TITLE: INCOME DISTRIBUTION AND PRICE CONTROLS: TARGETING A SOCIAL SAFETY NET DURING ECONOMIC TRANSITION

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Income Distribution and Price Controls: Targeting a Social Safety Net During Economic Transition

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EXECUTIVE SUMMARY

During the ongoing post-communist economic transitions, the relative well-being of many people is changing rapidly, and governments are not well positioned to accurately measure individual living standards. First, the second economy tends to be very large, so official income captures a relatively small percentage of total monetary income. Second, the in-kind provision of goods and services often is substantial and variable, diminishing the correlation between monetary income and welfare. Third, government authorities have little experience with the implementation and enforcement of the new explicit social welfare policies. At the same time, a sharp increase in income inequality during transition raises the importance of providing a social safety net to the poor. Under such circumstances, continued price controls over basic consumer goods within the state sector, and the associated queuing, can form a serviceable device for targeting poor people for subsidies. With a fixed-price state sector and free-price parallel markets, rich people might choose to avoid queues and shop in the free markets, while poor people would prefer to pay low nominal prices and queue in the state sector. The targeting of subsidies through queues, therefore, can be accomplished even if the government has no information on individual income or living standards. Using a simple model, we show that when the alternative to price controls is a poorly targeted explicit social safety net, the resource cost of queues might be more than compensated for by an improvement in the targeting of subsidies.
Income Distribution and Price Controls: Targeting a Social Safety Net During Economic Transition

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The provision of an adequate social safety net is a leading concern during economic transitions from socialism to capitalism. The safety net in socialist societies consists of explicit provisions such as pensions and disability payments, as well as other features inherent in the system of central planning. In particular, the policies of full employment and low fixed prices for most basic consumer goods within the state sector are major elements of the social safety net in socialist economies. During the transition, however, privatization (or the implementation of hard budget constraints) and price liberalization undermine these implicit social welfare protections. Transitional economies, therefore, have enacted additional explicit provisions, such as unemployment benefits and minimum wages, to protect the welfare of some of their citizens.

A fundamental difficulty in providing benefits to needy individuals is to distinguish those who are in need from others who can afford to provide subsidies. Many programs in the West are means-tested, only available to those whose incomes fall below some threshold. Such targeting of benefits is by no means perfect, even in the absence of fraud, because official income is an imperfect indicator of welfare. The targeting of social safety provisions is even more problematic in transitional societies, however. First, the second economy tends to be very large, so official income captures a smaller percentage of total monetary income. Second, the in-kind provision of goods and services often is substantial and variable, diminishing the correlation between monetary income and welfare. Third, government authorities have little experience with the implementation and enforcement of the new explicit social welfare policies. It has been claimed that many of those who receive unemployment benefits, for example, actually hold jobs.

The difficulty of identifying poor people in transitional societies is matched by its importance. While there are many problems with the data and their interpretations, the socialist states tended to have distributions of income
that were egalitarian relative to most Western market economies. During the transitional years, these countries generally have seen a sharp increase in measured income inequality. The increasing (and increasingly visible) gap between the haves and have-nots frequently is cited as leading to an anti-reform backlash, and in promoting the electoral success of former communists.

One policy often advocated by former communists is either to delay price liberalization, or, after a liberalization, to return to price controls on basic consumer commodities within the state sector. Western economists typically lament such policies because of the resource misallocations, including queuing, that accompany price controls, and because such controls would seem to slow down the transformation to a market economy.

Price controls, nevertheless, have continued to play a large role in some transitional economies, and especially in Russia. While most central price controls were eliminated in Russia in 1992, prices of basic consumer goods frequently are controlled by local authorities. The EBRD estimated that one-third of Russian prices remained under control in 1995. The controls can take the direct form of mandated price ceilings, or the indirect form of limitations on profit rates. The controls also can be applied informally, through governmental threats to retaliate in some manner (perhaps through anti-monopoly provisions) against firms that charge high prices. Many Russian localities have coupled their price controls with internal trade restrictions, to prevent the "export" of price-controlled goods to other Russian regions.

Why are price controls so popular in countries that are engaged in a transition to a market economy? The purpose of this paper is to argue that queue rationing can be a serviceable device for targeting poor people for subsidies, particularly during the reform period, and this feature adds to the attractiveness of price controls during transition. With a fixed-price state sector and free-price parallel markets, rich people might choose to avoid queues and shop in the free markets, while poor people would prefer to pay low nominal prices and queue in the state sector. The targeting of subsidies through queues, therefore, can be accomplished even if the government has no information on individual income or living standards. When the alternative to price controls is a poorly targeted explicit social safety net, the resource cost of queues might be more than compensated for by an improvement in the targeting of subsidies.
A substantial literature has developed on the relative merits of queuing for distributing goods among heterogeneous consumers. Sah (1987) shows that poor people prefer queue-rationing to free markets, in a model with fixed output, no parallel markets, and where everyone, rich and poor alike, queues for goods under the price-control regime. Alexeev (1991) and Polterovich (1993) derive similar results in models that also includes free-price, parallel markets. Boycko (1992) and Osband (1992), while not primarily concerned with distributional issues, add production into their models of queue-rationing. Price controls then carry a further cost in terms of lost output, as waiting in queues reduces the time available for work. Our model incorporates a production cost to queuing, but this cost is muted by the fact that only the least productive workers stand in line for goods, while more productive workers purchase goods in the parallel markets.

Berkowitz (1995) is an earlier paper that addresses the question of the persistence of queue rationing during reform. His model considers a capacity-constrained market with both state and private firms, where the local government values consumer surplus more highly than producer surplus. He shows that in situations where capacity constraints in private firms lead to high prices, the local government should set a low price in the state sector and induce queue-rationing. In a sense, such a policy is an efficient indirect regulatory tool, inducing the private firms to lower their prices. Our model complements Berkowitz (1995) by considering situations where the government values a relatively equal distribution of economic welfare, again finding that state-sector price controls can form an optimal second-best policy.

The generalization of the argument in this paper is simply that initial conditions are very important for transitional socialist economies. Explicit social safety nets that do not include price controls are perhaps the preferable means for protecting social welfare in Western market economies. When starting from a situation of state socialism, however, continuing price controls can play an important role during the transition. Likewise, continued state ownership of some enterprises might also form part of a safety net during the transition, even if the desired final destination involves near-complete privatization. There are many substitute means available to provide a social safety net. The preferred alternative in transitional socialist societies may well be quite different from that in advanced market economies.
The remainder of this paper is organized as follows. Section 2 presents an illustrative model of three different allocation mechanisms: free markets, queue rationing and parallel markets, and imperfectly targeted subsidies to poor people. Section 3 compares social welfare under these regimes through graphical and numerical analysis, and section 4 contains a brief discussion and conclusions.

2. An Illustrative Model

There are two types of individuals, rich (denoted by the subscript r) and poor (denoted by the subscript p). Let the total size of the population be normalized to 1, with the proportion of poor people denoted by v, and the proportion of rich people by 1-v. Rich and poor people differ in their wage rates, assumed to be fixed and exogenous, at \( w_r \) and \( w_p \), respectively. It will be convenient at times to denote the ratio of rich to poor wage rates by \( a > 1 \); i.e., \( a = \frac{w_r}{w_p} \).

Both rich and poor have a total of \( L \) hours per period available; leisure hours are denoted by \( l_r \) and \( l_p \), and hours of work are given by \( h_r \) and \( h_p \). We will normalize with \( L = 1 \): hours of work, plus hours of leisure, plus hours of queuing, sum to 1 for every individual. There is one consumption good, with the quantities consumed given by \( x_r \) and \( x_p \). Consumers have Cobb-Douglas utility in leisure and consumption given by \( U_r = l_r^r \cdot x_r \) and \( U_p = l_p^p \cdot x_p \).

Assume that workers are paid their marginal product, and that the production function of the consumption good for both rich and poor people is linear in hours of labor, with slope equal to marginal product: poor individuals, who have marginal product \( w_p \), produce in total \( Q_p = v \cdot w_p \cdot h_p \), and the rich, with marginal product \( w_r \), produce \( Q_r = (1-v) \cdot w_r \cdot h_r \). Total output \( Q \), therefore, is \( Q = v \cdot w_p \cdot h_p + (1-v) \cdot w_r \cdot h_r \). Time spent queuing, then, not only directly decreases utility, but also holds the potential to reduce total output, by detracting from the hours of labor supplied by poor workers who wait in line.

The "social planner" is assumed to value both individual welfare and a relatively egalitarian distribution of living standards. (Alternatively, it could be assumed that the individuals themselves care about distribution.) Social welfare, \( W \), is taken to be the sum of the welfare (utility) of the poor and of the rich, multiplied by the ratio of the average utility of the poor to that of the rich: \( W = [vU_p + (1-v)U_r][U_p/U_r] \cdot \). Thus a perfectly equal distribution of individual utility (\( U_p = U_r \)) yields social utility equal to the sum of individual utilities; increasing
departures from equality, everything else equal, result in diminishing social welfare.

**Case 1: No Intervention**

As a benchmark, it is useful to consider the outcome under a free market, with no price controls or social safety net. The general problem facing consumers, then, is:

\[
\max_{l_i, x_i} U_i = l_i x_i \\
\text{subject to}: \quad l_i + h_i = 1, \quad \text{and} \quad P x_i = w_i h_i, \quad \text{for } i = p, r.
\]

The first constraint reflects the fact that with no queuing under free markets, people spend all of their time either working or at leisure. From the budget constraint, \( x_i = w_i (1 - l_i) / P \), and the consumer's problem can be rewritten:

\[
\max_{l_i} U_i = l_i \left[ w_i (1 - l_i) / P \right].
\]

Solving from the first-order condition yields \( l_i^* = 1/2 \), \( h_i^* = 1/2 \) and \( x_i^* = w_i / 2P \), for \( i = p, r \).

At equilibrium, the total quantity demanded equals the total quantity supplied:

\[
v x_{p^*} + (1-v) x_{r^*} = Q = v w_p h_{p^*} + (1-v) w_r h_{r^*},
\]

and substituting for \( h_{p^*} \) and \( x_{r^*} \) yields a free-market equilibrium price of \( P^* = 1 \). A poor person achieves utility \( U_p = w_p / 4 \), and a rich person has utility \( U_r = w_r / 4 \). Social welfare is

\[
W = \left[ v U_p + (1-v) U_r \right] \left[ U_p / U_r \right] = \left[ w_p (1-v) + w_r v \right] / 4a.
\]

**Case 2: Price Controls**

When the social safety net consists of a price-controlled sector, there exist two channels in which the consumption good can be secured. In the state sector, the good is sold at a controlled price \( P' \), while in the free-market sector, the
price is $P$. We are interested in the case of a completely separating equilibrium, where all the poor consumers shop in the state sector and all of the rich consumers shop in the free markets. While we assume (see the introduction, and the formalization of a targeted safety net) that the government cannot identify poor and rich people \textit{ex ante}, in the equilibrium with price controls that is examined, \textit{ex post} the poor people will be those who are shopping in the state sector.\textsuperscript{11}

A rich person, then, solves the same problem as in the free-market case:

$$\max_{l_r, x_r} U_r = l_r x_r$$
subject to: $l_r + h_r = 1,$ and $P x_r = w_r h_r.$

with solutions $l_r^* = 1/2,$ $h_r^* = 1/2,$ and $x_r^* = w_r / 2P.$

A poor person shops only in the state sector, and devotes $t$ hours in queueing per unit of the good purchased.\textsuperscript{12} A poor person therefore solves the problem:

$$\max_{l_p, h_p, x_p} U_p = l_p x_p$$
subject to: $l_p + h_p + tx_p = 1,$ and $P x_p = w_p h_p.$

Solving this problem yields $l_p^* = 1/2,$ $h_p^* = P' / 2 (tw_p + P'),$ and $x_p^* = w_p / 2 (tw_p + P').$

At equilibrium, as in the free-market case, the total quantity demanded equals the total quantity supplied: $v x_p^* + (1 - v) x_r^* = Q = v w_p h_p^* + (1 - v) w_r h_r^*.$ For a given per-unit wait time $t,$ this condition establishes the equilibrium price $P^*$ in the free-market sector. The wait time must be such to support our assumption of a fully separating equilibrium; i.e., wait times cannot be so high that poor individuals would find it in their interest to shop in the free markets, nor so low as to induce rich people to shop in the state sector. Since the effective price in the state sector is $tw_p + P'$ for poor people and $tw + P'$ for rich people, and the equilibrium price in the free-market sector is $P^*$, these conditions imply that:

$$tw_p + P' \leq P^*, \text{ or } t \leq (P^* - P') / w_p, \text{ and } tw + P' \geq P^*, \text{ or } t \geq (P^* - P') / w.$$

\textsuperscript{2}
The shortest queue time, then, that is still consistent with a fully-separating equilibrium, is \( t = (P^* - P') / w' \). Employing this queue time in the market-clearing condition \( v x^*_p + (1-v) x^*_r = v w_p h^*_p + (1-v) w_r h^*_r \), and solving for the equilibrium price yields the following expression:

\[
P^* = \left[ (2vP' + aP' - P' - vaP' - 1) - (1-2P' - 6avP' + 2aP' + 4vP' + 6avP') - 4vP' + \right.
\]

\[
a^2P'^2 - 2aP'^2 + P'^2 + 4av^2P' - 4v^2P')^{1/2} \right] / 2(v-1).
\]

In part because of the complexity of this expression, social welfare comparisons between the price control regime and the targeted safety net regime will be done in terms of numerical examples in Section 3. Because the authorities can always make the price control high enough to be non-binding, resulting in no queuing, an optimal price control regime cannot be dominated (in terms of social welfare) by the no intervention case.

**Case 3: Imperfectly Targeted Redistribution**

One alternative to state-sector price controls as a social-safety net is a targeted redistribution plan. The targeting, however, is not perfect, in the sense that not all of the subsidies go to poor people. We assume that a poor person cannot appear to be rich; however, a rich person may incorrectly be viewed as poor (and hence a potential recipient of a targeted subsidy). To be specific, the government has available a signal of reliability \( \gamma \), \( 0 \leq \gamma \leq 1 \), such that the signal indicates that a rich person is indeed rich with probability \( \gamma \). A person who is indicated to be rich is then taxed a lump-sum amount (per period) equal to \( T \). Total tax collections are \( (1-v)\gamma T \), reflecting the fact that some people who are actually rich are judged to be poor. The money collected in this fashion is then redistributed to people who are indicated poor. The transfer to a person judged to be poor, therefore, is \( S \) (for Subsidy) = \( (1-v)\gamma T / [v + (1-\gamma)(1-v)] \).

The taxes and subsidies will influence an individual’s labor supply and consumption. With homothetic preferences, however, the balanced-budget lump-sum transfers will not affect the equilibrium price, which remains at the non-intervention level of \( P^* = 1 \). There are now two "types" of rich individuals: type \( r1 \) (occurring with probability \( \gamma \)) that is correctly viewed as rich and hence taxed, and type \( r2 \) (occurring with probability \( 1-\gamma \)) that is signaled as being poor, and hence receives a subsidy. The first type will solve the problem:
\[
\begin{align*}
\text{max} & \quad U_{r_1} = l_{r_1} x_{r_1} \\
\text{s.t.} & \quad l_{r_1} + h_{r_1} = 1, \quad \text{and} \quad P x_{r_1} = w_r h_{r_1} - T. 
\end{align*}
\]

Employing \( P^* = 1 \), this problem has solutions \( l_{r_1}^* = (w_r - T) / 2w_r \), \( h_{r_1}^* = (w_r + T) / 2w_r \), and \( x_{r_1}^* = (w_r - T) / 2 \).

The problem for type 2 is identical, except that the budget constraint is now \( P x_{r_2} = w_r h_{r_2} + S \), yielding solutions \( l_{r_2}^* = (w_r + S) / 2w_r \), \( h_{r_2}^* = (w_r - S) / 2w_r \), and \( x_{r_2}^* = (w_r + S) / 2 \). Poor people solve the same problem as type 2, except that they have the lower wage rate, \( w_p \). So, \( l_p^* = (w_p + S) / 2w_p \), \( h_p^* = (w_p - S) / 2w_p \) and \( x_p^* = (w_p + S) / 2 \).

The utility achieved by type 1 rich individuals is \( U_{r_1} = l_{r_1}^* x_{r_1}^* = (w_r - T)^2 / 4w_r \), and the utility of type 2 rich individuals is \( U_{r_2} = (w_r + S)^2 / 4w_r \), or, substituting for \( S \),
\[
U_{r_2} = (w_r + [(1 - \gamma) \gamma T / [(1 - \gamma)(1 - \gamma)]])^2 / 4w_r.
\]

The "average" utility for a rich person is \( U_r = \gamma U_{r_1} + (1 - \gamma) U_{r_2} \). The utility achieved by a poor person is \( U_p = (w_p + S)^2 / 4w_p \).

3. Graphical Analysis

The first series of graphs is concerned with comparisons of social welfare under queuing and redistribution, and how the comparison changes with certain parameters. For all cases that are considered, \( w_p \) is normalized to one.

The initial comparisons involve the following parameter values:

- \( \nu = .8 \), so the majority of individuals are poor;
- \( \alpha = 1.1 \), indicating that rich individuals are much more productive than poor individuals; and
- \( \gamma = .6 \), so the indicator of rich individuals is only moderately reliable.
Employing these parameters, Graph 1 indicates the relative desirability of price controls versus imperfect targeting, as the size of the tax $T$ changes. In this graph, $P'=0.5$, so the controlled price is one-half the free-market level. In this case, solving for the parallel-market equilibrium price yields $P^*=2.5$. The vertical axis plots the ratio of social welfare under queuing to social welfare under targeting, minus one, so that positive values indicate higher welfare under queuing, and negative values indicate higher welfare under targeting. In this case, the larger the tax, the more desirable targeting is relative to queue-rationing.

Graph 2 again provides the welfare comparisons under the two safety net alternatives, but this time notes changes as the controlled price, $P'$, increases from .3 to .9, while the size of the tax is fixed at $T=5$. In this case, increases in the controlled price make queue-rationing less attractive.

Graph 3 employs the same parameters as graph 1, including $P'=0.5$, but instead of overall social welfare, it looks at the ratio of utilities of poor consumers only, as the size of the tax increases. Increased levels of the tax make the targeted safety net relatively better for the poor.

The second series of graphs looks at the effect of changes in the controlled price under queue rationing. In particular, the monotonic relationship between the controlled price and the relative desirability of queue rationing depicted in graph 2 does not generalize to all parameter values. If $a=6$, $v=0.9$, $T=3$, and $y=0.5$, then the relationship between the social welfare ratio between queue rationing and targeting looks as in Graph 4, with the relative desirability of queues peaking at an intermediate level of the controlled price. Graph 5 employs the same parameter values to show the relative desirability of queues for just the poor individuals. In this case, higher controlled prices diminish the attractiveness of queues to the poor. How can these two graphs be reconciled? Part of the answer is provided in Graph 6, which shows how total output increases as the controlled price increases, as the amount of time spent waiting in queues diminishes.

4. Conclusions

We have demonstrated the possibility that price controls and state-sector queue rationing can be preferable to imperfectly-targeted income subsidies in
providing a social-safety net. The advantage of price controls in targeting subsidies is perhaps greatest in the transitional socialist countries, for two reasons. First, they have familiarity with the administration of price controls and state-owned stores. Second, the measures available for means testing social spending are likely to be very imprecise, and those most in need of subsidies could change quickly throughout the reform period. In a sense, our model presented an optimistic assessment of the ability to target subsidies, in that all truly poor people were identified as poor by the government. In real-world safety nets, some needy individuals "fall through the cracks," not receiving benefits for which they qualify. Taking this possibility into consideration would add to the relative desirability of price controls.

Nevertheless, there are costs to price controls other than those included in our model, and these must be considered in formulating policy. Price controls may be evaded in a variety of ways, from bribes to government officials to theft of the goods (and diversion to free markets) by production, retail or transportation employees. It is unlikely that the rents created by the price controls would then flow to relatively poor people, i.e., the targeting of the price-control safety net could be undermined. A similar problem could result within the framework of the model, if the controlled price does not generate a separating equilibrium, and some rich people acquire price-controlled goods. Another possibility is that the opportunity cost of time (which determines the willingness to wait in line for goods) and overall economic welfare are not highly and positively correlated. (In our model, those with the lowest incomes are also those with the lowest marginal opportunity cost of time.) Again, this would reduce the relative targeting advantage of state-sector price controls. With multiple goods, however, the targeting of price controls can be enhanced by instituting controls only on those goods (generally, basic consumer commodities) that are intensely consumed by the poor.

A further danger with transitional price controls is that they could become permanent, remaining in place even after sufficiently reliable information over economic welfare is available to efficiently implement Western-style targeted subsidies. Perhaps the largest danger is that the state-sector price controls could lead to further restraints on private economic activity. For example, producers may be unwilling to sell to the state stores at the low fixed price. If the state is unwilling to pay the subsidy itself, it might choose to compel producers to supply at low rates, extend price controls to the non-state sector, or prohibit "exports" of the good to non-price controlled regions. Producers might then lose
money, and the state might compel production and low-price sales, or move to
direct state ownership of production facilities. At the extreme, such a
snowballing of controls could unintentionally re-establish a planned economy.\textsuperscript{15} Despite these potential problems, however, price controls have some desirable
features. When the alternatives are themselves far from first best, limited price
controls and queue-rationing within the state sector can offer one element of a
serviceable social-safety net.
References


Graph #1. The ratio of social welfare under queuing (WQ) to social welfare under imperfect government targeting (WT) as a function of the tax on the identified rich.

\[ w_p = 1; \ a = 11; \ v = 0.8; \ \gamma = 0.6; \ P' = 0.5 \]
Graph #2. The ratio of social welfare under queuing (WQ) to social welfare under imperfect government targeting (WT) as a function of the controlled price.
\(w_p = 1; a = 11; v = 0.8; \gamma = 0.6; T = 5\)
Graph # 3. The ratio of welfare of the poor under queuing (WQP) to welfare under imperfect government targeting (WTP) as a function of the tax on the identified rich.

\( w_p = 1; a = 11; \nu = 0.8; \gamma = 0.6; P' = 0.5 \)
Graph # 4. The ratio of social welfare under queuing (WQ) to social welfare under imperfect government targeting (WT) as a function of the controlled price.

\( (w_p = 1; \ a = 6; \ v = 0.9; \ \gamma = 0.5; \ T = 3) \)
Graph # 5. The ratio of welfare of the poor under queuing (WQP) to welfare under imperfect government targeting (WTP) as a function of the controlled price.

\( w_p = 1; a = 6; v = 0.9; \gamma = 0.5; T = 3 \)
Graph # 6. Output as a function of the controlled price.
($w_p = 1; \ a = 6; \ v = 0.9; \ \gamma = 0.5; \ T = 3$)
Endnotes


2. It was reported in mid-1995, for example, that the average Russian family received only 40% of its income from wages at officially-reported jobs. OMRI Daily Digest, No. 132, Part 1, 10 July 1995.

3. Sachs (1993, p. 73), notes that the official unemployment rate in Poland was estimated to overstate actual unemployment by approximately one-third. Of course, the holding of informal jobs by those collecting unemployment benefits is not limited to transitional socialist societies.


6. On local Russian price controls, see, e.g., the discussion in Berkowitz (1996).

7. Murrell, Dunn, and Korsun (forthcoming) argue that the culture of policymaking in transitional societies also tends to favor continued price controls.

8. Barro and Romer (1987) explore situations where profit-maximizing firms might employ a two-part pricing scheme with a zero per-unit charge, using queuing to allocate a capacity-constrained good. They assume, however, that waiting in line is not costly.

9. Weitzman (1977) is an early paper that compares a price system with rationing in meeting a distributional objective, finding that in some circumstances, rationing is preferred. PREL (1996) extends Weitzman’s analysis to include the alternative of a price control, though without parallel markets.


11. Barzel (1974) indicates two factors that make it likely that the poor will be those who acquire goods distributed via price controls and queuing: (1) a high price elasticity of demand and (2) a low income elasticity. He goes on to suggest that those conditions are likely to be met in the case of consumer necessities for which close substitutes are available in free-price, parallel markets.

12. Price controls in socialist societies frequently were accompanied by strict limits on the amount of a good that a single individual could purchase once the front of the queue was reached. For a discussion, see Stahl and Alexeev (1986).

13. Alternatively, it could be assumed that poor people also will be mis-categorized occasionally as being rich. Such an alteration would increase the attractiveness of price
controls relative to targeting.

14. Leitzel (forthcoming) examines the distributional impact of price liberalization when price-controlled goods are diverted from the state to the private sector.

15. There is some evidence that such a snowballing of controls led to the Soviet planned economy in the first instance. See the discussion and references in Leitzel (1995, pp. 6-7).