Towards the Theory of Privatization

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Abstract

An attempt is made to define main problems of the privatization theory and to present a survey of some results in this area. Two models are discussed that demonstrate paradoxical consequences of property right restrictions and dynamics of property right redistribution which entails a stratification of society. Two ways of transition from centralized to a market system (through privatization and through price liberalization processes) are compared in frameworks of a mixed economy model with queues. Relations between theoretical conclusions and real issues of the Russian privatization are discussed as well.

0. INTRODUCTION

Privatization is the central point of reforms taking place in the East European countries during last five years. Time to time privatization cases occur in capitalist economies as well but they are sporadic events. Therefore I guess, five years ago there were not so many theoretical researches devoted to privatization phenomena. I would like to mention Sappington and Stiglitz (1987), Chamberlin and Jackson (1987), Vickers and Yarrow (1988). Now we have great experience and an explosion in number of investigations on privatization in East European countries and Russia. A very incomplete list of

references includes Fisher and Gelb (1990), Tirole (1991), Nuti (1992), Tardos (1992), Fridman, Rapazinski (1993), Rutgaizer (1993), Blanchard, Commander and Coricelly (1994), Boycko, Shleifer and Vishny (1994), Čapek (1994). There are scrupulous descriptions and analyses of different projects of privatization, a row of models are developed. One can expect that very soon we will have a privatization theory which can be compared with theories of inflation, unemployment or rationing.

The goal of this survey is to outline some problems which, I think, are important for the future theory of privatization, and to discuss some recent theoretical contributions. I do not pretend to build a unique model covered a wide range of relevant topics. What I would like to present is a row of different and very simple models that reveal important questions and possible answers. Some widely accepted theoretical assumptions are discussed in a context of Russian privatization processes.

The plan of the paper is as follows.

1. WHAT KIND OF ECONOMIC SYSTEM SHOULD WE CREATE?

1.1. Private owned or labor managed enterprises?

In the process of privatization an enterprise can be sold or transferred to its workers, to its managers, to institutional investors (such as investment funds), to citizens or to the state. They are players in the game which has property right distribution as an issue.

In Russia this game was played in a revealed form. There were three variants of privatization. Due to the first variant, the majority of shares was got by outside shareholders (institutional investors or citizens). The second variant meant that labor collectives received at least 51% of the voting shares. The third variant transferred main part of a firm to its managers. In Russia labor collectives won the first part of the battle. Despite all efforts of the Russian government to sell enterprises to outside owners, about 65% of firms chose the second variant and their labor collectives received control packages of shares.

It was a result of long history of relations between the state and enterprises. During the history the state power turned out to be weaker and weaker, and administration of enterprises felt itself more and more dependent on labor collectives. Even before privatization, particularly after destruction of ministry and party systems, labor collectives considered themselves as real owners of their firms (Polterovich (1993a)).

Now the process continues. Securities are redistributed and it is unclear what kind of property right structures will be settled as a result of the process. Many economists want profit maximizing agents and competitive markets. It means compulsion of enterprises to change behavior, to decrease number of employees, to refuse from financing of their own social infrastructure: kindergartens, sport centers, holidays homes. Many firms financed such kinds of social structures in the recent past and some of them do the same now. In Russia and in other East European countries one can observe a peculiar cooperative system of inner- and interfirm relations, which is probably incompatible with western patterns of competitive behavior. Should it be destroyed? Practice shows that creation of private owned firms can be very costly due to resistance of labor collectives.

The question "What kind of economic system should we create?" is the most important since it entails the design of a concrete privatization scheme. Its deeper discussion is out of the scope of this paper. I would like to underline only one conclusion that turned out to be more evident after the experience of privatization than before. The answer on the question depends not only on comparisons of different property right systems but also on the informal property right relations historically established in the society.

A related but less pretentious question is the following: should the privatization lead to (more or less) uniform distribution of property or there are no reasons to concern about it? Many researchers considered the concentration of property in hands of the few as an evil and suggested receipts to prevent it. The simplest way is to use nontradable vouchers as it was done by the most countries conducting voucher privatization. In the next sections I discuss J. Roemer's model of limited privatization, compare schemes using tradable and non-tradable vouchers, and consider a model of property right redistribution which leads to the concentration of capital.

1.2. Should the concentration of property be prevented? [1]

In Roemer (1993) an interesting model is proposed which includes four types of mechanisms or institutions: mechanisms of distribution of resources and distribution of property rights, a rule to choose a volume of investments, and a political mechanism for choice of public bad levels. The central point of the paper is a very old and important question: should capital (or using marxist language, means of production) be considered as a private owned and tradable good or it is common property of the whole society and every person has equal rights for its return? Professor Roemer argues that the socialist variant can be better for the majority of society if one takes into account public bads.

Public bads are goods that enter negatively into the utility functions of citizens but positively into production functions of firms. There is endowment differentiation in the model but the initial property rights are uniformly distributed among the population. In the capitalist variant of the model these

[1] This and two next sections contain a discussion and generalization of results from Polterovich (1994)

rights can be sold. One can expect that the property will be concentrated in the hands of the rich. The rich will derive a large fraction of their incomes from profit of the firms. Hence they will support a high level of production and therefore a high level of public bads. If the class of capitalists has strong influence on political decisions then restrictions of pollutions are low and the technological regimes are harmful for the most citizens. It is a reason to prevent formation of the capitalist class. The author realized the idea in the socialist variant of the model where the property rights are not tradable. He built an example and show by calculations that uniform allocation of property rights can be better for most citizens than the market allocation.

It is well known that in the presence of externalities market allocations should not be Pareto-optimal and therefore an intervention of a central body can turn out to be useful. But property right restrictions entail economic losses for society, and I do not believe that this instrument is appropriate to overcome the shortcomings of high differentiation of wealth. This problem is discussed in the next section.

1.3. Comparative statics of property right restrictions: a paradox

One can think that if the government introduces restrictions on the volume of property in hands of one person then the property is distributed more uniformly and the poorer part of population gains. Mainly due to this point voucher trading was prohibited in Czechoslovakia, Lithuania, Mongolia. Unlike these countries Russia adopted a free trading scheme. Its supporters argue that tradability is more preferable for the poor people since it means a possibility to sell vouchers and to get more money for immediate consumption needs (Boycko et al. (1994)). Both arguments are true to some extent. The problem is related to a more general question: "Do the poor gain if the property right of the rich is stronger restricted?" It is obvious that the answer is "not always". But one can give an answer in a more specific form.

Let us consider a system of agents each of them is described by the following maximization problem:

$$\max\ u_i(c_i, \sigma_i), \tag{1.1}$$

$$c_i + \sigma_i p = w_i + p/n, \tag{1.2}$$

$$\sigma_i \leq \delta_i. \tag{1.3}$$

Agent i chooses her consumption c_i, and a shareholding σ_i. Her endowment is denoted by w_i; p is a present price (in good units) of the privatized property (firms); n is the total number of population. Property right restrictions δ_i are constants.

Let the supply of the shares (or vouchers) be equal to 1 and each share gives the right for a fixed future consumption volume. Then the utility function u can be considered as depending on present and future consumptions c_i, σ_i.

Suppose that there are two types of agents $i = 1, 2$, and n_i is the number of agents of type i.

An equilibrium is defined as an array of a price $\overline{p}$, and shareholdings $\overline{\sigma}_i$, and quantities $\overline{c}_i$ such that every pair $\overline{c}_i, \overline{\sigma}_i$ is a solution of the problem (1.1)–(1.3) under $p = \overline{p}$, and the balance of shares holds:

$$n_1\overline{\sigma}_1 + n_2\overline{\sigma}_2 = 1.$$

Let $w_2 > w_1$, and assume that usual concavity conditions are valid for u_1, u_2, and

$$u_1(c_1, \sigma_1) = f(c_1) + g(\sigma_1), \qquad \delta_1 = \infty, \quad \delta_2 = \delta, \quad 0 < \delta < 1. \tag{1.4}$$

So the rich people only are restricted in property rights, they are permitted to own not more than fraction δ of the total production. If $\delta = \infty$ then we have a competitive pure exchange equilibrium, if $\delta = 1/n$ then $\overline{\sigma}_1 = \overline{\sigma}_2 = 1/n$.

Let us study the dependence of equilibrium utility values on restriction δ.

We will consider $\overline{p}$, $\overline{c}_i$, $\overline{\sigma}_i$ and $V_i = u_i(\overline{c}_i, \overline{\sigma}_i)$ as functions of δ assuming they are well defined and smooth on an interval $\Delta = \{\delta\colon 0 < \delta < \delta^M\}$, where δ^M is a minimal δ under which the equilibrium coincides with the competitive one. Then $\overline{\sigma}_2(\delta) = \delta$ for $\delta \in \Delta$. Let $1/n \in \Delta$. This is true if, for example, agents have the same utility functions and future consumption is a normal good. To see it one should remember that the second agent is richer.

Let $'$ and $''$ be symbols of taking first and second derivatives, and let $\nu = n_2/n_1$. If $\delta \in \Delta$ then one has

$$\overline{\sigma}_1 = (1 - n_2\delta)/n_1, \quad \overline{c}_1 = w_1 + \overline{p}\,(\delta - 1/n)\nu, \tag{1.5}$$

$$g'(\overline{\sigma}_1) = \overline{p}\,f'(\overline{c}_1) \tag{1.6}$$

Hence

$$d\overline{p}/d\delta = -\nu\,[g''(\overline{\sigma}_1) + \overline{p}^{\,2} f''(\bar{c}_1)]/[f'(\bar{c}_1) + \overline{p}\, f''(\bar{c}_1)(\delta - 1/n)\nu]. \tag{1.7}$$

Therefore

$$\begin{aligned} dV_1/d\delta &= f'(\bar{c}_1)\, d\bar{c}_1/d\delta - \nu g'(\overline{\sigma}_1) \\ &= f'(\bar{c}_1)(d\bar{c}_1/d\delta - \overline{p}\nu) = f'(\bar{c}_1)(\delta - 1/n)\nu\, d\overline{p}/d\delta. \end{aligned} \tag{1.8}$$

We assume that f, g are concave and increasing functions. Therefore $d\overline{p}/d\delta$ is positive in a neighborhood of $1/n$, and V_1 has its local minimum at $\delta = 1/n$.

Suppose now that

$$f''(c_1)c_1 \geq (\alpha - 1)f'(c_1) \quad \text{for some} \quad \alpha, \quad 0 \leq \alpha < 1, \quad \text{and all} \quad c_1 > 0. \tag{1.9}$$

Obviously (1.9) is valid if f is a homogeneous function of degree α. Let us prove that $d\overline{p}/d\delta > 0$ for all $\delta \in \Delta$. If $\delta \leq 1/n$, this is true due to (1.7). Let $\delta > 1/n$. Using (1.5) and (1.9) one has $f'(\bar{c}_1)\bar{c}_1 + \overline{p} f''(\bar{c}_1)\bar{c}_1(\delta - 1/n)\nu \geq f'(\bar{c}_1)[w_1 + \overline{p}\alpha(\delta - 1/n)\nu] > 0$. Hence, $d\overline{p}/d\delta > 0$ and V_1 reaches its global minimum at $\delta = 1/n$. It has two local maximum points: at $\delta = 0$ and at competitive equilibrium.

One can suggest the following partial explanation of these paradoxical results. Equal initial shareholdings make relatively larger contribution to the income of the poor; the relation between incomes approaches to 1 under price increasing. Tighter restrictions entail a decrease of demand for property and hence a decrease of its price. Therefore relative income differentiation increases. This fact plays a dominating role under $\delta > 1/n$, therefore the less is δ the larger are losses of the poor . But if $\delta < 1/n$ then another circumstance turns out to be dominating: the rich are forced to sell a part of their vouchers, and the poor get a possibility to buy property at lower prices under lower δ.

Maybe even more paradoxical is the possibility demonstrated below: the rich gain due to their property right restrictions.

Since $\overline{\sigma}_2 = \delta$, $\bar{c}_2 = w_2 + \overline{p}(1/n - \delta)$, one has

$$dV_2/d\delta = u_{21}[(1/n - \delta)d\overline{p}/d\delta - \overline{p}] + u_{22}, \tag{1.10}$$

where u_{21}, u_{22} are partial derivatives of u_2 with respect to the first and second arguments at point $(\overline{c}_2, \overline{\sigma}_2)$. Due to optimality condition, we have

$$\overline{p}u_{21} \leq u_{22} \tag{1.11}$$

with equality at the competitive equilibrium, i.e. under $\delta = \delta^M > 1/n$. It follows from (1.10), (1.11) that $dV_2/d\delta > 0$ under $\delta \leq 1/n$ and $dV_2/d\delta < 0$ in a small left vicinity of $\delta = \delta^M$. It means that $V_2(\delta)$ has a maximum inside the interval $(1/n, \delta^M)$. Thus the rich gain from their restriction in a vicinity of the competitive equilibrium.

Let us summarize the results.

THEOREM 1. *Let us suppose that*

1) *u_i are increasing, strictly quasiconcave and twice differentiable; $w_2 > w_1$;*

2) *conditions* (1.4) *are valid, and f, g are strictly concave;*

3) *all equilibria are positive and unique for $\delta > 0$; $1/n < \delta^M$.*

Then $V_1(\delta)$ reaches its local minimum at $\delta = 1/n$ and $V_2(\delta)$ decreases in a left vicinity of the competitive value $\delta = \delta^M$. If moreover (1.9) *is fulfilled then $V_1(\delta)$ has its global minimum at $\delta = 1/n$, and two local maxima: at $\delta = 0$ and at the competitive equilibrium.*

As an example, let $u_i = c_i\sigma_i$, $n_i = 1$, $i = 1, 2$, $w_1 = 1$, $w_2 = 3$. The condition (1.4) is fulfilled for $\ln u_1$; this is sufficient for Theorem 1 to be valid. One has the following dependencies V_i of equilibrium values of u_i on δ (Fig. 1). The poor have a global minimum at status quo, and two maximal points. For the rich it is most advantageous to have the weak restriction $\delta = \delta_m = 0.59 < \delta^M = 5/8$.

1.4. Mechanisms of concentration: property right dynamics

In the previous model wealth inequality was given at the beginning whereas saving behavior of the agents could be identical. But an apologist of the capitalist system should say that the richness is occasional only in the short

run, and in the long run the rich are richer than the poor since they are more thrifty.

To check this argumentation let us consider dynamics of property right redistribution. To simplify the analysis I will not consider investment policy, and will assume capital to be fixed, nondepreciated and equal to 1. It is used to produce a unit of consumption good during one period of discrete time.

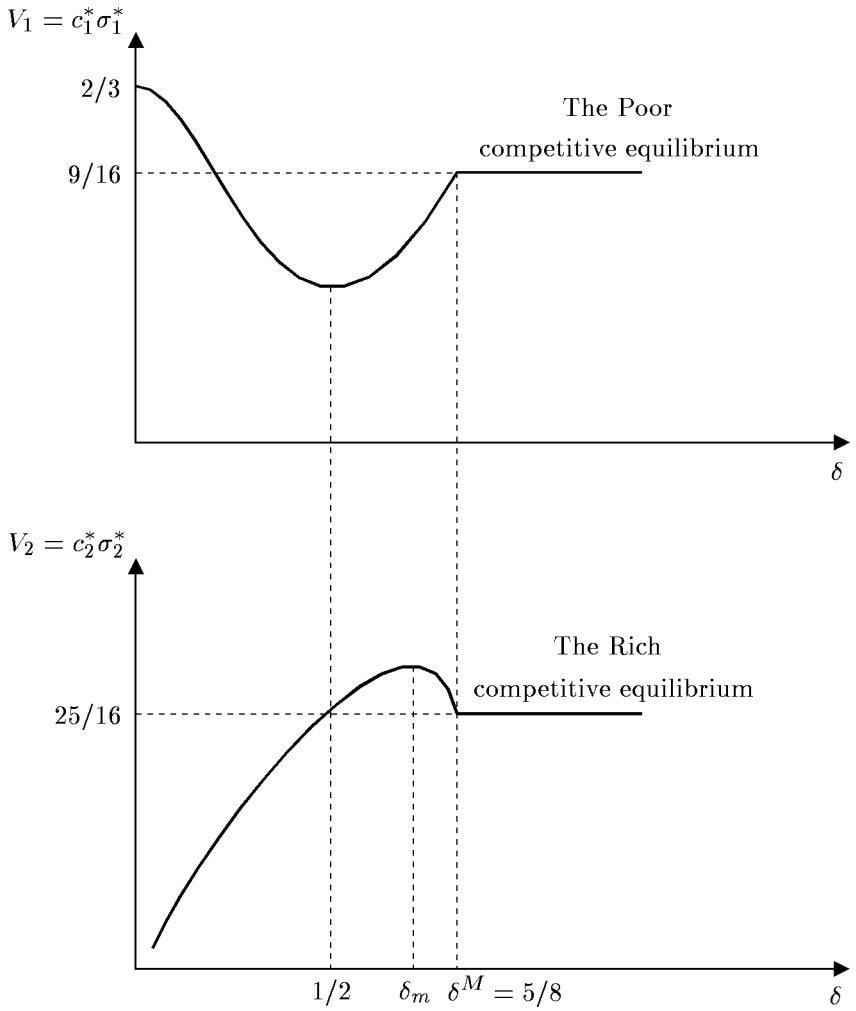

Figure 1

Assume that the behavior of agent i at period t is described by the fol-

lowing optimization problem

$$u_i(c_i) + \lambda_i u_i(\sigma_i) \Rightarrow \max, \tag{1.12}$$

$$c_i + \sigma_i p_t = \sigma_{i\,t-1} + \sigma_{i\,t-1} p_t, \tag{1.13}$$

$$c_i \geq 0, \quad \sigma_i \geq 0, \tag{1.14}$$

where u_i is a utility function, t is discrete time, $t = 1, 2, \ldots$; $i \in I$; I is a finite set of consumers, p_t is a price of total capital at moment t. Let σ_{i0} be given, $\sigma_{i0} > 0$, $\sum_{i \in I} \sigma_{i0} = 1$.

An equilibrium trajectory $\{p_t, \{c_{it}, \sigma_{it}\}_{i \in I}\}_{t=1}^{\infty}$ is a set of prices p_t, consumptions c_{it} and shares σ_{it} of total capital such that for every t and i the pair c_{it}, σ_{it} is a solution of (1.12)–(1.14) and the balance condition holds

$$\sum_{i \in I} \sigma_{it} = 1. \tag{1.15}$$

The problem (1.12)–(1.14) reflects agent expectations which can be not realized[2]. But they are close to reality if σ_{it} approach some constants since in this case $c_{it} - \sigma_{it} \Rightarrow 0$.

Let us denote $J = \{j\colon\ \lambda_j = \lambda = \max_{i \in I} \lambda_i\}$.

THEOREM 2. *Let u_i be increasing, differentiable, and concave functions, and let $u_i'(0) = \infty$ for all i. Then*

$$S_t = \sum_{j \in J} \sigma_{jt} \ \Rightarrow\ 1 \ \ \text{as} \ \ t \ \Rightarrow\ \infty.$$

Proof. It follows from optimality conditions and budget constraints that

$$p_t u_i'(\sigma_{it} + (\sigma_{i\,t-1} - \sigma_{it})(p_t + 1)) = \lambda_i u_i'(\sigma_{it}). \tag{1.16}$$

Therefore, due to concavity of u_i, one has

$$\begin{aligned} p_t &\leq \lambda_i \quad \text{if} \quad \sigma_{i\,t-1} \leq \sigma_{it}, \\ p_t &\geq \lambda_i \quad \text{if} \quad \sigma_{i\,t-1} \geq \sigma_{it}. \end{aligned} \tag{1.17}$$

[2]I use "sliding plan method" to build an infinite time version of a finite horizon model. Another way is to implement an OLG model similar to Tirole (1985) where expectations are supposed to be perfect.

It follows from (1.15) and (1.17) that $p_t \le \lambda$. If $p_t < \lambda$ then $\sigma_{i\,t-1} < \sigma_{it}$ for $i \in J$. If $p_t = \lambda$ then $\sigma_{i\,t-1} > \sigma_{it}$ for $i \notin J$. In both cases $S_{t-1} < S_t$. Therefore $S_t \Rightarrow S$ for some $S > 0$.

Let us prove that $p_t \Rightarrow \lambda$. By contradiction, suppose $p_{t(k)} \Rightarrow p < \lambda$ for some subsequence $t(k)$. Then $\sigma_{i\,t(k)-1} < \sigma_{i\,t(k)}$ for all $i \in J$. Hence $\sigma_{i\,t(k)-1} - \sigma_{it(k)} \Rightarrow 0$ for all $i \in J$. Since $S > 0$ one can suppose that $\sigma_{jt(k)} \Rightarrow \sigma_j > 0$ for some $j \in J$, and a contradiction follows from (1.16).

Since $p_t \Rightarrow \lambda$ one has $\sigma_{i\,t-1} > \sigma_{it}$ for $i \notin J$ in view of (1.17). Therefore $\sigma_{it} \Rightarrow \sigma_i$ for every $i \notin J$. Due to (1.16) it is possible only if $\sigma_i = 0$. Hence $S = 1$, and Theorem 2 is proved.

Thus the most patient agents turn out to be richer than others in the long run independently on utility functions and initial conditions[3].

This simple model supports a standard argument of free market apologists that wealth differentiation derives from different saving behavior even if we ignore other abilities, heritance, and fortune. The most striking situation occurs when two agents have identical one-period utility functions and utility discount rates but different planning horizons, and expect stable conditions (including prices). A farther looking agent turns out to be more thrifty, and she captures all the property in the long run. She reaches it due to decrease of consumption at the beginning of the process.

One can suppose that the saving behavior is much more homogeneous in developed societies than in underdeveloped ones. For example, in Russia people traditionally do not like persons who accumulate money. It means that this group includes only small part of population. So one can expect that the degree of wealth differentiation will grow very fast.

There are two kinds of reasons why high level of wealth differentiation is dangerous for society. Firstly, small group of the rich gets too much economical and political power and has a possibility to make decisions which can be harmful for the majority. Another important reason is pauperization of a large group of population and, as results, asocial behavior, criminal activities and so on.

Thus the danger of overconcentration comes from differences in planning horizons. But a ban of reselling of vouchers cuts off the most far-sighted part of population from investment decisions and prevents the capital flow

[3]Similar facts were detected by Bewley (1983) and Guriev (1994) in frameworks of quite different models

from population to firms. I do not know good solutions of the dilemma. It is possible that a suitable compromise is a system of corporate finance of Japanese type (see, for example, Aoki (1988)) where concentration of capital coexists with distribution of power among banks.

2. Sequencing and speed of privatization

An important problem discussed in many projects and papers concerns with time sequencing and speed of the reform.

2.1. Could we justify the shock method of privatization?

The Russian economy experienced two shocks at the beginning of 1992: shock price liberalization and shock liberalization of foreign trade. Then very fast privatization, creation of a new tax system and a new financial sector followed.

During the term of voucher privatization since December 1992 till July 1994 there were privatized 15,052 large and medium sized industrial enterprises. These privatized firms employ 17.4 million workers, which is 84% of the total industrial employment. The total number of privatized firms including small enterprises in trade and services reached 106,000 at the end of August 1994 and 112,000 at the end of 1994. At the end of June 1994 the market share of private enterprises was 75% in retail trade, 66% in catering and 77% in personal services. (Russian Economic Trends (1994), pp. 94–96; Social-Economic Situation in Russia (January, 1995), p. 112). Shock type reforms were conducted in some other East European countries as well.

This grandiose changes were preceded by debates about optimal speed of privatization. Now they continue as a rather theoretical issue.

As the main argument, supporters of the shock are saying that a gradual process would be too long and with high probability would be stopped due to political pressure of dissatisfied social groups. Fast privatization is necessary to increase efficiency of production and prevent massive theft of state property by managers after destruction of communist power. Since privatization by sale of individual enterprises or their shares takes time for preparation

and since it is not popular for public, the only possibility turns out to be mass privatization through vouchers (Boycko, Schleifer, and Vishny, 1994).

An attempt to justify fast privatization theoretically were developed in Roland and Verdier (1994) and Laban and Wolf (1993). Whereas their models are different and complicated the structures of their argumentation are similar and based on so called critical mass effects. It can be illustrated by a very simple model.

Let us consider n investors with unit of capital each. They can buy risk-free assets or shares of privatized enterprises. Risk-free assets yield r per a period of time. The yield of shares per a unit of money is a function $f(K)$ of total capital K invested by all participants. So each investor i should maximize his/her payoff function

$$k_i f(K) + (1 - k_i)r$$

under the constraint $0 \leq k_i \leq 1$, where $K = \sum_{i=1}^{n} k_i$. An increasing function $f(K)$ reflects the fact that the probability of successful privatization increases when the sum of investments raises (Laban and Wolf (1993)). Another interpretation says that efficiency of the private sector increases when the sector grows since private enterprises need in private infrastructure (Roland and Verdier (1994)). Let $f(K^*) = r$ and $n > K^* > 1$. Then the game has two Nash equilibria: no privatization equilibria ($k_i = 0$ for all i) or full privatization equilibria ($k_i = 1$ for all i). K^* is a critical mass. If more than K^* is invested or if more than K^* agents expect that more than K^* will be invested then full privatization will occur. But gradual privatization is impossible.

Arguments against too fast privatization were developed by Katz and Owen (1993), Murrel and Wang (1993), Aghion, Blanchard and Burgess (1994), Kazakevich (1994), Alexeev and Kaganovich (1994). One of the main line of argumentation is the following. It is assumed that privatization increases efficiency of labor force. Due to downward rigidity of real wages this leads to unemployment. But there is a policy constraint that defines acceptable levels of unemployment, and creation of new worker places takes time and resources. Therefore the optimal time path of privatization is gradual (Katz and Owen (1993)).

The necessity of a gradual approach can be demonstrated the most clearly if one assume minimal wage requirement and immobility of labor force among different production sectors (Alexeev and Kaganovich (1994); immobility of

resources is supposed also in Murrel and Wang (1993)). Simplifying an example by Alexeev and Kaganovich, let us consider an economy with two sectors. Let their production functions be $F_1 = 108L_1^{1/2}$, $F_2 = 20L_2^{1/2}$ where L_i is a quantity of labor used in sector i. Before privatization the sectors employ $L_1 = L_{10} = 16$ and $L_2 = L_{20} = 400$ labor units, and the economy has 832 units of goods. The government distributes the goods uniformly, and each worker gets 2 units. Suppose that labor is immobile, minimum real wage is equal to 5/3, and unemployment compensation is set up as 4/3. There are two independent labor markets and, due to low productivity of the second sector, 364 units of labor turn out to be unemployed. The production falls drastically up to 552 units. It is not enough to fulfill the subsistence constraint. So full privatization is impossible. A possible strategy is to privatize firstly more productive sector 1. One can hope that it will gradually increase its productivity being privatized, and the state will use taxes to cover unemployment compensations for workers of the second sector.

Almost all researchers assume that efficiency jumps at the moment of privatization. It contradicts real data for Russia. In the survey described in Bim (1994, p. 69) 100% of respondents said that privatization does not increase efficiency of their enterprises. For other surveys the results are not so strong but generally affirm the conclusion (see, for example, Dolgopyatova and others (1994), pp. 25–26).

Another unexpected phenomenon of the Russian transition process is a comparatively slow raise of unemployment. The level of production in 1994 was about 54% of the 1991 level, and it continues to decrease in 1995. In spite of the huge recession the officially registered unemployment was 2.5% of labor force in February of 1995[4]. In contrast with a usual theoretical assumption unemployment did not jump immediately after Russian privatization.

Probably, the most simple and realistic argument in use of gradual privatization is given in Kazakevich (1994). Privatization is costly in the short run since it demands resources for restructuring and can give positive effects in the long run only. Investments in privatization, like other investments, should be implemented with an optimal rate. Only very fast growth of efficiency could justify privatization shock. Such growth is not observed in

[4]Surveys show 7.4% of unemployment. Besides about 7% of workers were forced to rest a part of working time (Social-Economic Situation in Russia (January–February, 1995), p. 82–83)

Russia.

I think that both gradual and shock approaches catch some parts of truth. One can not have a unique privatized firm, a critical mass is necessary at the beginning. But it does not mean mass privatization. Gradual approach looks more well-founded economically but only experience could show if it is politically possible.

2.2. Liberalization or privatization: what should be the first?

The problem of sequencing was discussed intensively before the privatization boom both on theoretical and political levels (Fisher and Gelb (1990), Tirole (1991), Rutgaizer (1993)). Prices of firms should be defined to conduct privatization. Therefore liberalization should precede to create competitive markets. At another hand it is difficult to expect competitive behavior of producers without private property. Hence privatization should be the first. A possible solution is to have a package of reforms including creation of new tax and financial systems.

In all socialist countries free markets were developed to some extent and coexisted with a centralized state market. If one prefers gradual approach then two ways of transition turn out to be possible. The first one is to increase prices in the state sector step by step up to free market levels and then to liberalize them without any shocks. The second way is the gradual privatization so that larger and larger part of the total production would be sold at free market prices. These two ways were compared by Fridman (1994). She used frameworks of a model with queues developed by Stahl and Alexeev (1985) and Polterovich (1993b). It turns out that for a simple variant of the model stylized privatization is uniformly better then stylized liberalization path.

Below we describe the model and prove the Fridman result under slightly more general assumptions.

There is a representative consumer with a fixed positive income β and with a utility function u. The function depends on the n-dimensional consumption vector c and on the leisure l. The allocation mechanism includes queues, therefore the consumer can spend his total quantity of nonwork time T for waiting and for leisure. A fixed commodity vector y is supplied. Some

part of it, the vector z, is supposed to be distributed through queues at fixed prices $\overline{p} = (\overline{p}_i)$. If some price $\overline{p}_i$ is too high then consumers refuse to buy their rations of good i. All quantities which are not purchased at fixed prices (including $y - z$ and a residual of z) are sold in free markets at flexible equilibrium prices p. So the rationing system of the good i really works only if $\overline{p}_i < p_i$.

There are two reasons to consider rationing and queues jointly with the free market. As a rule, legal free markets coexist with other types of allocation mechanisms even in centrally planned economies. Besides, there is an illegal flow of free market commodities as a result of underground productions or stealing. These commodities don't come through rationing or queue systems and are not paid at fixed prices. So, taking the free market into consideration we reflect the reality. The second reason is connected with the problem of existence of equilibria in systems of rationing or queues with reselling of commodities firstly purchased at fixed prices. For such systems equilibria may not exist but arbitrary small free markets correct the situation.

We describe the consumer behavior under queueing by the following optimization problem

$$\max\ u(c, l), \tag{2.1}$$
$$p(c - d) + \overline{p}d \leq \beta, \tag{2.2}$$
$$\tau d + l \leq T, \tag{2.3}$$
$$c,\ d,\ l \geq 0, \tag{2.4}$$

where $\tau = (\tau_i)$ is a nonnegative waiting time vector. So, the scalar τ_i means the quantity of time which is necessary to buy a unit of the good i at the fixed price $\overline{p}_i$.

Definition: An array $E = (p, \tau, \widetilde{c}, \widetilde{d}, \widetilde{l})$ is a queue equilibrium with black markets if the triple $\widetilde{c}, \widetilde{d}, \widetilde{l}$ is a solution of the problem (2.1)–(2.4), and the following balance conditions are fulfilled

$$\widetilde{c} = y, \quad \widetilde{d} \leq z, \quad \tau(\widetilde{d} - z) = 0. \tag{2.5}$$

The last of the conditions means null waiting times for commodities in excess supply.

A competitive equilibrium price vector p^M is defined as a vector such that y is a solution of the problem

$$\max\ u(c,T), \quad p^M c = \beta, \quad c \geq 0. \tag{2.6}$$

Let us choose time horizon H and consider two variants of transition to the competitive equilibrium during H steps:

Variant I: $\quad \overline{p}^t = \overline{p} + (p^M - \overline{p})t/H;$

Variant II: $\quad z^t = z(1 - t/H),$

where $t = 1, 2, \ldots, H$.

Variant I means gradual liberalization due to increase of state prices. Variant II envisages gradual reswitching a flow of goods z from the state market to competitive one. It can be considered as gradual privatization.

Since equilibrium consumption is equal to y for every t in both variants we should compare equilibrium values of leisure l_{I}^t and l_{II}^t for trajectories of liberalization and privatization. One can expect that l_{I}^t can be less than l_{II}^t for some t and greater than l_{II}^t for others. Surprisingly, it is not the case.

Let us introduce the following assumptions.

1. The function u is separable: $u(c,l) = f(c) + \varphi(l)$.
2. The functions f, φ are smooth and concave; their derivatives f', φ' are positive, and $f'(0) = \infty$, $\varphi'(0) = \infty$.
3. $z < y, \ \ T > 0, \ \ \beta > 0.$
4. $\overline{p} < p^M$.

THEOREM 3. *Under the conditions* 1–4 *privatization is uniformly better than liberalization:* $l_{\mathrm{I}}^t < l_{\mathrm{II}}^t$ *for all* $t = 1, \ldots, H$.

Proof. Let y, $\tilde{l}$, $\tilde{d}$ be a solution of the problem (2.1)–(2.4). Then there exist positive numbers λ, w such that the triple $(y, \tilde{l}, \tilde{d})$ is a solution of the problem

$$\begin{gathered} u(c,l) - \lambda[pc - (p - \overline{p})d + w(\tau d + l)] \ \Rightarrow\ \max \\ c \geq 0, \quad d \geq 0, \quad l \geq 0. \end{gathered} \tag{2.7}$$

Therefore

$$f'(y) = \lambda p, \quad \varphi'(\tilde{l}) = \lambda w, \tag{2.8}$$

$$p - \overline{p} \le w\tau, \quad (p - \overline{p} - w\tau)\tilde{d} = 0, \tag{2.9}$$

$$py = \beta + w(T - \tilde{l}). \tag{2.10}$$

One can check that

$$p^M = f'(y)\beta / f'(y)y. \tag{2.11}$$

Let p, τ, y, $\tilde{l}$, $\tilde{d}$ be an equilibrium in the model with queues. From (2.8), (2.10), (2.11) one has

$$p = \frac{f'(y)\beta}{f'(y)y + \varphi'(\tilde{l})(\tilde{l} - T)} \ge p^M. \tag{2.12}$$

Hence for our trajectories $p > \overline{p}$. Since $\tilde{d} \le z$ and $\tau\tilde{d} = \tau z$, by (2.9) we get

$$w\tau\tilde{d} = (p - \overline{p})\tilde{d} \le (p - \overline{p})z \le w\tau z = w\tau\tilde{d}.$$

Thus

$$(p - \overline{p})z = w\tau\tilde{d} = w(T - \tilde{l}) = py - \beta. \tag{2.13}$$

It follows from (2.8) and (2.13) that

$$\lambda = \frac{f'(y)(y - z)}{\beta - \overline{p}z} \tag{2.14}$$

and

$$\varphi'(\tilde{l})(T - \tilde{l}) = \lambda(p - \overline{p})z = f'(y)z - \lambda\overline{p}z. \tag{2.15}$$

The equation (2.15) defines $\tilde{l}$ as an increasing function of λ. Hence it is sufficient to compare $\lambda_{\mathrm{I}}(t)$ and $\lambda_{\mathrm{II}}(t)$:

$$\lambda_{\mathrm{I}}(t) = \frac{f'(y)(y - z)}{\beta - \overline{p}^t z} = \lambda^M \frac{p^M(y - z)}{\beta - \overline{p}z - (p^M - \overline{p})zt/H}, \tag{2.16}$$

$$\lambda_{\mathrm{II}}(t) = \frac{f'(y)[y - z(1 - t/H)]}{\beta - \overline{p}z(1 - t/H)} = \lambda^M \frac{p^M(y - z) + p^M zt/H}{\beta - \overline{p}z + \overline{p}zt/H}, \tag{2.17}$$

where λ^M is defined from equality $f'(y) = \lambda^M p^M$.

Since $p^M y = \beta$, it is easy to check that

$$\lambda_{\mathrm{I}}(0) = \lambda_{\mathrm{II}}(0); \quad \lambda_{\mathrm{I}}(H) = \lambda_{\mathrm{II}}(H) = \lambda^M.$$

Furthermore, $\lambda_{\mathrm{I}}(t)$ and $\lambda_{\mathrm{II}}(t)$ are increasing functions of t, $\lambda_{\mathrm{I}}(t)$ is strictly convex and $\lambda_{\mathrm{II}}(t)$ is strictly concave (Fig. 2).

Therefore $\lambda_{\mathrm{II}}(t) > \lambda_{\mathrm{I}}(t)$ for all t, $0 < t < H$. The theorem is proved.

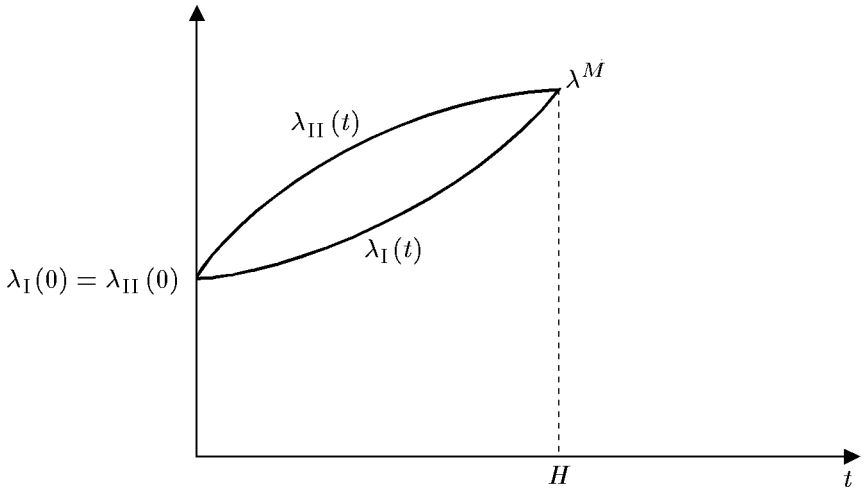

Figure 2

3. Privatization, recession, and monopoly power

3.1. Privatization and recession

In all East-European countries privatization was initiated by governments which announced enhancing economic efficiency and increasing fiscal revenue as main goals of the property right reform. Surveys show that both of the goals were not reached during one or two years after large-scale privatization. Revenues turned out to be insignificant and privatized firms did not reveal substantial improvements in comparison with non-privatized enterprises (Nuti (1992), p. 199; Čapek (1994), p. 298; Bim (1994)).[5] Enterprise

[5]Firms with participation of foreign capital revealed better performance.

behavior was not changed. One possible explanation is the following. Before privatization the enterprises belonged to the state by law but in fact the state had small influence on its decisions. The decisions were worked out on the base of compromises among managers and workers, and the same mechanism continues to work after privatization. Privatization did not change top managers of the most enterprises and replacement of owners was a pure formal action. Farther investigations are needed to check this guess.

The question discussed above is a part of more general problem about relations between privatization and deep recession which took place in all East-European countries.

3.2. Does privatization decrease monopoly effects?

At the first glance privatization should decrease the degree of monopolization of an economy and therefore increase the production level. But it is not necessarily so.

Indeed privatization leads often to disintegrations of large enterprises. But one should distinct two types of disintegrations: horizontal (parallel separation) and vertical (sequence separation) ones. It is obvious that horizontal disintegration results decreasing of monopoly power. But it is not the case for vertical disintegration.

It was proved in a number of papers (Vernon and Graham (1971), Schmalensee (1972), Greenhut and Ohta (1979)) that vertical disintegration increases the monopoly effect, rises prices and decreases outputs.

To present the essence of the arguments, let us consider the simplest case. Let a production system have two subsystems with production functions $z = h(y)$, $y = f(x)$, where x, y, z are quantities of a resource, an intermediate good and a final good, respectively. (Fig. 3). The price of the resource is a constant c; the price of the final good is a function $q(z)$. Before privatization the system is a monopoly, and its decision is derived from a problem

$$\max\ q(h(y))h(y) - c\psi(y), \tag{3.1}$$

where $\psi(y) = f^{(-1)}(y)$ is the inverse function for f. Let us suppose that after privatization the system disintegrates into two firms, each of them governs the price of its own output, and does not influence the input price. Their

decisions come as solutions of the problems

$$\max\ q(h(y))h(y) - p(y^*)y, \tag{3.2}$$
$$\max\ p(y)y - c\psi(y), \tag{3.3}$$

where $p(y)$ is the price of the intermediate good as a function of its volume, and y^* is given for (3.2). Let us define

$$p(y) = F'(y), \tag{3.4}$$

where $F(y) = q(h(y))h(y)$. It means that y^* is a solution of (3.2) for concave F. At an equilibrium y^* should be also a solution of (3.3).

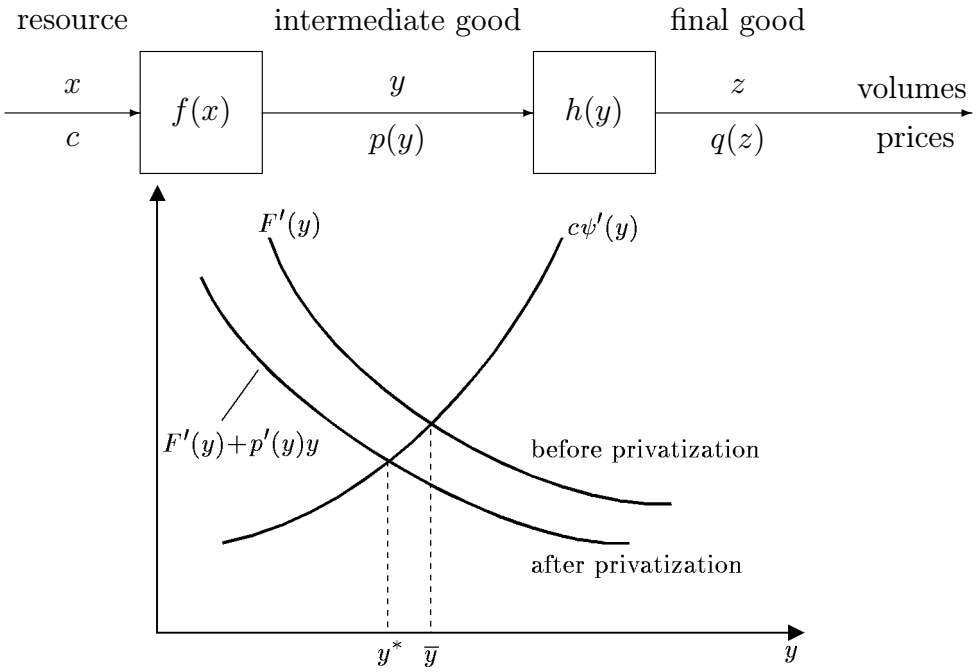

Figure 3

We suppose that the functions f, h, F are positive and increasing under $x > 0$, $y > 0$, f is concave, F is strictly concave, $q(z)$ is positive and decreasing, all functions are smooth. Then the volume $\overline{y}$ of the intermediate good before privatization is defined from the equation

$$F'(y) = c\psi'(y). \tag{3.5}$$

The volume y^* of the intermediate good after privatization is a solution of the equation

$$F'(y) + p'(y)y = c\psi'(y). \tag{3.6}$$

Since $p'(y) < 0$ one has (see Fig. 3): $y^* < \overline{y}$, and $z^* = h(y^*) < \overline{z} = h(\overline{y})$, $q(z^*) > q(\overline{z})$.

Thus, if privatization leads to vertical disintegration of a production system then the monopoly effect becomes aggravated: the system supplies less and by a higher price.

In Russia there were a lot of cases of the vertical disintegration, so that one can not wait improvements in this sense.

4. Concluding remarks

There are some important questions that were not concerned above. First of all there is no good theory to explain why private property system is better than centralized one. Following the well- known idea by R. Coase one can suppose that transaction costs are much larger in huge hierarchies than at free markets, and privatization should decrease the transaction costs. If one could measure the transaction costs and privatization costs then an optimal decision could be made by cost-benefit analysis.

Another problem that should be mentioned is the following.

In a row of East European countries one can observe the same stages of the privatization process: spontaneous privatization, people privatization (property distribution through vouchers or auctions), and money privatization when large institutional or private owners buy the property). Probably each stage has its own reasons and goals, and it would be interesting to study it (see Polishchuk (1994)).

A very important problem is connected with property right protection. In Russia we observe the lack of protection system. It leads to supremacy of mafia and drastically increases the transaction costs. This is a very serious obstacle for a success of the Russian transition process.

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