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**Fiscal Constraints on Market-Oriented Reform
in a Socialist Economy**

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Abstract

This paper develops a simple two-sector model of a socialist economy, in which government revenues required for servicing external debt are obtained from taxation of the socialized sector and from import taxes. Wages and employment in the socialized sector are the outcome of Nash bargaining between the government and an import-competing labor-dominated state enterprise with domestic market power. The effects of trade liberalization, demonopolization, technical improvements, and limitations on labor's bargaining power are examined, and the implications for privatization are considered. It is shown that some combination of tax reform and debt reduction may be a precondition for market-oriented reforms.

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Summary

This paper examines the relationship between market-oriented reform, debt reduction, and tax reform in a socialist economy. The analysis focuses on the tendency, in socialist economies, for the government to rely on state enterprises as the major source of tax revenues; this reliance may act as a constraint on reforms that would reduce the profitability of socialist enterprises. Tax reform measures, which would broaden the base of the tax system and shift taxation from state enterprises to households, have been proposed, but in most cases have not yet been fully implemented.

A simple two-sector model of a socialist economy is presented. The socialized sector is represented as a labor-dominated monopoly enterprise. The enterprise, on behalf of its employees, bargains with the government over wages and employment; the outcome of this bargaining, which is represented as a Nash bargaining equilibrium, determines the enterprise's monopoly rents and the share of these rents returned to the government in taxes. The outcome of bargaining depends on the competitive (nonsocialized sector) wage, the import competition facing the enterprise, the relative bargaining power of the two parties, and the relative strength of the enterprise's preferences for wages and for employment.

The nonsocialized sector is treated as a competitive sector employing the residual labor. The nonsocialized-sector wage equals the marginal product of labor in that sector.

It is assumed that the socialized sector is import-competing subject to a quantitative import restriction, while the nonsocialized sector produces exportable goods.

This framework is used to trace the implications of several types of reform measures. Trade liberalization, the breakup of monopolies in the state sector, technical improvements that increase productivity in either sector, and measures that affect the relative bargaining power of the enterprise and the government are considered. The implications of the results for privatization are then discussed.

The analysis shows that, given the reliance on taxation of the enterprise sector, reforms may be constrained by the government's ability to collect the resources needed to finance its domestic expenditure and service its external debt. The paper concludes that some combination of debt reduction and tax reform may facilitate market-oriented reforms in socialist economies.

I. Introduction

Encouraging liberalization and structural reform in socialist economies is one of the greatest challenges of economic policy in the 1990s. A range of reform measures has been undertaken or proposed, in particular for the socialist economies of Eastern Europe. These include the liberalization of trade flows, the breaking up of widespread monopolies, the implementation of measures to tighten control of enterprise management, measures to increase productivity, and finally, privatization.

One salient feature of socialist economies is the importance of the enterprise sector in generating revenues for the government. Revenues from enterprises may consist primarily of taxes, such as an enterprise income tax or dividend, or the pervasive turnover tax, but they may also extend to include the appropriation of enterprise surpluses. Table 1 shows the composition of tax revenues in Eastern Europe and the Soviet Union in 1989. Note the small role of income taxes on households in all countries except Yugoslavia. Profit tax, turnover tax, and a substantial portion of social security contributions and "Other" are all levied on the enterprises; in many cases, these taxes or exemptions therefrom have been negotiated between each enterprise and the government.

Any government needs revenues, but particularly important is the need for revenues to service external debt. Table 2 shows the external debt of Eastern European countries in 1989; the ratio of debt to annual tax revenues suggests that for some of these countries--particularly Poland, Hungary, Yugoslavia, and Bulgaria--collecting the resources needed to service external debt may make substantial demands on the budget.

Replacing the enterprises by households as a source of revenues would require a major reform of the tax system; such a reform has been carried out in Hungary, in 1988, with the introduction of a personal income tax and a value added tax, and a similar reform is to be carried out in Poland in 1992, but tax reform has yet to be implemented in a number of socialist countries (see Tanzi, 1991b). In the absence of tax reform, liberalization measures may impair the government's ability to meet its expenditure requirements, in particular to service its external debt. In this paper, it will be argued that some combination of debt reduction and tax reform is essential, if the other market-oriented reforms contemplated for socialist economies are to be feasible. ^{1/}

^{1/} Trzeciakowski (1989) and others have also argued that the existing structure of socialist economies may impede their ability to service their external debt.

Table 1. Composition of Tax Revenue, 1989

(In percent)

	Bulgaria	Czechoslovakia	Hungary	Poland	Romania	USSR	Yugoslavia
Profit tax	47	{ 39 }	14	28	26	32	16
Income tax	8		11	9	16	12	28
Turnover tax	23	32	36	24	35	31	15
Customer duties	2	2	8	3	2	16	5
Social security contributions	19	27	29	24	21	9	26
Other	1	-	1	12	-	-	10
	100	100	100	100	100	100	100

Source: Tanzi (1991).

Table 2. External Debt, 1989

	Total Debt (\$ billions)	Debt/GNP (percent)	Debt/Tax Revenues (percent)
Bulgaria	9.2	21 <u>1/</u>	43
Czechoslovakia	7.9	6 <u>1/</u>	11
Hungary	20.6	76	155
Poland	43.3	68	186
Romania	0.5	4 <u>1/</u>	8
USSR	54.0	(...)	(...)
Yugoslavia	19.7	34	97

Source: World Bank (1990), and Tanzi (1991) except where noted.

1/ Estimate from Institute of International Finance (1990).

In analyzing these issues in the Eastern European context, it is important to recognize that these economies are not classic centrally planned economies, but modified planned economies (MPEs) in which government maintains a looser control over the economy leaving some degree of autonomy to the socialized enterprises. For example, in Poland, enterprise managers are appointed by Enterprise Councils representing the workers, and (subject to certain restrictions) profits not paid to the government in taxes or other forms may be distributed to the employees as a bonus.

The framework that will be developed in this paper incorporates several of the distinctive features of the MPE. 1/ First, several of the socialist countries of Eastern Europe have substantial nonsocialized sectors. For example, in Poland, 28 percent of the labor force is employed in agriculture, which is predominantly private; similarly, in Hungary agriculture has had a large nonstate component (Kornai, 1986). Second, in the socialized sector there is typically a high degree of monopoly. A third typical feature of a MPE is "labor hoarding," a term used to describe the prevalence of socialist enterprises employing more than the profit-maximizing number of workers. This phenomenon is generally believed to result from the fact that the system provides enterprises with no incentive to minimize costs.

Another characteristic of a MPE is the government's role in influencing output. In a traditional centrally-planned economy, each enterprise is faced with a target for its output, which must be fulfilled. In many MPEs,

1/ cf. the list presented by Welfens and Welfens (1991), pp. 2-3

formal central planning has ceased and been replaced by decision-making of varying degrees of autonomy in enterprises. Even where this has occurred, however, there are other means whereby the central authorities can influence the output decisions of firms. In particular, central allocation of raw materials, of foreign exchange to purchase imported materials, and of credit needed to finance inventories enables the central authorities in a MPE to influence the output decisions of socialized enterprises.

Another feature of MPEs that has been noted by many observers is the pervasiveness of bargaining in the relationship between the government and the socialized enterprises. This bargaining takes a number of different forms. First, there is bargaining over prices, to the extent that these are centrally controlled or regulated. There is also bargaining over tax collection: while tax laws may, in principle, determine the taxation to which the enterprise is subject, in practice exemptions are frequently negotiated. Third, there is bargaining over wage policy; in a number of socialist countries, incomes policies have been established to control the rate of wage increase (see e.g., Blanchard and Layard, 1990), but exceptions to these policies have often been made, permitting wage increases in excess of the established norm; bargaining between enterprises and government has been the mechanism determining the scope of these wage increases. Fourth, there may be bargaining over the availability and cost of raw materials, without which the enterprise cannot operate. Bargaining over credit is also quite important, as credit is often provided at a negative real rate of interest, but is limited in supply, and allocated across the enterprises by a decision of the central bank, which is an appendage of the government. The foreign exchange regime may occasion further bargaining, as a limited supply of centrally allocated foreign exchange is rationed among enterprises wishing to import materials, equipment or finished products. Bargaining on all of these fronts may be regarded as essentially determining the share of an enterprise's monopoly rent that is received by the government, and the share that is distributed to the enterprise's employees in the form of wages and bonuses.

In this paper, we shall present a simple model incorporating these essential features of a MPE and permitting an examination of the relationship between the external debt service, tax reform, and possible measures for market-oriented reform. There is one very important characteristic of many MPEs that will not be addressed in this framework, however: the prevalence of shortages. To the extent that shortages are

associated with repressed inflation, the present "real" model, which does not incorporate money, abstracts from their analysis. ^{1/}

The model contains two sectors, socialized and nonsocialized. In the socialized sector (SS) there is a monopoly, while the nonsocialized sector (NSS) is characterized by perfect competition. Bearing in mind the Polish case in which the NSS is predominantly agricultural, we assume that the NSS employs a sector-specific factor of production, land, while only labor is used in the SS. Tax revenues, which are needed to meet domestic expenditure requirements and service a given stock of external debt, are collected from the SS; the government also collects revenues from trade taxes, depending on the trade regime. Bargaining is used to determine the share of the SS's monopoly profits collected in tax revenues, and the residual share paid as incomes for the workers.

The paper is organized as follows: In Section II, the basic model is presented; the solution to the model is characterized in Section III. In Section IV, the model is used to trace the implications of some market-oriented reforms, including trade liberalization and demonopolization, as well as technical improvement and changes in the bargaining power of workers; finally, the implications of privatization are examined. In Section IV, the model's implications for the sequencing of reforms are discussed.

II. A Model of a Modified Planned Economy

This section develops a simple two-sector general equilibrium model that captures the institutional structure of a modified planned economy (MPE) as characterized in the introduction. There is a private or nonsocialized sector (NSS) characterized by perfect competition and a socialized sector (SS) consisting of a state enterprise. We assume that the country takes the world price as given and that the pattern of trade is such that the state enterprise faces import competition subject to a quantitative import restriction. Moreover, we will assume full employment, as is typical in a MPE.

^{1/} With repressed inflation, households wish to exchange money for goods but cannot obtain the goods without considerable queuing (see e.g., Nuti, 1986); this can be interpreted simply as implying that part of the price of goods is nonpecuniary, embodying time spent waiting in line. This, of course, ignores any monetary implications of shortages; to the extent that these implications are important, the model is more readily applicable to an economy in which a currency reform (see e.g., McKinnon, 1990) or inflation (as in Poland) has already wiped out any initial overhang of liquidity.

1. The socialized sector

We assume that labor is the only factor of production in the SS enterprise: 1/ one unit of labor is required to produce one unit of the final product (an assumption to be relaxed later). We will suppose that the socialized enterprise is labor managed (or at least labor dominated) 2/ and thus that its objectives can be represented by a utility function that depends positively on the employment and the real wage. 3/

For simplicity we adopt a modified Stone-Geary form for this utility function:

$$U(w, x, \bar{w}) = (w - \bar{w})^\theta x^\gamma \quad (1)$$

where \bar{w} is the private sector wage, w is the wage in the socialized sector and x is output (equal to employment) in the socialized sector. Expression (1) implies that the firm is interested in the after tax excess wage and employment. 4/ The weight on employment in the firm's objective function is intended to capture the tendency for "labor hoarding" mentioned in the introduction. Parameters $\theta \geq 0$ and $\gamma \geq 0$ correspond to the excess wage and employment elasticities of $U(\cdot)$; we define the firm as "wage (employment) oriented" if $\theta > \gamma$ ($\theta < \gamma$). We will assume that the SS enterprise is employment oriented for the rest of the analysis.

1/ See Dinopoulos (1991) for a similar specification also incorporating capital.

2/ Sometimes the term "labor-managed firm" is used to refer specifically to enterprises that are concerned only with the wages and employment of incumbent workers; the associated asymmetry and dynamic efforts would not have a role in our model, which is static. See e.g., Prasnikar et. al (1990).

3/ The enterprise is assumed for simplicity to care about the wage expressed in units of the NSS good, rather than in terms of the consumption basket; in the bargaining framework, this assumption implies myopia about the effect of the bargained wage on relative prices.

4/ This utility function has been used in the literature to represent the objectives of a labor union; see McDonald and Solow (1981); Brander and Spencer (1988); Mezzetti and Dinopoulos (1991). Pemberton (1988) derives $U(\cdot)$ as the maximand of a "managerial" labor union whose leadership is interested in union size (employment) and in the excess wage earned by each worker already in the firm. A variant of this objective function for a labor-managed firm is the maximization of the representative incumbent worker's expected utility assumed in Lane (1990), where risk aversion leads to a bias toward preserving employment.

The utility function of the representative consumer, which is also the social welfare function, is specified as:

$$V(x+y, z) = S(x+y) + z \quad (2)$$

where $S'(\cdot) > 0$, $S''(\cdot) < 0$, x is the production of the state enterprise, y is the amount of imports, and z is consumption of the private sector good. That is, we assume without loss of generality that $V(\cdot)$ is linear in z , and also assume that y and x are perfect substitutes.

Solving the consumer maximization problem, and denoting by P the relative price of good x in terms of good z , we express the inverse demand function of the socialized sector as:

$$P(x+y) = S'(x+y) \quad (3)$$

with $P'(x+y) = S''(x+y) < 0$.

The absence of an effective personal income tax or value added tax system, as discussed in the introduction, implies that the majority of government revenues are obtained through taxes on enterprises. A prevalent form of such taxes in MPEs is the turnover tax; in practice, the calculation of the turnover tax is quite complicated, but here we shall represent it as equivalent to unit sales tax. ^{1/} The government imposes a unit tax equal to $\tau = P(x+y) - w$, where w is the wage negotiated between the firm and the government. We will assume that the government is interested in maximizing total tax revenues collected from the labor managed firm. These revenues expressed in units of good z are:

$$\Pi = \tau x = [P(x+y) - w]x \quad (4)$$

The labor managed firm and the government bargain over the wage w and employment x . This encapsulates the array of bargaining discussed in the introduction; since the government can influence output via its control of raw materials, credit and foreign exchange, and can influence wages (including bonuses) via the tax system, income policies, real interest rates and other instruments, both wages and output/employment can be regarded as

^{1/} Since it is total tax revenue that is important in bargaining, this treatment of the tax system does not limit the generality of the results. Tanzi, 1991a discusses the various taxes on enterprises--turnover, profit and payroll taxes--and concludes that "it is not quite clear whether they are really three different taxes in an economic sense" (page 19). All of these taxes may be viewed together as a negotiated share of an enterprise's net revenues.

determined by bargaining between the enterprise and government. The bargaining process assumed is a generalized Nash bargaining game (Nash, 1950). We assume that bargaining is conditioned on the wage in the NSS, \bar{w} , and on the level of imports y competing with the good produced in the SS. The level of imports is given by commercial policy, reflecting the prevalence of nontariff barriers in Eastern European countries. We shall assume for simplicity that commercial policy is not subject to bargaining between the government and the socialized enterprise. This framework is equivalent to assuming a government consisting of two independent agencies, one collecting revenues from state enterprises and one controlling imports. The Ministry of Trade imposes a binding import quota y , buys imports at international price and sells the quantity imported at the domestic price ($P(x+y)$). This approach permits an examination of the implications of alternative degrees of liberalization of the trade regime. 1/

Based on these assumptions, the Nash solution maximizes the generalized Nash product defined as:

$$G(w, x) = [Px - wx]^{1-\alpha} [(w - \bar{w})^\theta x^\gamma]^\alpha \quad (5)$$

where $0 \leq \alpha \leq 1$ is a parameter capturing the relative bargaining power of the enterprise vis-à-vis the government.

The bargaining framework assumes that either the enterprise or government could shut down production in the SS if an agreement on wages and output were not reached; in this case output, the utility of the enterprise, and tax revenue would all be zero. Such a shutdown could be visualized as a strike by workers in the socialized enterprise, as strikes are infrequent, but certainly not nonexistent in socialist economies, but this interpretation would be too narrow: even in the absence of the strike instrument, the cooperation of the management and workers in the SS is required to generate any output, as output could be reduced to very low levels through shirking, sloppy work, or sabotage. In a labor-dominated firm, there are relatively few constraints on such actions. The government, for its part, could also bring output to zero, through its control of credit, foreign exchange and vital raw materials. However, the Nash bargaining solution implies that shutdowns do not occur; rather, agreement is reached at a wage such that the product (5) is maximized.

1/ This assumption can be partly justified with reference to the fact that many aspects of the trade regime have been entrenched in international agreements, both within the CMEA and with Western countries (such as, for instance, with reference to the Multi-Fibre Agreement) and are therefore more difficult to change. An obvious extension of this analysis is to consider the case in which there is simultaneous bargaining over wages, employment, and import protection along the lines of Dinopoulos (1991).

Maximizing the generalized Nash product $G(\cdot)$ with respect to the negotiated wage w and output x yields the following first-order conditions:

$$G_w = G \left[\frac{\alpha \theta}{w - \bar{w}} - \frac{(1-\alpha)x}{Px - wx} \right] = 0 \quad (6)$$

$$G_x = G \left[\frac{\alpha \gamma}{x} - \frac{(1-\alpha)(w - P - xP')}{Px - wx} \right] = 0 \quad (7)$$

where subscripts and primes denote partial derivatives. Equations (5) and (6) determine the negotiated wage and output target in the socialized sector for a given level of imports y and for a given NSS wage \bar{w} .

2. The nonsocialized sector

The nonsocialized sector is characterized by perfect competition and constant return to scale. In addition to labor, there is a sector-specific factor T (say land); the sector's technology is summarized by the following production function:

$$z + z^* = \phi Z(\ell, T) \quad (8)$$

where $Z(\cdot)$ is a monotonically increasing quasi-concave function. Here z is consumption and z^* exports of the good produced, ℓ the amount of labor employed in the NSS and ϕ is a productivity parameter. The wage in the NSS, \bar{w} , is determined competitively, and thus equals the marginal product of labor in that

$$\bar{w} = \phi Z_\ell(\ell, T) \quad (9)$$

where \bar{w} is expressed in units of the good produced in the NSS, z , and

$$Z_\ell = \frac{\partial Z(\cdot)}{\partial \ell}.$$

Assuming that there is no unemployment, 1/ the full employment of labor condition is expressed as:

$$L = x + \ell \quad (10)$$

where x is the number of workers employed in the SS (equal to that sector's output), ℓ is the number of workers employed by the private sector and L is the labor endowment.

3. International trade

Trade is modeled by assuming that the government collects the quota revenues, which are defined as:

$$RY = (P - P^*)y \quad (11)$$

where P^* is the international price of product x and y is the import quota. We may visualize the difference between domestic and world prices as similar to a specific tariff.

The model closes with the balance of payments condition:

$$yP^* + E = z^* \quad (12)$$

which requires that the value of exports z is equal to the value of imports yP^* plus external debt service E . 2/

1/ Because $u(.)$ depends on the excess wage, the equilibrium negotiated wage exceed the private sector wage. The rationale for the persistence of such a wage discrepancy is that there may be rationing of jobs in the SS in a MPE. An alternative mechanism for allocating labor across the two sectors would be through Harris-Todaro type unemployment or underemployment; introducing such unemployment would be a straightforward extension of the present model.

2/ An alternative to this balance of payments condition would be a demand equation for the NSS good; given households' budget constraints, one equation is redundant by Walras's Law.

III. Analysis of Equilibrium

The structure characterized in the preceding section is sufficient to determine an equilibrium in a modified planned economy. Equations (6), (7), (8), (9), (10), and (12) determine the six endogenous variables of the model w , x , \bar{w} , ℓ , z , and z^* for a given P^* and y .

The equilibrium can be analyzed graphically as follows. From equations (5) and (6) we can derive the contract curve (CC) which is the locus of tangencies between the enterprise indifference curves and the government's iso-revenue contours in wage-employment space. ^{1/}

$$\frac{\gamma}{\theta} (w - \bar{w}) = w - P - xP' \quad (\text{Contract Curve}) \quad (13)$$

The contract curve passes through the intersection of a wage line $w = \bar{w}$ and the marginal revenue curve $P + xP'$ because the LHS of (13) becomes zero when $w = \bar{w}$. The slope of the contract curve is

$dw/dx = -\theta(2P' + xP'')/(\gamma - \theta) > 0$ given our assumption that $\gamma > \theta$; note that $2P' + xP'' < 0$ is the slope of the marginal revenue curve.

Equation (7) defines another curve in wage-employment space called the Nash Bargaining Curve: (NBC).

$$w = (1 - \kappa)(P + xP') + \kappa P \quad (\text{Nash Bargaining Curve}) \quad (14)$$

where $\kappa \equiv \alpha\gamma/(1 - \alpha + \alpha\gamma)$ increases in the bargaining power of the firm, α . Notice that $0 \leq \kappa \leq 1$, which means that the NBC is downward sloping and located between the inverse demand curve $P(\cdot)$ and the marginal revenue curve $P + xP'$.

By substituting the negotiated wage from equation (14) into (13), for a given level of imports, we can express the NSS wage \bar{w} as a function of employment in the SS:

$$\bar{w} = \beta P + (1 - \beta) (P + xP') \quad (15)$$

^{1/} See Mezzetti and Dinopoulos (1991, Section 2.1) for an analysis of the properties of the contract curve.

where $\beta \equiv \alpha(\gamma - \theta)/(1 - \alpha + \alpha\gamma)$ increases in the bargaining power of the firm, α , and decreases in the excess wage elasticity of the firm's utility, θ . Notice also that the value of β is positive and less than one because $0 \leq \theta < 1$. Equation (15) defines a curve in wage-employment space with slope $\partial \bar{w}/\partial x = P' + (1 - \beta)(P + xP'')$. Provided that the socialized enterprise's marginal revenue curve is downward sloping (i.e., $2P' + xP'' \leq 0$), then $\partial \bar{w}/\partial x < 0$. Equation (15) implies that the wage in the nonsocialized sector is a weighted average of the price and marginal revenue of the socialized sector.

By combining equations (14), (8) and (9), the allocation of labor across the SS and NSS is determined:

$$\beta P + (1 - \beta)(P + xP') = \phi Z_\ell(L - x, T) \quad (16)$$

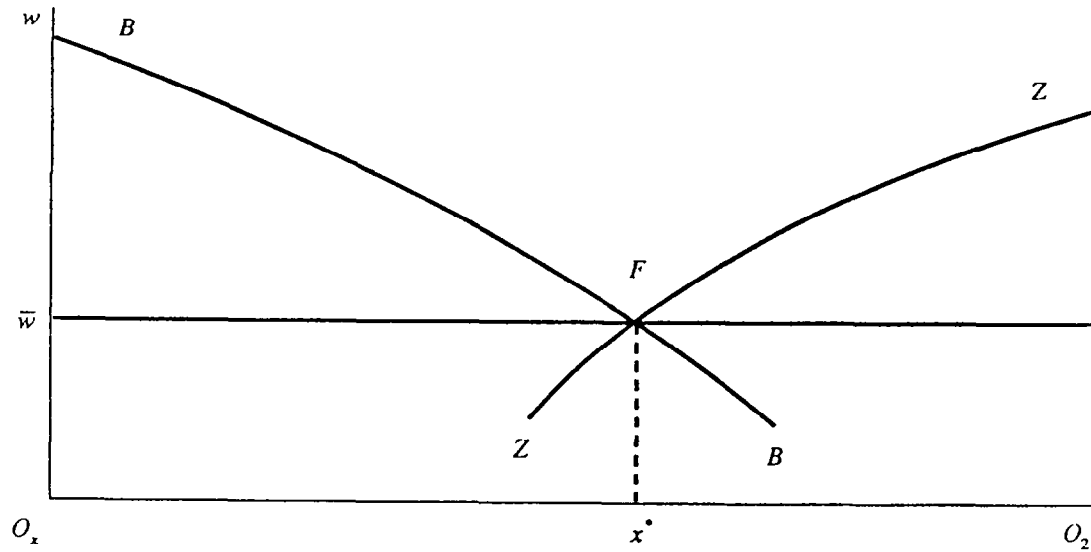
where $\phi Z_\ell > 0$ is the marginal product of labor in the nonsocialized sector. Equation (15) determines x for any given level of imports y .

Figure 1 illustrates the production and labor allocation. The horizontal axis in each figure measures the total labor endowment L with O_x and O_z being the origins for the socialized and the nonsocialized sector respectively. The vertical axes measure the wage and price in units of good z . First consider Figure 1A. Curve BB shows the combinations of negotiated output and employment x and the reservation wage \bar{w} consistent with equation (15).

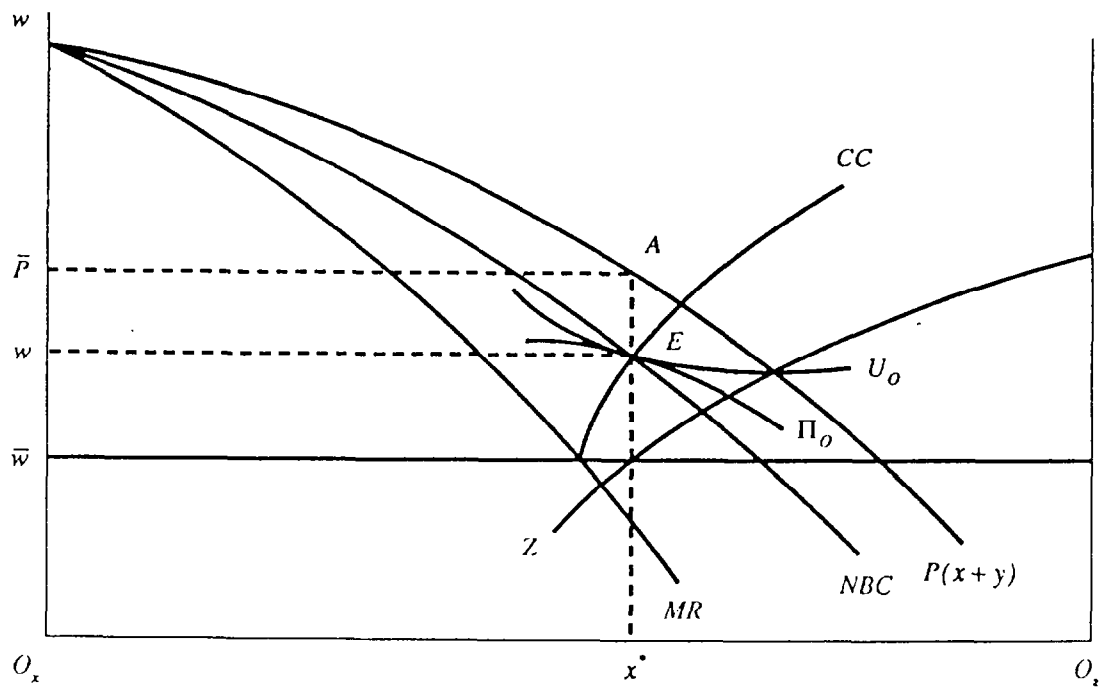
Curve ZZ is the value of the marginal product of labor in the nonsocialized sector. The intersection of the two curves F determines the wage in the nonsocialized sector \bar{w} and the labor allocation between the two sectors x^* which is also the solution of equation (16). In other words, $O_x x^*$ is the amount of labor in the socialized sector and $O_z x^*$ is the labor allocated to the nonsocialized sector.

Figure 1B illustrates the equilibrium in the socialized sector once we determine \bar{w} and x^* . Curve $P(x+y)$ is the inverse demand for the sector's output, for a given level of imports, and MR is the marginal revenue curve. The intersection of the marginal revenue curve MR and the line $w = \bar{w}$ determines the origin of the contract curve CC which is defined by equation (13). Figure 1B shows the Nash bargaining curve NBC defined by equation (14) which is downward sloping and intersects the CC curve at point E, which lies vertically above point F. Point E determines the negotiated wage w ; point A, the intersection of the inverse demand curve and the vertical line x^*FEA , determines the domestic price in the socialized sector. The negotiated tax revenue collected from the state enterprise is shown by area PAEw and the workers' income in the socialized sector is area WEx *O_x . Notice that U_0 is the firm's indifference curve passing through point E; it is tangent to iso-tax-revenue curve Π_0 because of efficient

FIGURE 1
ALLOCATION OF LABOR ACROSS SOCIALIZED AND NON-SOCIALIZED SECTORS



WAGE AND PRICE DETERMINATION IN THE SOCIALIZED SECTOR



bargaining between the government and the firm. ^{1/} This equilibrium implies an endogenous wage differential across sectors in favor of the socialized firm.

Equilibrium in this model is characterized by a labor market as well as a product market distortion, in addition to the trade restriction in place. Because each worker in the socialized sector produces one unit of output, the first-best allocation of labor between the two sectors is given by the intersection of a line $P^* = \bar{w}$ with the ZZ curve in Figure 1.

Notice, however, that in this model, the elimination of all distortions would imply that the government's tax revenue would fall to zero; thus, full liberalization is incompatible with positive fiscal requirements, including those associated with debt servicing, given the absence of direct taxation of households. The next section will develop this observation further, exploring the relationship between trade liberalization and revenue generation based on the second-best equilibrium illustrated in Figure 1.

IV. Market-Oriented Reforms

Various measures for market-oriented reform have been considered for implementation in socialist economies: these include liberalizing trade; breaking up monopolies; limiting workers' ability to appropriate enterprise profits; upgrading enterprises' technology, organization, and capital stock to increase productivity; introducing various measures to increase productivity in the nonsocialized sector; and finally, privatization of state enterprises. In this section, each type of reform will be discussed in turn, with a view to its allocative as well as its fiscal effects. The question that will be explored is the extent to which the revenue constraints faced by a government with outstanding external debt will impede the reform process.

1. Trade liberalization

Trade liberalization is one of the major areas of market-oriented reform being carried out in socialist economies (see e.g., Wolf, 1989; and Plowiec, 1988). This section explores how protection from import competition affects the ability of the government to collect tax revenues which in turn can be used to pay external debt services. Appendix I contains the necessary algebra.

^{1/} Sequential bargaining, in which the firm and the government bargain over the tax rate and the firm chooses output unilaterally to maximize its utility, can be introduced readily into the model. See Dinopoulos (1991) for a different bargaining process in a similar context.

The government of the modified planned economy in this model has two sources of revenue, revenues from trade restrictions and revenues from state enterprises. 1/ Both components of revenue are affected by the level of protection of the SS (i.e., the differential between domestic and world prices). Total revenues are used to finance a given level of domestic spending plus debt servicing E.

The revenue from trade restrictions (expressed in units of the NSS good z) is:

$$R^Y = (p - p^*)y \quad (17)$$

The change in R^Y with respect to imports y is $dR^Y/dy = (p^* - p) + P'y \leq 0$.

Figure 2 illustrates the standard relationship between the revenue from trade restrictions and the quota. Revenue is maximized at y_R , whereas it is zero at free trade imports y_{FT} and where imports are completely excluded. For imports $y \geq y_F$ the quota revenue is zero.

The second source of revenue consists of enterprise taxation Π :

$$\Pi = (P - w)x \quad (18)$$

Differentiating Π totally with respect to the quota y ,

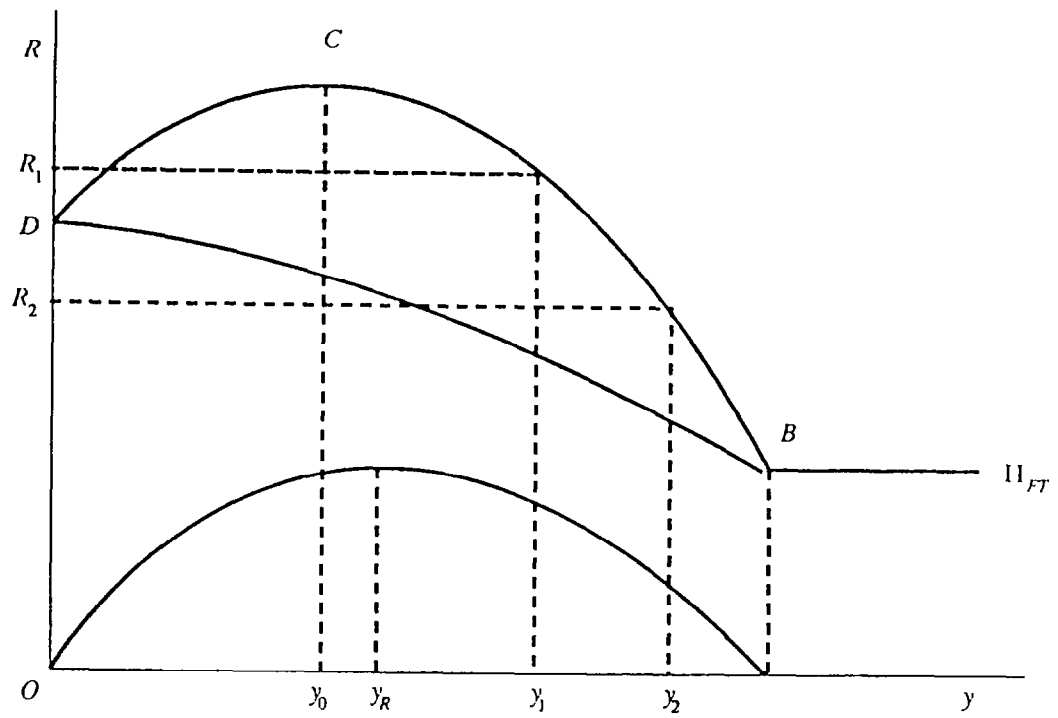
$$\frac{d\Pi}{dy} = \left[P' \left(\frac{dx}{dy} + 1 \right) - \frac{dw}{dy} \right] x + (P - w) \frac{dx}{dy} \quad (19)$$

The first term in brackets shows the increase in tax revenues for a given output x , because a change in protection alters both the domestic price and the negotiated wage. The second term shows the effect of protection on tax revenues for a given price and wage, through the change in output. Notice that $dx/dy < 0$ because of (A2) and that $dx/dy + 1 = [(1-b) P' + \phi Z_{\ell\ell}] / D > 0$. The change in the negotiated wage due to protection can be obtained by differentiating totally the equation of the Nash bargaining curve and substituting the appropriate expressions from Appendix I:

$$\frac{dw}{dy} = \frac{1}{D} \left[\frac{\alpha\theta}{1-\alpha+\alpha\tau} (P')^2 + \phi Z_{\ell\ell} (P' + (1-\kappa)xP'') \right] < 0. \quad (20)$$

1/ The model abstracts from other sources of revenue, including seignorage, which might be important in practice.

FIGURE 2
TRADE LIBERALIZATION AND REVENUES



The negotiated wage decreases in the amount of imports because a higher level of imports reduces the demand for labor and output in the socialized sector. Substituting $dx/dy + 1$, dw/dy , and (20) into (18), we obtain

$$\frac{d\Pi}{dy} = \frac{(1-\kappa)}{D} [(P')^2 - xP''\phi Z_{\ell\ell}] + (P-w) \frac{dx}{dy} \quad (21)$$

where $D < 0$ and $dx/dy < 0$. A sufficient condition for revenues Π to increase in imports y that the term in brackets is positive. However,

$$\frac{dw}{dy} - \frac{d\bar{w}}{dy} = \frac{\alpha\theta}{(1-\alpha+\alpha\tau)} \frac{1}{D} [(P')^2 - xP''\phi Z_{\ell\ell}] \quad (22)$$

where $d\bar{w}/dy = -\phi Z_{\ell\ell} \frac{dx}{dy} < 0$.

In other words, trade liberalization decreases both the negotiated wage and the private sector wage. However, when trade restrictions have a smaller effect on the NSS wage than on the SS wage (i.e., $|dw/dy| > |d\bar{w}/dy|$), tax revenues collected from state enterprises decrease with trade liberalization. This would also be true if the marginal product of labor in the NSS is constant ($\phi Z_{\ell\ell}=0$) or if demand in the socialized sector is linear ($P''=0$). In order to proceed with the analysis, we shall assume that tax revenues Π decrease with trade liberalization.

Figure 2 illustrates the total revenue as well as the state enterprise revenue as a function of the price differential. Free trade results in revenue Π_{FT} because the revenue from trade restrictions is zero. Curve BD shows the revenue collected from state enterprises, which increases monotonically until it reaches the level OD where there is no trade. Total revenue remains fixed for any amount of imports greater than y_{FT} . In Figure 2 a level of imports y_0 maximizes the level of revenue available to the government; y_0 is less than the maximum trade revenue quota y_R . Curve BCD shows the total revenue collected by the government, $\Pi+R$, as a function of the level of permissible imports. This is the revenue available for debt service payments given the institutional features of a reformed socialist economy.

This analysis implies that in a socialist economy, trade liberalization reduces revenues in two ways: it reduces the trade revenue, and, by reducing the market share of the monopoly producer, it reduces the revenues that can be collected through taxation of the socialist enterprise. This implies that, given the existing fiscal structure, the government's revenue requirements affect the extent to which trade liberalization can take place. For instance, in Figure 2, if the initial revenue requirement is R_1 , then the level of imports cannot increase above Oy_1 . If debt reduction takes place, reducing the government's revenue requirement to R^2 , further trade

liberalization can take place, increasing the level of imports to Oy_2 . This illustrates the way in which debt reduction can ease the fiscal constraint on trade liberalization.

2. Demonopolization

Another important set of reforms planned or begun for many socialist economies is demonopolization. The pervasiveness of monopolies in socialist economies is generally viewed as a source of inefficiency, and breaking up monopolies is accordingly regarded as an important goal of market-oriented reform.

Demonopolization can be analyzed in the model as follows. Suppose that the government breaks up the monopoly in the socialized sector into firms competing in the product market. We shall assume that these firms' behavior is characterized by the Cournot model, such that each takes the others' output as given when making its own output decision. We shall also assume that there is no overarching institutional structure, such as an industry-wide trade union, that enables the enterprises to set wage and employment for the industry as a whole; rather, we shall assume that each enterprise bargains with the government independently over the tax that each will pay (and therefore the residual available to the workers in wages and bonuses), given the outcome of bargaining between the government and the other enterprises. In considering the effects of competition policy, we shall also assume a given quota establishing the level of imports y ; this is tantamount to assuming that the Ministry of Trade is another player in the Cournot game played by the enterprises. As in the previous analysis, it is assumed that trade protection contributes to the revenues collected by the government.

Given these assumptions, the objective of the i 'th firm is

$$U_i(w_i, x_i, \bar{w}) = (w_i - \bar{w})^\theta x_i^\gamma \quad i = 1, 2, \dots, n \quad (23)$$

The revenue collected from each enterprise is then

$$\Pi = [P_i(x_i + \sum_{j \neq i} x_j + y) - w_i] x_i, \quad i = 1, 2, \dots, n \quad (24)$$

Then, supposing that bargaining is carried out separately between the fiscal authorities and the management of each enterprise, the bargaining solution maximizes the generalized Nash product

$$G_i(w_i, x_i, \bar{w}, y) = [Px_i - w_i x_i]^{1-\alpha_i} [(w_i - \bar{w})^\theta x_i^\gamma]^{\alpha_i} \quad (25)$$

Then assuming for simplicity that all firms are symmetric, the condition determining the firm's employment and wage is

$$\beta P(nx + y) + (1-\beta) [P(nx + y) + xP'(nx + y)] = \phi Z_{\ell}(L-nx, T) \quad (26)$$

where condition (26) is therefore analogous to condition (15) for the monopolist.

By differentiating condition (26) totally, the effect of increased competition and imports on the output and employment of the SS, x , can be determined:

$$\frac{dx}{dn} = - \frac{xP' + (1-\beta)x^2P'' + xZ_{\ell\ell}}{[P'(n+1-\beta) + (1-\beta)xP''n + nZ_{\ell\ell}]} < 0 \quad (27)$$

$$\frac{d(xn)}{dn} = \frac{(1-\beta)xP'}{[P'(n+1-\beta) + (1-\beta)xP''n + nZ_{\ell\ell}]} > 0 \quad (28)$$

Condition (27) shows that, as one would expect, breaking up the monopolist in the SS into more pieces (increasing n) reduces the output of each resulting firm, but condition (28) shows that it results in an increase in the overall output of the SS. This result implies that an increase in competition reduces the price and increases consumption of the good produced in the SS; because it shifts labor into the SS from the NSS, it therefore increases the equilibrium wage in the NSS. The wage resulting from negotiation between the enterprise and the government is therefore also affected by competition:

$$\frac{dw}{dn} = \frac{xP'[(\kappa-\beta)P' - (1-\kappa)\phi Z_{\ell\ell}]}{[P'n + (1-\beta)P' + (1-\beta)xnP'' + n\phi Z_{\ell\ell}]} \quad (29)$$

Increased competition in the SS thus has two opposing effects: the direct effect of the competition is to reduce excess wages in the SS, but by shifting labor into the SS, it also puts upward pressure on the wage in the NSS. A sufficient condition for the direct effect to dominate, leading the sign of (29) to be negative, is that $|\phi Z_{\ell\ell}|$ is not large; under this condition, increased competition in the SS reduces the wage that labor-managed firms there are able to obtain for their employees. As the number of firms becomes large, the wage gap $w-\bar{w}$ approaches zero.

Relaxing trade restrictions has a similar effect under Cournot oligopoly as it was shown in the previous section to have under monopoly: it leads to a reduction in the output of each enterprise in the SS, and thus to a reduction in the SS's output:

$$\frac{dx}{dy} = - \frac{P' + (1-\beta)xP''}{nP' + (1-\beta)P' + (1-\beta)xP''n + n\phi Z_{\ell\ell}} < 0 \quad (30)$$

Finally, the effects of demonopolization on the profits (net of bonuses to the workers) of the SS, which constitute a major source of revenues for the authorities, can be determined. Denoting these revenues by $\Pi = -(1-\kappa)x^2nP'(nx+y)$ and differentiating with respect to the number of firms n into which the monopoly is broken, we obtain

$$\frac{d\Pi}{dn} = - \frac{[(1-\kappa)P'nx^2[\beta P' + \phi Z_{\ell\ell}]]}{P'(n+1-\beta) + (1-\beta)xP''n + n\phi Z_{\ell\ell}} \quad (31)$$

Thus, increased competition in the SS generally reduces the revenues obtained from that sector.

We can also derive the effects of demonopolization on the revenues obtained from trade restrictions. Since the revenues from a quota depend on the difference between the domestic and foreign price, these revenues R are reduced if domestic output is increased and the domestic price is reduced:

$$\frac{dRY}{dn} = \frac{d}{dn} [(P-P^*)y] = yP' \frac{d(xn)}{dn} < 0. \quad (32)$$

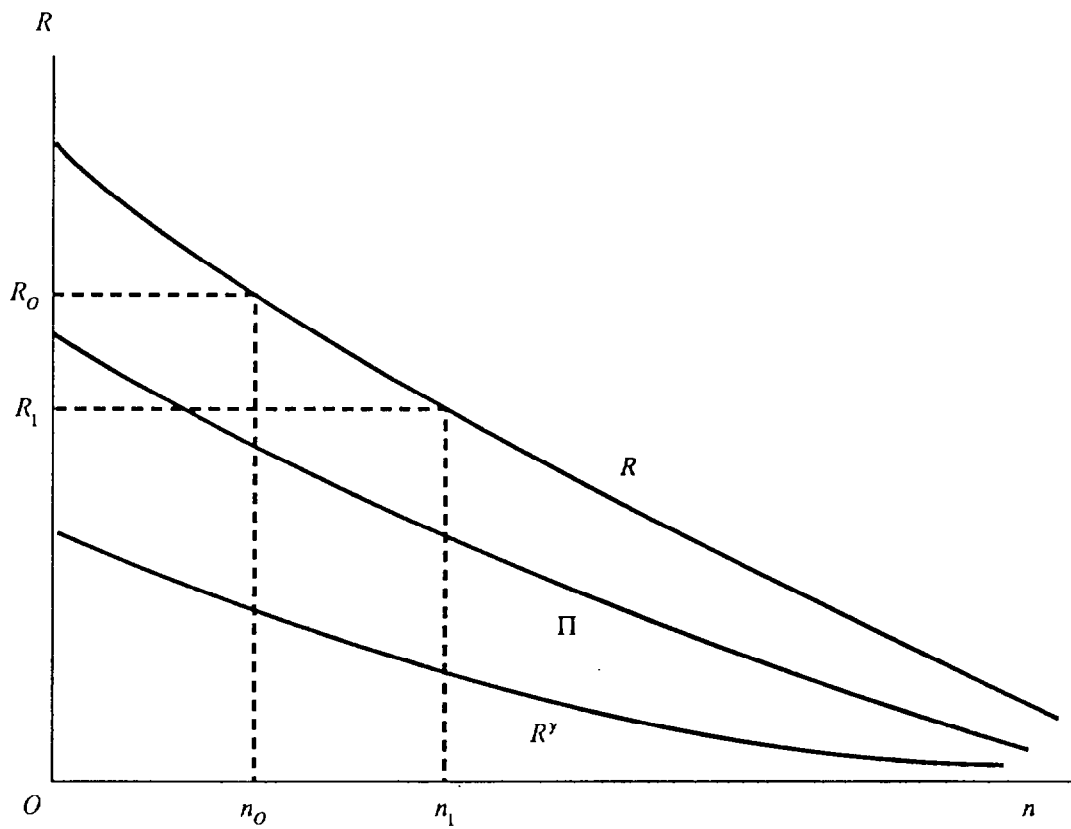
Thus, increased competition in the domestic market reduces the rents obtainable via trade restrictions.

Demonopolization of the SS therefore decreases government revenues for two reasons: the revenues obtained from the profits of the socialized enterprises decrease, and so do the revenues associated with trade restrictions. These revenues are lower, the greater the degree of competition created in the socialized industry, represented in this model by the number of pieces into which the socialized enterprise is split. This relationship is illustrated in Figure 3. If there is a minimum required level of revenues R_0 , this implies that a maximum number of firms n_0 can be allowed to compete. Thus, to the extent that the government of a MPE is constrained to obtain a particular level of revenues, for instance for servicing its external debt, it will be constrained in its ability to demonopolize the socialized sector--perhaps creating profitable oligopolies rather than going all the way to establishing competition.

3. Technical improvements

In establishing priorities for the transitional socialist economies of Eastern Europe, much attention has been given to measures intended to increase productivity. Some such measures are related to the restructuring of enterprises; it is held that many of the socialized enterprises suffer

FIGURE 3
DE-MONOPOLIZATION AND TAX REVENUES



from poorly-designed internal structures, diseconomies of scale, inappropriate product mix, and antiquated management procedures. Some measures have more to do with the need for investment to replace obsolete equipment and provide better infrastructure. Others relate to the transfer of technology, both with regard to more efficient production techniques and to more effective management practices. Although the emphasis has been on increasing the efficiency of the socialized sector, either before or after privatization of socialized enterprises, there have also been some efforts directed toward the nonsocialized sector, as seen for instance in the Task Force on Polish Agriculture established in 1990, sponsored jointly by the World Bank, the European Community, and the Polish Government.

In this section, we shall consider the implications of improvements in productivity, in the context of our simple general equilibrium model, with regard to their implications for the distribution of output between the SS and NSS and for the revenue-raising capacity of the government under the assumption that there is only one firm in the SS. Here, we shall not be concerned with the origins of the productivity improvement, as our model does not distinguish between improvements associated with restructuring, investment, or technology transfer. We shall therefore consider the implications of technical improvements, showing how these implications differ depending on the sector in which they take place.

Assume that each worker hired by the state enterprise produces ψ units of output (instead on one) and labor is the only factor of production. Consequently, total output in the SS is ψx where x denotes the number of workers in the SS as before. The equilibrium condition of the model is given by:

$$P + (1-\beta)\psi x P' = \phi Z_{\ell}(L-x, T) \quad (33)$$

where $P(\psi x+y)$ is the domestic price in the SS.

By totally differentiating (33) we can calculate the change in employment x due to changes in productivity in the SS and in the NSS. The impact of a technical improvement in the SS ψ is given by:

$$\frac{dx}{d\psi} = - \frac{[xP' + (1-\beta)xP' + (1-\beta)\psi x^2 P'']}{[\psi P' + (1-\beta)\psi P' + (1-\beta)\psi^2 x P'' + \phi Z_{\ell\ell}]} < 0 \quad (34)$$

Consequently an increase in labor productivity in the SS decreases employment in the state enterprise and increases employment in the NSS. However, total output in the SS increases as a result of higher sectoral productivity.

$$\frac{d(\psi x)}{d\psi} = \frac{x\phi Z_{\ell\ell}}{[\psi P' + (1-\beta)\psi P' + (1-\beta)\psi^2 x P'' + \phi Z_{\ell\ell}]} > 0 \quad (35)$$

Equation (35) implies that total consumption $y+\psi x$ in the SS increases and the domestic price declines. Moreover, because employment in the NSS increases, its output rises and the wage \bar{w} is reduced when productivity ψ increases.

Higher productivity in the SS also raises profits in that sector; this follows from the fact that in the bargaining equilibrium marginal revenue exceeds the outside wage \bar{w} .

Now consider a technical improvement in the NSS:

$$\frac{dx}{d\phi} = \frac{Z_{\ell}}{[\psi P' + (1-\beta)\psi P' + (1-\beta)\psi^2 x P'' + \phi Z_{\ell\ell}]} < 0 \quad (36)$$

An increase in productivity in the NSS decreases employment in the SS sector and reduces output in that sector; it raises the domestic price P and the NSS wage \bar{w} . Technical improvement in the NSS may therefore lower profits in the socialized enterprise.

4. Bargaining power

An important aspect of the model is the bargaining power of the labor-managed socialized enterprise, in extracting as large as possible a share of the monopoly rents, in terms of a combination of gains in wages and employment, in the socialized industry. One can consider institutional reforms that would influence the bargaining power of the enterprises vis-à-vis the government. Some examples of such reforms might include (a) the introduction of tough wage control laws limiting wage increases on a uniform basis for all enterprises, and thus reducing the enterprises' ability to bargain for higher wages; (b) increasing the uniformity, and stiffening the enforcement, of tax laws; (c) restricting the activities of trade unions, which might otherwise provide an additional institutional channel for demanding higher wages; (d) setting tight budgetary limits on subsidization of state enterprises; (e) setting ceilings for the expansion of credit to the SS. Such policy changes might be viewed either as changes in the framework in which bargaining between enterprises and government takes place, or simply as moves in the bargaining game; they might actually change the parties' bargaining power if the government made a commitment to change policies in these ways, particularly if this commitment were entrenched as part of an agreement, for instance as part of a program of structural reforms on which international lending was made conditional.

Changes in the bargaining power of the enterprise can readily be analyzed as a change in the parameter α in the model. For the simple model developed in Section 2, increasing the bargaining power of the enterprise γ increases employment in the SS. (See equation (A3) in Appendix I), which implies a lower P and a higher \bar{w} .

5. Privatization

The most visible and controversial aspect of reform planned for socialist economies is the privatization of state enterprises. It is also the most difficult to treat in a general equilibrium framework, for the following reason: it is not the titular ownership of the means of production itself, but the more specific allocation of property rights and the mechanisms whereby the new privatized enterprises are controlled, that is important (e.g., Frydman and Rapaczynski, 1990).

The implications of privatization may reflect a combination of several changes that have already been considered. Privatization may include an element of demonopolization, as has been the case, for example, with much of the piecemeal "spontaneous privatization" that has taken place in several Eastern European countries to date, as well as for instance with the privatization of retail outlets that took place in Poland in 1990. This is not a necessary concomitant of privatization, however: particularly if privatization takes place through sales, and if the government is short of revenue, there is a strong motive for the government to leave an enterprise's monopoly position intact, in order to increase its market value. ^{1/} To the extent that demonopolization is a result of privatization, it would have effects such as are analyzed in subsection 2.

A second possible implication of privatization is a restructuring of the enterprise, increasing productivity. This would occur to the extent that privatization results in the management's being chosen and influenced by a group that has a stake in the enterprise's long-term profitability; such a group would set up more effective management procedures to provide greater incentives for effort as well as better coordination of activities. To the extent that this results from privatization, it would be reflected in an increase in productivity such as is analyzed in subsection 3.

A third possible implication of privatization is a change in the government's bargaining power vis-à-vis other claimants on the income streams generated by the enterprise. To the extent that this occurred, its effects would be as analyzed in subsection 4. This would occur, for example, to the extent that privatization entails taking property rights from the workers, as represented by the Workers' Councils, and giving (or selling) them to the new owners. In this case, if there were competition among the set of potential owners, bringing the owners' expected excess

^{1/} This has been the case, for instance, with many of the privatizations that took place in developed countries, such as Britain, during the 1980s.

return to zero, the government's bargaining power to obtain a larger share of revenues from the enterprises would be increased through privatization. On the other hand, a lack of competition among potential owners might give the owners bargaining power at the expense of both the workers and the government; in this case, the net effect on the government's bargaining power might be either positive or negative. The workers' ability to bargain over wages via the enterprise councils might also, to some extent, be replaced by the increasing activity of trade unions.

Privatization may also have direct implications for the government's revenue constraints. First, privatization may have a direct effect on the time profile of revenues, to the extent that part or all of the shares in privatized companies are sold. If shares of the privatized enterprises were given away through a voucher system or some other method, rather than being sold (e.g., Sachs and Lipton, 1990; Frydman and Rapaczynski, 1990), this effect would of course be nullified. Secondly, to the extent that revenues would have to be extracted from privatized enterprises through a uniform, and potentially distortionary tax system rather than from each enterprise through case-by-case bargaining, this would reduce the revenues obtainable from the enterprises.

Therefore, privatization is likely to affect the revenues available to the government, increasing these revenues to the extent that it results in technical improvement or decreases the bargaining power of the workers, but decreasing it to the extent that it results in demonopolization or to the extent that it creates a group of owners with bargaining power at the expense of that of the government. These effects are in addition to the more straightforward revenue consequences of privatization, which depend on the specifics of the arrangements whereby privatization takes place. Therefore, the government's revenue constraint may dictate either a faster or slower speed of privatization, and may also suggest arrangements that would be more likely to enhance the revenue obtained by the government.

V. Conclusions

The analysis in this paper suggests that fiscal constraints may in some cases provide an impetus to structural reform in socialist economies, but in some important cases may impede market-oriented reforms. Trade liberalization has a cost in terms of lost revenues, both revenues associated with the trade restrictions themselves and those deriving from the government's share of the monopoly profits of the protected socialized industry. Breaking up monopolies also has a fiscal cost, to the extent that it reduces both the monopoly rents that can be extracted by the government and the revenues associated with trade restrictions. Reforms in these directions therefore tend to be constrained by the fiscal structure. A pre-condition for such reforms would be some combination of fiscal reform and reduction in the spending of the government; an important element in the latter category would be debt reduction.

Some other reform measures might actually enhance revenues. Measures that enhance productivity in the SS, such as restructuring, infrastructure investment, or technology transfer, may increase profits in the SS and thus increase government revenues. On the other hand, measures that increase productivity in the NSS may, by raising the competitive wage, reduce profits and excess wages in the SS; this would tend to be only partly offset by the resulting shift of labor from the SS into the NSS. Measures that increase the bargaining power of the government vis-à-vis the labor-managed firm, or increase the profit-orientation of management within the firm, would tend to increase the government's revenues, while measures that increase the workers' role in management would tend to reduce revenues.

Privatization potentially entails a combination of several changes. It may be associated with demonopolization if a large state concern is sold off in pieces; it may give rise to internal restructuring that increases the efficiency of production in the enterprise; it may alter the bargaining power of the workers within the enterprise; it may also have direct effects on government revenues, for instance to the extent that privatized enterprises are sold to the public. Thus, whether privatization eases or tightens the revenue constraint depends greatly on the manner in which it is implemented.

The analysis in this paper has implications for the sequencing of reforms. It suggests that particular priority should be given to the introduction of taxation of households, falling indiscriminately on socialized and nonsocialized sectors, such as personal income taxes and value added taxes, in place of the traditional reliance on taxation of socialized enterprises. Such fiscal reform, designed to lessen the dependence of the state budget on revenues from the enterprise sector, may be a pre-requisite for other types of reform--notably for trade

liberalization and demonopolization--rather than simply being an additional type of reform that is desirable on efficiency grounds. 1/

The analysis also strengthens the case for debt reduction. To the extent that debt reduction reduces the minimum level of revenues that must be obtained by the government, it eases the fiscal constraints on liberalization measures, and permits the country to proceed further with a program of market-oriented reforms.

1/ This argument would have to be qualified to the extent that the government can borrow from either domestic or foreign sources pending tax reform; however, foreign borrowing would of course be limited by a debt overhang, while domestic borrowing would be limited by the lack of financial market development.

APPENDIX

This appendix characterizes the comparative statics results referred to in Section IV. The equilibrium condition which determines the sectoral allocation of labor is given by equation (16) which is reproduced below:

$$P + (1-\beta)xP' = \phi Z_{\ell}(L-x, T) \quad (A1)$$

Denote with $D = [P' + (1-\beta)(P' + xP'') + \phi Z_{\ell\ell}] < 0$, assuming that demand is not too convex (i.e., $P'' \leq 0$). By totally differentiating equation (A1) we obtain the following comparative statics results.

$$\frac{dx}{dy} = - \frac{[P' + (1-\beta)xP'']}{D} < 0 \quad (A2)$$

Trade liberalization decreases employment in the socialized sector.

$$\frac{dx}{dy} = \frac{xP'}{D} > 0 \quad (A3)$$

An increase in β (which is associated with an increase in the bargaining power of the state enterprise α , or with an increase in the employment elasticity τ , or with a decrease in the wage elasticity θ) increases employment in the socialized sector.

$$\frac{dx}{dL} = \frac{\phi Z_{\ell\ell}}{D} > 0 \quad (A4)$$

An increase in labor endowment increases employment of the state enterprise.

$$\frac{dx}{dT} = \frac{\phi Z_{\ell T}}{D} < 0 \quad (A5)$$

An increase in the endowment of land, decreases employment in the socialized sector.

$$\frac{dx}{d\phi} = \frac{Z_{\ell}}{D} < 0 \quad (A6)$$

An increase in productivity in the nonsocialized sector decreases employment of the state enterprise. Notice that the above comparative statistics exercises suggest that the behavior of our economy is identical to the specific sector model despite the existence of bargaining and imperfect competition in the SS sector.

References

- Blanchard, Olivier, and Richard Layard, "Economic Change in Poland" in The Polish Transformation: Programme and Progress (London: Centre for Research into Communist Economies, 1990), pp. 63-83.
- Brander, James A. and Barbara J. Spencer, "Unionized Oligopoly and International Trade Policy," Journal of International Economics, Vol. 24 (1988), pp. 217-34.
- Dean, James W., and Aihua Xu, "Debt Relief for Eastern Europe? Why Poland is a Special Case" (mimeographed, Simon Fraser University, 1991).
- Dinopoulos, Elias, "Quid Pro Quo Foreign Investment and VERs: A Nash Bargaining Approach," Economics and Politics, 1991 (forthcoming).
- Frydman, Roman and Andrzej Rapaczynski, "Markets and Institutions in Large-Scale Privatizations: An Approach to Economic and Social Transformations in Eastern Europe," paper prepared for conference on Adjustment and Growth: Lessons for Eastern Europe, Pultusk, Poland, October 1990.
- Kornai, Janos, "The Hungarian Reform Process: Visions, Hopes, and Reality," Journal of Economic Literature, Vol. 24, No. 4 (December 1986), pp. 1687-1737.
- Institute of International Finance, Building Free Market Economies in Central and Eastern Europe: Challenges and Realities (Washington: Institute of International Finance, 1990).
- Lane, Timothy, "Wage-Bill Ceilings, Employment and Privatization" (mimeographed, Washington: International Monetary Fund, March 1990).
- Lipton, David, and Jeffrey Sachs, "Privatization in Eastern Europe: The Case of Poland," Brookings Papers on Economic Activity, 1990, No. 2, pp. 293-341.
- McDonald, Ian M., and Robert M. Solow, "Wage Bargaining and Employment," American Economic Review, Vol. 71, No. 5 (December 1981), pp. 896-908.
- McKinnon, Ronald I., "Stabilizing the Ruble: The Problem of Internal Convertibility" (paper presented to the Second International Monetary Conference, FU and Landeszentralbank Berlin, Berlin, May 1990).
- Mezzetti, Claudio, and Elias Dinopoulos, "Domestic Unionization and Import Competition," Journal of International Economics, (forthcoming, 1991).

- Nash, John, "The Bargaining Problem," Econometrica, Vol. 18, No. 2 (April 1950), pp. 155-62.
- Nuti, D.M., "Hidden and Repressed Inflation in Soviet-Type Economies: Definitions, Measurements and Stabilization," Contributions to Political Economy, Vol. 5 (March 1986), pp. 37-82.
- Pemberton, J., "A 'Managerial' Model of the Trade Union," Economic Journal, 98(392) (September 1988), pp. 755-71.
- Plowiec, Urszula, "Economic Reforms and Foreign Trade in Poland," in Economic Adjustment and Reform in Eastern Europe and the Soviet Union: Essays in Honor of Franklyn D. Holzman, ed. by Josef C. Brada, Ed A. Hewett, and Thomas A. Wolf (Durham and London: Duke University Press, 1988), pp. 340-69.
- Prasnikar, Janez, Jan Svejnar, Dubravko Mihaljek, and Vesna Prasnikar, "A Test of Enterprise Behavior Under Labor-Management" (mimeographed, University of Ljubljana, 1990).
- Tanzi, Vito (1991a), "Mobilization of Savings in Eastern European Countries: The Role of the State," Working Paper No. WP/91/4 (Washington: International Monetary Fund, January 1991).
- _____, (1991b), "Tax Reform in Economies in Transition: A Brief Introduction to the Main Issues," Working Paper No. WP/91/23, (Washington: International Monetary Fund, March 1991).
- Trzeciakowski, Witold, "Reform, Restructuring, Indebtedness," Eastern European Economics Vol. 27, No. 3 (Spring 1989), pp. 5-23.
- Welfens, Paul J.J., and Maria J. Welfens, "The Socialist Shadow Economy: Causes, Characteristics and Role for Systemic Reforms" (mimeographed, AICGS/The John Hopkins University, January 1991).
- Wolf, Thomas A., "Market-Oriented Reform of Foreign Trade in Centrally Planned Economies," Working Paper No. WP/90/28 (Washington: International Monetary Fund, April 1990).
- World Bank, World Debt Tables 1990-91, (Washington, DC, 1990).