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Radical Reforms versus Gradual Approach

Working paper # BSP/99/022

This paper presents a Master's Thesis completed at NES in 1999.

The paper was written within the research program "Transforming Government in Economies in Transition" (GET) sponsored by the Ford Foundation (Grant No.950-1503), project "Institutional Changes and Traps in Transition Economies".

This paper was prepared under the supervision of Prof. L. Polishchuk and Prof. V. Polterovich. I would like to thank them for their helpful guidance.

1999

Chisty A.V. Radical Reforms Versus Gradual Approach. / Working Paper #BSP/99/022.-
Moscow, New Economic School, 1999. –37 p. (Engl.)

In this paper the attempt is made to answer the question: could the subsidies to the state sector prevent or alleviate the economic decline? The dynamic model created on the basis of Blanchard & Kremer's model was used. The negative effects of subsidizing, such as the support of inefficient productions, lobbying, the distortion created by taxes, were taken into account. The optimal policy is defined for different initial conditions.

The government can completely avoid the output decline during transition by means of subsidies and quotas in the case only if it can control the distribution of the resources among firms. The radical reforms can be more preferable under the weak government. If the share of the good firms is low, and lobbying is strong or the distortion created by taxes is high, the policy radical reforms gives the higher aggregate output. But when the negative effects associated with subsidizing is not strong the gradual approach is the optimal policy. The speed of the growth of the private sector is not an important factor in determining the optimal policy.

Чистый А.В. Радикальные реформы или плавный переход к рынку. Препринт # BSP/99/022
М.: Российская экономическая школа, 1999 -37с. (Англ.)

Целью данной дипломной работы являлся анализ причин экономического спада, наблюдаемого практически во всех странах с переходной экономикой после начала экономических реформ. Olivier Blanchard & Michael Kremer в своей статье «Disorganization» показали на примере статических моделей, что специфичность производства, неполнота контрактов, асимметрия информации и появление альтернативных возможностей у частных фирм могут привести к резкому падению общего выпуска.

В дипломной работе сделана попытка дать ответ на вопрос, могут ли государственные субсидии предотвратить или уменьшить спад в переходной экономике. Для этого используется динамическая модель, созданная на базе модели Бланчарда и Кремера. Учтены такие отрицательные стороны субсидий, как субсидирование неэффективных предприятий, лоббирование, искажающая роль налогов. Получены результаты, определяющие наиболее эффективную политику при заданных начальных условиях.

ISBN 5-8211-0061-5

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Content:

1.Introduction	3
2.The Basic Model	5
3.What equilibrium should be chosen	10
4. The Modification of the Basic Model	11
5.Policy implications	13
6. The model with negative effects of subsidizing	17
7. Radical reforms versus gradual approach	23
8. Conclusion	30
References	32

1.Introduction.

The central planner in Soviet economy was unable to allocate resources effectively. Given the myriad price and trade distortions present under the Soviet system, Russian economy surely operated far inside their production frontier. With the removal of this distortion, many economists expected it would operate closer to the frontier, and thus output would increase. The development of new activities could shift the production frontier out, leading to further increases in output over time. This clearly is not what has happened.

In paper «Disorganization» Olivier Blanchard and Michael Kremer show how the specificity of production, together with incompleteness of contracts and asymmetric information, can lead to large output losses. They also demonstrate how the emergence of new private opportunities can lead to a collapse of production in the state sector, and to a sharp reduction in total output. The authors predict that the government regulation of the economy, such as the subsidies and quotas, may prevent the large economic decline at the beginning of the reforms.

Many economists object to the intervention of the government into the economy. Murphy, Shleifer, and Vishny (1992) give the following arguments: when some, but not all, resources are allowed to move into the private sector, and state prices remain distorted, the result may be a significant disruption of the state sector. The reforms in the former Soviet Union illustrate the mistakes emphasized in the paper. In 1988 the government legalized some private enterprises, such as cooperatives, and substantially liberalized plan enforcement, allowing state enterprises more discretion on what to do with their output. At the same time, the arbitrary schedule of official prices between state firms was largely retained. The result has been that only some resources moved to the private sector, but the ones

that did often create bottlenecks and shortages in the state sector. By destroying the traditional coordination mechanisms in the economy, without substituting true markets, partial reform contributed to the collapse of output.

Subsidies create the background for corruption and rent-seeking, which have bad consequences for the economy. Andrei Shleifer and Robert Vishny in paper «Corruption» explored two broad reasons why corruption may be costly to economic development. The first reason is the weakness of central government, which allows various governmental agencies and bureaucracies to impose independent bribes on private agents seeking complementary permits from these agencies. When the entry of these agencies into regulation is free, they will drive the cumulative bribe burden on private agents to infinity.

A good illustration of this problem is foreign investment in post-Communist Russia. To invest in a Russian company, a foreigner must bribe every agency involved in foreign investment, including the foreign investment office, the relevant industrial ministry, the finance ministry, the executive branch of the local government, the legislative branch, the central bank, the state property bureau, and so on. The obvious result is that foreigners do not invest in Russia. Such competing bureaucracies, each of which can stop a project from proceeding, hamper investment and growth around the world, but especially in countries with *weak governments*.

The second broad reason that corruption is costly is the distortions entailed by the necessary secrecy of corruption. The demands of secrecy can shift a country's investments away from the highest value projects, such as health and education, into potentially useless projects, such as defense and infrastructure, if the latter offer better opportunities for secret corruption. The demands of secrecy can also cause leaders of a country to maintain monopolies, to prevent entry,

and to discourage innovation by outsiders if expanding the ranks of the elite can expose existing corruption practices. Such distortions from corruption can discourage useful investment and growth.

Similar arguments are in D. Nikologorskii [1998]. He claims that private firms have higher chances to obtain subsidies than the state firms have in Russia because private managers apply more efforts to lobby their needs. For example, the state order with insurance to pay on time was given to Samara Aviacionnyi plant only after it had been declared bankrupt and bought by a big commercial bank. The similar story took place with Norilskii Nikel. This examples show that the government decisions to help or not to help a firm depends not only on the efficiency criteria but also on the rent-seeking efforts of the managers.

Thus, there are many arguments for and against the intervention of the government into the economy during the transition.. The main aim of this paper is to investigate in what case the intervention can weaken the decline during the transition, and when they are harmful. Subsidizing the state firms at the beginning of the transition can be considered as a gradual approach. Radical reforms imply sharp transition to the free market.

When considering the policy implications, both positive and negative sides of subsidies will be taken into account. On the one hand, subsidies guarantee that a state firm will be able to pay its suppliers for inputs. As a result, the suppliers cooperate with the state firms, and the collapse of production in the efficient state firms is prevented at the beginning of the reforms. On the other hand, subsidizing negatively influences the economy. First, it stimulates the production of low-quality goods when the cost of used inputs is higher than the market value of the produced goods. Second, the politicians are usually reluctant to stop subsidizing on time due to political risks, which have place in such situation. Third, subsidies

create rent-seeking activity and have to be financed by an increase of taxes, which distort the market incentives of the economy.

The general plan of this paper is as follows. Section 2 presents the model of the economic decline in the transition developed by Olivier Blanchard and Michael Kremer. In section 3 we characterize the equilibria of the model. The authors used a static model in their reasoning. In section 4, to consider the dynamic behavior of the output of the economy this model will be modified to make the dynamic calculus more simple. We will speak of the policy implication of this model in section 5. To make the model more adequate to the real problem associated with the transition the model will be improved considerably in section 6. In section 7 we will compare the radical reform policy versus the gradual approach. Finally, a few concluding comments about implementation are put forth in section 8.

2. The Basic Model

The model described in this section was developed by Olivier Blanchard and Michael Kremer in paper «Disorganization». It is worth presenting this model in detail because it will help to understand the reasoning in the following sections.

The assumptions of the model:

A state firm needs n inputs in order to produce efficiently. Assume that its technology is Leontief in those inputs (that are therefore the inputs which are difficult to replace, we can think of the other inputs as having been solved out of the production function.) If all inputs are present, the firm produces n units of output, equivalently 1 unit of output per supplier. If one or more inputs are absent, the firm can find replacements; replacements are however less productive. If the firm has to use one or more replacements, output per supplier is equal to $g < 1$. Thus n measures the complexity of the production process. The parameter g is

an inverse measure of the specificity of existing suppliers. It is important to underline that the state firm produces competitive goods, which can be sold on the market at the price equal to 1.

Each supplier has an alternative opportunity given by c , distributed uniformly on $[0, \bar{c}]$. Draws are independent across suppliers. The distribution of c is known, but the specific realization of each c is private information. One can think of c as a private sector alternative, such as small scale production or sale of the inputs to a foreign buyer. (We can think of c as representing the opportunities open to the suppliers after transition, from finding new partners, to producing new goods, and so on.) The payment for each supplier is equal (this follows from the assumption that alternative opportunities are private information, and the symmetry in production), and is equal to output per supplier. These assumptions simplify the analysis.

Suppliers must decide whether to take up their private opportunity before they know of the decisions of other suppliers, and thus the level of output and the revenue per supplier in the state firm. It is assumed that they are risk neutral, so that their decision is based on the expected revenue.

Thus, if all suppliers decide to cooperate with the state firm, output per supplier, and therefore the revenue, is equal to one. If one or more suppliers take up their private alternative, some replacement suppliers must be found, and output per supplier and the revenue are equal to g .

It is clear that the solution to the problem facing each supplier has the following form. Stay if c is less than some threshold c^* , otherwise leave. To characterize c^* , think of the decision problem facing one supplier. If he leaves and takes up his private opportunity he will receive c . Suppose he decides instead to stay. Given that, by symmetry, the $(n - 1)$ other suppliers also have a threshold

equal to c^* . The probability that they all stay is given by $(F(c^*))^{n-1}$. Expected output per supplier, and thus the revenue he can expect to receive if he stays, is thus equal to

$$(F(c^*))^{n-1} + \{1 - (F(c^*))^{n-1}\}g.$$

The threshold level c^* is such that the supplier must be indifferent between leaving or staying, so that:

$$c^* = g + \min\left(1, \left(\frac{c^*}{\bar{c}}\right)^{n-1}\right)(1 - g) \quad (1)$$

Expected output per supplier, and thus the expected revenue, are given by

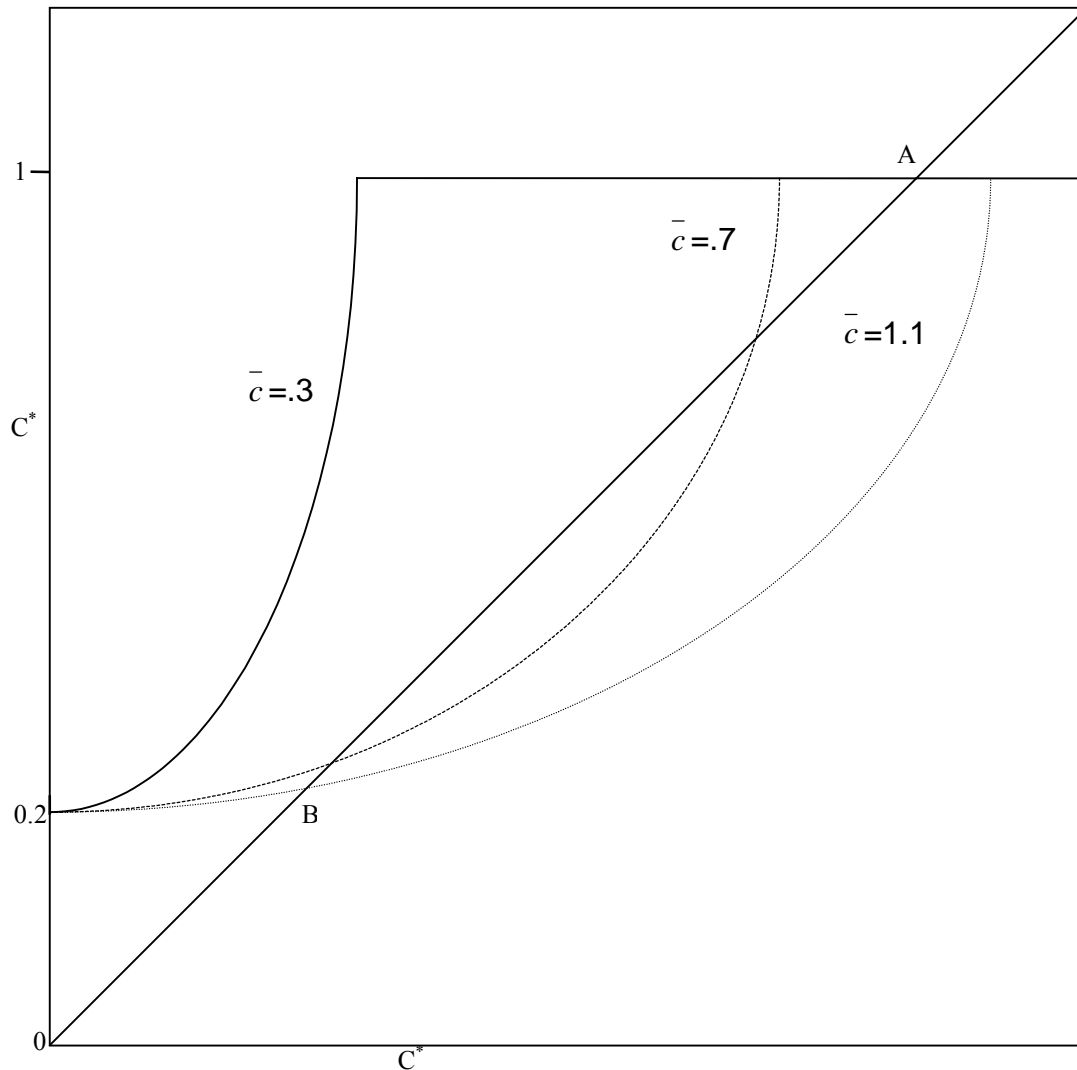
$$w = g + \min\left(1, \left(\frac{c^*}{\bar{c}}\right)^n\right)(1 - g) \quad (2)$$

The solution to equation (1) can be one of three types, depending on the value of \bar{c} . These three cases are schematically represented in Figure 1, which plots both sides of equation (1) on the vertical axis against c^* on the horizontal axis. The figure is drawn assuming values of $n = 5$, and $g = 0.2$. The left-hand side of the equation is represented by 45-degree line. The right-hand side is represented by a curve which is initially convex, turning flat at $c^* = 1$.

For low alternative opportunities, there is only one equilibrium, in which all initial supplier decide to stay, leading to a level of output per supplier equal to one.

In Figure 1 the only equilibrium corresponding to the case where $\bar{c} = .3$ is at point A. For intermediate alternative opportunities, there are two equilibria (the equilibrium in-between is unstable using standard arguments), one in which all suppliers stay and output per supplier is one, and one in which most suppliers are likely to leave, where c^* , and in turn expected output per supplier, are close to g . In Figure, $\bar{c} = .7$, the two equilibria are at points A and B. At A, c^* is 1. At B, c^* (and the expected revenue from (2)) is very close to 0.2: the probability that at least

Figure 1. Equilibrium c^* for alternative values of \bar{c}



one supplier will leave is very high. For higher alternative opportunities - for $\bar{c}=1.1$ - there is a unique, low activity, equilibrium. In Figure 1, $\bar{c} = 1.1$, the only equilibrium is at point B, where c^* , and the expected revenue, are both equal to a value close to .2: production in the state sector is very unlikely.

The two separate aspects of these results can be emphasized:

The first is the existence, over some range, of multiple equilibria. This result is not due to private information. To see this, note that even when suppliers have an alternative opportunity equal to a known value c , then, for values of c

between g and \bar{c} , there are two equilibria, one in which all suppliers stay in the state firm (the efficient outcome), and one in which all suppliers take up their alternative opportunity.

Is one equilibrium more likely to prevail? The arguments here are standard. On the one hand, the equilibrium with high production is Pareto superior. The game is one of pure coordination, so if the suppliers can talk beforehand, they should be able to coordinate on the equilibria which is better for all of them. On other hand, if each supplier believes that there is some probability that some other supplier will irrationally refuse to participate, then the high equilibrium can unravel. As n becomes large, even a small probability that one supplier will irrationally refuse to participate can lead to the rational collapse of output.

This aspect of the model captures the fact that complex production process, which require the contribution of many specific suppliers imply complex coordination problems. A reflection of these problems is the potential presence of multiple equilibria.

The second aspect derives from the combination between private information and interactions between decisions given the timing of decisions. It is the rapid collapse of state output as soon as the probability that at least one private alternative excel the wage under efficient production in the state firm becomes positive. For example, for the case here $\bar{c} = 1.1$ in Figure 1 (so that the expected value of private opportunities is only equal to .55, compared to 1 in the state firm if suppliers stay) the probability that all initial suppliers stay in the state firm is nearly equal to zero, and expected production per supplier in the state firm very close to .2, a highly inefficient outcome.

To see why output collapses, note that as soon as it is greater than one, there is a chance that a supplier will leave. The revenue that remaining suppliers

can expect to receive is thus reduced in proportion to the probability that at least one supplier will leave. In turn, this reduction in the expected revenue prompts more suppliers to leave, and so on. The effect of higher values of n is to magnify the interactions between the suppliers' decisions. For example, for $\bar{c} = 1.01$, expected output per supplier in the state firm is equal to .92 if $n=2$, but fall to .21 when $n=3$.

This aspect of the model appears to capture a number of aspects of transition. It captures the idea that the crucial suppliers may leave a firm, despite potentially large payoff from turning it around, because they are not sure that others will stay around long enough. The model is consistent with anecdotal evidence that suppliers are often very reluctant to supply state firms, because of the difficulties of getting paid. If they are not paid on delivery but only if the firm succeeds in producing and selling its production, then suppliers become residual claimants (this raises the issue of why state firms do not pay their suppliers on delivery.) The probability that one of them will not supply leads all of them not to supply, leading to collapse of the state firm.

3. What equilibrium should be chosen.

It is difficult to say whether effective or ineffective equilibrium will occur in this model. But the conditions in the post-communist Russian economy seem to force the economy to fall in the bad equilibrium. After the beginning the reform the financial resources of firms were depreciated by the very high inflation (in 1992 the inflation was 2600%). Undeveloped financial sector could not provide cheap credits. As a result, firms were unable to pay wages and pay for the inputs on time. The state firms could received money only after selling their goods. Thus suppliers could receive the payment for their delivery only after the state firm

succeeded in producing and selling its production. The payment crisis and the deficiency of current Russian legal system (Greif and Kandel [1994]) exaggerate the problem of credibility to the state firms.

Contract enforcement is weak, but it is crucial in the model. Firms have few assets which can be seized, and thus less to lose from breaking a contract. A number of examples of the failure to execute obligations in Russian economy provide the background for bad expectations, which lead to the inefficient equilibrium.

There can be also other reasons why private firms prefer to use their alternative opportunities, which ensure stable income, rather than to cooperate with state firm to receive high revenue. Although Blanchard and Kremer believe that suppliers or workers are risk-neutral, it is wise to assume that they are risk-averse. In Western economies share-holders can diversify their risks by buying shares of different firms. In Russia stock market is not developed: dividends are not paid, most share-holders are unable to influence on the firm's managers. The managers extract firm's profit by means of controlling the flow of the finance of the private firm. If the state firm does not pay the managers lose the main source of their income. If managers are risk-averse the private firms will behave as risk-averse agents. Therefore, it is likely that they will prefer lower but stable income and will use their private opportunities. Thus, ineffective equilibrium occurs in the economy, and production at state firm is collapsed. It is worth stressing that the goods produced by the state firm have higher market value than the inputs of the private firms. For example, the state firm can be a highly technological plant with complex production. Cases are known when Russian firms can not fulfil the order from the Chinese government because of disorganization in the economy. As a result, Chinese officials prefer to deal with Western companies in spite of

considerably higher cost of their services.

4. The Modification of the Basic Model.

Let's investigate in depth Blanchard and Kremer's model keeping in mind Russian peculiarities. It is interesting to study the output in the model in dependence on the development of private sector. It is reasonable to assume that the economy always falls in the bad equilibrium due to the conditions in the economy described above. For simplicity of calculations the number of crucial suppliers is supposed to be large. This assumption do not affect the conclusion of the model, but considerably simplify further calculations. It is easy to show that $n=5$ gives almost the same results as $n=\infty$.

Let's examine equation (1) for $n=\infty$. This case is schematically represented in Figure 1, which plots both sides of equation (1) for $n=\infty$ on the vertical axis against c^* on the horizontal axis. From figure 2 it can be seen that:

If $\bar{c} < g$ there is only one solution: $c^* = 1$. This result implies that the output of the economy will be unchangeable until the private opportunities are small enough.

If $g < \bar{c} < 1$ two equilibria exist: $c^* = g$, the bad equilibrium where the output of the state firm is less than it could be; and $c^* = 1$, the equilibrium without the collapse of the state production. The first equilibrium is Pareto dominated by the second one. Thus, after the upper frontier of private opportunities reaches value g the inefficient equilibrium emerges.

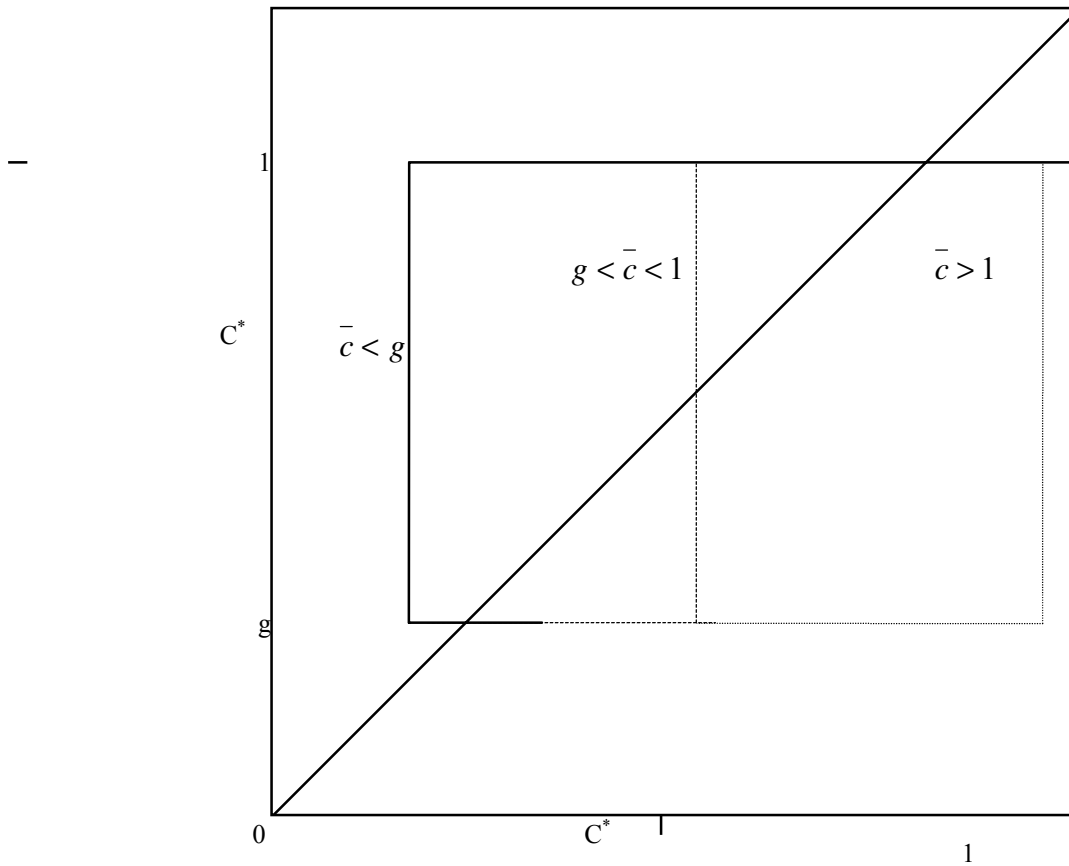
If $\bar{c} > 1$ the only equilibrium with $c^* = g$ exists.

Now, let's calculate the expected output per supplier y .

When $\bar{c} < g$ the expected output $y=1$, and there is no economic decline.

When $\bar{c} > g$, then

Figure 2



$$y = g * P(c < c^*) + 1 * E(c | c > c^*) * P(c > c^*) \quad (3)$$

Here $P(c < c^*) = \frac{c^*}{\bar{c}}$ is probability that $c < c^*$,

$E(c | c > c^*) = \frac{c^* + \bar{c}}{2}$ is the conditional expectation of c if $c > c^*$

Now, it is easy to determine the value of expected output per supplier if $\bar{c} > g$. Keeping in mind that $c^* = g$, since we consider only bad equilibrium, we obtain that

$$y = \frac{\bar{c}^2 + g^2}{2\bar{c}} \quad (4)$$

The output per supplier sharply falls from 1 to g when $\bar{c} = g$ and then grows

along with the development of the private opportunities. Since number of the suppliers n is fixed one can speak about the output per supplier as about the output of the whole economy.

If $\bar{c}=g$ then $y=g$. If $\bar{c}=1$ then $y=\frac{1+g^2}{2} < 1$. Let's find \bar{c} , the value of \bar{c} when the output is equal to 1, the pre-transitional level. One can obtain that

$$\bar{c} = 1 + \sqrt{1 - g^2} \quad (5)$$

Now it is possible to describe the behavior of the output after the beginning of the reforms. The output is 1 until $\bar{c} < g$. When private opportunities reach point $\bar{c}=g$, the output collapse and $y=g$. Then the output will rise along with development of the efficient private sector. The output will recover when \bar{c} reach \bar{c} . The decline will be deep and long if g is small.

5. Policy implications.

Suppose that in a neo-classical benchmark. (i.e. absent the effects we have focused on so far), absent subsidies, many state firms can be expected to disappear over time. The argument we have developed implies that, once the implications of specificity are taken into account, this may well lead to the immediate collapse of those firms. Shorter horizons may lead suppliers to behave more opportunistically, leading to the collapse of state production. By the same argument, a commitment by (he government to subsidize state firms for some time may avoid their immediate collapse.

One can think of subsidies by the government as affecting the probability that the state firm will be alive at any point in the future. A high enough probability will lead suppliers to increase the threshold at which they take up their private opportunities. Technically, the commitment of the government must be

such that there is a positive probability, however small, that the state firm survives forever. The argument is standard: if it were known that a firm was going to disappear with certainty at some future point in time, the firm would collapse at, the beginning.

Should a government commit to subsidizing state firms, and thus avoid a collapse of state production at the beginning of transition? This will depend on the expected path of private opportunities, on the time path of c in the model. If efficient private firms (firms with values of c equal to or greater than productivity in the state firms) are expected to develop quickly, then a commitment to maintaining state firm for a long time is likely to be very costly. It may be better to accept the fall in initial output, in exchange for higher production soon after. If however, the development of an efficient private sector is expected to take more time (if c is expected to be high enough to create problem of bargaining, but low enough that state production dominates private production for a long time), it may then be justified to commit to subsidize state firm for some time, and avoid their immediate collapse in the face of mediocre private opportunities.

The second case is very likely when suppliers supply raw materials. The private opportunities to sell inputs on foreign markets are limited by rather low international prices. Therefore, the progress in this sector is almost absent. This situation is typical for Russia, where the output of the manufacture have reduced by several times since the beginning the reform while the industries dealing with mineral resources remain stable. This result can be considered as an evidence that the disorganization plays an important role in the transition.

Let's examine how the government can alleviate the negative effects of the market reform. Suppose that the upper frontier of private opportunities has an exponential growth, and at the initial moment its value equals g :

$$\bar{c} = g * e^{at} \quad (6)$$

Where a is the growth rate of \bar{c} .

Here we assume that the subsidies do not affect the growth of the private opportunities. We also imply that this growth does not depend on whether or not a private firm cooperate with the state firm. These assumptions can be justified by the fact that the growth of the private opportunities is due to the finding of new potential partners, the development of new technologies, market institutions. Since the private firm is small it can quickly adjust to new environment after it stops cooperating with the state firm.

From formula (4) one can obtain the expected output per supplier:

$$y(t) = \frac{g}{2} * [e^{at} + e^{-at}] \quad (7)$$

If r is the discount rate, and it is more than a , the aggregate product per supplier can be calculated:

$$Y = \int_0^{\infty} y(t) * e^{-rt} dt = \frac{g * r}{r^2 - a^2} \quad (8)$$

If the economic reforms did not take place the output per supplier would be constant and equal to one. Then the aggregate output would be $1/r$. One can calculate the condition for society to prefer pre-transition stagnation to the reforms: $Y > 1/r$, or

$$a < r * \sqrt{1 - g} \quad (9)$$

Inequality (9) says that the liberal reform will be preferred by society when the efficient private sector develops quickly (a is high), or the post-transitional recession is not deep (g is close to 1), or society's value of the future welfare is high (r is small).

What is the optimal policy of the government in this situation? The government should subsidize the state firm to prevent the collapse of output after the beginning of the reforms. When the private opportunities become high the government should stop subsidizing. It is clear that the government should commit to subsidize the state firm until the upper frontier of private opportunities is not higher than 1. In this case all suppliers will work with the state firm and there will be no decline in the economy. It is important to underline that the subsidies will be very small and will not distort the economy because their role is to insure solvency of the state firm. Since the state firm produces competitive goods it will be able to pay to the supplier without big financial aid from the government. When \bar{c} is higher than 1 the subsidies are useless since the collapse of the output of the state firm is inevitable. Because the number of crucial suppliers is very high, as it has been assumed, it is very likely that some private firms will use alternative opportunities which are higher than 1. Thus, if the government commit to subsidize the state firm until \bar{c} is lower than 1 the decline of output will be smaller and shorter. Using formula (4) one can calculate that the output per supplier will fall to

$$y=(1+g^2) /2,$$

when \bar{c} reaches 1, that is considerably less than in the case of radical reforms, and then will rise along with the development of the private sector.

The government can achieve better results when it has full control over the economy. Suppose that the government can force private firms to cooperate with the state firm and regulate prices in the state sector, i.e. the state firm pay state prices for inputs to suppliers. The private firms can use their alternative opportunities only after they have supplied to the state firm. In this case it is possible almost completely avoid the recession.

The government controls the economy until time T. Its purpose

is to maximize aggregate output of the economy. Before time T the output per supplier is one; after time T the output per supplier is defined by formula (7), and the aggregate output can be calculated as :

$$Y(T) = \int_0^T 1 * e^{-rt} dt + \int_T^{\infty} y(t)e^{-rt} dt \quad (10)$$

The value of T_{opt} which gives the maximum of aggregate output can be obtained by differentiating formula (10):

$$T_{opt} = \frac{\ln(1 + \sqrt{1 - g^2}) - \ln g}{a} \quad (11)$$

In this case there is no output decline, because $y(T_{opt})=1$. Thus, controlling the economy by means of subsidies and quotas during first steps of the transition allows to avoid collapse in the state sector.

Although a commitment by the government to subsidize state firms for some time may avoid their immediate collapse, and avoid a large decline in output at the beginning of transition, there are many argument against the subsidies. Subsidies may reduce the incentives of state firms to adjust. They have to be financed, and through the tax channel, slow the growth of new private firms. The politicians are usually reluctant to stop subsidizing on time due to political risks, which occur in such situations.

Subsidies create the background for corruption. The corrupt government cannot effectively distribute aid for state firms.

6. The model with negative effects of subsidizing.

In the previous sections we considered a very simple economy where there were only one state firm. The negative sides of subsidies were disregarded. As a

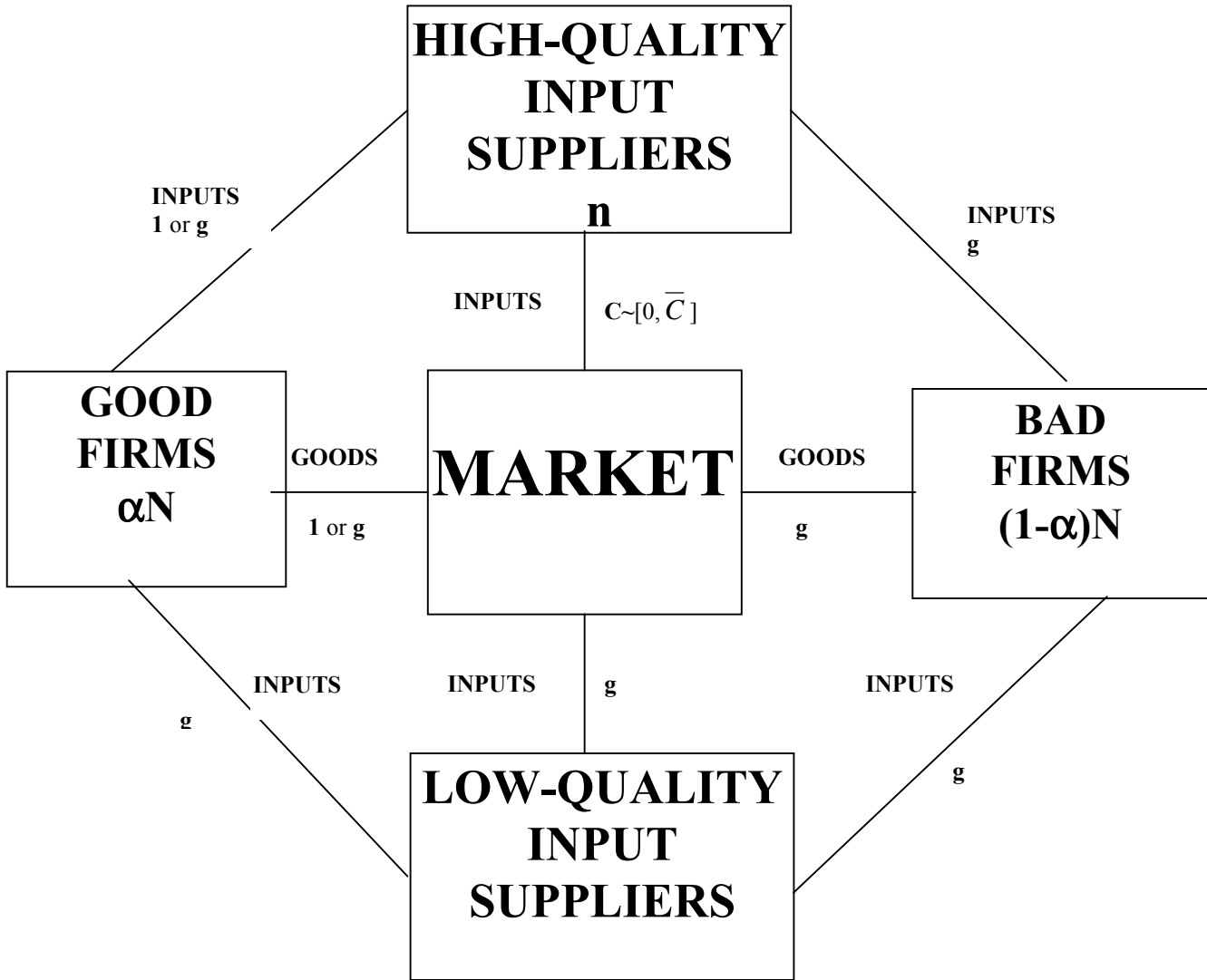
result, the conclusion that subsidizing the state firm will prevent the economic decline can be rarely applied to real life phenomena. The economy usually is much more complex. In this section we will modify the described above model to do it more realistic. Then we answer the question under what condition the government can alleviate the economic decline, and when the laissez-faire policy is more preferable. To do this we will compare the two possible policies, the policy of radical reforms versus the gradual approach.

Let's consider the following economy:

In the economy are two types of firms. This economy is schematically presented on figure 3.

For convenience, we will call them state firms and private firms. **State firms** are big firms, which can not change their technology of production in the short-run. Thus, they can not adjust to economic reform immediately. To operate the state firms need inputs produced by private firms. A **private firm** is a small firm, which produces only one input. Since it is small it can adjust to changes in economic environment much quicker than a state firm can. Words «state» and «private» should not confuse readers. The purpose of this paper is not to investigate how the privatization can influence the efficiency of the economy. We will not even concern this question. In our model we use term «state» for big firms because big firms are usually privatized in the last turn, whereas small firms are privatized in the first turn. But this notation does not exclude the case that the big firm is private, although we call it «state», or small firm (supplier) is state, but we call it private. The main difference between big firms and suppliers is the speed of adjustment to the changes in the economic environment.

Figure 3.



Good firms are the firms which can produce high-quality goods with market value 1. Their technology of production is identical to that of the state firm described in section 2, i.e. they need n high-quality inputs to produce effectively. If one or more inputs are absent they replace them by low-quality inputs, and the market value of the goods is g ($g < 1$).

Bad firms are the firms, which produce only low-quality goods. These firms use the obsolete technologies, and are market inefficient. Their existence is due to inefficiency of the planning system. In the short-run the bad firm cannot be replaced by the good firm, therefore we should take them into account. The bad firms as well as the good firms need n inputs to operate. But unlike the good firms, the output of the bad firms does not depend on the quality of inputs. The market value of their goods is g ($g < 1$) no matter what kinds of input were used. If a bad firm uses high-quality inputs it is possible that the market value of the goods produced by the bad firm is lower than that of used inputs. The main problem associated with bad firms is that it is difficult to distinguish these firms from good firms. Although the market value of their goods is less than that of the goods produced by the good firms, the manager of the bad firm can claim that its firm is a good firm, and the low value of its goods is due to the disorganization, i.e. impossibility to use high-quality inputs to produce high-quality outputs. Since the central planner controlled prices before the economic reforms, the market value of the good were not known and, therefore, the claim of the manager cannot be verified.

In the industry are N big firms. Share α of all state firms are good firms, respectively $(1-\alpha)$ is the share of bad firms. Parameter α is a crucial in our analysis since it characterizes the efficiency of the economy.

A **high-quality input supplier** is a small efficient firm, which

produces one kind of a unique qualitative input. The total number of the high-quality suppliers in the economy is n . Each supplier produces an input which can not be produced by another supplier. The suppliers had to deliver their inputs only to big firms, both good and bad ones, under the central planner. After the beginning of the market reforms the suppliers can choose their partners. They can dispose their inputs at their discretion. For example, they can supply one part of their inputs to good firms, and the rest of their production may be exported. The private firms can also simply switch to production of more profitable goods. The development of new activities lead to the growth of private opportunities. Let's assume that these opportunities grow with constant rate a , and the upper frontier of the opportunities equals to g at the initial moment of time. As above, we assume that the subsidies does not affect the grows of the private opportunities, and growth rate a does not depend on whether a private firm cooperate with the state firm, or not cooperate.

The effectiveness of the state policy depends on the ability of the government to control the economy. We will call the government **strong**, if it can distinguish bad state firms from good firms. It maximizes the aggregate output of the economy and, therefore, it will stop subsidizing state firms at the optimum point of time. Since these conditions are difficult to be satisfied in the well developed market economy it is unlikely that the government during the transition will be strong. More interesting case in our analysis is the weak government.

The «**weak**» **government** cannot distinguish good firms from bad firms. In this case the subsidies can result in that the bad firms use the qualitative inputs to produce the goods which market value is lower than that of the inputs. The weak government also cannot resist the pressure of lobbyists. It means that the subsidies will not be stopped when it is economically reasonable to do it.

Both governments can conduct two types of policy: radical reforms or gradual approach. Radical reform policy assumes that the government stops controlling the economy at the initial moment of time and then do not help firms to adjust to the new economic environment. The gradual approach differs from the radical reforms in that the government commits to subsidize state firms to prevent the economy from falling in the bad equilibrium. But now, unlike the model we have analyzed in previous sections, the subsidies have negative effects on the economy.

Let's examine the case with the strong government. It can conduct different policies for bad and good firms. Since there is no collapse of the production at the bad firms the government has no reason to subsidize them. Then, the government should focus on the good firms only. And the situation with strong government comes to that described in section 4 (Policy Implications). In this case the commitment of government to subsidize the good firms prevents the collapse of their production at the beginning of market reforms. At the same time, the government does not need to increase the taxes to finance the subsidies, since the good state firms are solvent in the good equilibrium. The role of the commitment to subsidize the good firms is to prevent the economy from falling to the inefficient equilibrium. The subsidies have no negative effects on the economy under the strong government. When the upper frontier of private opportunities reaches 1 the strong government will stop subsidizing the good firms, since the commitment to subsidize can not prevent the collapse of production in the good firms. The output of the economy will fall to the level under lesser-fare policy. Thus, the aggregate output of the economy will be higher than that it would be under radical reform policy.

The weak government as well as the strong one can prevent the

collapse of the production in the state sector. The government can ensure that every private firm who supplies an input to any state firm will be given payment 1 for this input. As a result the suppliers will cooperate with the state firms, and the production at the good firm will not collapse. But now, the subsidies have negative effects on the economy since the weak government has to subsidize both good and bad firms. We will concentrate on the three main such effects.

First, they stimulate the production of low-quality goods when the cost of used inputs is higher than the market value of the produced goods. When the government commits to pay 1 per supplied input the private firms will supply their inputs not only to the good firms but also to the bad firms if private opportunity c are less than 1. The market value of goods produced by the bad firms is g . When $c > g$ the value of the goods produced by the bad firms is less than the value of resources used to make these goods. Therefore, the subsidies lead to inefficient allocation of resources and delay the economic growth in the private sector.

Second, the politicians are usually reluctant to stop subsidizing on time due to political risks, which have place in such situation. We will consider the following interpretation of this statement. The weak government needs the political support. If it decides to stop subsidizing, the firms which receive the benefit from the subsidies will try to change the officials who insist on stopping subsidizing. The trial will be successful if there are enough concerned firms. In our model the concerned firms are suppliers because they receive profit $(1-c)$ from the subsidies. The profit of the state firms is always equal to zero. Let parameter s be the share of high-quality input suppliers with private opportunities c less than 1. Parameter s presents the share of the high-quality input suppliers interested in the subsidies. We assume that subsidizing will continue if share s is more than s^* , the crucial value of s which characterizes the resistance of the government to the

lobbying. The higher s^* is the more weak the government is. If s^* is 1 the subsidies will be stopped after the upper frontier of private opportunities becomes higher than 1. It is optimal time for stopping the subsidies because after \bar{c} is higher than 1 the subsidies do not help to support the good equilibrium. If s^* is 0 the subsidies will continue forever. After \bar{c} is higher than 1 the state firms will produce inefficiently wasting the resources.

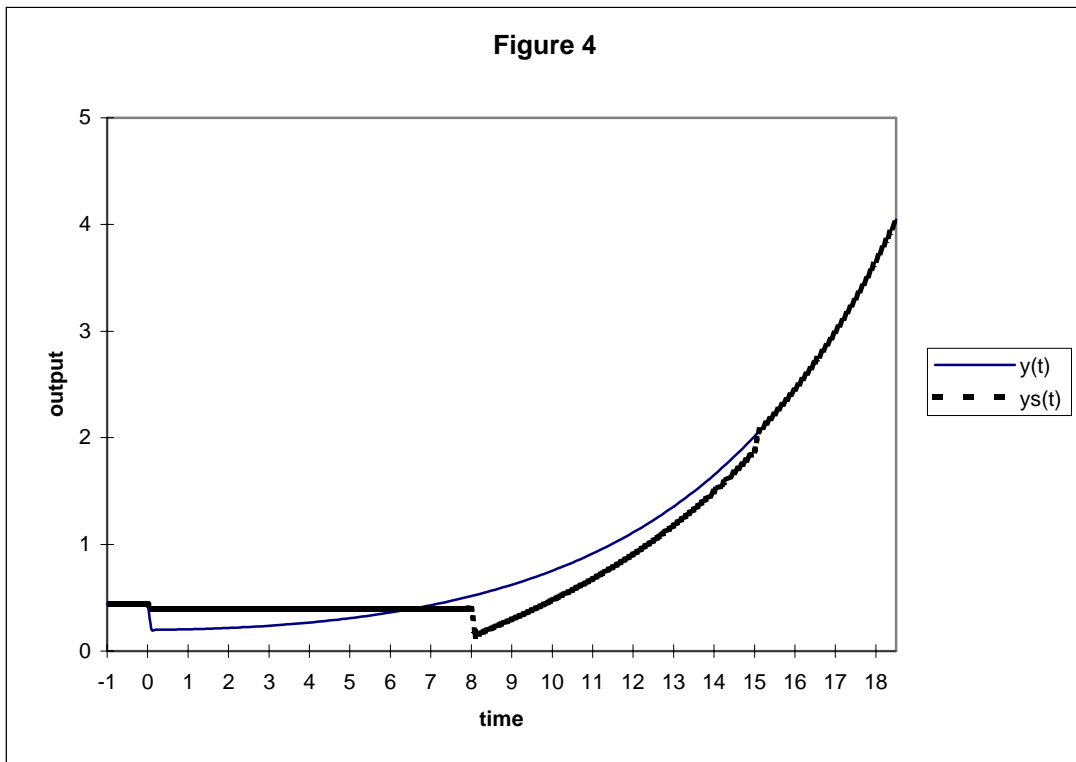
One can note that the lobbying can influence on the type of policy, which the government will conduct. For instance, if the lobbying is strong enough it can force the government to subsidize the state sector even in the case when the radical reforms are more preferable. Consideration of this possibility will make the model more complicated. But, since our main purpose is to compare the two policies we assume that the lobby does not affect on the choice of the policy. This assumption can be justified if the lobby is not organized before the transition.

Third, public money is more expensive than the private money. Subsidies have to be financed by an increase of taxes which distort the market incentive of the economy. The government has to spend some money to levy the taxes and to distribute the subsidies. All these facts lead to the losses. Let's assume that these losses are proportional to the amount of taxes. If X is the total amount of taxes collected then fX is the losses of the economy, where f is a positive parameter which characterizes the inefficiency created by taxes. The losses increase with increasing f . Parameter f also reflects the losses associated with the corruption and rent seeking. For example, we can suppose that officials steal some share of collected taxes, or that subsidies lead to rent seeking and unproductive efforts accompanying it.

7. Radical reforms versus gradual approach.

Given the positive and the negative sides of the subsidies we can determine what policy is optimal for weak government. To do this we should calculate the expected aggregate output of the economy for each policy, and choose the policy, which gives the highest output.

The behavior of the output for the two types of policy is drawn on figure 4.



Before the initial moment of time ($t=0$) \bar{c} is less than g , and the output per high-quality input supplier y_0 is equal to pre-transitional level, when share α of high-quality inputs were consumed by the good firms, and share $(1-\alpha)$ were consumed by the bad firms.

$$y_0 = \alpha N + (1-\alpha)Ng \quad (12)$$

If the government conducts the radical reform policy the output sharply falls

from y_0 to g at moment $t=0$ when \bar{c} equals g because of the collapse of the production of the good firms. Then the output grows due to the development of the private sector. Since the situation is identical to that described in section 4 the output growth is described by the formula similar to formula (7)

$$y(t) = \frac{Ng}{2} * [e^{at} + e^{-at}] \quad (13)$$

If the weak government commits to subsidize state firms it has to pay $(1-g)$ per supplied input to a bad firm. It is to collect the following amount of taxes

$$X = (1-g)n(1-\alpha)N, \quad (14)$$

$$\text{or } x = (1-g)(1-\alpha)N, \quad (15)$$

x is the tax burden per high-quality input supplier. This tax revenue creates fx losses of the output per supplier. Thus, the subsidies results in decrease of the output from y_0 to y_s at moment $t=0$, where

$$y_s = y_0 - fx \quad (16)$$

The output stays stable and equal to y_s until time T , when the upper frontier of private opportunities reaches 1. During this time the suppliers cooperate with the state firms, and do not use their private opportunities.

$$T = -1/a * \ln(g) \quad (17)$$

After time T some suppliers have alternative opportunities higher than 1. These supplier do not want to cooperate with the state firms. As a consequence, there is the collapse of the production on good firms at time T . Nevertheless, the other high-quality input suppliers deliver their inputs to the state firms because the government continues subsidizing the state firms. But now, both good and bad state firms produce the goods with low value g . Therefore, the output falls from y_s to g at moment T . Now, the government has to collect more taxes per supplier. Let's denote this value as x_1 :

$$x_I = (1-g)N \quad (18)$$

After moment T , the output will rise with the growth of the private opportunities. If the alternative opportunity is less than 1 a supplier cooperate with the state firms, which produces goods with market value g . If c is more than 1 a supplier uses its private opportunities. Let's put N be equal to 1 for further computation. The expected output per high-quality input supplier at moment t ($t > T$) is $y_s(t)$:

$$y_s(t) = g * P_t(c < 1) + \frac{\bar{c}(t) + 1}{2} * P_t(c > 1) - fx_1 \quad (19)$$

Here, $P_t(c < 1)$, $P_t(c > 1)$ are the probabilities that private opportunity c is less, more than 1 at moment t ; $\frac{\bar{c}(t) + 1}{2}$ is the expected output per high-quality input supplier, given $c > 1$; fx_1 is losses created by the taxes.

$$P_t(c < 1) = 1/\bar{c}(t) \quad (20)$$

$$P_t(c > 1) = (\bar{c}(t) - 1)/\bar{c}(t) \quad (21)$$

Substituting formulas (6),(18),(20),(21) into (19) one can obtain

$$y_s(t) = \left(1 - \frac{1}{2g}\right)e^{-at} + \frac{g}{2}e^{at} - f(1-g) \quad (22)$$

The subsidizing will be stopped at moment T_s when $P_t(c < 1) = s$:

$$T_s = -1/a * (\ln(g) + \ln(s)) \quad (23)$$

After moment T_s there is no difference between the policy of radical reforms and gradual approach, and the output will be the same. Thus, to compare the two policies we should calculate the aggregate output until time T_s .

Let's calculate expected aggregate output under the radical reforms policy from initial moment to time T_s : $Y(T_s)$

$$Y(T_s) = \int_0^{T_s} y(t) e^{-rt} dt \quad (24)$$

where r is a discount factor. We assume that the development of private opportunities is quick enough, so that $r < a$.

Substituting formula (22) for $y(t)$, formula (23) for T_s and integrating one can obtain

$$Y(T_s) = \frac{g}{2(a-r)} (sg)^{-\frac{a-r}{a}} - \frac{g}{2(a+r)} (sg)^{\frac{a+r}{a}} - \frac{gr}{a^2 - r^2} \quad (25)$$

In the same way we can calculate $Y_s(T_s)$, the expected aggregate output of the economy under the gradual approach:

$$Y_s(T_s) = \int_0^T y_s e^{-rt} dt + \int_T^{T_s} y_s(t) e^{-rt} dt \quad (26)$$

The substitution of formulas (17),(23),(22) for $T, T_s, y_s(t)$ leaves :

$$\begin{aligned} Y_s(T_s) = & \frac{y_s}{r} \left(1 - g^{\frac{r}{a}} \right) - \left(1 - \frac{1}{2g} \right) \frac{1}{a+g} \left((sg)^{\frac{a+r}{a}} - g^{\frac{a+r}{a}} \right) + \\ & + \frac{g}{2} \frac{1}{a-r} \left((sg)^{-\frac{a-r}{a}} - g^{-\frac{a-r}{a}} \right) + \frac{f(1-g)}{r} \left((sg)^{\frac{r}{a}} - g^{\frac{r}{a}} \right) \end{aligned} \quad (27)$$

Now we can compare the two policies. The only parameter which depends on α is y_s . If y_s is known one can calculate α , and vice versa. Let y_s^* be the value of the output before time T which gives the same aggregate output under the both policies. To obtain y_s^* we should equate $Y(T_s)$ to $Y_s(T_s)$. Let's introduce q as $q=r/a$, then y_s^* equals to :

$$y_s^* = \frac{1}{1-g^q} \left[\frac{q}{1+q} g^{1+q} \left(\frac{1}{2g} - 1 - \frac{(1-g)^2}{2g} s^{1+q} \right) + \frac{q}{2(1-q)} g^q - f(1-g)g^q (s^q - 1) - \frac{gq^2}{1-q^2} \right] \quad (28)$$

Let α^* be the share of good firms which associates with y_s^* . From formula (16) one can obtain

$$\alpha^* = \frac{y_s^* - g + f(1-g)}{(1-g)(1+f)} \quad (29)$$

Thus, if actual share of the good firms α is less than α^* the policy of radical market reforms is preferred. If α is higher than α^* the gradual approach gives the higher aggregate output.

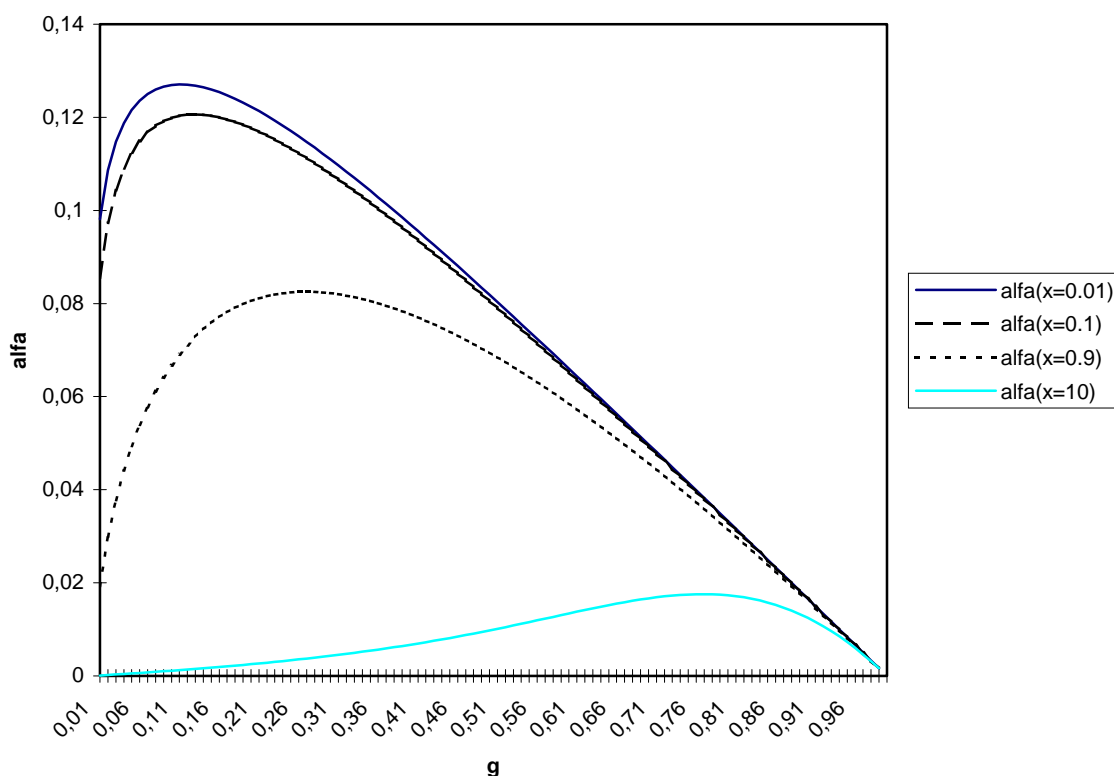
Let's start analyzing this result with the simplest case where there is no lobbying neither the distortion created by taxes, i.e. we should put $s=1, f=0$ in formulas (28), (29). The modified formulas are:

$$y_s^*(g, q | s=1; f=0) = \frac{1}{1-g^q} \left[\frac{q}{1+q} g^{1+q} \left(\frac{1}{2g} - 1 - \frac{(1-g)^2}{2g} \right) + \frac{q}{2(1-q)} g^q - \frac{gq^2}{1-q^2} \right] \quad (30)$$

$$\alpha^*(g, q | s=1; f=0) = \frac{y_s^*(g, q | s=1; f=0) - g}{(1-g)} \quad (31)$$

We will examine these formulas numerically. On figure 5 critical share of good firms α^* is drawn in dependence on parameter g , given different values of q . One can see that α^* is rising with q . This result was expected because higher q corresponds to higher rate of the growth of the private sector the discount rate being constant. The higher rate of the growth of the private opportunities results in the quicker recovery of the economy after the decline at the beginning of the reforms. As a consequence, radical reforms look more attractive for the higher rate of the growth of the private sector. But when rate of growth of the private opportunities a is much more than discount rate r , for example $q=0.1$, the further increase of a leads to considerably smaller increase of α^* . This means that the speed of the growth of the private sector is important when it is of the same order as the discount rate. To see it better, let's assume that $r=0$ then $q=0$ and nothing

Figure 5



depends on a in formulas (28), (29). In our model, it is reasonable to assume that q is much less than 1, for example $q=0.1$, and the rate of the growth of the private opportunities does not crucially influence on the choice of the optimal policy.

The dependence of α^* on g is not so simple as that was for q . But the most striking result is that α^* is less than 14% for all possible g and q . This means that the weak government should subsidize state firms if it knows that the share of the good firms is higher than 14% no matter what parameters g and q equal to. This result tells us that the existence of inefficient production is not a strong argument against subsidizing of the state firms if the government can stop subsidizing on time.

Now, we will investigate how α^* depends on s and f . From formula (29) it can be seen that the critical share of good firms rises with decreasing of s .

The lower s is the longer the weak government will subsidize the state sector when there is no sense to do it from the economic point of view. Figure 6 presents the dependence of α^* on s when $f=0$, and figure 7 represents the same dependence when $f=0.1$. It can be seen that the critical share of the good firms increases significantly with decreasing of s . The losses created by the taxes worsen the situation with subsidizing. For example, when $s=0$, i.e. the subsidizing will last forever, the critical share of the good firms is only 33% for parameter: $g=0.2$, $q=0.1$, $f=0$; and it is equal to 65% for the same parameters, but $f=0.1$. Thus, one can conclude that the strong lobbying makes the gradual approach much more costly, especially, when taxes create the losses.

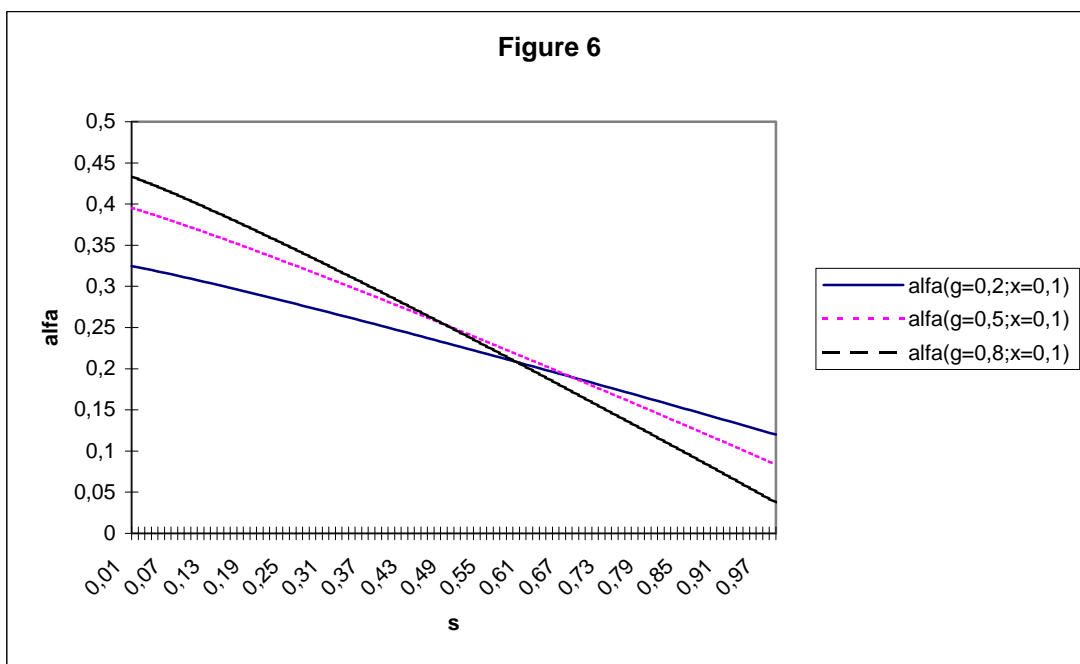


Figure 7

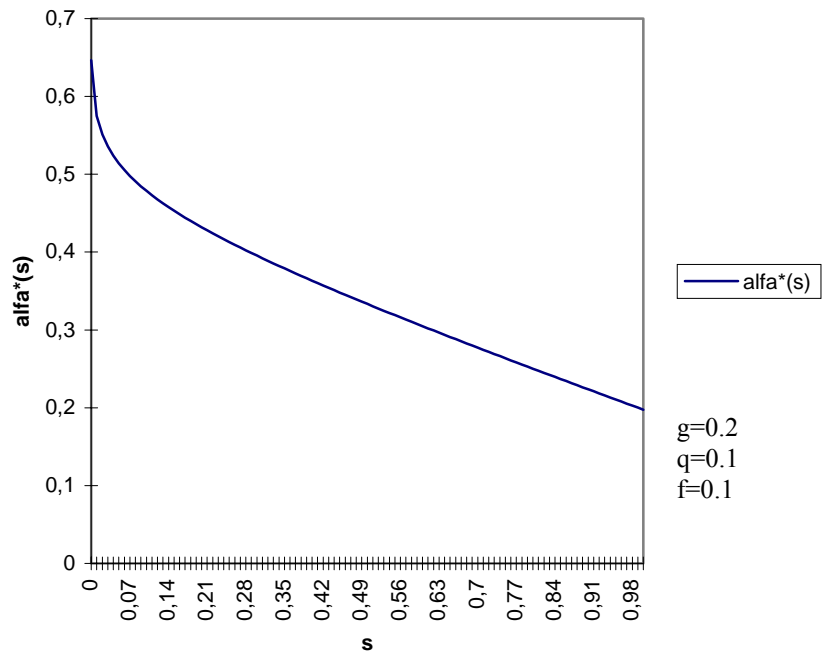
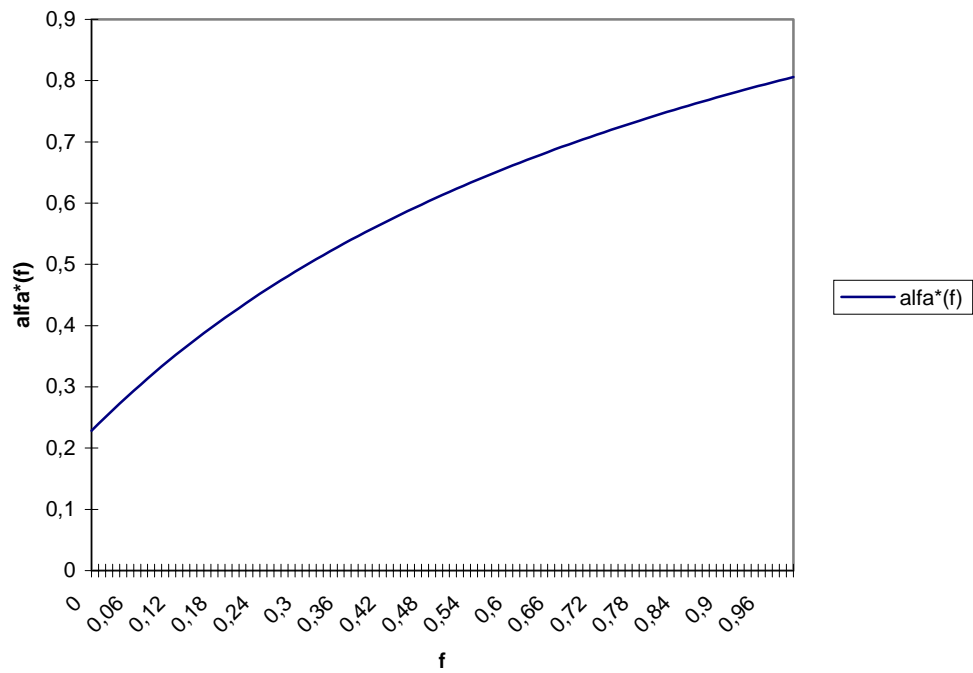


Figure 8



Finally, figure 8 shows how α^* depends on f if $g=0,2$; $q=0.1$; $s=0.5$.

Figure 8 shows that the subsidies are considerably less effective if the taxes create economic losses. For example, when f equals to 0.3 the share of the good firms should be higher than one half for the gradual approach being more preferable than the radical reforms.

8. Conclusion.

Transition may cause the existing organization of production to collapse leading to a large decline in output until new institutions can be created. Competitive firms can disappear during transition along with ineffective production if the government conducts the policy of radical reforms. This paper provides some support for gradualist policies in dealing with state firms. The main results of the paper is following:

1. The government can completely avoid the output decline during transition by means of subsidies and quotas in the case only if it can control the distribution of the resources among firms. Since the government usually do not have such power in transition, and the central planner having the power was unable to allocate the resources effectively, this policy is unlikely to be implemented during the transition.
2. The strong government can alleviate the economic decline if it subsidizes the good firms.
3. The radical reforms can be more preferable under the weak government. If the share of the good firms is low, and lobbying is strong or the distortion created by taxes is high, the policy radical reforms gives the higher aggregate output. But when the negative effects associated with subsidizing is not strong the gradual approach is the optimal policy. The speed of the growth of the private sector is not an important factor in determining the optimal policy.

References

- [1] Blanchard, O., Kremer, M., "Disorganization", 1996
- [2] Greif, A., Kandel, E., 1994, "Contract enforcement institutions: historical perspective and current status in Russia."
- [3] Murphy, K., Shleifer, A., Vishny, R., "The Transition to a Market Economy: Pitfalls of Partial Reform", 1992, Quarterly Journal of Economics" 107(3), 889-906.
- [4] Sachs, J., 1993, "Poland's jump to the market economy", MIT Press, Cambridge, Mass.
- [5] Shleifer, A., Vishney, R., 1993, "Corruption", QJE 108(3), 599-618
- [6] Матвиенко, И., Вострокнутова, Е., Буев, М., 1998, Трансформационный спад и предпосылки роста в России.
- [7] Никологорский, Д., 1998, Возможности активной промышленной политики и первоочередные условия её проведения, Общество и экономика, 1, 1998