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Many observers of the Russian scene, including the author of this paper, have noticed the extent to which reforms are being blocked or channeled in different directions by local leaders, and there is much discussion at present about what are the primary objectives of these local leaders. The author conjectures that it is the presence of a "consumption bias", i.e., a tendency for vote-maximizing local politicians to set state-sector prices at a level which enhances consumer welfare even when this means foregoing an increment of locally generated profits.

For a more detailed economic modeling analysis, readers are referred to Daniel Berkowitz, "Price Liberalization and Local Resistance: A Theory for Economies in Transition" (Feb. 1993), copies of which are available from the National Council on request.
Executive Summary

Local Support for Market Reform:
Implications of a Consumption Bias

April, 1993

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In January of 1992 the President of the Russian Federation, Boris Yeltsin, attempted to end one of the major vestiges of the command economy: price controls. In a presidential decree, approximately 90% of retail prices and 80% of wholesale price were released from administrative control (Bush 1991, p. 27; Decree, 1991). A reason for this radical policy is that broad price controls place a major drain on the federal and sub-national budgets. More importantly, a flexible price system provides information about relative scarcities of goods and services and, thus, is critical for the transition to a market economy.

Despite the advantages of a flexible price system, many local governments (local soviets) ordered their retail enterprises and organizations to maintain prices below market-clearing levels. The objective of this paper is to develop a simple framework for understanding the economic reasons for local resistance to or support for a price liberalization in state retail stores. The paper develops a simple model which incorporates several important features of the contemporary Russian local environment. First, in the local consumer market there is both state and private provision. The local government regulates the state sector price and entrepreneurs freely set the private sector price. Second, the local government chooses a price regulation policy in order to maximize the votes it will receive from its constituents. Finally, this paper argues that local governments are driven by a "consumption bias" and, at the margin, are willing to forego a unit of locally generated state firm profit in order to gain an additional unit of local consumer welfare.
The existence of a consumption bias implies that the level of private sector development is an important factor in determining whether a local government will support or resist a state sector price liberalization in the consumer market. When the private sector is poorly developed and most of the productive capacity is under the jurisdiction of the local government, enforcement of low state sector prices effectively promotes consumer welfare. In this case, a local government would tend to resist a liberalization and rationing in the state sector would persist. However, when the private sector is sufficiently developed, local administrators will tend to favor a liberalization. An effective liberalization would induce the private sector to cut its prices and increase its output and would eliminate rationing in the state sector.

I am indebted to Martha Banwell, Michael Conlin, Raymond Deneckere, Theodore Friedgut and Jan Svejnar for their thoughtful comments. This research was supported by the National Council for Soviet and East European Research under contract 807-09.
Introduction

In January of 1992 the President of the Russian Federation, Boris Yeltsin, attempted to end one of the major vestiges of the command economy: price controls. In a presidential decree, approximately 90% of retail prices and 80% of wholesale price were released from administrative control (Bush 1991, p.27; Decree, 1991). A reason for this radical policy is that broad price controls place a major drain on the federal and sub-national budgets. More importantly, a flexible price system provides information about relative scarcities of goods and services and, thus, is critical for the transition to a market economy.

Despite the advantages of a flexible price system, many local governments\(^1\) (from now on denoted local soviets) ordered their retail enterprises and organizations to maintain prices below market-clearing levels. When price liberalization began, the Russian federal government established regulated prices for fourteen basic food products, such as salt, sugar, bread and dairy products. Funds were allocated to local governments to subsidize state retail enterprises selling these basic commodities. While most local governments did not receive sufficient funding to support these low prices, "in many regions the mandatory list was expanded at the initiative of the local administration." (Demchenko, 1992a, p.29) During the first half of 1992, prices of some 27 food groups were controlled by local authorities. In the second quarter of 1992, the Russian federal government gradually began to lift these price restrictions and phased its financing of subsidies. However, most local governments continued the subsidies with funds from local budgets. (Demchenko, 1992a, p.29)

The objective of this paper is to develop a simple framework for understanding the economic reasons for local resistance to or support for a price liberalization in state retail stores. A local government supports a price liberalization when it allows the price of goods sold in its state
stores to rise to a level at which demand is no greater than supply. A local government resists liberalization when it sets a price in its state stores at which demand exceeds supply.

The model incorporates several important features of the contemporary Russian local environment. First, in the local consumer market there is both state and private provision. The local government regulates the state sector price and entrepreneurs freely set the private sector price. Second, because of the increased importance of voting and grass roots interest groups, local governments have become more concerned with constituent welfare. Thus, this paper models local price regulation as being determined by a vote-maximizing politician. Specifically, a local politician maximizes his expected votes by maximizing both consumer welfare and state enterprise profits in the local market. Thus, consumers and the state firm generally have conflicting interests with respect to regulatory policy. The lower the state sector price ceiling, the higher is consumer welfare and the lower are state firm profits. Finally, this paper argues that local governments are driven by a "consumption bias" and, at the margin, are willing to forego a unit of locally generated state firm profit in order to gain an additional unit of local consumer welfare.

The existence of a consumption bias implies that the level of private sector development is an important factor in determining whether a local government will support or resist a state sector price liberalization in the consumer market. When the private sector is poorly developed and most of the productive capacity is under the jurisdiction of the local government, enforcement of low state sector prices effectively promotes consumer welfare. In this case, a local government would tend to resist a liberalization and rationing in the state sector would persist. However, when the private sector is sufficiently developed, local administrators will
tend to favor a liberalization. An effective liberalization would induce the private sector to cut its prices and increase its output and would eliminate rationing in the state sector.

The model in this paper is related to two literatures. Papers by Rees (1984, section 7.1), Bos (1986), Hagen (1979), Harris and Wiens (1980), Beato and Mas-Colell (1984) analyze how a public (state) firm in competition with a private firm can improve efficiency in an imperfectly competitive market. These contributions analyze the extent to which a public firm should optimally deviate from marginal cost pricing under different assumptions regarding the timing of the public/private interaction. Peltzman (1976) analyzes pricing policy for a monopoly state sector firm when government regulators try to maximize votes. In all of these studies, markets clear. This paper extends these works by incorporating disequilibrium pricing.

The model also uses the literature on price competition under capacity constraints that began with Edgeworth (1897) and continues with Levitan and Shubik (1972), Kreps and Scheinkman (1983) and Brock and Scheinkman (1985) in the context of a supergame. In these papers, all firms maximize profits. In this paper, although a private firm maximizes profit, the state firm sets a vote maximizing price.

The paper is organized in the following manner: Section I summarizes current regional developments in Russia and argues in favor of a consumption bias. Section II sets up a simple model for understanding how a local government which is driven by a consumption bias maximizes votes by setting an appropriate state sector price. Section III analyzes the implications of private provision in the consumer market and Section IV concludes.
I. Local Government Incentives

During the Soviet period local governments (local soviets) had jurisdiction over enterprises and organizations that directly influenced the local standard of living. Between 1976 and 1989, 77%-89% of local budgetary expenditures were allocated to the social consumption fund, which includes financing for restaurants, retail shops, light (consumer good) industries as well as housing, education and public health (see Berkowitz and Mitchneck, 1993, pp. 4-6 and Wallich 1992). Thus, local governments were responsible for overseeing pricing, sales, payments and tax collections in those state enterprises and organizations which provided consumer goods and services to their constituents.

Even though local governments managed much of the state provision of consumer goods and services, evidence suggests that during the pre-perestroika period local governments were not under strong pressure to advance the local standard of living. During this period popular voting for members of the local soviets was a pro-forma exercise which often legitimized candidates chosen by local Party officials. Under the system of dual subordination, local soviets were responsible for fulfilling the commands issued by both higher level ministerial officials and members of higher level soviets. Local soviets were in principle responsible to their constituents. However, since spending and hiring decisions in the local soviets were largely controlled by higher level organizations (Hahn, 1991, p.93), local soviets often worked to fulfill projects and planned quotas that were detrimental to their constituents (see Kolomiychenko and Parotikov, 1989; Pabat, 1985).

In the perestroika period and since the demise of the Soviet Union, local soviets in Russia still have jurisdiction over state enterprises and organizations which provide basic consumer goods and services. In the
current system, oblasts have received more responsibility for managing small businesses, light industries and consumer enterprises. The lower level cities and rayons now have the responsibility both to regulate prices in their consumer enterprises and organizations and to finance consumer price subsidies (Wallich, 1992). Furthermore, with the rise of competitive multi-party elections, local governments are under more pressure to regulate their enterprises in a fashion which advances the local standard of living.

The extent to which voting has forced local governments to represent their constituent's interests is a matter of debate. As Jeffrey Hahn points out, the elections to local offices in March 1990:

...were held at a time when local control still rested largely with local Party organization and those dependent on it. It was also held in the absence of multi-party competition leaving voters with little to guide their choices among a large number of candidates competing in a large number of districts often over the course of several elections. (Hahn 1992, pp.4-5)

Hahn further argues that local government resistance to market reforms does not imply that local governments do not represent their constituents.

Many critics of the soviets contend that the 1990 elections did not ... accurately reflect voters' preferences because they were manipulated by the existing authorities. This view may have some merit, but there was little evidence of widespread cheating and it ignores the possibility that many people ...may have reservations about what the democratic movement would mean for them. Arguments that the soviets are "ineffective" because they resist policies made at the center obscure the fact that many voters are unhappy with these policies. (Hahn 1992, p.10)

Despite these caveats, the local environment in Russia has changed fundamentally. The broad direction of change implies that many local deputies must pay more attention to the voters that elected them as well higher level ministerial and governmental officials. The rest of this paper analyzes the implications of this change for local price regulation.
II. Local Price Regulation in the Absence of Private Provision

There are three sets of actors in local government who could regulate state sector prices: local deputies, the executive committee and the local department heads and administrators. The local deputies are most sensitive to constituent opinions since they are elected. Members of the local executive committee, basically the hired managers of the region's branches, are to a large extent insulated from voter pressure since in many regions they are no longer elected. Finally, the local department heads and administrators are unelected officials. Each of these groups has different objectives and even though the local deputies are formally sovereign, the members of the local executive committee and the local department heads and administrators can obstruct the decisions made by the deputies.

In what follows, it is assumed that local regulators, be they members of executive committees, departments or administrative units, implement regulations passed by local deputies. Local deputies choose a price regulation which maximizes the number of votes that they would receive from their constituents in the next election.

To capture this situation, first consider a local market in which there is only state sector provision in the consumer market. In particular, the state enterprise is regulated by the local government and can sell up to $k_s$ units of a homogeneous consumer good which has a constant unit cost, $c_s$. For simplicity, market demand for the consumer good is described by the linear function $P(q_s) = p_s = a - q_s$, where $q_s$ denotes market demand and $P(q) = p_s$ denotes the marginal consumer's willingness to pay (i.e. reservation price) for a unit of the consumer good.

This local market is illustrated in figure 1. The financial variables, price ($p_s$) and state sector unit cost ($c_s$), are on the vertical axis and the physical variables, state sector capacity ($k_s$), market demand ($q_s$) and
sales \( (z_s) \), are on the horizontal axis. Segment EEGD represents the market inverse demand curve, \( P(q_s) \) and the segment HIGk_s represents the state firm's supply curve. To ensure that the state firm is viable, it is assumed that the state firm can earn a profit when it sells all of its capacity:

\[
P(k_s) = a - k_s > c_s
\]  

(A1)

The price chosen by a local regulator determines state sector sales in the following fashion. First, any state sector price, \( p_s \), induces market demand for state good, \( q_s \):

\[
q_s = a - p_s
\]  

(2.1)

Thus, sales, \( z_s \), is the minimum of capacity and market demand:

\[
z_s = \min \{k_s, a - p_s\}
\]  

(2.2)

By inspection of eq. (2.2) there are three kinds of prices that the state firm can charge. When \( p_s > a - k_s \), market demand is less than supply and the state enterprise charges an excess capacity price. Any price above point F in figure 1 is an excess capacity price. When \( p_s = P(k_s) = a - k_s \), supply equals demand and the state enterprise charges the competitive price (point F in figure 1). Finally, when \( p_s < a - k_s \), market demand exceeds supply and the state enterprise charges a ration price. Any price below point F in figure 1 induces rationing.

To determine the vote maximizing state sector price, consider point B in figure 1. Point B lies on the market demand curve and corresponds to the excess capacity price and quantity pair \( \{p^b_s, q^b_s\} \). By setting this excess capacity price, \( p^b_s \), local regulators effect both consumer welfare and state enterprise profits. Consumer surplus is the area of triangle XBE:

\[
\text{Consumer surplus} = .5(a - p^b_s)^2
\]  

(2.3)

By inspection of eq. (2.3), consumer surplus increases for any small cut in the state price. This holds for two reasons. First, all consumers who
buy the good at the initial price $p^b_s$, now get a discount. Second, a lower price means that additional consumers are willing to buy the state good. And, since there is excess capacity, these additional consumers can obtain the state good for a sufficiently small price cut. Thus, if a local government represented consumer interests only, it would always cut an excess capacity price.

When the state firm charges excess capacity price $p^b_s$, profit is the differential between price and cost times sales:

$$\text{state profit} = (p^b_s - c_s)(a - p^b_s) \quad (2.4)$$

The area of rectangle HCBA in figure 1 represents state profit. Increased state profit serves the interests of the managers and shareholders in the state firm. Furthermore, the share of state enterprise profits that flow into the local budget could be used to finance local projects.

A vote maximizing price takes into account the interests of consumers as well as state sector managers, shareholders and the local budget. For these reasons, the vote function is written as:

$$V = V(\text{Consumer surplus, state profit}) \quad (2.5)$$

$V$ denotes votes in the next election. Clearly, $V$ is increasing in both consumer surplus and state profit.

When the local government has a consumption bias, then it believes that an increase in consumer surplus attracts more votes than an increase in state profit. The assumption of a consumption bias captures two important features of the current local environment. First, voting has become more important. Thus, local deputies must be more responsive to their constituents, the majority of whom are simple consumers. Second, local enterprises have become a much weaker tax base. Local governments in Russia are having an increasingly difficult time collecting taxes from their enterprises because of the rise in inter-enterprise arrears (see Ickes and
Ryterman, 1992) and because much of the collection is controlled by non-local administrators. 7

A vote function which operationalizes a consumption bias is:

\[ V = V( (1 - \lambda) \text{Consumer surplus} + \lambda \text{state profit} ) \]  

(2.6)

where \( 0 \leq \lambda < .5 \)

The existence of a consumption bias has several implications for price regulation in a local market which are summarized in the following two propositions.

**Proposition 1.** Suppose there is no private provision. If a local government has a consumption bias, then it never sets an excess capacity price.

**Proposition 2.** Suppose there is no private provision. If a local government has a consumption bias and has a break-even constraint, then the vote maximizing price is \( p_s = c_s \).

The arguments for these results are as follows. If the state set an excess capacity price, then a small cut in the state price would always increase consumer welfare. The existence of a consumption bias implies that the potential loss in state profits is more than offset by a gain in consumer welfare. Therefore, the local government gains votes by cutting any excess capacity price down to the competitive price, \( P(k_s) \), at which supply equals demand. The competitive price-quantity pair is point G in figure 1.

By proposition 2, the local government sets the ration price \( p_s = c_s \). If the local government set the competitive price shown, then supply would equal demand and there would be no rationing in the consumer market. In this case, consumer surplus is the area of triangle FEG and state profit is the area of rectangle FGHI. However, any cut in the state price induces a
one-to-one transfer of social surplus from state firm profit to consumer surplus. Thus, a local government driven by a consumption bias would discount its price to the minimal level and thus transfer all of its potential profit, rectangle FGHI, to consumers.⁹ A plausible minimal level under the current conditions of self-financing in enterprises is the price which just covers costs.¹⁰

This section has argued in the context of a simple model that a local government resists market reform and sets a ration price when it is driven by a consumption bias and when there is no private provision. The next section incorporates private provision into the analysis.

### III. Local Price Regulation with Private Provision

Local governments in Russia have always depended upon private provision in the consumer market. Private producers are significant suppliers of food as well as clothing, housing construction, handicrafts, small electronics and repair services. This section argues that the capacity of the local private sector to produce goods may induce a local government to abandon rationing and thus support a state sector price liberalization.

To capture the impact of private provision, consider a local market with a capacity profile, \( k = \{k_s, k_p\} \), in which \( k_s \) and \( k_p \) are components controlled by the local government and a private entrepreneur. The state and private firms can sell up to \( k_s \) and \( k_p \) units of a consumer good at a constant per unit cost and market inverse demand remains \( P(q_s + q_p) \). The state enterprise has no cost advantage: \( c_s \geq c_p \). Finally, to ensure viability, it is assumed that both firms can earn a profit when all capacity is sold:

\[
P(k_s + k_p) = a - k_s - k_p > c_s > c_p \geq 0 \tag{A.2}
\]

where \( P(k_s + k_p) \) denotes the competitive price.
FIGURE 2A
Private Market when $p_s = c_s$, $c_p = 0$. 
FIGURE 2B
Private Market when $p_s = c_s$, $c_p = 0$. 
To draw a sharp distinction between the state and private firms, it is assumed that the local government cannot regulate the private firm. Thus, while vote maximizing politicians supply price regulation for the state firm, the private firm maximizes its profits. The next proposition argues that a profit maximizing private firm sets a price no lower than the competitive price, \( P(k_s + k_p) \).

**Proposition 3.** The private firm sets \( p_p \geq P(k_s + k_p) > c_s > c_p > 0 \).

Proof (see Kreps and Scheinkman, 1983, Lemma 2). By naming \( p_p < P(k_s + k_p) \), private profits are, at most, \( (p_p - c_p)k_p \). By setting \( p_p = P(k_s + k_p) \), private profits are, at least, \( (P(k_s + k_p) - c_p)k_p \).

Suppose that the state firm charges the ration price \( p_s = c_s \). Then, by proposition 3, the private firm sets a higher price, since

\[
p_p \geq P(k_s + k_p) > c_s = p_s
\]

Assuming the highest valuation consumers buy the state good, demand for the private good is:

\[
q_p = \max \{a - k_s - p_p, 0\}
\]

Private sales, \( z_p \), are the minimum of capacity and market demand:

\[
z_p = \min \{k_p, \max \{a - k_s - p_p, 0\}\}
\]

The private market is illustrated in figures 2a and 2b for the case in which the state firm charges the ration price \( p_s = c_s \). In both cases MN is the residual market demand, i.e., the demand for the private good net of the consumers who buy from the state enterprise. Segment MP represents the marginal private revenue for an additional unit of sales and marginal costs, \( c_p \), are normalized to zero for simplicity.

A profit maximizing private firm with market power sets a price at which marginal revenue equals marginal cost. In the absence of private
capacity constraints, the profit maximizing price is
\[ p_p = 0.5(a - k_s), \] (3.4)
which corresponds to private sales, \( z_p \), and profits \( \pi_p \):
\[ z_p = 0.5(a - k_s) \] (3.5)
\[ \pi_p = 0.25(a - k_s)^2 \] (3.6)

In figure 2a private capacity is small: \( k_p < 0.5(a - k_s) \). Thus, the private firm is capacity constrained and its profit maximizing strategy is to choose the competitive price: \( p_p = P(k_p + k_s) \). Point Y in figure 2a is the optimal private price-sales pair. Because the private firm sets the competitive price and sells all of its capacity, it is efficient.

In figure 2b the private sector is more developed: \( k_p > 0.5(a - k_s) \). In this case the private firm's profit maximizing strategy is to choose the excess capacity price \( p_p = 0.5(a - k_s) \). Because there is excess private capacity, the private market is inefficient and generates a deadweight loss:

Private deadweight loss = area triangle TYXP (3.7)
\[ = 0.5(k_p - 0.5(a - k_s))(1.5a - 1.5k_s - k_p) \] (3.8)

Suppose that the local government knows the level of private development and understands that the private entrepreneur maximizes profits. The next proposition shows that local support or resistance to a state sector price liberalization depends upon the size of private capacity.

Proposition 4. Suppose private capacity is small: \( k_p \leq 0.5(a - k_s) \). If the local government has a consumption bias and a break-even constraint, then it maintains a ration price: \( p_s = c_s \). However, if the private sector is sufficiently developed: \( k_p > 0.5(a - k_s) \), then the local government might set a state sector price which eliminates rationing.

The idea behind Proposition 4 is as follows. When private capacity is
sufficiently small: $k_p < 0.5(a - k_s)$ and $p_s = c_s$, the private market is efficient. In this case the local government maximizes votes by maintaining a ration price and resisting price liberalization. When private capacity is larger: $k_p > 0.5(a - k_s)$, rationing in the state sector induces private market inefficiency. The private firm charges an exorbitant excess capacity price and therefore wastes available capacity.

A local government might consider abandoning rationing in the state sector if this would eliminate private sector inefficiency. Specifically, an increase in the state sector price might increase votes for the local deputies if it induces the private sector to cut its price and sell at full capacity. A sufficient condition for local government support of a price liberalization is that state sector profits do not decrease and consumer surplus increases once rationing is eliminated. Proposition 5 summarizes two conditions under which a local government is more likely to support a price liberalization.

Proposition 5. Suppose that the private sector is highly developed: $k_p > 0.5(a - k_s)$. If the local government has a consumption bias and a break-even constraint, then is more likely to support a price liberalization when:

(a) there is an increase in private capacity;
(b) the state firm's costs, $c_s$, increase.

Suppose there is rationing in the state sector: $p_s = c_s$. When private capacity, $k_p$, increases, private excess capacity holdings increase and rationing becomes no more desirable from the local government's perspective. However, a state sector price liberalization becomes more desirable, since the private sector will provide even more goods at a
cheaper price.

An increase in the state firm’s costs, \( c_s \), has no impact on prices and sales and, therefore, no impact on welfare in the liberalization regime. However, an increase in \( c_s \) in the resistance regime means that the state firm sells the same amount of goods at a higher price while the private firm’s price and sales level remain constant. This induces a decrease in consumer welfare and implies that the local government is more likely to support liberalization.

IV. Conclusions

A basic tenet driving the Russian price liberalization in January of 1992 is that liberalization of state sector prices is critical for a successful transition to a market economy. This paper presents no arguments against the benefits of free market pricing. However, it does offer an explanation of why local governments have resisted raising the prices of many consumer goods and services.

This paper argues that state sector prices are regulated by vote maximizing politicians who are driven by a consumption bias. Thus, these regulators are willing to forego an increment of locally generated profits in order to increase consumer welfare. The existence of a consumption bias explains why local governments continue to hold down prices when private capacity holdings are sufficiently low. It also predicts that once private capacity holdings reach a sufficiently large level, a local government will increase both consumer welfare and local budgetary revenues by supporting a price liberalization.

The basic model used for arguing this point is a local market in which a government regulated state firm competes with an unregulated profit-maximizing private firm. This implies that one entrepreneur controls
all of the private pricing decisions within a region. However, the basic argument can be generalized to analyze a local market where the private sector consists of more than one firm.

Suppose that the private sector contains two equal-sized firms which maximize profits. In Berkowitz (1993, Section IV) it is shown that when the local government supports a ration price in the state sector, this local anti-monopoly policy has two effects. First, it makes the private sector more competitive. Thus, it is less likely that any private firm will charge an inefficient excess-capacity price. However, if the private sector is inefficient, then there will be price volatility in the private sector as the private firms engage in price wars. Thus, if the private sector is inefficient, a state sector price liberalization both induces private sector efficiency and eliminates private price volatility. Furthermore, such a price liberalization is more likely to increase votes for local politicians the greater is private firm capacity.
References


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1In this paper, local governments include the deputies and administrators overseeing the oblasts and cities in the Russian Republic.

2Thus, the model ignores local capacity controlled by non-local state organs. This is reasonable, since in the former Soviet Union most state provision of consumer goods and services was and still is under control of local governments. See Berkowitz and Mitchneck (1992) and Wallich (1992).

3The idea of vote maximizing politicians was introduced by Peltzman (1976).

4I thank Theodore Friedgut for both raising and carefully explaining the significance of this point.

5Thus, in the language of modern economics, this paper ignores principal-agent problems, in which unelected officials, whose interests are different than the deputies, implement legislation in a way which misrepresents the spirit of the law.

6The model which is developed in this and the next section is rigorously developed in Berkowitz (1993).

7I thank members of the Yaroslavl' city and oblast government, especially V.V. Istominova, for emphasizing this point to me during interviews conducted in the summer of 1992.

8Formal proofs of both of these propositions are available upon request.

9This result follows from the efficient rationing assumption which is that there when there no income effects the highest valuation consumers obtain the state good when there is rationing. This rationing rule allows for resale among consumer (see Levitan and Shubik (1972) and Kreps and Scheinkman (1983)). However, for simplicity, it ignores the social costs of rationing, such as queuing and hoarding. If the consumption bias was sufficiently strong, i.e. \( \lambda \) was sufficiently lower than .5, then the results of this analysis would generalize to the case when there are social costs associated with rationing.
10 This result could be generalized to include subsidies.

11 In reality, local governments can sometimes regulate private firms through tax and credit policy as well as by imposing price restraints. Nevertheless, the local government's ability to regulate private pricing is limited.

12 Since demand is linear, the marginal revenue curve is linear. It intersects the vertical axis at the demand curve and intersects the horizontal axis at half the distance of the demand curve.

13 In the language of modern economics, the local government is the leader and the private firm is the follower in a Stackelberg game. The local government first sets the state enterprise price in anticipation of the best reaction of the private firm. The order of moves reflects a situation in which the private firm is more flexible in its pricing policy than the state enterprise. The state enterprise may have significant "menu costs" since pricing decisions are subject to the approval of government officials who do not work in the enterprise. However, an unregulated private firm can simply change its price without bureaucratic interference.

14 A detailed proof of proposition 4 is in Berkowitz (1993, section III).

15 Any state sector price which induces this private sector to sell at full capacity must generate private profits no less than the private profits when the state good is rationed, \( .25(a - k_s)^2 \). This implies that the state sector price in a liberalization is no less than \( .25(a - k_s)^2/k_p \).

16 A proof of this proposition is in Berkowitz (1993), Section III.