Organization No.2

Model number		Model 21	Model 22	Model 23	Model 24
Model type		Linear	Linear	Linear	Linear
Procurement description	Set of variables included in the model	Dependent variable		Dependent variable	
		Delay	Delay	Delay	Delay
Type of procured good according to the Nelson - Darby - Karni classification	Search goods	Reference category			
	Experience goods		-0.401		-0.418
	Credence goods		1.11		1.04
Type of procurement according to the standard Russian classification	Goods	Reference category			
	Works	0.785		0.988	
	Services	1.96*		1.92*	
Method of procurement	RFQ	Reference category			
	Tenders	Excluded			
	Open Auction	Absent			
	Electronic auctions	-0.0141	-0.505	-0.531	-0.864
	Simplif. procedures	Absent			
	Single-source	-1.13	-1.22	-1.44	-1.51
Period of procurement	1 – 2 quarter 2011	Reference category			
	3 – 4 quarter 2011	2.82	2.87		
	1 – 2 quarter 2012	-0.074	-0.83		
	3 – 4 quarter 2012	1.13	1.19		
Quarter of delivery	I	Reference category			
	II	4.85	4.98	4.20*	4.31*
	III	5.20 ***	5.24 ***	5.54 ***	5.60 ***
	IV	-1.09	-0.959	-0.167	-0.014
Number of bidders	Number of bidders	0.812	0.801	0.739	0.735
Contract duration (days)	Days	0.037*	0.040**	0.034**	0.037**
Logarithm of the budget of the bid	Thousand rubles	0.808*	0.810*	0.816*	0.816
Price reduction	Percent of price reduction	-0.022	-0.019	-0.016	-0.014
Procurement Provision adopted in Organization 1	Procurement Provision			1.14	1.18
P-value test of equality periods of procurement		0.11	0.11		
R^2		0.06	0.06	0.05	0.05
Number of observations		1313	1313	1313	1313

*, **, *** - the coefficient is significant at 10 percent, 5 percent, or 1 percent, respectively

5. Conclusion

The authors of this work, relying on a large empirical dataset for two large state universities, estimate the effect of introducing new approaches to regulating public procurements, which are to be developed in full measure in the process of creating the Federal Contract System. Specifically, we tried to find out to what degree extending opportunities of government customers during the transfer from the status of a budget institution to the status of an autonomous organization impacts the level of tender competition and price decrease during the placement of orders the fulfillment of obligations under the concluded contracts. Basing our study on an analysis of provisions of 94-FL and the procurement provision of the considered autonomous organization, we assumed that extending the spectrum of used procurement procedures and the possibility of using additional qualification and business reputation criteria would lead to a decrease in competition and lesser price reductions, but also to a better execution of obligations.

To test the formulated hypotheses, we employed difference-in-differences methodology by comparing the effect for the autonomous organization, which introduced considerable changes to its procurement regulations, and for the budget institution, which conducted its procurements on the basis of 94-FL. It should be noted that substantial differences in these organizations' procurement structures constituted an objective restriction for our analysis, despite the comparability of their volumes. Nevertheless, these differences have no impact on the significance of the findings.

The findings partially substantiated our hypotheses. Specifically, we revealed that the enforcement of the autonomous institution's own procurement provision resulted in a decrease of the number of bidders and in much less delays of contract execution. At the same time, zero effect was registered at the budget institution considered as the benchmark. Moreover, as far as price reduction analysis is concerned, no significant effect of the enforcement of the autonomous institution's own procurement provision was registered in either of the two organizations.

It is clear that our findings need additional verification based on a wider sample of data that includes more than two organizations, as well as employing non-parametric econometrics to cover the non-linearity of some factors. Nevertheless, we can state that the offered approach enables us to make a quantitative measurement of the effects of introducing new procurement regulation mechanisms. Therefore, this approach can be applied in practice by regulatory authorities, principal administrators of budget funds, and major organizations who are government customers for analyzing the results of piloting the introduction of individual FCS elements.

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Annex

Table P1. Description of variables for Organization No. 1

Variable	Values	number	percent
Type of procured good according to the Nelson - Darby - Karni classification [a)]	Search goods	472	28.5
	Experience goods	1056	63.77
	Credence goods	128	7.73
	Total	1656	100
Type of procurement according to the standard Russian classification [a)]	Goods	481	29.5
	Works	87	5.25
	Services	1088	65.70
	Total	1656	100
Method of procurement [a)]	Quotations	438	26.45
	Electronic quotations	27	1.63
	Auctions	207	12.5
	Electronic auctions	147	8.88
	Tenders	55	3.32
	Simplified procedures	363	21.92
	Single-source contracting	419	25.3
	Total	1656	100
Period of procurement [a)]	1 – 2 quarter 2011	257	15.5
	3 – 4 quarter 2011	561	33.8
	1 – 2 quarter 2012	320	19.3
	3 – 4 quarter 2012	518	31.2
	Total	1656	100
Quarter of delivery	I	111	6.70
	II	245	14.79
	III	292	17.63
	IV	1008	60.87
	Total	1656	100
Number of bidders	Min = 1, Max = 12, Average = 1.53, Median = 1, Standard deviation = 1.01.		
Contract duration (days)	Min = 1, Max =1792, Average = 110,5, Median = 48, Стандартное отклонение = 142.2		
Budget of the bid (RUR)	Min =700, Max = $1.66*10^8$, Average =2619672, Median =500000, Standard deviation = $1.02*10^7$		
Delay (in contract delivery, days)	Min = 0, Max = 369, Average = 3.45, Median = 0, Standard deviation = 19.9		
Auction price decrease (%)	Min = 0, Max = 85, Average = 5.81, Median = 0.27, Standard deviation = 11.1		
Own Procurement Provision	1 - Yes	1355	81.82
	0 - No	301	18.18
	Total	1656	100

a) The variable is categorical. In the estimated models, these variables were replaced by a set of dummy variables. For example, the "method of procurement" variable was replaced with the variables "auctions" (a value of 1 was given if there was an auction during the order placement and 0 if otherwise), "tenders" (a value of 1 was given if there was a tender during the order placement and 0 if otherwise). Quotations were used as the reference category.

Table P2. Description of variables for Organization No. 2

Variable	Values	number	percent
Type of procured good according to the Nelson - Darby - Karni classification [a)]	Search goods	296	22.17
	Experience goods	787	58.95
	Credence goods	252	18.88
	Total	1335	100
Type of procurement according to the standard Russian classification [a)]	Goods	816	61.12
	Works	78	5.84
	Services	441	33.03
	Total	1335	100
Method of procurement [a)]	Quotations	265	19.85
	Electronic auctions	668	50.04
	Tenders	2	0.15
	Single-source contracting	400	29.96
	Total	1335	100
Period of procurement [a)]	1 – 2 quarter 2011	185	13.85
	3 – 4 quarter 2011	496	37.15
	1 – 2 quarter 2012	124	9.28
	3 – 4 quarter 2012	530	39.70
	Total	1335	100
Quarter of delivery	I	96	7.19
	II	113	8.46
	III	225	16.85
	IV	901	67.49
	Total	1335	100
Number of bidders	Min = 1, Max =23, Average = 1.77, Median =1, Standard deviation = 1.39		
Contract duration (days)	Min =4, Max =484, Average =70.28, Median =47, Standard deviation = 73.40		
Budget of the bid (RUR)	Min = 1000, Max =$3.45*10^7$, Average = 896211, Median = 120000, Standard deviation = 3057823		
Delay (in contract delivery, days)	Min = 0, Max =274, Average =2.64, Median =0, Standard deviation = 17.22		
Auction price decrease (%)	Min = 0, Max =71.42, Average =7.33, Median = 0.4, Standard deviation = 12.53		
Period of enforcement by Organization No. 1 of its own Procurement Provision	1 - Yes	1150	86.14
	0 - No	185	13.86
	Total	1335	100

a) The variable is categorical. In the estimated models, these variables were replaced by a set of dummy variables. For example, the "method of procurement" variable was replaced with the variables "auctions" (a value of 1 was given if there was an auction during the order placement and 0 if otherwise), "tenders" (a value of 1 was given if there was a tender during the order placement and 0 if otherwise). Quotations were used as the reference category.