Quantitative Analysis of the Regional Protection in Russia

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This paper gives one possible explanation why the regional authorities in Russia intervene in local markets combining subsidizing and tax exemptions.

Theoretical framework of the analysis is modified model proposed by G.Grossman and E.Helpman. The authors consider lobbing effect on the international trade protection policy, and focus of the analysis is equilibrium prices resulted from export and import subsidies. Our problem is slightly different; firstly, regional governments can not use export and import tariffs and subsidies, however they can provide input, output subsidies and tax exemptions, secondly, regional governments are more restricted financially and problem of the financial acceptability of the protection policy needs introduction of regional budget constraint into the model, and, finally, we are interested not in equilibrium prices but in equilibrium combinations of different tools of the protection policy.

Theoretical features of the equilibrium regional protection policy are tested empirically for the Russian regions. The estimations have shown that the regional protection is provided because of political pressure of lobbing groups representing interests of the local industrial sectors. The social factors are not in the focus of the policy-maker's concern and are not significant when the authorities make decision about size of budget resources directed for the purpose of the local producers' protection.

1. Introduction

Regional leaders are inclined to interference in the regulation of local economy everywhere in Russia. Almost all regional policy-makers base the micro-management at their jurisdictions on the protection of domestic enterprises and on the resistance to the expansion of the external ones (Henson (2001)).

Tools of the regional protection include tax exemptions, credits, subsidies, budget compensations. Since federal budget subsidies decreased in Russia the regional authorities have more actively involved in the supporting of enterprises. However the level of subsidizing and providing tax exemptions differ essentially among the regions.

Very often regional authorities explain the price control, subsidizing and granting tax exemptions to local producers by social imperatives. However several facts contradict this thesis. A characteristic of the regional budgets is a high level of overdue for salary and transfers to population (more than 40%), the next item is overdue to infrastructure monopolies, supplying public utilities (28%) (Report of the World

Bank (2000)). Hence, the biggest part of burden, resulted form regional policy is imposed on population.

The regional protection of local producers contradicts to the federal macroeconomic policy and hinders market integration in Russia. Why do the regional authorities pursue this costly policy and intervene in local markets by combining subsidizing and tax exemptions? There are several candidate explanations in the economic literature related to our problem: political constraints of transition period, interest groups, and attitudes towards governments.

Although price liberalization is the key element of transition and is a necessary precondition for the market mechanisms and for the improvement in the allocation of resources (Lipton and Sachs (1990), Boyko (1992), McKinnon (1991)) political constraints of the transition period could make gradual price reform preferable despite its efficiency costs (Dewatripont and Roland (1992 a, b), Roland (2000)). What policy-makers put in place depends on the political acceptability of the reforms. Milder reforms and even reversal sometimes are the only way to speed up the process and enhance political acceptability.

Political constraints affecting the speed and design of price reforms are determined by initial conditions. Kruegel and Ciolko (1996) and Castanheira

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and Popov (1999) suggest that the rate and extend of price liberalization may be endogenous. The worse the initial conditions for transformation the greater the probability of the deep transformation recession as a result of the liberalization, and hence there are more likely delays in liberalization. When initial conditions are favorable, rapid liberalization is feasible and preferable.

The political constraints are reinforced when the fact that bureaucrats and regulators may benefit from the persistence of price control is taken into account. Shliefer and Vishny (1992) show that price control creates rent for state sector and represents opportunities for soliciting bribes from interest groups.

The role of lobby groups in the shape of trade policy is incorporated into analysis in two ways. The first approach stresses political competition between opposing candidates. In the works of Magee et al. (1989), Hillman and Ursprung (1988), the lobby groups evaluate their prospects after the alternative trade policy proposals have been made by competing parties. In making the decisions about their giving, the lobbies weigh the benefit of increasing the probability of their favorite party being elected against the direct cost for the donation. The parties use the resources to influence the election outcome. In the second approach presented in Stigler (1971), Hillman (1982), Grossman and Helpman (1994), the economic policy is considered as being set by an incumbent government seeking to maximize its political support. The political support function has as arguments the welfare that designated interest groups derive from the chosen policies and the deadweight loss that the policies impose on society at large. In this formulation, campaign contributions do not enter directly into the analysis, and the political competition of the next election is kept in the background. Both of the approaches consider the political optimization as underlying the endogenous determination of trade policy.

Features of the regional policy in Russia correspond more to the second approach. The realities of the regional policy life are, firstly, absence of concrete trade policy public proposals at the election stage and, secondly, interest of regional authorities and local business in mutual cooperation.

Local policy depends also on the attitudes towards the governments. Paper by Edwards and Keen (1996) synthesizes the two extremes: the view of government as a Leviathan and the view of government as a benevolent maximiser of their citizens' welfare. The policy-makers have preferences defined over some item of public expenditures, which, while financed from general revenues, benefit only the policy-maker, and the welfare of their representative citizen. Polishchuk (2000) shows that under certain assumptions a revenue-maximizing Leviathan-type government might offer better conditions for economic development than a benevolent, which is concerned about economic wellbeing of its constituency at large.

So a design of regional protection policy is a result of a number of factors, among which are initial conditions, political process, influence of interest groups, and objectives of the policy-makers. Based on the results of the reviewed studies we propose a model of regional trade policy determination.

2. The model

2.1. Statement of the problem

We consider a regional market, so we may assume that the economy is small and market regulation is the result of the political process. One of the characteristics of Russian regional economies is a high level of specialization in the production, the producers have incentives to form lobby groups and they demonstrate ability to overcome the free-rider problem.

The regional lobby groups confront regional policy-makers with requirements to provide protection for the sector against external producers in exchange for political support. The regional government bears costs for implementing an inefficient protection policy that is result of creating deadweight loss and its accountability to the general electorate. The government sets protection policy comparing benefits of the political cooperation with local producers and costs of deterioration of its reelection prospects. The implemented policy must be financially feasible.

The proposed theoretical framework for the analysis of the barriers of regional price regulation is very similar to the one developed by Grossman and Helpman (1994) in the study devoted to protection trade policy.

2.2. Overview of Grossman - Helpman's results

Grossman and Helpman consider a small, competitive economy. Free trade is efficient for such an economy, so any policy interventions can be ascribed to the political process. They assume that there is a high degree of concentration in the ownership of the specific inputs and that the various owners of some of these inputs have banded together to form lobby groups. They assume also that some factor owners overcome the free-rider problem to conduct joint lobbying activity, while other do not.

The lobby groups may offer political contributions to the incumbent politicians, who are in a position to set the current trade policy. While the lobby groups ignore the effects of their contributions on the election probabilities, the incumbent politicians may see a relationship between total collections and their reelection prospects. Incumbent politicians' objective is to maximize a weighted sum of total political contributions and aggregate social welfare.

The authors model the lobbing process as follows. Each interest group confronts the government with a contribution schedule. The schedule maps every policy vector that the government might

choose (where policies are import and export taxes and subsidies) into a campaign contribution level. The government then sets a policy vector and collects the contribution associated with its choice.

Let introduce some notations: p is the vector of domestic prices; $C_i(p)$ - the contribution schedule tendered by lobby i; $W_i(p)$ - gross-of-contributions joint welfare of the members of lobby group i; $G(p)$ - government's utility function; L - set of sectors which are able to organize a lobby group.

The authors are interested in the political equilibrium of a two-stage non-cooperative game in which the lobbies simultaneously choose their political contribution schedules in the first stage and the government sets policy in the second. An equilibrium is a set of contribution functions $\{C_i^0(p)\}$, one for each organized lobby group, such that each one maximizes the joint welfare of the group's members given the schedules set by the other groups and the anticipated political optimization by the government; and a domestic price vector p^0 that maximizes the government's objective taking the contribution schedules as given. The Nash-equilibrium contribution schedules implement an equilibrium policy choice.

Grossman - Helpman's model has the structure of a menu-auction problem. Bernheim and Whinston (1986) have characterized the equilibrium for a class of such problems. Grossman and Helpman applied these results to the problem of protection trade policy. The adaptation resulted in the following proposition.

Proposition 1. ($\{C_i^0\}_{iL}$, p^0) is a subgame-perfect Nash equilibrium of the trade policy game if and only if:

(i) C_i^0 is feasible for all iL;

(ii) p^0 maximizes $G(p)$ on the set of domestic price vector;

(iii) p^0 maximizes $W_j(p) - C_j^0(p) + G(p)$ on the set of domestic price vector for every jL;

(iv) for every jL there exists a p^j that maximizes $G(p)$ on the set of domestic price vector such that $C_j^0(p^j)=0$.

Condition (i) states that lobby's contributions must be nonnegative and no greater than the joint income available to the sector. Condition (ii) states that, given the political contributions offered by the lobbies, the government sets trade policy to maximize its own welfare. Condition (iii) stipulates that for every lobby, the equilibrium price vector must maximize the joint welfare of that lobby and the government, given the contributions offered by other lobbies. Condition (iv) requires that for every lobby j there must exist a policy that elicits a contribution of zero from lobby j, which the government finds equally attractive as the equilibrium policy p^0. If there does not exist such a policy, then lobby j can lower their political contributions without changing the government's choice, which necessarily leaves sector j strictly better off.

Condition (iii) characterizes the equilibrium structure of protection. Condition (iv) characterizes the equilibrium structure of political contributions.

Our problem and the one of Grossman-Helpman are very similar and we largely rely on the significant results obtained by the authors, however there are several differences. The differences come from three issues. The first one is the fact that Russian regional governments can not use export and import tariffs and subsidies opposed to the case of Grossman - Helpman consideration and are restricted to other tools of price regulation: price ceiling, price mark-ups, input and output subsidies, tax exemptions or credits. The second issue stems from the requirement of financial acceptability of the regional protection policy, regional budget constraint needs explicit introduction into the model. The third difference is explained by the problem to distinguish between different tools of the protection policy. These differences modify Grossman - Helpman's model and obviously its analytical inferences as well.

2.3. Formal framework

We consider a regional market with tradable goods $i=0,1,...,n$. The local demand curve for a particular good is $d_i(p_i)$. Assume that when there is no price dispersion all consumers prefer domestic goods. Suppose that in the absence of trade the equilibrium price of goods $i=1,...,n$ is higher than in the situation of interregional and/or international trade. Assume that there is no possibility for the protection of good 0. Let use good 0 as a numeraire, and let its price equal to $1, p_0=1$.

The supply curves of local producers depend on input and output exogenous prices and/or implemented local protection policy. Assume that the regional government can use input, output subsidies and tax exemptions. We assume that production in each sector requires labor and a specific input, subsidized and regulated are prices of the specific inputs. Consequently the supply function of a locally produced good i depends on price (which differs from the exogenous market price if local government imposes price limitations), input subsidy, output subsidy, input price restrictions, and tax exemption $y_i(p_i, s_{p_i,s})$ where p_i is exogenous price, s_i is subsidy per unit of good i, $_i$ is subsidy per unit of specific input in sector i, and $_i$ - tax exemptions granted to sector i. Let denote by p, s, $_,$ the vectors of output prices, output and input subsidies, and tax exemptions respectively.

Let the regional economy is populated by individuals with identical preferences. Each individual maximizes utility given by

$$u = x_0 + \sum_{i=1}^{n} u_i(x_i) \qquad (1)$$

where x_0 is consumption of good 0 and x_i is consumption of good i, $i=1,...,n$. With these quasi-linear preferences demand for good i is independent of the prices of other goods, and possibilities for

substitutions of complementarities among the goods are absent. An individual spending an amount E consumes $x_i=d_i(p_i)$ of good i, $i=1,...,n$, where the demand function is inverse of $u_i(x_i)$, and

$$x_0 = E - \sum_{i=1}^{n} p_i d_i(p_i)$$

The consumer surplus derived from the goods is equal to

$$CS(p) = \sum_{i=1}^{n} u_i(d_i(p_i)) - \sum_{i=1}^{n} p_i d_i(p_i) \qquad (2)$$

Where p is the vector of the exogenous prices.

The protection must be financially acceptable. The financial acceptability means satisfying the budget constraint, local government expenditures should be less than receipts. The receipts are in the form of taxation of the domestic aggregate income, the expenditure items are input and output subsidies to local producers. The excess of receipt over protection expenditures, here regarded as a source of public expenditures financing, is:

$$r(p,s,\rho,\tau) = t\left[\sum_{i=1}^{n}(1-\frac{\tau_i}{t})y_i(p_i,s_i,\rho_i,\tau_i) + E - \sum_{i=1}^{n}p_i d_i(p_i)\right] -$$
$$-\left[\sum_{i=1}^{n}s_i y_i(p_i,s_i,\rho_i,\tau_i) + \sum_{i=1}^{n}\rho_i z_i(p_i,s_i,\rho_i,\tau_i)\right]\beta \geq 0 \qquad (3)$$

Where t is the tax rate, $z_i(p_i, s_{i,i})$ - demand for specific input in sector i, and reflects the local government ability to 'soften' local budget, it can be done through transferring expenses of local policy to another budgets or by obtaining additional resources from higher level budgets.

The producers are interested in protection of their sectors and enter the political activity. The lobby representing a sector i makes its political contribution contingent on the protection policy implemented by the government. Denote by $c_i(p_i, s_{i,i})$ the contribution tendered by lobby i. The lobby determines the contributions to maximize total welfare of the sector's members: labor income plus profit of the sector plus consumer surplus and benefits from the public expenditures less contributions. The scheme of the distribution of the political donations among the sector's members is out of consideration here. We assume the existence of ways to allow all the members to share the gains from the political coordination. The joint gross-of-contribution welfare of the members of sector i is:

Where l - the wage rate; $\overset{*}{i}$ - exogenous price of the specific input in sector i; i - share of the voting population related to sector i.

The government's utility function depends on attitudes towards government. There are two extreme types of government presented in the literature as stark alternatives: benevolent and Leviathan. When the government is a benevolent, it is a maximizer of their citizens' welfare. A Leviathan-government maximizing items of expenditures benefits only the policy-makers. A more general assumption is that policy-makers are neither wholly benevolent nor wholly self-serving, an obvious conclusion is that the policy-makers maximize a weighted sum of citizens' welfare and their own wellbeing. The latter assumption is accepted for our problem.

The incumbent government maximizes a weighted sum of political contributions and aggregate welfare of the population. The political contributions provide direct benefits to the government. However the social welfare can result in indirect benefits if voters are more likely to reelect a government that provides a high standard of living. The government objective function is:

$$G(p,s,\rho,\tau) = \sum_{i\in L}c_i(p_i,s_i,\rho_i,\tau_i) + \theta\sum_{i=1}^{n}V_i(p,s,\rho,\tau) \qquad (5)$$

Where $0 \leq \theta \leq 1$.

We consider a two-stage non-cooperative game: in the first stage sector's lobbies make decisions and propose political contributions contingent on protection policy; in the second stage the regional government determines the implemented policy. An equilibrium is a set of contribution functions $\{c_i^0(p_i,s_{i,i})\}$, one for each sector, such that each one maximizes the joint welfare of the sector's members given the schedules proposed by the other sectors and the anticipated optimization by the regional government; and a regional protection policy vector $(p_i^0, s_i^0, \overset{0}{i}, \overset{0}{i})$ that maximizes the government's objective taking the contribution schedules as given. The Nash-equilibrium realizes an equilibrium policy.

The proposed formal framework corresponds to the structure of Grossman-Helpman's problem. However, the modification of the Grossman-Helpman's model and more detailed consideration of some issues modify Proposition 1. The proposition relevant to our problem is as follows.

Proposition 2. $(\{c_i^0\}_{iL}, \{p^0, s^0, \overset{0}{,}, \overset{0}{,}\})$ is a subgame-perfect Nash equilibrium of the regional protection policy game if and only if:

(a) $\{c_i^0\}$ is feasible for all iL;

$$W_i(p,s,\rho,\tau) = \pi_i l_i + [p_i y_i(p_i,\rho_i,s_i,\tau) - (\pi_i^* - \rho_i)z_i(p_i,\rho_i,s_i,\tau_i) - \pi_i l_i] +$$
$$+\alpha_i[r(p,s,\rho,\tau) + CS(p)] - c_i(p_i,s_i,\rho_i,\tau_i) = p_i y_i(p_i,\rho_i,s_i,\tau_i) -$$
$$-(\pi_i^* - \rho_i)z_i(p_i,\rho_i,s_i,\tau_i) + \alpha_i[r(p,s,\rho,\tau) + CS(p)] - c_i(p_i,s_i,\rho_i,\tau_i) = \qquad (4)$$
$$= V_i(p,s,\rho,\tau) - c_i(p_i,s_i,\rho_i,\tau_i)$$

(b) $\{p^0, s^0, \rho^0, \tau^0\}$ maximizes $G(p, s,,)$ subject to budget constraint $r(s,)0$ for all iL;

(c) $\{p^0, s^0, \rho^0, \tau^0\}$ maximizes $W_j(p, s,,) + G(p, s,,)$ subject to budget constraint $r(s,)0$ for every jL;

(d) for every jL there exists a bundle $(p^j, s^j, \rho^j, \tau^j)$ that maximizes $G(p, s,,)$ subject to budget constraint such that $c_j^0(p^j, s^j, \rho^j, \tau^j) = 0$.

Condition (a) implies that lobby's proposals are positive and less than welfare of members of the represented sector. Condition (b) states that given the political proposals of the interest groups the government determines input and output subsidies, tax exemptions maximizing its utility function and satisfying the budget constraint taking into account exogenous price of output. Condition (c) stipulates that for every sector the equilibrium bundle of input and output subsidies and tax exemptions maximizes sum of welfare of the sector and the government, given the budget constraint and the proposals of other lobbies. Condition (d) means that for every sector j participating in the political lobbing exists a combination of subsidies and tax exemptions, which requires contri-

bution of zero from sector j, and which is equivalent for the government to equilibrium protection policy.

2.4. The equilibrium structure of protection policy

Grossman and Helpman have proved that if the contribution schedules are differentiable around the equilibrium, the shape of the political contributions reveal the lobbies' true preferences in the neighborhood of the equilibrium. They have also demonstrated an interesting characteristic of Nash equilibria, in equilibrium government behaves as if it attributed to lobbies higher weight than other population. Below we show that these results hold to our model as well.

Let assume that the political contribution functions and welfare functions are differentiable. To characterize the structure of the equilibrium protection policy let consider conditions (b) and (c) Proposition 2, they imply that the first order condition is satisfied at $\{p^0, s^0, \rho^0, \tau^0\}$:

$$\nabla W_j(p^0, s^0, \rho^0, \tau^0) + \nabla G(p^0, s^0, \rho^0, \tau^0) - \lambda \nabla r(p^0, s^0, \rho^0, \tau^0) = 0 \quad (6)$$

$$\nabla G(p^0, s^0, \rho^0, \tau^0) - \lambda \nabla r(p^0, s^0, \rho^0, \tau^0) = 0 \quad (7)$$

Where λ is a Lagrange multiplier. Inserting (7) into (6) gives $\nabla W_j(p^0, s^0, \rho^0, \tau^0) = 0$.

By definition

(4) $\nabla W_j(p^0, s^0, \rho^0, \tau^0) = \nabla V_j(p^0, s^0, \rho^0, \tau^0) - \nabla c_j(p_j^0, s_j^0, \rho_j^0, \tau_j^0)$.

Taken together the equations imply

$$\nabla V_j(p^0, s^0, \rho^0, \tau^0) = \nabla c_j(p_j^0, s_j^0, \rho_j^0, \tau_j^0) \quad (8)$$

Equation (8) establishes that around the equilibrium change in the political contributions reflects the effect of change of the government protection policy on the joint welfare of members of the lobby's group.

By the definition

$$c_i(p_i^0, s_i^0, \rho_i^0, \tau_i^0) = V_i(p^0, s^0, \rho^0, \tau^0) - W_i(p^0, s^0, \rho^0, \tau^0), (4)$$

where $W_i(p^0, s^0, \rho^0, \tau^0)$ is net-of-contribution welfare of group i members. If the political contributions correspond to true preferences of the group, then $W_i(p^0, s^0, \rho^0, \tau^0) \geq W_i((p, s, \rho, \tau)$ and

$$c_i(s_i^0, \rho_j^0) \geq V_i(s^0, \rho^0) - W_i(s, \rho) \quad (9)$$

Condition (b) of Proposition 2 states that if $(p^0, s^0, \rho^0, \tau^0)$ and (p, s, ρ, τ) are feasible then $G(p^0, s^0, \rho^0, \tau^0) \geq G(p, s, \rho, \tau)$,

or

$$\sum_{i \in L} c_i(p_i^0, s_i^0, \rho_i^0, \tau_i^0) + \theta \sum_{i=1}^{n} V_i(p^0, s^0, \rho^0, \tau^0) \geq \sum_{i \in L} c_i(p_i, s_i, \rho_i, \tau_i) + \theta \sum_{i=1}^{n} V_i(p, s, \rho, \tau).$$

From expression (9)

$$\sum_{i \in L} V_i(p^0, s^0, \rho^0, \tau^0) + \theta \sum_{i=1}^{n} V_i(p^0, s^0, \rho^0, \tau^0) \geq \sum_{i \in L} V_i(p, s, \rho, \tau) + \theta \sum_{i=1}^{n} V_i(p, s, \rho, \tau).$$

Consequently the government in the equilibrium maximizes weighted sum of welfare of different groups of population. Welfare of groups of population presented by lobbies in the political process receives weight $(1 + \theta)$, welfare of other ones receives weight θ, where $0 \leq \theta \leq 1$.

Let us present in a more detailed record expression (7), it takes form

$$\sum_{i \in L} \nabla c_i(p_i^0, s_i^0, \rho_i^0, \tau_i^0) + \theta \sum_{i=1}^{n} \nabla V_i(p^0, s^0, \rho^0, \tau^0) - \lambda \nabla r(p^0, s^0, \rho^0, \tau^0) = 0 . \quad \text{Inserting} \quad (8)$$

into the expression gives

$$\sum_{i \in L} \nabla V_i(p^0, s^0, \rho^0, \tau^0) + \theta \sum_{i=1}^{n} \nabla V_i(p^0, s^0, \rho^0, \tau^0) - \lambda \nabla r(p^0, s^0, \rho^0, \tau^0) = 0 \quad (10)$$

The equation shows how marginal change of protection policy influences the welfare of the groups of populations distinguishing between participating and not participating in lobbing.

So the features of the equilibrium structure of the regional protection policy are as follows.

Firstly, around equilibrium the political contributions reveal preferences of the interest groups regarding protection policy. Secondly, equilibrium protection policy results in distribution of welfare in favor of the sectors, participating into political lobbing. Thirdly, in equilibrium marginal change of welfare of different groups influenced by the protection policy depends on the participation in political lobbing.

We consider further features of the different protection tools: output subsidies, input subsidies, or tax exemptions. Let us first consider output subsidies

a) Output subsidies

We analyze a solution of equation (10).

$$\nabla W_j(p^0, s^0, \rho^0, \tau^0) + \nabla G(p^0, s^0, \rho^0, \tau^0) - \lambda \nabla r(p^0, s^0, \rho^0, \tau^0) = 0 \quad (6)$$

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Condition (b) of Proposition 2 states that if $(p^0, s^0, \rho^0, \tau^0)$ and (p, s, ρ, τ) are feasible then $G(p^0, s^0, \rho^0, \tau^0) \geq G(p, s, \rho, \tau)$, or

$$\sum_{i \in L} c_i(p_i^0, s_i^0, \rho_i^0, \tau_i^0) + \theta \sum_{i=1}^{n} V_i(p^0, s^0, \rho^0, \tau^0) \geq \sum_{i \in L} c_i(p_i, s_i, \rho_i, \tau_i) + \theta \sum_{i=1}^{n} V_i(p, s, \rho, \tau).$$

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into the expression gives

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a) Output subsidies

We analyze a solution of equation (10).

From (4) we find $\dfrac{\partial V_i}{\partial s_j} = \sigma_{ij}(p_i^* \dfrac{\partial y_i}{\partial s_j} - (\pi_i^* - \rho_i) \dfrac{\partial z_i}{\partial s_j}) + \alpha_i \dfrac{\partial r}{\partial s_j}$,

where σ_{ij} - Kronecker's symbol. Substitution of the terms in expressions (10) allows to derive

$$\sum_{i \in L} (\sigma_{ij} (p_i^* \frac{\partial y_i}{\partial s_j} - (\pi_i^* - \rho_i) \frac{\partial z_i}{\partial s_j}) + \alpha_i \frac{\partial r}{\partial s_j}) + \theta \sum_{i=1}^{n} (\sigma_{ij} (p_i^* \frac{\partial y_i}{\partial s_j} - (\pi_i^* - \rho_i) \frac{\partial z_i}{\partial s_j}) + \alpha_i \frac{\partial r}{\partial s_j}) -$$

$$- \lambda \frac{\partial r}{\partial s_j} = 0$$

Let us introduce an indicator variable φ_i that equals 1 if the sector uses lobby pressure and 0 - otherwise. Denote $\sum_{i \in L} \alpha_i$ by L^*. The equation takes the form

$$(p_j^* \frac{\partial y_j}{\partial s_j} - (\pi_j^* - \rho_j) \frac{\partial z_j}{\partial s_j})(\vartheta + \varphi_j) = \frac{\partial r}{\partial s_j} (\lambda - L^* - \theta).$$

From (3) we find $\dfrac{\partial r}{\partial s_j} = (t - \tau_j) \dfrac{\partial y_j}{\partial s_j} - \beta (y_j + s_j \dfrac{\partial y_j}{\partial s_j} + \rho_j \dfrac{\partial z_j}{\partial s_j})$.

Inserting let to derive

$$s_j = \frac{1}{1 + \varepsilon_j^s} (t - \tau_j - \rho_j \frac{\partial z_j}{\partial y_j} (1 + \frac{\theta + \varphi_j}{\lambda - L - \theta} 1\!\!/\!\beta) + \pi_j^* \frac{\theta + \varphi_j}{\lambda - L - \theta} 1\!\!/\!\beta - p_j \frac{\theta + \varphi_j}{\lambda - L - \theta} 1\!\!/\!\beta),$$

where ε_j^s - subsidy elasticity of production good j. Let $\dfrac{\theta + \varphi_j}{\lambda - L - \theta} = k$, then

$$s_j = \frac{1}{1 + \varepsilon_j^s} (t - \tau_j - \rho_j \frac{\partial z_j}{\partial y_j} (1 + \frac{k}{\beta}) + \pi_j^* \frac{k}{\beta} - p_j \frac{k}{\beta})$$

Proposition 3. The government in the equilibrium chooses output subsidies that satisfy

$$s_j = \frac{1}{1 + \varepsilon_j^s} (t - \tau_j - \rho_j \frac{\partial z_j}{\partial y_j} (1 + \frac{k}{\beta}) + \pi_j^* \frac{k}{\beta} - p_j \frac{k}{\beta}) \text{ for all } j = 1, \dots, n$$

So output subsidies for a good positively correlated with tax rate, ability of the regional administration to soften regional budget constraint, with weight attributed to population's welfare, exogenous input price, with lobbing activity of the sector and overall lobbing pressure of the regional producers. Output subsidy for a particular good negatively correlated with level of exogenous output price, subsidy elasticity of production, granted tax exemptions and input subsidies.

In contrast with Grossman-Helpman's economy, where export and import tariffs are considered, our case is restricted to positive subsidies. International trade policy belongs to federal level jurisdiction and regional authorities do not have to interfere with this sphere.

Output subsidies are positive if $(t-\tau_j)-\rho_j\dfrac{\partial z_j}{\partial y_j}(1+\dfrac{k}{\beta})+\dfrac{k}{\beta}(\pi_j^*-p_j)>0$. Assume $\dfrac{\partial z_j}{\partial y_j}>0$ and $k>0$, the latter requires λ-L-$\theta>0$, which means that the regional authority has tight budget, at least enough tight to take the budget into consideration when the government faces pressure from population and lobbing groups. When the budget is not binding restriction of the policy-making, the government may grant any subsidies and any tax exemptions, it is not the case of our analysis.

The first term in the above expression is always positive, the second one is always negative, and sign of the third one depends on technology and input and output prices. So granting output subsidies to a producer depends on input subsidies, tax exemptions to the producer, on ration of input and output exogenous prices and technology of the production.

The range of output subsidies values is presented in Diagram 1

Diagram 1
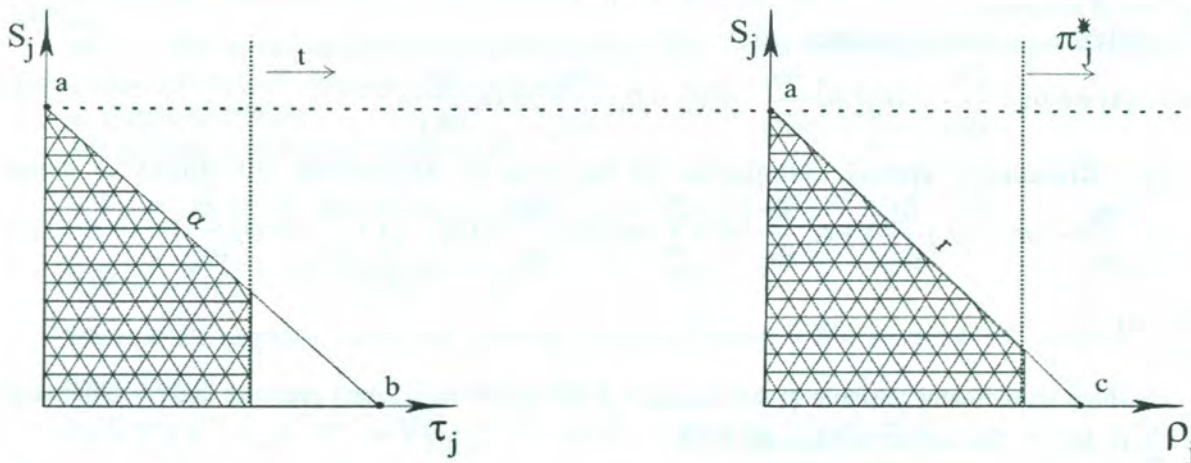
Here slope $\alpha=-\dfrac{1}{1+\varepsilon_j^s}$, slope $r=-\dfrac{1}{1+\varepsilon_j^s}\dfrac{\partial z_j}{\partial y_j}(1+\dfrac{k}{\beta})$, $a=\dfrac{1}{1+\varepsilon_j^s}(t-\dfrac{k}{\beta}(p_j-\pi_j^*)$,

$b=t-\dfrac{k}{\beta}(p_j-\pi_j^*)$ (b may be less or more than t), $c=\dfrac{\pi_j^*-p_j+t\dfrac{k}{\beta}}{\dfrac{\partial z_j}{\partial y_j}(1+\dfrac{k}{\beta})}$ (c may be less or more than π_j^*).

b) Input subsidies
We continue analysis of the equation (10).

From equation (4) $\dfrac{\partial V_i}{\partial \rho_j}=\sigma_{ij}[p_i\dfrac{\partial y_i}{\partial \rho_j}-(\pi_i^*-\rho_i^*)\dfrac{\partial z_i}{\partial \rho_j}+z_i]+\alpha_i\dfrac{\partial r}{\partial \rho_j}$, equation (10) takes form:

$$\sum_{i\in L}(\sigma_{ij}[p_i^*\dfrac{\partial y_i}{\partial \rho_j}-(\pi_i^*-\rho_i^*)\dfrac{\partial z_i}{\partial \rho_j}+z_i]+\alpha_i\dfrac{\partial r}{\partial \rho_j}\sigma_{ij})+$$

$$\theta\sum_{i=1}^{n}(\sigma_{ij}[p_i^*\dfrac{\partial y_i}{\partial \rho_j}-(\pi_i^*-\rho_i^*)\dfrac{\partial z_i}{\partial \rho_j}+z_i]+\alpha_i\dfrac{\partial r}{\partial \rho_j}-\lambda\dfrac{\partial r}{\partial \rho_j}=0$$

Or $(\theta+\varphi_j)[p_j^*\dfrac{\partial y_j}{\partial \rho_j}-(\pi_j^*-\rho_j^*)\dfrac{\partial z_j}{\partial \rho_j}+z_j]=\dfrac{\partial r}{\partial \rho_j}(\lambda-L^*-\theta)$.

From (3) we can find

$$\dfrac{\partial r}{\partial \rho_j}=(t-\tau_j)\dfrac{\partial y_j}{\partial \rho_j}-\beta(s_j+\rho_j\dfrac{\partial z_j}{\partial \rho_j}+z_j).$$

Taken together let us derive

$$\rho_j = \frac{1}{(1+\varepsilon_j^\rho)(k+\beta)}\left((t-\tau_j)\frac{\partial y_j}{\partial z_j} - s_j\frac{\partial y_j}{\partial z_j}\beta - p_j\frac{\partial y_j}{\partial z_j}k + \pi_j^* k\right),$$

where ε_j^ρ - input price subsidy elasticity of demand for input of production good j.

Proposition 4. The government in the equilibrium chooses input subsidies that satisfy

$$\rho_j = \frac{1}{(1+\varepsilon_j^\rho)(k+\beta)}\left((t-\tau_j)\frac{\partial y_j}{\partial z_j} - s_j\frac{\partial y_j}{\partial z_j}\beta - p_j\frac{\partial y_j}{\partial z_j}k + \pi_j^* k\right)$$

for all $j=1,\dots,n$

So input subsidies for a good positively correlate with level of the exogenous input price, with tax rate, weight attributed to population's welfare, ability of the regional administration to soften regional budget constraints and lobbing activity. However the level of input subsidy for a particular good negatively correlates with output exogenous price, with input price subsidy elasticity of demand for input, with tax exemptions and output subsidies to the sector.

If we assume that $k>0$, then input subsidies are positive if

$(t-\tau_j)\dfrac{\partial y_j}{\partial z_j} + \pi_j^* k - \dfrac{\partial y_j}{\partial z_j}(s_j\beta + p_j k) > 0$. The first and the second terms in the expression are

positive, the third term is negative.

So probability of input subsidy granting depends on ratio of tax exemption to tax level in the region, on level of exogenous input price and output price, on granted output subsidies, on technology and tightness of the regional budget constraint.

The range of input subsidies values is shown in Diagram 2

Diagram 2
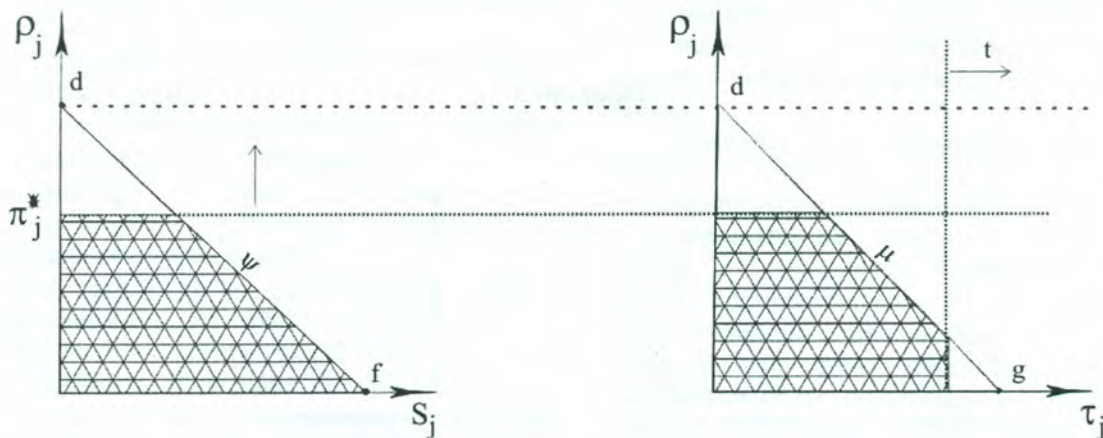
Here   slope $\psi = -\dfrac{\beta}{(1+\varepsilon_j^\rho)(k+\beta)} * \dfrac{\partial y_j}{\partial z_j}$,   slope $\mu = -\dfrac{1}{(1+\varepsilon_j^\rho)(k+\beta)} * \dfrac{\partial y_j}{\partial z_j}$,

$d = \dfrac{1}{(1+\varepsilon_j^\rho)(k+\beta)}\left(t\dfrac{\partial y_j}{\partial z_j} - kp_j\dfrac{\partial y_j}{\partial z_j}k + \pi_j^* k\right)$ (d may   be   less   or   more   than π_j^*),

$f = \dfrac{1}{\beta}\left((t - p_j k + \dfrac{\pi_j^* k}{\partial y_j/\partial z_j}\right)$, $g = t - p_j k + \dfrac{\pi_j^* k}{\partial y_j/\partial z_j}$ (*g* may be less or more than *t*).

c) Tax exemptions
This case concludes the analysis of equation (10).

From (4) we find $\dfrac{\partial V_i}{\partial \tau_j} = \sigma_{ij}(p_i\dfrac{\partial y_i}{\partial \tau_j} - (\pi_i^* - \rho_i)\dfrac{\partial z_i}{\partial \tau_j}) + \alpha_i\dfrac{\partial r}{\partial \tau_j}$. Substitution of the terms in

expressions   (10)   let   us   to   derive

$$\sum_{i \in L}(\sigma_{ij}(p_i \frac{\partial y_i}{\partial \tau_j} - (\pi_i^* - \rho_i)\frac{\partial z_i}{\partial \tau_j}) + \alpha_i \frac{\partial r}{\partial \tau_j}) + \theta \sum_{i=1}^{n}(\sigma_{ij}(p_i \frac{\partial y_i}{\partial \tau_j} - (\pi_i^* - \rho_i)\frac{\partial z_i}{\partial \tau_j}) + \alpha_i \frac{\partial r}{\partial \tau_j}) -.$$

$-\lambda \frac{\partial r}{\partial \tau_j} = 0$. The equation takes the form $(p_j^* \frac{\partial y_j}{\partial \tau_j} - (\pi_j^* - \rho_j)\frac{\partial z_j}{\partial \tau_j})(\theta + \varphi_j) = \frac{\partial r}{\partial \tau_j}(\lambda - L - \theta)$.

From (3) we find $\frac{\partial r}{\partial \tau_j} = (t - \tau_j)\frac{\partial y_j}{\partial \tau_j} - y_j - \beta(s_j \frac{\partial y_j}{\partial \tau_j} + \rho_j \frac{\partial z_j}{\partial \tau_j})$. Inserting lets to derive

$\tau_j = \frac{1}{1+\varepsilon_j^\tau}(t + \pi_j^* \frac{\partial z_j}{\partial y_j}k - p_j k - \rho_j \frac{\partial z_j}{\partial y_j}(k+\beta) - s_j \beta)$, where ε_j^τ - tax exemption elasticity of production good j.
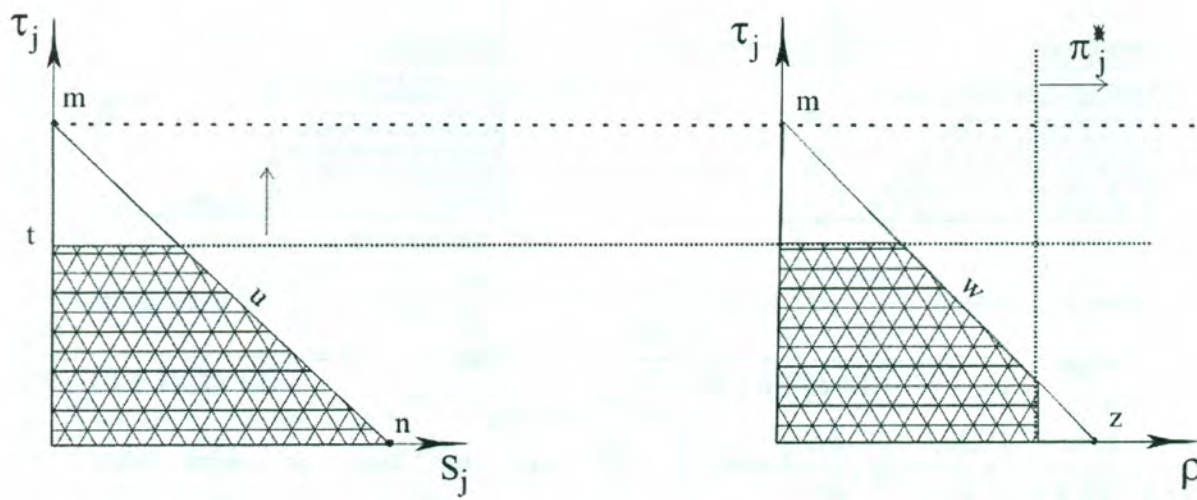
Proposition 5. The government in the equilibrium chooses tax exemptions that satisfy

$$\tau_j = \frac{1}{1+\varepsilon_j^\tau}(t + \pi_j^* \frac{\partial z_j}{\partial y_j}k - p_j k - \rho_j \frac{\partial z_j}{\partial y_j}(k+\beta) - s_j \beta) \text{ for all } j=1,\dots,n$$

So tax exemptions for a sector positively correlate with tax rate, with weight attributed to population's welfare, with lobbing activity of the sector and with input exogenous price. Tax exemptions for a sector negatively correlate with level of exogenous output price, tax exemption elasticity of the production, input and output subsidies granted to the sector.

Opportunity set for tax exemptions values is shown in Diagram 3.

Diagram 3

Here slope $u = -\frac{1}{1+\varepsilon_j^\tau}$, slope $w = -\frac{k+\beta}{1+\varepsilon_j^\tau}*\frac{\partial z_j}{\partial y_j}$, $m = \frac{1}{1+\varepsilon_j^\tau}(t + \pi_j^* \frac{\partial z_j}{\partial y_j}k - p_j k)$ (m may be less or more than t), $n = \frac{1}{\beta}(t + \pi_j^* \frac{\partial z_j}{\partial y_j}k - p_j k)$, $z = \frac{k}{k+\beta}\pi_j^* + \frac{t+kp_j}{\partial z_j/\partial y_j(k+\beta)}$ (z may be less or more than π_j^*).

The table below summarizes the characteristics of the equilibrium protection policy.

Table 1. *The correlation characteristics of equilibrium*

Variables	Output subsidy	Input subsidy	Tax exemption
Output subsidy		-	-
Input subsidy	-		-
Tax exemption	-	-	
Tax rate	+	+	+
Exogenous output price	-	-	-
Exogenous input price	+	+	+
Weight attributed to population's welfare	+	+	+
Overall lobbing pressure on a regional government	+	+	+
Political activity of the sector's lobby	+	+	+
Output subsidy elasticity of production	-		
Input price subsidy elasticity of demand for input		-	
Tax exemption elasticity of production			-
Ability of the regional administration to soften regional budget constraint	+	+	+

3. Empirical Estimations

3.1. Hypotheses

Assuming the model is correct the empirical estimations will support the hypotheses as follows.

Hypothesis 1. Output subsidies, input subsidies and tax exemptions are substituting tools of the regional protection. Each of the measures negatively correlates with others.

To test this hypothesis correlation of subsidies and tax exemptions will be estimated.

Hypothesis 2. Regional subsidizing and granting tax exemptions is a feature of the regions having higher tax burden in the regions.

For testing these hypotheses connection between subsidies, tax exemptions and level of the regional tax collection must be estimated.

Hypothesis 3. Regions demonstrating active subsidizing and granting tax exemptions have larger share of transfers from the federal center which is one of the ways to soften regional budget constraint.

To test the hypothesis the dependence of subsidies and tax exemptions on level of federal transfers received by region has to be estimated.

Hypothesis 4. Subsidizing and granting tax exemptions positively correlated with political lobbing of the interest groups.

Lobbying power depends on the concentration of the producer's interests; the higher is the concentration the higher is the ability to influence the government and to persuade it of the protection. To test the hypothesis the correlation of the regional subsidizing and tax exemptions with level of the regional specialization should be estimated. Usually the agreements between policy-makers and business have a long-term character, so an autoregressive dependence is worth being taken into account.

Hypothesis 5. Activity of the regional protection depends on needs of the population, in the model the corresponding indicator is weight attributed to the population's welfare. Some literature considers industry protection as result of social policy, the protection is granted to industries that would, otherwise, be declining. One of the possible consequences of decline is unemployment; correlations of the protection activity with level of unemployment will be estimated.

Hypothesis 6. Subsidies and tax exemptions depend on exogenous prices, so macroeconomic demand and supply shocks resulting in sharp change of the prices may also result in change of protection activity. Two years in the recent period (1995 and 1998) in Russia were famous for sharp devaluation of ruble, growth of consumer demand and prices of goods of both import and domestic production. Correlations of the protection activity with macroeconomic price indexes and two macro-shock dummy variables for 1995 and 1998 will be estimated.

Hypothesis 7. Statistical data on subsidies and tax exemptions allow assuming extension of the regional protection practice in the considered years. So time trend needs to be included.

3.2. Information

Testing of the formulated hypotheses assumes data for a period of time on subsidies, tax exemptions, and import by regions and by sectors, and information on structure of economies, on budgets, and taxes by regions.

Reports on the executed regional budgets for 1996 - 2000 are taken from Ministry of Finance of the Russian Federation. The reports contain information on total subsidies provided by the regional authorities to local producers. The characteristics of regional economic development, including dynamics, price

level, and structures of the production are presented in statistical yearbook "Regions of Russia ".

However the disaggregated information on subsidies by 10 sectors was obtained only for Novosibirsk region, but for longer period 1995 - 2002. The aggregated data on subsidies for all Russian regions in 1996 - 2000 are presented in the regional budgets. Information on the regional tax exemptions is reflected in database "Consultant Plus. Regional legislation", these data reflect the fact of tax exemptions granted without estimations of sum of the tax relief. The qualitative data on the value of the tax exemptions was available also for Novosibirsk region only (for 1995 - 2002). Tax exemptions variable for Russian regions is constructed assuming that three types of tax relief might be a result of lobbing activity: tax relief for particular enterprises, tax relief for industries and setting up free economic zones. Any of these tax reliefs contributes 1 to the tax exemptions variable, so the variable takes values from 0 to 3, the former corresponds to case of no tax relief, the latter means granting three types of the mentioned ones.

In order to test the formulated hypotheses under the conditions of the restricted information we estimated two systems. Each of the systems is a modification of one corresponding to the system of the advanced hypotheses above.

3.3. Methods of estimation
Initial system

The theoretical model structure implies doing an empirical analysis by sectors and by regions. Because of radical changes during transition period in Russia time effect must be taken into consideration as well. Let $i=1,...,N$ is index for sector, $r=1,...,R$ is index for region, and $t=1,...,T$ is index for time. The system of the hypotheses shapes the system of regression equations as follows.

Transfers$_{rt}$ - share of transfers from federal budget in the regional budget income in region r in year t;

Share in regional production$_{irt}$ - share of sector i in production of region r in year t;

Exogenous price$_{it}$ - average price level for sector's i production in year t;

Tax exemptions$_{irt}$ - tax exemptions for sectors i provided by regional government in region r in year t;

Unemployment$_{rt}$ - share of unemployed active population in region r in year t;

Time trend$_t$ - number of year t.

As it is mentioned above quantitative data for subsidies and tax exemptions by sectors were obtained for one region - Novosibirsk region, hence the regional variables and the regional effects cannot be estimated on the basis of the data available by sectors. Unemployment rate, budgetary transfers from the federal level, and level of taxation in a region are among these regional variables. These regional characteristics are constant for different sectors in a region for every year and become a part of time effect for the panel estimations.

The modified system adapted for one region is as follows:

Modification 1

$Subsidies_{it} = f(Share\_in\_regional\_production_{it}, Exogenous\_price_{it},$
$Tax\_exemption_{it}, Dummies\_for\_macro-shocks_t, Time\_trend_t$
$Subsidies_{i(t-1)}) + \lambda_i + \upsilon_{it}$ (A'')

$Tax\_exemptions_{it} = f(Share\_in\_regional\_production_{it}, Dummies\_for$
$macro-shocks_t, Exogenous\_price_{it}, Subsidies_{it}, Time\_trend_t,$
$Tax\_exemption_{i(t-1)}) + \varphi_i + \upsilon_{it}$ (B'')

Subscript i identifies sector, t - year; λ_i and ϕ_i are sector's effects.

$$Subsidies_{irt} = f(Dummies\_for\_macro-shocks_t, Level\_of\_taxation_{rt},$$
$$Transfers_{rt}, Share\_in\_regional\_production_{irt}, Exogenous\_price_{it}, \qquad (A)$$
$$Tax\_exemption_{irt}, Unemployment_{rt}, Time\_trend_t, Subsidies_{ir(t-1)}) + \mu_r + \nu_{rt} + \varepsilon_{irt}$$

$$Tax\_exemptions_{irt} = f(Dummies\_for\_macro-shocks_t, Level\_of$$
$$taxation_{rt}, Share\_in\_regional\_production_{irt}, Exogenous\_price_{it},$$
$$Subsidies_{irt}, Unemployment_{rt}, Transfers_{rt}, Time\_trend_t, \qquad (B)$$
$$Tax\_exemptions_{ir(t-1)}) + \upsilon_r + \xi_{rt} + \varepsilon_{irt}$$

Where:
  μ_r - fixed regional effect;
  ν_{rt} - random regional error;
  ε_{irt} - random sector's error;
Subsidies$_{irt}$ - subsidies for sector i from regional budget in region r in year t;
Dummies for years$_t$ - dummy year variables;
Level of taxation$_{rt}$ - tax income per capita in total regional budget income in region r in year t;

However effect of the omitted regional variables (unemployment, federal transfers, and regional level of taxation) is of interest as well, in order to estimate their contribution the estimations were done on the basis of data aggregated by sector. The information on tax exemption is another as well; it is fact of tax granting. Variable of tax exemptions is equal to the number of decisions on tax exemptions adopted in the region. Variable of share of industry in regional production have to be omitted, since sum of the

shares for a region equals one. However as a proxy for lobbing pressure in a region dummy variable of specialization level is introduced, which takes value "1" when there is an industry producing more than 1/3 of total regional industrial product and value "0" otherwise. Variable of exogenous price in the aggregated by sectors case coincides with time effect. The observations have the panel structure and include characteristics of 88 regions over time period 1996 - 2000. Since 1995 is not in the covered period, one dummy variable for macro-shock in 1998 is used in the estimations.

Modification 2

$$Subsidies_{rt} = f(Dummy\_for\_macro-shock_t, Level\_of\_taxation_{rt},$$

$$Transfers_{rt}, Tax\_exemptions_{rt,} Unemployment_{rt}, Specialization\_level_{rt},$$

$$Time\_trend_t, Subsidies_{r(t-1)}) + \lambda_r + \varepsilon_{rt}$$

$$Tax\_exemptions_{rt} = f(Dummy\_for\_macro-shock_t, Level\_of$$

$$taxation_{rt}, Subsidies_{rt}, Specialization\_level_{it}, Unemployment_{rt}, Transfers_{rt},$$

$$Time\_trend_t, Tax\_exemptions_{r(t-1)}) + \mu_r + \varepsilon_{rt}$$

Comments on the new notations are below.

Subsidies_{rt} - share of subsidies for the local producers in regional budget expenditures in region *r* in year *t*;

Specialization level_{rt} - dummy variable for the specialization level, which takes value "1" when there is an industry producing more than 1/3 of total regional industrial product in region *r* in year *t* and value "0" otherwise;

Tax exemptions_{rt} - number of decisions granted different tax exemptions in region *r* in year *t*;

λ_r and μ_r - regional effects.

The equations (A'), (B'), (A") and (B") are dynamic panel regressions with endogenous variables. One of the proposed methods for such models is the two-step Arellano and Bond (1991) GMM estimator, where past variables are used as instruments.

For instance consider equation (A'), where *i=1,...,10, t=1,...,8*. For convenience, we introduce the following notations: y_{it} - *subsidies_{it}*, vector x_{it} - vector of independent variables in *it* equation (A'). So we have $y_{it=}\delta\ y_{i,t-1+}\ x_{it}\ \beta_+\lambda_{i+}\ \upsilon_{ir}$ Instruments for y_{it} are y_{is}, where *s<t*, instruments for x_{it} are x_{is}, where *s<t*. Define

$$G = \begin{pmatrix} 2 & -1 & 0 & ...... & 0 & 0 & 0 \\ -1 & 2 & -1 & 0... & 0 & 0 & 0 \\ ... & ... & ... & ...... & ... & ... & ... \\ 0 & 0 & 2 & ...... & 0 & -1 & 2 \end{pmatrix}$$

$$W_i = \begin{bmatrix} y_{i1} & x_{i1}' & x_{i2}' & 0 & 0 & ... & ... & ...... & ... & ... & ...... & ... & ... & 0 \\ 0 & 0 & 0 & y_{i1}\ y_{i2} & x_{i1}' & x_{i2}' & x_{i3}'0 & ... & ... & ...... & ... & ... & 0 \\ ... & ... & ... & ...... & ... & ... & ...... & ... & ... & ...... & ... & ... & 0 \\ 0 & 0 & 0 & ...... & ... & ... & ...... & 0 & y_{i1} & ...y_{i6} & x_{i1}' & ... & x_{i7} \end{bmatrix}$$

$$\Delta y = \begin{pmatrix} y_{1,3}-y_{1,2} \\ y_{1,4}-y_{1,3} \\ ... \\ y_{1,8}-y_{1,7} \\ ... \\ ... \\ y_{10,3}-y_{10,2} \\ y_{10,4}-y_{10,3} \\ ... \\ y_{10,8}-y_{10,7} \end{pmatrix}, \Delta y_{-1} = \begin{pmatrix} y_{1,2}-y_{1,1} \\ y_{1,3}-y_{1,2} \\ ... \\ y_{1,7}-y_{1,6} \\ ... \\ ... \\ y_{10,2}-y_{10,1} \\ y_{10,3}-y_{10,2} \\ \vdots \\ y_{10,7}-y_{10,6} \end{pmatrix}, \Delta X = \begin{pmatrix} x_{1,3}'-x_{1,2}' \\ x_{1,4}'-x_{1,3}' \\ ... \\ x_{1,8}'-x_{1,7}' \\ ... \\ ... \\ x_{10,3}'-x_{10,2}' \\ x_{10,4}'-x_{10,3}' \\ ... \\ x_{10,8}'-x_{10,7}' \end{pmatrix}$$

The matrix of instruments is $W=[W_1`,..., W_{10}`]$. The preliminary first-step consistent estimator:

$$\begin{pmatrix} \delta_0 \\ \beta_0 \end{pmatrix} = \left[(\Delta y_{-1}\Delta X)' W \left(\sum_{i=1}^{10} W_i GW_i \right)^{-1} W'(\Delta y_{-1}\Delta X) \right]^{-1} \left[(\Delta y_{-1}\Delta X)' W \left(\sum_{i=1}^{10} W_i GW_i \right)^{-1} W'\Delta y \right]$$

Differenced residuals obtained from the preliminary estimator: $\Delta v_i = \Delta y_i - \delta_0 \Delta y_{i,-1} - \Delta x_i' \beta_0$.

Define $\hat{V} = \sum_{i=1}^{10} W_i' \Delta v_i \Delta v_i' W_i$

The resulting estimator is:

$$\begin{pmatrix} \delta_{GMM} \\ \beta_{GMM} \end{pmatrix} = \left[(\Delta y_{-1}\Delta X)' W \hat{V}^{-1} W'(\Delta y_{-1}\Delta X) \right]^{-1} \left[(\Delta y_{-1}\Delta X)' W \hat{V}^{-1} W'\Delta y \right]$$

A consistent estimate of the asymptotic variance of the coefficients is given by

$$\text{var}\begin{pmatrix} \delta_{GMM} \\ \beta_{GMM} \end{pmatrix} = \left[(\Delta y_{-1}\Delta X)' W \hat{V}^{-1} W'(\Delta y_{-1}\Delta X) \right]^{-1}$$

The same way of estimation is used for equations (B') and (A'') - (B'').

4.3. Results of the estimations

The results of the empirical estimations are presented in the tables below.

Table 2. *The results of regression (A') estimation*

Variables	Coefficient	P-value
Constant	-4.86	0.228
Dummy for macroeconomic shock 1995	3.91	0.038
Dummy for macroeconomic shock 1998	1.39	0.060
Time linear trend	1.61	0.001
Share in regional production	0.07	0.439
Exogenous price	-0.01	0.975
Tax exemptions	-0.11	0.518
Subsidies in the previous year	0.08	0.034
R^2	0.32	

So the correlation of the subsidies provided for the sectors with subsidies of the previous year and macroeconomic price shocks is significant and positive. There was increasing tendency in subsidizing local producers, time variable is positive and significant. Other variables were insignificant for Novosibirsk region. However, they have predicted sign.

Table 3. *The results of regression (B') estimation*

Variables	Coefficient	P-value
Constant	1.65	0.560
Dummy for macroeconomic shock 1995	2.85	0.031
Dummy for macroeconomic shock 1998	0.50	0.078
Time linear trend	0.65	0.006
Share in regional production	0.01	0.842
Exogenous price	-0.03	0.015
Subsidies	-0.06	0.482
Tax exemptions in the previous year	0.25	0.029
R^2	0.34	

Table 4. *The results of regression (A'') estimation*

Variables	Coefficient	P-value
Constant	3.77	0.885
Dummy for macroeconomic shock 1998	0.17	0.561
Time linear trend	0.11	0.016
Level of taxation	0.07	0.031
Transfers	0.45	0.093
Unemployment	-9.22	0.736
Specialization level	0.91	0.494
Tax exemptions	-0.85	0.537
Subsidies in the previous year	0.54	0.010
R^2	0.29	

Table 5. *The results of regression (B'') estimation*

Variables	Coefficient	P-value
Constant	0.22	0.676
Dummy for macroeconomic shock 1998	0.09	0.597
Time linear trend	0.09	0.041
Level of taxation	0.01	0.029
Transfers	0.01	0.032
Unemployment	-0.73	0.815
Specialization level	0.23	0.437
Subsidies	-0.02	0.691
Tax exemptions in the previous year	0.60	0.000
R^2	0.34	

The results confirm negative correlation of tax exemptions with exogenous output price level for the sectors and positive correlation with macroeconomic instability. There is practice of long-term supporting of the producers in the region, tax exemptions in the previous year is significant and positive variable. Weight of the sectors in regional production and provided subsidies are insignificant.

In both regressions the share of the sectors in the regional production is insignificant variable so the weight is not important, the lobbing activity itself is more important. Subsidies and tax exemptions are granted to the sectors, which had obtained them in the past and continue to keep their positions. One of the factors of value for subsidies and of tax exemptions is the macroeconomic situation. Size of subsidies and tax exemptions does not depend on each other.

The estimations on the sample of the aggregated data for Russia, have confirmed dependence of subsidies and tax exemptions on tax burden in the region and on transfers obtained from the higher-level budget. Higher level of taxation and transfers from federal level budget are the factors allowing the regional governments to increase the subsidizing of the local firms and granting them tax exemptions.

Unemployment is not significant factor of the regional protection, so the social factor does not influence the regional governments' decisions on the protection of local producers very much. The estimations on the country level sample have confirmed the results received for one region that the regional authorities prefer to support the same sectors, significant are correlations with previous year level of the support. Another common feature is tendency to increase the protection for local producers through subsidizing and tax relief; both of the activities have a significant growing trend.

4. Conclusions

Regional authorities in Russia acting on the request of the local business groups interfere with local market price mechanism. Direction of the influence provides more favorable conditions to the local producers. Regional authorities use a wide range of legal protection instruments: from direct (price ceiling, making-up price, limitations on profitability, limitations on trade extra charge, declaration about change in price) to indirect methods (tax exemptions, credits, subsidies, budget compensations, tax payments overdue).

Protection of local producers becomes one of the typical features of the sub-federal policy in Russia. The protection is provided because of political pressure of local lobbying groups. The social factors are not in the focus of the policy-maker's regards.

When regional authorities have got real power they become an aim of activity of industrial interests

groups. This process results in integration of interests of regional policy-makers and local business. One of the economic political consequences of the interactions is the appearance of political collusions between industrial groups and regional decision-makers; one of the economic is disintegration of the internal market in Russia. Under the conditions of economic growth, which Russia is experiencing now, a policy of competition suppressing through the protection barriers is especially inefficient for a region and for country as a whole.

The political options that could improve the balance of the macroeconomic and regional interests in the field of the local producers protection could be adoption a legal document prohibiting discrimination between local and external producers, restricting level of subsidies, tax exemptions and guarantee provided from the regional budget resources, and obligatory competitive elements in the distribution of subsidies and tax exemptions at the expenses of regional budgets.

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REFERENCES

Arellano, M. and S. Bond (1991), Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations, Review of Economic Studies, 58, 277 - 297.

Baltagi, B.H. (2001), Econometric Analysis of Panel Data, 2-nd edition, John Wiley & Sons, LTD.

Bernheim, D. and M. Whinston (1986), Menu Auctions, Resource Allocation, and Economic Influence, Quarterly Journal of Economics, vol. 101, N 1, pp. - 31.

Boycko, M. (1992), When Higher Incomes Reduce Welfare: Queues, Labor Supply, and Macroeconomic Equilibrium in Socialist Economies. Quarterly Journal of Economics, 107, pp. 907 - 920.

Castanheira, M and V.Popov, (1999), Framework Paper on the Political Economic of Growth in Russia and Central ad Eastern European Countries, mimo.

Dewatripont, M. and G. Roland (1992a), Economic Reform and dynamic political constraintts, Review of Economic Studies, 59, pp. 703-730.

Dewatripont, M. and G. Roland (1992b), The virtues of gradualism and legitimacy in the transition to a market economy, Economic Journal 102, pp. 291 - 300.

Edwards, J., M. Keen, (1996) Tax competition and Leviathan, European Economic Review, 40, pp. 113 - 134.

Gluschenko K.P, (2001), Пространственное поведение уровней цен, ЭММ, т .37, № 3, с . 3 -13

Grossman, G. and E. Helpman (1994) Protection for Sale, American Economic Review, vol. 84, N 4, pp. 833 - 850.

Hilman, A. (1982), Declining Industries and Political-Support Protectionist Motives, American Economic Review, vol. 72, N 5, pp. 1180-1187.

Hilman, A. and H. Ursprung (1988), Domestic Politics, Foreign Interests, and International Trade Policy, American Economic Review, vol. 78, N 4, pp. 729-745.

Henson F. (2001) Effect of the factor of regional diversity on economic transformation in Russia, Problemi prognozirovaniya, N 3

Hsiao, C. (1986), Analysis of Panel Data. Cambridge University Press.

Kruegel, G., and M. Ciolko, (1998), A Note on Initial Conditions and Liberalization during Transition, Journal of Comparative Economics, 26 (4), pp. 618-634.

Lipton, D. and J. Sachs (1990) Creating a Market Economy in Eastern Europe: The Case of Poland. Brookings Paper on Economic Activity, 1, pp. 75 - 133.

Magee, S., W. Brock and Y. Leslie, Black hole tariffs and endogenous policy theory: Political economy in general equilibrium. Cambridge University Press, 1989.

McKinnon, R. (1991) The Order of Economic Liberalization. Financial Control in the Transition to a Market Economy, The Johns Hopkins University Press.

Polishchuk L. (2000)"Political Economy of Scale and Endogenous Rule of Law", mimo, IRIS Center, University of Maryland.

Report of the World Bank «Destroying of the system of non-payments in Russia: creation of the condition for stable economic growth, (2000), Voprosi ekonomiki, N 3, с . 4 - 45.

Roland G. (2000), Transition and Economics: Politics, Market, and Firms. The MIT Press.

Shliefer, A. and R. Vishny, (1992), Pervasive shortages under socialism, Rand Journal of Economics 23 N 2, pp. 237 -246.

Stigler ,G. (1971), The Theory of Economic Regulation, Bell Journal of Economics, vol. 2, N 1, pp. 359 - 365.

NOTES

1 Fuel industry, ferrous metallurgy, non-ferrous metallurgy, chemical industry, engineering, wood industry, construction materials, textile industry, food industry, pharmaceutical and others industries.