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PERVASIVE SHORTAGES UNDER SOCIALISM

Andrei Shleifer

Robert Vishny

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ABSTRACT

We present a new theory of pervasive shortages under
socialism, based on the assumption that the planners are self-
interested. Because the planners -- meaning bureaucrats in the
ministries and managers of firms -- cannot keep the official
profits that firms earn, it is in their interest to create
shortages of output and to collect bribes from the rationed
consumers. Unlike official profits, bribes are not turned over
to the state, and so shortages enable the key decision makers who
collect them to profit personally. The theory suggests that an
increase in the official price of a good might reduce output.
The theory also suggests that market socialism is bound to fail
even without computational complexities facing the planners.

Andrei Shleifer
Department of Economics
Harvard University
Littauer Center 315
Cambridge, MA 02138
and NBER

Robert Vishny
Graduate School
 of Business
University of Chicago
1101 East 58th Street
Chicago, IL 60637
and NBER

1. Introduction.

Shortage of goods is the single most pervasive phenomenon in socialist countries. Consumer goods ranging from necessities, such as food, to luxuries, such as cars and gold, as well as many intermediate inputs, are typically in short supply. Kornai (1979) and Weitzman (1984) argue that shortages as opposed to excess supply of goods distinguish socialism from capitalism. In this paper, we offer a new explanation of shortages under socialism.

Standard explanations of shortages of goods under socialism are not completely persuasive[2]. The classical explanation (Lange 1936) argues that shortages result from the temporary difficulties in calculating equilibrium prices, which occur because convergence to equilibrium takes time. It is hard to take this story seriously. In the Soviet Union, shortages of some goods, such as automobiles, have lasted for decades, without any price increases. The planners simply do not raise prices to assure convergence to the market clearing equilibrium.

Second, it is often argued that distributional considerations lead socialist planners to keep down prices of some goods such as food (Weitzman 1977). Although distributional considerations may explain shortages of some goods, such as food and housing, they are hardly a general explanation. Why, for example, has the Soviet Union always experienced a shortage of such luxuries as cars and owner occupied apartments? The government has long been trying to extract the excess savings from the rich, and raising prices of luxuries would have been a natural way of doing this. It does not appear, then, that fairness is the real issue.

A third influential explanation of shortages, offered by Kornai (1979), is that firms

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[2]For an excellent overview of standard explanations, as well as an ingenious new theory, see Rotemberg (1990).

demanding inputs face soft budget constraints and so always want to get anything they possibly can at any price. In Kornai's model, it is not so much that goods are underpriced, but that the income of the buyers is effectively infinite. This model may be appropriate for some intermediate goods. But households face hard budget constraints, and therefore the systematic shortages of many consumer goods remain a puzzle. Moreover, we claim below that the notion that the socialist firm always wants to expand output is incorrect. Our explanation of shortages applies to consumer luxuries and necessities, as well as to intermediate goods.

We argue that the reason for pervasive shortages is self-interested behavior by ministry bureaucrats who set the plan prices and output. These bureaucrats intentionally plan shortages in order to encourage bribes from rationed consumers. If markets cleared, firms in an industry could earn profits, but most of these profits would accrue to the state treasury, not to the firms or the ministries. The key feature of socialism is that the decision makers who determine the prices and output of firms do not, to a first approximation, keep any of these profits. When, in contrast, there is a shortage of a good, the potential customers try to obtain this good by offering bribes and favors to the bureaucrats in the ministry (and to the managers of firms). These bribes tend to be much larger than the share of official profits that the bureaucrats and the managers are allowed to keep. And because these bribes are not official transactions, none of them go to the treasury. As a result, the industry is better off creating a shortage of the goods and collecting the bribes than making official profits it cannot keep. We show that, for a variety of regulatory schemes, socialist firms will always produce a level of output entailing a shortage at official prices.

Our paper is an application of the general principles of rent-seeking, introduced by

Tullock (1967), Krueger (1974), Posner (1975), and Bhagwati (1982). The literature on central planning has long recognized that price distortions can lead to Tullock-like welfare losses as people waste time queueing for the goods (Stahl and Alexeev 1985). This literature has taken underpricing as exogenous, however. The idea of our paper is that underpricing and shortages are the result of the rational choice of the key decision makers, who collect the rents that result from shortages. Although we focus on shortages in socialist countries, the point that bureaucrats create artificial barriers to private transactions in order to collect bribes is more general. Many laws and regulations in less developed and even developed countries have the same effect. It seemed useful to us to bring out the implications of this general principle for the most pervasive feature of socialism: the shortage of goods.

The next section of the paper discusses the objectives of a socialist industry and presents our explanation of pervasive shortages. Section 3 discusses some specific types of restrictions that the center might impose on the socialist industry to control bribery and raise output. We show how difficult it is to avoid shortages. Section 4 concludes with some general implications of this theory for socialist and market economies, and paricularly for market socialism.

2. The objective function of a socialist industry.

To describe its objective function, we must first define what we mean by "a socialist industry." We define a socialist industry as the combination of the firms in the industry and the ministry that supervises them. We assume that this industry has some demand curve and some cost curve. The objective function of this industry is the objective function of the bureaucrats

in the ministry and the managers of firms. Importantly, we assume that the bureaucrats and the managers collude to pursue their common objective function. As a result, we do not focus on the potential conflicts between the bureaucrats and the managers. Our view is that the bureaucrats in the ministry and the managers of the firm have the same broad objective -- namely to enrich themselves at the expense of their customers -- and they bargain efficiently on how to divide the surplus. One example of this is that the ministry gives the orders and the firms just follow them as best they can.

Given this view of a socialist industry, it is not important whether it consists of just one or of several firms. Even if there are several firms, the bureaucrats in the ministry will enforce collusion between them, and they will act as a monopolist. In particular, the bureaucrats will not allow these firms to compete for bribes. This assumption is quite natural: the ministry has a great deal of control over prices and outputs of the firms it supervises, and it is in the long run interest of the managers of the firms as well to make sure that the monopoly allocation is sustained. In short, we are assuming that the industry consists of one decision maker, who expresses the combined interest of the bureaucrats and the managers, and whom we shall call "the industry."

What is the objective function of this industry? Typically, the industry does not keep any of the profits it earns from selling its output at official prices, since the tax rate by the central authorities is close to 100 percent. The argument made to justify the expropriation of profits is that the state owns the firms and so is entitled to the profits. Even if the industry can keep some of the profits, virtually none of them accrue to the managers and to the ministry bureaucrats. Official profits are of no value to the decision-makers. Such taxation of profits

implies, in particular, that the industry has no interest in charging an official price equal to the monopoly price and supplying the monopoly output. Nor does the industry have any interest in producing a competitive output at a competitive price, since the profits on the inframarginal units again accrue to the state. A socialist industry gets no or virtually no benefits from earning legal profits.

The only way that the industry can get anything for itself is by having a shortage of the good it produces and then collecting the rents from the quantity-constrained buyers in the form of bribes. When there is a shortage, buyers' valuation of the good exceeds the official price, and so they are willing to stand in line, lobby the firm and the ministry, and most importantly pay bribes to get the good. Of course, to the extent they lobby and stand in line, the buyers do not benefit the industry. But to the extent that the shortage brings in bribes, the industry benefits from a shortage. The advantage of bribes over profits is of course that bribes are hidden and therefore are not turned over to the treasury. As long as the tax rate on official profits is high enough that the managers and the bureaucrats would prefer to collect the bribes even despite all the waste associated with queueing and lobbying, they would try to create a shortage. The industry's objective, briefly stated, is to maximize the bribes.

If we denote the inverse demand curve of the industry by $D(Q)$ and the official price by P, the objective function of the industry is given by

(1) $D(Q)*Q - P*Q$

This objective function, for an arbitrary P and Q, is given by the rectangle in Figure 1. We are assuming that the true price the industry charges the buyers is $D(Q)$ -- the reservation price of the marginal buyer -- and that this price consists of two parts. The first is the official price P,
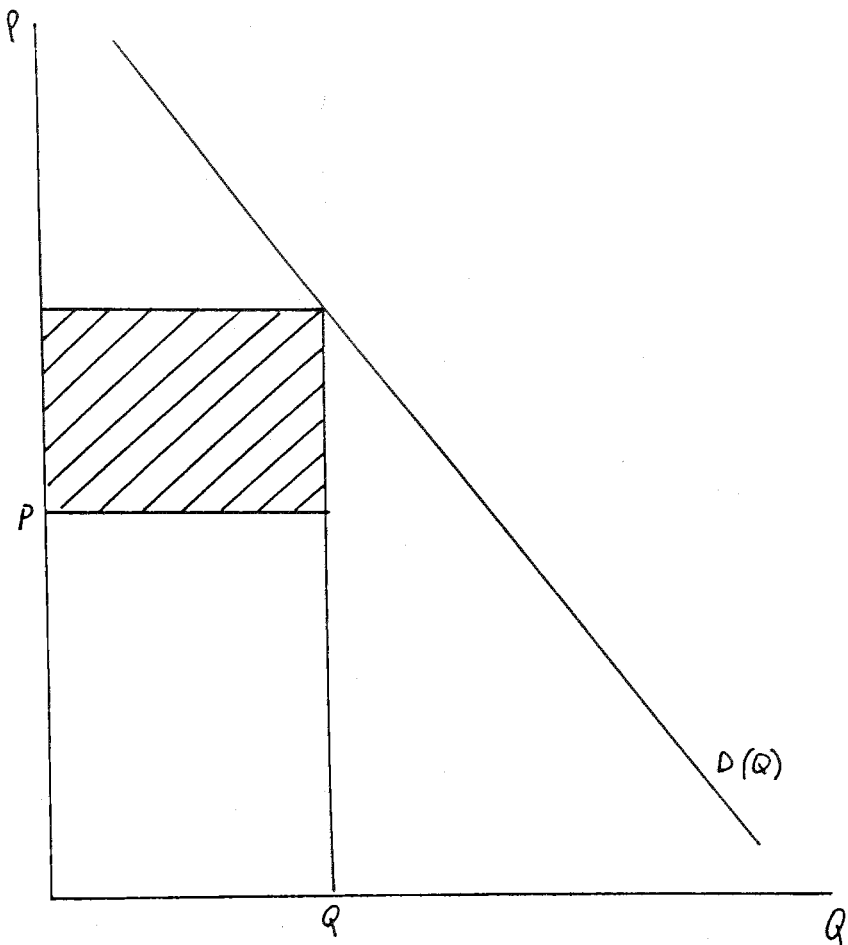
FIGURE 1

and the second is the bribe $D(Q) - P$. The rents that this industry collects are the product of the bribe per unit of output times the output.

There is a simple way to think of this objective function. The first term, $D(Q)*Q$ is simply the revenue that any industry would collect if the market cleared at the output Q, which we will denote by $R(Q)$. However, the cost to a socialist industry is very different from the cost to a private industry. The real cost function does not even enter the objective function (1). As Kornai has pointed out, the socialist industry does not care at all about the cost of its inputs, since these inputs are effectively paid for by the state. With a close to 100 percent profits tax, the official cost of the inputs only trivially affects the fortunes of the bureaucrats and the managers in the industry. Instead, the official revenues of the firm, $P*Q$, are the cost to the managers and the bureaucrats[3]. The higher the official price for its output, the lower are the bribes that the industry can collect per unit of output, and so the higher the effective cost of this output. This is the key assumption that drives our view of shortage: the official revenues are a drain to the bureaucrats and managers; they are just like the production cost or an excise tax to a private firm. Once this point is recognized, the objective function of the industry given by (1) is just the revenue minus the cost.

In writing down this objective function, we are making several specific assumptions. First, we are assuming that bribes are collected efficiently. Customers don't stand in line or

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[3]We make the assumption that the true costs do not enter the objective function for realism. We could easily assume that these costs in fact enter the objective function because some or all of the costs have to be paid in bribes, or because the industry faces some profitability constraints (as we assume below). These assumptions will change the exact solution to the industry's problem. However, the result that the industry will try to create a shortage is preserved under all these alternative assumptions.

inefficiently lobby the producers, they just pay the bribe $D(Q)$ - P. This assumption is obviously unrealistic, since we observe queues, lobbying and other inefficient behavior as well as bribes in socialist countries. We do not need such a strong assumption, however. We need to assume that the tax rate on official profits is high enough that the industry tries to collect bribes rather than official profits. Even if there are some restrictions on bribery that lead to queues in equilibrium, the objective function will be similar to (1), and we will still get the result that the industry wants to create a shortage.

Second, we are assuming that there is no price discrimination in bribes. Every customer who wants the good pays $D(Q)$ - P. If price discrimination in bribes were perfect, every customer would pay his reservation price in the form of bribes, and there would be no shortage at the official price. But as long as price discrimination is not perfect, there will be a shortage. In section 3, we present an example in which the industry imperfectly price discriminates between buyers by setting high bribes but allowing some queues as well.

Third, as we already mentioned, the ministry precludes bribe competition between producers, so in equilibrium bribes are chosen monopolistically. If bribes were chosen competitively, producers would cut bribes competitively until they reached 0. Unlike market economies, however, where price competition is intense, socialist economies have a natural collusion device, namely the ministries.

Once the objective function (1) is granted, our main point follows immediately. The industry maximizes the value of the bribes, and this value is zero if markets clear. The only way this industry can get anything to itself -- meaning to its bureaucrats and managers -- is by having a combination of the quantity and the official price that creates a shortage. Only if there

is a shortage will the value of bribes be positive. Shortage is thus not just the coincident consequence of the difficulty of socialist calculation; it is the most generic consequence of the true objectives of socialist industries.

Figure 2 illustrates what an unrestrained socialist industry would like to do. Differentiating (1) with respect to Q holding the official price constant, we obtain the first order condition for the industry for the case where the official price is given exogenously:

(2) $R'(Q) = P$.

If the industry takes the price as exogenous, it will set the marginal revenue equal to the official price. This result is immediately obvious once it is recognized that the official price is the marginal cost of the socialist industry. Equation (2) explains the indifference curves of the socialist industry presented in Figure 2. These indifference curves peak our at their intersection with the marginal revenue curve, and decline on both sides of it. Figure 2 illustrates that if the industry could pick both its price and the quantity it produces, it would set the price equal to zero (to minimize what it perceives to be its marginal cost), and set the output at the point where the marginal revenue from producing more is equal to zero. Again, this result is obvious once it is realized that the official price is the marginal cost of the industry.

More generally, Figure 2 illustrates that starting from any market clearing price/output combination, the industry always wants to cut both its official price and its output. The industry wants to cut its price because lower official prices for a given output simply raise the market clearing bribes. And the industry wants to cut its output at a given price for precisely the same reason that monopoly wants to cut output from the competitive level at a given marginal cost: marginal revenue curve is to the left of the demand curve. By cutting output from the market
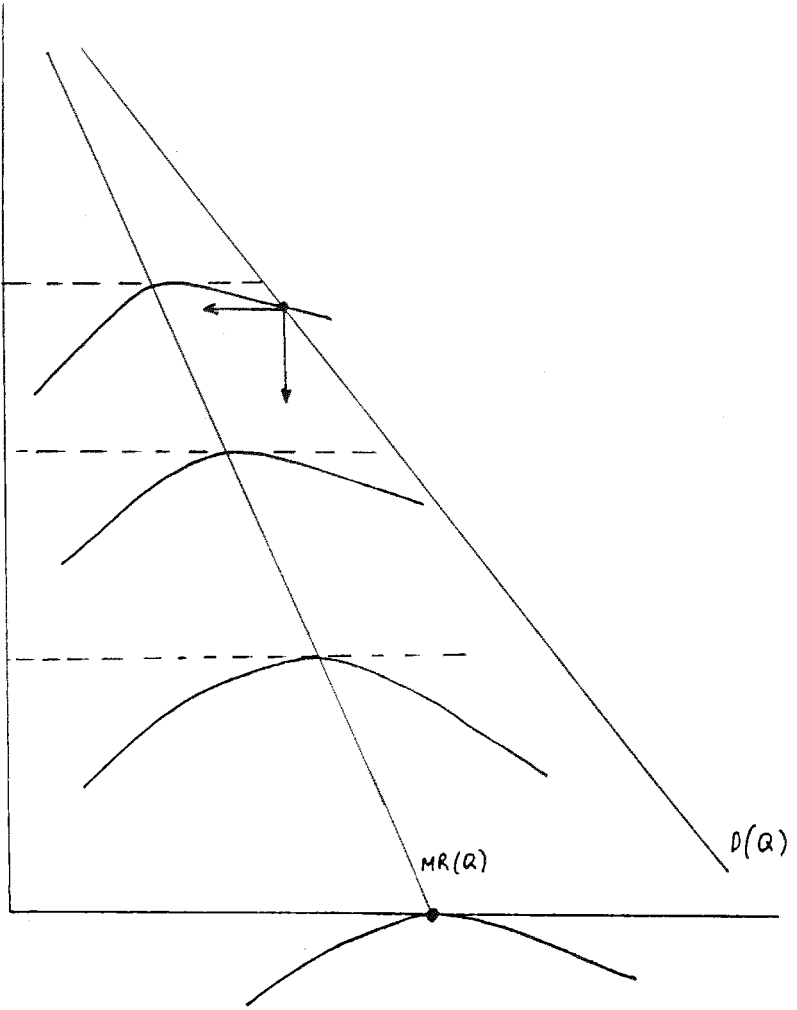
$D(Q)$

$MR(Q)$

FIGURE 2

clearing level, the socialist industry increases the value of the rents it collects. This socialist industry always wants to move southwest from the market clearing position, i.e. to create a shortage. If the plan imposed from the center is so tight as to force the industry to be on the demand curve, the market would clear and no bribes would be collected. But if the socialist industry has any discretion whatsoever to renegotiate the plan so as to move southwest from a point on the demand curve, it would do so and thereby create a shortage. This is the central proposition of this paper.

This result casts doubt on Kornai's (1979) argument that because socialist firms do not pay for their inputs, they have an incentive to expand ad infinitum. Perhaps they have an incentive to get all the inputs they can lay their hands on, since they don't pay for them and maybe can sell them. But output expansion is not costless to socialist firms, because it limits their ability to collect bribes. As these firms expand, marginal revenue falls and at some point it falls below the true marginal cost to these firms, which is the official price. Since socialist firms have a well-defined objective of maximizing the value of bribes, they have the incentive to restrict output to the level where the marginal revenue equals to the marginal cost they face; and this output certainly is not infinite.

The message of this section, then, is that a socialist industry has a very strong incentive to create a shortage. So long as it has some discretion over its price and output, it will do so. Of course, we do not really believe that the socialist industry will get its maximum bribes and charge a zero official price. The central authorities will then run an enormous deficit as well as face enormous pressure from consumers to interfere in some ways. In the next section, we will discuss some plausible forms of such interference and their implications.

3. Restrictions on the industry.

This section does not describe the optimal regulatory scheme for the central planners. The optimal regulatory scheme would probably let the industry keep enough of its profits that it chooses to collect profits on the official market rather than in the form of bribes. We are also reluctant to pursue the optimal regulatory framework because we do not believe that this is the true objective of the central planners. As we have argued, bureaucrats in the ministries and higher up share in the bribes collected by the industry. As a result, to a significant extent they are "captured" by the industry and so have no incentive to eliminate the bribes (Stigler 1972). Nonetheless, it is plausible to think that central authorities are under some political pressure from the consumers, especially the consumers of intermediate goods, to limit the shortages. They are probably also under budgetary pressure to collect some official profits. In these cases, they might try to impose some constraints on the industry. In this section, we examine two interesting types of constraints: price setting by the center and minimum profit requirements.

Price setting by the center

What happens when the center sets the price for the industry is clear from equation (2), and is illustrated in Figure 3. The industry sets output at the point where the marginal revenue is equal to the official price. Because output at this point is below demand, there is a shortage and the industry collects positive bribes. In this case, the industry would want the price to be set at as low a level as possible, since the bribes are maximized at the zero (or even negative) price. But even at higher prices, there are shortages. The center could set the price equal to the marginal revenue at the competitive output level. In this case, the industry would produce
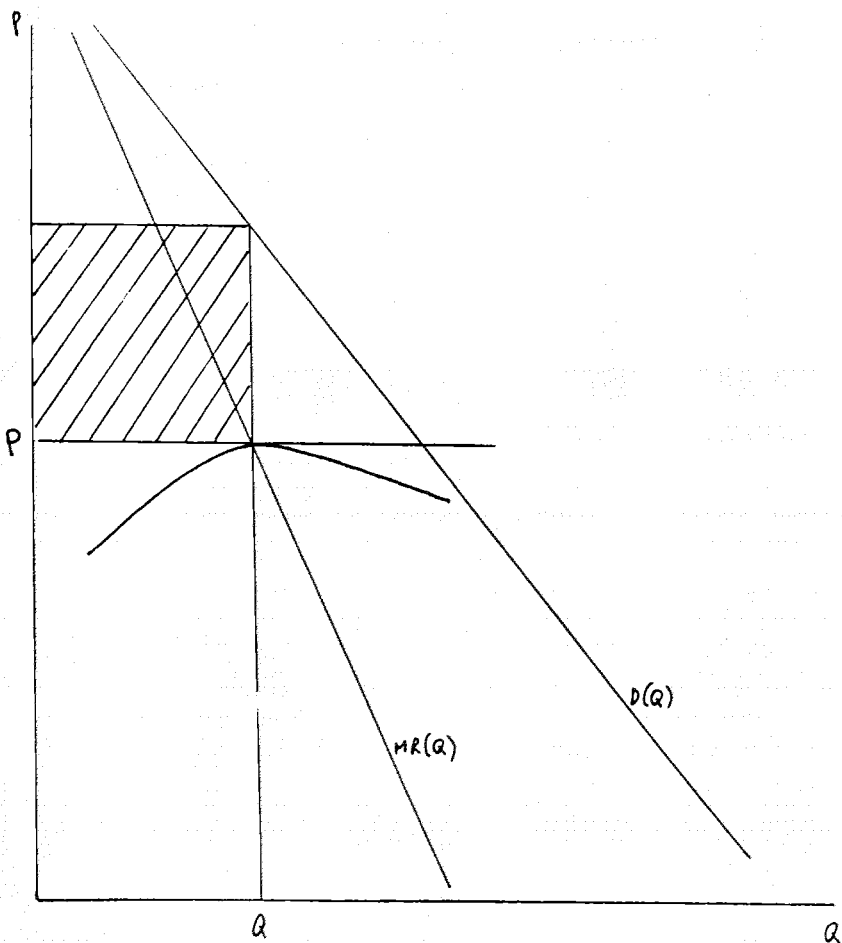
FIGURE 3

the efficient output level, the effective price (including the bribe) would be equal to the market clearing price, but the official price would be below that level.

What happens when central authorities raise prices to reduce shortages? In this model, the effect of raising prices is to reduce rather than to raise output, since a higher marginal revenue corresponds to a lower output. The reason is that the official price of output is the marginal cost to the socialist industry. Raising official prices is just like raising the marginal cost, and so leads to a reduction in output. Because higher official prices lead to losses of bribes on the marginal units, it pays the industry to cut its output. An official price increase thus has the perverse effect of reducing supply as the industry struggles to keep up the value of the bribes. A price increase does not solve the problem of shortages.

Of course, the center could address this problem by imposing both the price and the minimum quota that the industry must sell. If this quota is high enough to put the industry on its demand curve, there is no way it can collect bribes (unless it can destroy output -- which sometimes happens in the USSR). If, however, there is a shortage at the official quota output, the industry can collect some bribes. It can try to collect a bribe from each consumer, equal to the difference between the marginal valuation at the quota output and the official price at that output. Alternatively, the industry can try to price discriminate between consumers, collecting bribes from those with high value of time, and leaving those with low value of time standing in line. In this case, we will observe both bribes and queues in equilibrium. The analysis of the various price discrimination devices that the industry can employ is beyond the scope of this paper. However, it is worth noting that if the industry must meet an output quota, output obviously will not fall in response to a price increase.

Minimum profit constraints

Central authorities might try to limit bribery by imposing a minimum profit constraint on the industry, but letting it choose the price and the output. We have already shown that, if left to its own devices, the industry would charge a zero official price and collect huge bribes. It would consequently run a large loss on the official account, which, with a soft budget constraint, it does not care about. One way that the central authorities can raise prices indirectly is to harden the budget constraint.

Suppose the center demands from the industry an official account profit of at least A:

(3) $P*Q - C(Q) > A$,

where $C(Q)$ denotes the official cost of producing the output Q. The minimum required profit could be zero, but it also could be positive or negative.

If we substitute (3) into (1), the objective of the industry becomes to maximize

(4) $D(Q)*Q - C(Q) - A$.

Taking the first order condition, we find that at the maximum level of bribes, it must be that:

(5) $R'(Q) = C'(Q)$,

i.e., the marginal revenue is equal to the marginal official cost. The industry subject to a profit constraint always chooses monopoly output regardless of the level of the constraint (see Figure 4). It then chooses the lowest price for which its official profits are exactly equal to the amount that it has to earn. The effective price to the consumers is the monopoly price, but it is split between the official price that assures the industry the required level of profits and the bribe.

Hardening the budget constraint in this model raises official prices and reduces shortages. The reason for lower shortages, however, is not a higher output but a higher price: the output
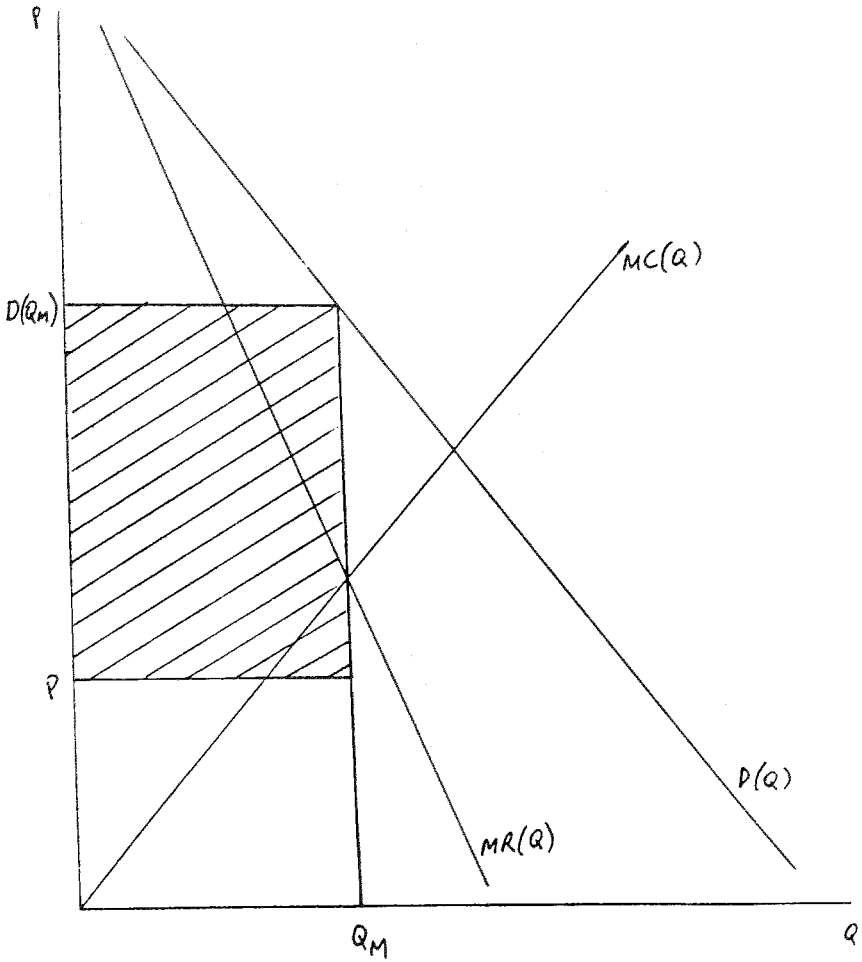
P

D(Q_M)

P

MC(Q)

D(Q)

MR(Q)

Q_M

Q

FIGURE 4

stays the same at the monopoly level. A harder budget constraint only redistributes profits between the industry and the treasury; it does not affect output. If the central authorities want a high output, they should set a low official price and let the firm run large losses on the official account. This sometimes happens in socialist countries.

4. Conclusion.

We have presented a model of shortages in socialist economies intentionally created by an industry -- meaning bureaucrats in the ministry and managers of firms -- trying to collect rents in the form of bribes when they cannot keep the official profits. This theory suggests that because public ownership of firms and the resulting expropriation of official profits is endemic to socialist economies, so will be the shortages. In contrast, because firms and their profits are owned privately under capitalism, capitalist producers would always wish to collect "official" profits by charging higher "official" prices. At a given price, a capitalist producers would want to sell more, leading to what Weitzman (1984) calls "excess supply" of goods. Our model thus accords well with the central distinction between capitalism and socialism stressed by Kornai and Weitzman: "excess supply" of goods under capitalism and excess demand under socialism.

The issue of who keeps the profits is germane to publicly held firms in market economies as well. It is often said that public monopolies underprice output and so create shortages. In many countries with public phone companies, such as Brazil and France, it takes a long time to get a phone line, and a bribe helps to get it faster. Since public monopolies and their managers cannot keep a large share of the profits they generate, it is not surprising that they create a situation so conducive to the collection of bribes and favors more generally.

The major theme of our analysis is that the planners socialist economies are self-interested. This assumption contrasts sharply with the one usually made in the debate on market socialism. Since Barone (1898), both opponents and advocates of market socialism have assumed a benevolent central planner. As a result, the market socialism literature has focused on the complexity of the computational task facing this benevolent planner (e.g., Lange 1936). If, contrary to the assumption of this literature, central planners are self-interested, then the possibility of efficient resource allocation under market socialism is in much greater doubt. For, as we have shown, it is in the interest of such planners to cut output and to create price distortions. In direct contrast to Lange's (1936) claim that monopolistic output restrictions are the likely product of market economies, we have shown that such restrictions are likely to take place under socialism. Even without computational complexities, socialism with self-interested planners will not result in efficient resource allocation.

How big the inefficiencies are depends largely on how the rectangles resulting from shortages are allocated. If the rectangles are fully collected as bribes, as we have generally assumed in this paper, then welfare losses will be small. If, however, these rectangles are largely wasted in queues and other inefficient rent-seeking, then the welfare losses from shortages will be much higher. The time spent in queues will largely be taken out of work. Moreover, when procuring goods takes time, people might have a very low incentive to work rather than look for goods, which of course leads to lower output. If a follow-up paper (Shleifer and Vishny 1991), we argue that the general equilibrium effects of inefficient rent-seeking, such as queueing, may be much larger than even the Tullock rectangles would suggest.

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