TRADE LIBERALIZATION IN THE PRESENCE OF DOMESTIC DISTORTIONS

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The idea that external liberalization can spur economic growth is gaining wider acceptance among policy makers, especially those in developing nations. Yet the record on liberalization as an effective means to improve economic performance is mixed, and important elements in the theoretical case for liberalization remain unresolved. This paper discusses some reasons for increased interest in trade liberalization to promote growth and analyzes problems raised when trade is liberalized in a country that cannot simultaneously address all significant domestic distortionary policies. While other recent papers examine in detail the outcomes of specific liberalization episodes, this one provides a simple conceptual framework for examining the short-term consequences of trade liberalization for allocative efficiency and income distribution. Primary emphasis is on effects of liberalization in the presence of a real minimum wage.
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I. Trade Liberalization and Economic Development

Early scholarship on economic development emphasized the merit of sheltering infant industries from the full force of international competition. In the various rounds of multilateral trade negotiations, developing nations were exempted from making reciprocal concessions, reflecting the prevalent belief that temporary protection was desirable and perhaps even necessary to foster industrialization. Yet the "modern" sectors of many developing nations

¹Published studies are surveyed by Michaely (1984). More recent contributions include a number of country studies prepared for the World Bank as part of the Country Policy Department project on the timing and sequencing of a trade liberalization policy.
languished behind their high protective walls, while other economies far less insulated from foreign competition grew and prospered.

A mass of empirical evidence now challenges the conventional wisdom on the relationship between protection and development. The clear message from experience in recent decades is that restrictive trade policies are rarely associated with sustained growth and industrial development. Almost all of the development "successes" have relied on trade liberalization and an outward-oriented approach (see, for example, Harberger (1984) and Krueger (1980)). The evidence suggests that some degree of exposure to world market forces, rather than shelter from them, may be a key ingredient in development success.

On the other hand, it is clear that external liberalization in itself does not ensure successful development. While integration of the national economy into world markets seems very nearly a necessary condition for promoting sustained growth and industrial transformation, it is by no means sufficient. There are ample cases of failed liberalizations, ones which did not provide the anticipated economic benefits or could not be sustained politically for other reasons.

While the empirical association of successful growth with greater reliance on markets and liberal policies toward trade is striking, the mechanisms underlying the association are poorly understood. One important reason is that restrictive trade policies typically coexist with significant domestic distortions -- distortions in factor markets and often also administered prices for key intermediate goods or final outputs. The latter in turn entail complex allocational schemes which themselves absorb scarce productive resources.²

² Krueger (1974) suggests that resource-using allocational schemes may rob developing nations of a significant share of potential income. For Turkey and India, the estimated losses were 15% and 7.3% of gross national product respectively, taking into account both import restrictions and domestic distortions.
Because restrictive external policies are usually just one element of a strangling web of overall economic regulation, trade liberalization is likely to be part of a broader policy package that also includes macroeconomic reforms and domestic measures. This means potentially greater gains, but also greater difficulty in attributing the results, whether favorable or unfavorable, to any particular element of the package. Moreover, not even the most ambitious liberalization programs contemplate simultaneous removal of all significant domestic distortions at the same time that trade is liberalized. Thus, the theoretical case for trade liberalization must necessarily fall into the area of second-best.

It is well known that when some distortions remain, removal of others -- and specifically liberalization of trade -- need not improve an economy's overall efficiency or increase national well-being. This raises two important puzzles. The first is the observed link of liberal policies to economic performance. In particular, there is a need to explain why this relationship seems more robust than standard second-best analysis would suggest. The other puzzle concerns the interaction between liberalization and maintained domestic distortionary policies. Since liberalization will almost universally be carried out in a second-best context, there is a need to investigate the effects of liberalizing trade in the presence of the types of distortion most common in developing nations (see Krueger (1984)). Both tasks require an analytic framework that integrates two quite different effects of liberalization: the possible exacerbation of existing static-efficiency losses from resource misallocation caused by domestic distortions, and the broad-based efficiency gains often achieved through the dismantling of restrictive external (or internal) policies.
Although many types of domestic distortion raise second-best difficulties for predicting the effects of liberalization, this paper focuses mainly on one: an administered or negotiated minimum wage applying to workers in at least some sectors. Whatever its merits, such an arrangement is likely to produce open unemployment, a misallocation of labor between alternative uses, or both. Moreover, this situation is one in which liberalization could produce aggregate losses rather than gains, by worsening the unemployment or labor misallocation produced by the minimum wage in the first place. Yet even where this is true, such losses may be offset at least in part by broad-based efficiency gains from greater exposure to international markets.

A problem in modeling this tradeoff between the two types of effects is that no theory adequately takes account of the latter efficiency gains, even though many international economists believe they are large relative to the other, more easily specified, static gains from increased openness (see, for example, Balassa (1967) and Cline et al. (1978)). This paper takes a first step toward the required theoretical integration of the two types of changes resulting from liberalization. A simple algebraic formulation allows comparison of the relative sizes of the two effects.

Section II analyzes the short-run allocative and distributive effects of trade liberalization for a "base case" in which protection is the only initial distortion. This analysis highlights the consequences for predicted outcomes of incorporating possible broad-based efficiency gains from liberalization. Section III provides a brief discussion of capital-market distortions and their interaction with trade restrictions. Section IV analyzes the effects of liberalization in the presence of a real minimum wage under alternative assumptions about coverage and implementation. Section V summarizes the main conclusions from the minimum-wage analysis.
II. Short-Run Adjustment to Liberalization

This section describes effects on resource allocation and factor earnings of an unanticipated liberalization, which lowers the relative price of import-competing goods.\(^3\) The analysis looks mainly at short-run consequences, which are the major policy concern in evaluating the potential benefits and viability of the liberalization. As in the work of Jones (1971), Mayer (1974), Mussa (1974), and Neary (1978a), the short run is characterized here by the existence of a fixed stock of an immobile or industry-specific factor, "capital," in each sector, while "labor" is freely mobile between industries.\(^4\) The focus, however, is on the implications of existing domestic distortions that make any move toward liberalization a second-best measure. The analysis examines induced changes both in aggregate welfare and in other variables important for the broad acceptance of a liberalization. The latter include effects on employment, income distribution, and foreign investment. For simplicity, the liberalizing country is assumed to be a price-taker in international markets for traded goods.\(^5\)

The microeconomic gains or losses from liberalization arise through two quite different channels. The first is the response to changes in relative

\(^3\)In practice, some liberalization policies can have a minimal effect on relative prices. Recent thinking has emphasized that liberalization should be carried out in stages, with the first stage perhaps merely substituting equivalent tariff protection for other types of import controls (see Michaely (1984)). As this possibility indicates, trade liberalization may affect government revenues. Revenue effects are ignored in the analysis here.

\(^4\)In this type of model, sector-specific "capital" could include land and human skills as well as machinery and structures, while mobile "labor" might consist in part of capital items such as trucks or computers that are readily adapted to new uses.

\(^5\)Where the liberalizing country has some market power, the usually adverse effect on the nation's terms of trade introduces an additional source of ambiguity in the static welfare effects of unilateral liberalization.
prices of outputs. The relative-price effect will by itself favor production of exportables and discourage production of import-competing goods. The relative-price effect of liberalization will pull mobile labor into exportables production, with a corresponding push of mobile resources out of import-competing production.

However, liberalization is also likely to have a favorable effect on overall productive efficiency. This favorable effect may result at least in part from the release of productive resources previously employed in dealing with the controls themselves. It may also reflect various external economies achieved through greater integration with global markets, such as enhanced transfer of production and marketing know-how, availability of a wider range of imported intermediate inputs, and increased competition in domestic markets. By themselves, these productivity effects tend to promote the growth of both sectors, but with a net pull of mobile resources into the sector experiencing the greater productivity gains of this type. If, as one might expect, the efficiency gains are greater in the previously sheltered import-competing industry, the allocational consequences may be opposite to those induced by the relative-price change alone.

The overall impact on the allocation of resources thus depends on the relative sizes of three effects of liberalization: the fall in the relative price of import-competing goods and the respective improvements in overall productivity in the exportables and import-competing industries.

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6See Krueger (1974). As Bhagwati (1980) has shown, the withdrawal of productive resources in this way can, paradoxically, yield welfare improvements under certain conditions. However, this is impossible in the short-run framework analyzed here. Also see Bhagwati and Srinivasan (1983, Chapter 30).
The Model

The analysis is based on the standard two-sector production model, with goods X and Y produced using factors K and L. The economy exports X (assumed here to be relatively labor-intensive for developing nations) and imports Y. Production functions are homogeneous of degree 1 in K and L and have the standard neoclassical properties; a and b are neutral shift-parameters introduced to take account of induced changes in sectoral productivity:

\[ X = aF(L_X, K_X), \]
\[ Y = bG(L_Y, K_Y). \] (1)

In what follows, changes in a and b are called dynamic or broad-based effects of liberalization, to distinguish them from the familiar static effects arising through reallocation of the mobile factor between sectors.

Initially, output and factor markets are assumed to be perfectly competitive; earnings of each factor are then determined by the value of its marginal product. In the absence of distortions in factor or product markets, short-run equilibrium requires that the total supply of mobile labor, L, be allocated in such a way as to equate the value of the marginal product of labor across industries. Labor will be fully employed and will earn the same wage in both sectors.\(^7\) The equilibrium labor allocation and wage rate are then given by:

\(^7\)Ignored here is the possibility of a "surplus labor" economy, in which the supply of labor relative to other inputs is so high that the entire supply cannot be employed without driving labor's marginal product to zero.
\[ L_Y = L - L_X, \]  \hspace{1cm} (2)
\[ aF_L(L_X, K_X) = pbG_L(L_Y, K_Y), \]  \hspace{1cm} (3)
\[ aF_L(L_X, K_X) = w, \]  \hspace{1cm} (4)

where \( p \) is the relative price of the import-competing good, \( Y \), and \( w \) is the wage rate measured in terms of the numeraire \( X \). \( K_X \) and \( K_Y \) are stocks of industry-specific capital, assumed initially to be fixed in the short run. Thus, the returns to capital in the two sectors, \( r_X \) and \( r_Y \), need not be equal:
\[ aF_K(L_X, K_X) = r_X, \]  \hspace{1cm} (5)
\[ pbG_K(L_Y, K_Y) = r_Y. \]  \hspace{1cm} (6)

For simplicity, however, initial equality of returns to capital is assumed to hold except in the presence of a capital-market distortion.

**Liberalization in the Base Case**

To separate the second-best effects from the interaction of static and dynamic consequences of liberalization, we begin with a base case in which protection is the only initial distortion. For this case, the short-run impact of liberalization is determined by differentiating equations (2)-(6) totally, holding \( K_X, K_Y, \) and \( L \) constant. This yields:

\[ \hat{L}_X = -\left(\eta_L X \eta_L Y / \eta_L \right) \left( \hat{p} + \hat{b} - \hat{a} \right), \]  \hspace{1cm} (7)
\[ \hat{w} = \hat{a} - \hat{L}_X / \eta_L X \]  \hspace{1cm} (8)
\[ \hat{w} - \hat{p} = \hat{b} - \hat{L}_Y / \eta_L Y = \hat{b} + (L_X / L_Y) \hat{L}_X / \eta_L Y. \]  \hspace{1cm} (9)
\[ \hat{r}_X = \hat{a} + (L_X F_K / F_K) \hat{L}_X \]  \hspace{1cm} (10)
\[ \hat{r}_Y = \hat{p} + \hat{b} - (L_X G_K / G_K) \hat{L}_X, \]  \hspace{1cm} (11)
where $\eta_{LX}$ and $\eta_{LY}$ are the elasticities of demand for labor in the two industries,

$$\eta_{LX} = \frac{F_L}{F_{LL}L_X},$$

$$\eta_{LY} = \frac{G_L}{G_{LL}L_Y},$$

$\tilde{\eta}$ is the weighted average of the labor demand elasticities,

$$\tilde{\eta} = \frac{L_X\eta_{LX} + L_Y\eta_{LY}}{L},$$

and "\*" denotes proportional change.

Reallocation of Labor

Equation (7) indicates that the impact of liberalization on the allocation of labor depends on the relative strength of two types of effects. Reduced protection of the import-competing industry means a fall in $p$, narrowing the wedge between the domestic and world price ($p^*$). By itself, the price change should induce a change in the movement of labor toward the export sector, $X$ -- such a result is here termed the "normal" case. However, a liberalization package is likely to have broad-based efficiency effects as well, particularly in the previously sheltered $Y$ industry. If the efficiency gains in $Y$ are strong relative to comparable effects in $X$ (i.e., if $b - a$ is positive and large), labor may actually be pulled into the $Y$ industry -- a result that runs counter to the standard prediction.

Implications for real wages similarly reflect opposing forces. In the industry that gains labor, the capital-labor ratio declines, depressing labor's real marginal product and real earnings in terms of that good. However, a sufficient boost to productivity can offset this effect. Equations (8) and (9) indicate that labor necessarily gains in terms of the good produced by the
industry with shrinking employment. In the normal case where X employment rises, labor earnings must increase in terms of import-type goods but may fall in terms of the export good. To the extent that the export sector produces goods important in basic consumption, the resulting change in real earnings may be associated with an adverse shift in the distribution of income, even though national income necessarily rises.

As long as labor is perfectly mobile between sectors, real wages in the two industries remain equalized but may rise in terms of one product while falling in terms of the other. However, as equations (8) and (9) show, larger gains in efficiency increase the presumption that equilibrium real wages will increase even in terms of the good produced in the expanding industry (X in the normal case).

With capital sector-specific and immobile, its returns following liberalization are not equalized across the two sectors. The reward to capital will necessarily rise in the expanding sector, measured in terms of either good. The amount of the increase is determined by the fall in the capital-labor ratio and the gain in efficiency. Equation (11) indicates that in the normal case returns to Y capital fall in terms of both goods unless the sector experiences a strong efficiency boost as a result of liberalization.\(^8\)

Even without extending the analysis to deal with maintained domestic distortions, incorporation of possible broad-based productivity gains has

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\(^8\)In comparison, the long-run Stolper-Samuelson theorem (with capital homogeneous and perfectly mobile between sectors) predicts that liberalization should increase the return to labor measured in terms of either good, while capital's earnings fall in terms of both. Taking account of the efficiency terms \(\alpha\) and \(\beta\), which would presumably be more important in the long than the short run, reinforces the case for a rise in the real wage unless the Y sector's efficiency gain is far greater than that in the X industry. Greater overall efficiency tends to reduce the expected fall in capital's real earnings, although not relative to labor.
striking consequences for predicted outcomes. Liberalization-induced shifts in employment, earnings, and trade, as well as gains in aggregate welfare, are seen to depend crucially on the extent of broad-based efficiency gains that come about from liberalization. If these gains are important relative to the conventionally measured static effects, as much evidence suggests they are, the size and even direction of adjustments required by trade liberalization may be difficult to forecast. In particular, the exposed import-competing sector may expand rather than contract. If so, policies intended to facilitate adjustment may actually do the opposite if they focus on anticipated static effects only.

**Variable Sector-Specific Capital**

What will be the effect of liberalization on foreign investments? The clustering of foreign production facilities in protected markets is well documented. If protection is what makes the facilities economically viable, liberalization should dampen the enthusiasm of foreign investors. Yet there is also evidence that countries shifting toward an export orientation have enjoyed increased inflow of foreign capital. While policies directed specifically toward foreign investors no doubt play a role, the two phenomena also illustrate the potentially conflicting static and dynamic consequences of liberalization.

As noted above, the return to the sector-specific capital in the $Y$ industry is likely to fall as a consequence of liberalization. If $Y$ capital is provided in part by foreign investors, the lower return may induce a reduction in $K_Y$ or in the rate of new investment.⁹ To analyze the effect of

⁹This reduction may occur quite rapidly, particularly for the firm-specific assets that multinationals deploy among alternative investment sites.
this response, assume that foreign investors require an exogenously determined rate of return $r$ from local subsidiaries. To simplify further, assume that $r$ is measured in terms of $Y$, so that the initial value of $r_Y/p$ is equal to the required rate. Then (6) becomes

$$bG_K(L_Y, K_Y) = r_Y/p = \bar{r},$$  \hspace{1cm} (6')

and (11) becomes

$$\hat{r}_Y = \hat{p}. \hspace{1cm} (11')$$

In the absence of any broad-based efficiency gains, liberalization lowers the return to $Y$ capital below the required level. This induces foreign investors to withdraw capital from the $Y$ sector until $r_Y/p$ is restored to the initial value. Since $G$ is homogeneous of degree 1 in $K$ and $L$, this in turn requires that the $Y$ sector's capital-labor ratio and marginal product of labor also be restored to their initial values.

Without broad-based efficiency gains, the presence of internationally mobile capital in $Y$ implies that labor earnings necessarily fall as a consequence of liberalization. This is because wages are maintained constant in terms of good $Y$, which has fallen in value relative to $X$. The reward to $X$ capital is enhanced, however, over the base case, since its labor-capital ratio in the new equilibrium must be even higher.\(^{10}\)

Does liberalization necessarily raise national welfare when there is no domestic distortion but capital is internationally mobile? Leaving aside

\(^{10}\)Symmetry suggests the possibility of new direct investments being drawn into the $X$ sector. Here we assume that foreign investment occurs only in the $Y$ sector. However, allowing new investments in $X$ obviously increases the likelihood of a net expansion of $DF_1$.\)
such complications as taxation of subsidiary profits, the answer is yes. National income net of earnings of foreign capital and valued at world prices is raised by the reallocation of labor toward the X industry. A further social gain accrues because consumers now choose between X and Y on the basis of domestic prices that diverge less from international costs.\(^\text{11}\)

Taking into account the broad-based efficiency gains likely to accompany liberalization complicates the picture but further expands the predicted national benefits. If efficiency gains occur in the Y sector to an extent comparable to or greater than in X, capital withdrawal from that sector will be reduced or even reversed. This is because efficiency gains offset the reduction in the rate of return resulting from a lower labor-capital ratio. Even if foreign investments in the Y sector are reduced, the likelihood that labor earnings will fall unambiguously is smaller.

III. Capital-Market Distortions

Many nations seek to encourage modernization through subsidies to investment in targeted sectors. In these cases, the targeted sectors are typically a subset of import-competing manufactures. Other countries offer subsidized agricultural loans intended to offset the adverse production incentives of protected industry or controlled prices of staple foods.

In the context of the model developed above, sectoral investment policies would imply an initial divergence between the rates of return to capital in the two sectors.\(^\text{12}\) If the incentives favor import-competing manufactures,  

\(^{12}\text{Sectoral investment incentives are usually embedded in a broader set of credit-market controls, which may include negative real rates of interest to bank depositors and/or preferred borrowers as well as controls on capital outflows. These create complex problems worthy of study in their own right. Here only the effect of the initial allocation of investment between the two sectors is taken into account.}
the resulting misallocation of investment reinforces the effects of protectionist policies in depressing the output of X relative to the social optimum. Liberalization, which tends to promote X output, thus still has a favorable static impact on national product measured at world prices. Broad-based efficiency gains add to the potential increase in national welfare.

In some instances, sectoral investment incentives are used to promote investment in industries with direct foreign investments, so that elements of the two analyses above must be combined. Three cases may be distinguished:

(a) Incentives apply only to domestic investors. In the initial equilibrium, domestic capital is allocated according to net rates of return, i.e.,

$$r_X = r_Y (1+s)$$  \hspace{1cm} (12)

$$r_Y / p = \bar{r} = r_X / (1+s) p$$  \hspace{1cm} (13)

where s is the rate of subsidy to domestic investment in Y. However, direct foreign investment must be reduced enough to bring the sectoral return to the required level; domestic investment in Y thus drives out foreign capital. With less domestic capital for investment in the X industry, the economy’s total stock of capital (domestic plus foreign-owned) is reduced.

The initial situation is characterized by three distortions: with respect to relative output prices, the allocation of capital between sectors, and the extent of foreign investment. The first two distortions depress X production. Liberalization tends to promote X output and thus may increase efficiency. The effects via direct foreign investment are ambiguous, with protection raising and the discriminatory subsidy reducing the total. After liberalization, the lower return to Y capital means an exodus of foreign capital.
(b) Incentives apply only to foreign investors. Here the initial equilibrium is characterized by a larger stock of direct foreign investment and a larger total stock of capital:

\[ r_X = r_Y = \frac{pr}{1+s} \]  

The capital-market distortion tends to promote X production by pushing domestic capital out of the Y sector, while protection of Y and the investment subsidy have the opposite effect. The static-efficiency effects of liberalization are thus ambiguous with regard to welfare. Again, foreign investment is reduced by the static effects of liberalization.

(c) Incentives apply both to domestic and foreign investors in industry Y:

\[ \frac{r_X}{1+s} = r_Y = \frac{pr}{1+s} \]

As in (b), the incentive for direct investment is enhanced. However, the initial allocation of domestic capital also favors Y, reducing the total amount of foreign investment that can be accommodated at the lower required rate of return. The consequences for the total initial capital stock are thus ambiguous, and the analysis of liberalization potentially incorporates all the effects described in (a) and (b).

So far, no mention has been made here of possible broad-based efficiency gains from liberalization. These tend to reduce the outflow of direct investment that normally occurs as a result of liberalization. Also not mentioned here are further variations allowed if there is direct foreign investment in X as well as Y.
IV. A Real Minimum Wage

An implication of the base analysis in Section II is that even in the absence of an uncorrected domestic distortion, liberalization may be socially disruptive because it requires movement of labor across sectors, shifts the distribution of income, and reduces incentives for direct investment. However, one circumstance frequently associated with failed liberalization attempts is increased unemployment. While this association may be the result of combined programs of liberalization and stabilization, unemployment can also occur because wages in one or both sectors are fixed in real terms. Here the results depend on the way in which the fixed wage is determined, the degree of sectoral coverage, the extent of labor mobility between sectors, and international mobility of sector-specific capital.

In the long-run model of two sectors and two internally mobile factors, a real minimum wage covering all workers raises the capital-labor ratio that much be used in each industry (see Brecher (1974), (1975)). Given this constraint, employment is determined by the composition of output, or, equivalently, by relative prices. Because liberalization in a developing nation typically means a rise in the relative price of the labor-intensive output (here X), the long-run impact on employment will be favorable or at least neutral (if labor is fully employed before liberalization). For a small country, liberalization necessarily increases welfare.

For the shorter run in which capital is immobile or sector-specific, the prognosis is less favorable (see Edwards (1982)), but broad-based efficiency gains can offset the pressures for increased unemployment. The mechanism is analogous to that limiting equilibrium wage reductions in the base case discussed above. Six cases are considered, allowing full or
partial coverage of the labor force, denomination of the real wage in terms of X or Y, and free or restricted mobility of labor between sectors.

(a) Full coverage, minimum real wage \( \bar{w} \) set in terms of X. This combination produces the greatest potential for reduced employment and welfare when trade is liberalized. Initially, labor is allocated between sectors so that:

\[ aF_L(L_X, K_X) = \bar{w} \]  \hspace{1cm} (15)

\[ pbG_L(L_Y, K_Y) = \bar{w} \]  \hspace{1cm} (16)

\[ L_X + L_Y < L. \]  \hspace{1cm} (17)

The short-run impact of liberalization on employment is determined by differentiating equations (15) and (16) totally, holding \( K_X \) and \( K_Y \) constant, which yields:

\[ \hat{L}_X = \eta_{L_X} \hat{a} \]  \hspace{1cm} (18)

\[ \hat{L}_Y = \eta_{L_Y}(\hat{p} + \hat{b}). \]  \hspace{1cm} (19)

Ignoring broad-based efficiency effects \( \hat{a} \) and \( \hat{b} \), employment remains constant in industry X and falls in industry Y. Capital earnings remain fixed in industry X and fall in Y. National income at world prices declines, although the effect on welfare is offset in part by elimination of the distortion in consumption. Workers remaining employed are thus better off. Mobile foreign capital in the Y industry exacerbates losses by further reducing employment as investment is withdrawn from the Y sector.

As equations (18) and (19) indicate, the unfavorable employment effects can be offset or even reversed if broad-based efficiency gains are important.
The intuition underlying this result is straightforward: increased efficiency raises the marginal product of labor relative to any fixed real wage and thus reduces the loss from allocative inefficiency. Similarly, broad-based efficiency gains can offset or reverse the tendency for foreign capital to move out of the Y sector after liberalization. From (6) and (19), holding $K_Y$ constant,

$$\hat{\Gamma}_Y = \hat{p} + \hat{b} + \hat{L}_Y(G_{KL}L_Y/G_K) = (\hat{p} + \hat{b})(1 + \eta_{LY}L_YG_{KL}/G_K).$$  \hspace{1cm} (20)

If the efficiency gain outweighs the (unfavorable) terms-of-trade effect, inward foreign investment will reinforce the sector's gain in employment.

(b) Full coverage, real minimum wage $\bar{w}$ set in terms of $Y$. In this case (or where the real minimum wage is set in terms of a basket), the potentially unfavorable effects of liberalization on employment are eliminated (or attenuated).

If the wage is set in terms of $Y$, the initial equilibrium allocation of labor is given by

$$aF_L(L_X, K_X) = \bar{w}/p, \hspace{1cm} (21)$$

$$bG_L(L_Y, K_Y) = \bar{w}, \hspace{1cm} (22)$$

so that

$$\hat{L}_X = \eta_{LX}(\hat{a} - \hat{p}) \hspace{1cm} (23)$$

$$\hat{L}_Y = \eta_{LX}\hat{b}. \hspace{1cm} (24)$$

While in case (a) liberalization raised the minimum wage in terms of $Y$, here the effect is to lower it in terms of $X$. Employment and national welfare necessarily rise, even without the favorable effect of broad-based efficiency gains. Mobile foreign capital in the Y sector allows further gains.
(c) Coverage in Y sector only, \( \bar{w} \) set in terms of \( X \), mobility restricted.

When only the import-competing sector is covered, additional assumptions are required with respect to labor-force behavior. Given a minimum wage in one sector only, workers will clearly prefer employment there to employment in the uncovered \( X \) sector. The labor-market equilibrium could be maintained either through strict controls on movement into the covered sector (cases c and d) or by allowing \( Y \)-sector unemployment to equalize the expected earnings in the two sectors (e and f).

If labor mobility between sectors is restricted, employment in the \( Y \) sector is again given by equation (16). However, all remaining workers are now absorbed in the \( X \) sector, pushing the wage there below the market-equilibrium level:

\[
L_X = L - L_Y
\]  

\( aF_L(L_X, K_X) = \bar{w} < w_M < \bar{w}, \)  

where \( w_M \) is the market wage that would be obtained by all workers in the absence of the labor-market distortion. In this case, the static effects of the two distortions operate in opposite directions, with protection tending to increase output and employment in the \( Y \) sector, and the minimum wage tending to restrict them.

As in (a), the effect of liberalization on \( Y \)-sector employment is given by equation (19). By increasing the value in terms of \( Y \) of the real minimum wage, liberalization reduces employment in the sector. This reduction is offset, however, by any broad-based efficiency gain. Workers displaced from \( Y \) are employed in \( X \), widening the gap between wages in the two sectors and the accompanying misallocation of labor. Unless broad-based efficiency gains are large
relative to $\beta$, this is a case in which national income measured at world prices will fall as a consequence of liberalization -- but without creation of unemployment. The loss results entirely from an exacerbated misallocation of labor between sectors.\textsuperscript{13}

(d) Coverage in $Y$ sector only, $w$ set in terms of $Y$, mobility restricted. Here liberalization maintains the minimum wage in terms of $Y$. The only effect on labor allocation between sectors arises from broad-based efficiency gains in the $Y$ sector, which pull additional workers into covered employment. National welfare can rise through three channels: broad-based efficiency gains (depending on the magnitudes of $\hat{a}$ and $\hat{b}$), reallocation of labor toward the $Y$ sector (depending on $\hat{b}$), and improved efficiency in consumption (depending on $p-p^*$, the initial distortion due to protection). Foreign investment in the $Y$ sector will remain constant, since its return, along with that of labor, is held fixed in terms of $Y$ by the real minimum wage.\textsuperscript{14}

(e) Coverage in $Y$ sector only, $\bar{w}$ set in terms of $X$, labor freely mobile. In this case, workers will move into the covered sector until the expected returns in the two sectors are equalized through creation of $Y$-sector unemployment:

$$w = \bar{w} \left( L_Y / N_Y \right), \tag{27}$$

where $N_Y$ is the $Y$ industry labor force, including unemployed workers, and $w$ is the marginal product of workers in the $X$ sector. In the initial

\textsuperscript{13}The misallocation of labor between sectors might be termed an underemployment equilibrium.

\textsuperscript{14}Since the return to capital is not independent of the minimum wage, the initial equilibrium requires that $r$ be consistent with $w$ or that there is no foreign investment. An alternative possibility not pursued here is that $r$ is a function of the level of foreign investment in the $Y$ sector.
unemployment. However, the negative welfare effect is offset at least in part by a reduction in the misallocation of labor between sectors. Similarly, with $p + b < 0$, $L_Y$ falls and total employment rises, but the wage differential between sectors widens. Any gain in broad-based efficiency in the $X$ sector has an unambiguously favorable effect on both employment and national welfare.

(f) Coverage in $Y$ sector only, $\bar{w}$ set in terms of $Y$, labor freely mobile. Again, workers move between sectors to equalize expected returns:

$$w_p = \bar{w}(L_Y/N_Y).$$  \hspace{1cm} (29)

Employment in $Y$ is given by (22), and the effect of liberalization on covered employment by (24). In the absence of broad-based efficiency gains in $Y$, liberalization raises the relative attractiveness of uncovered employment, and unemployment must fall to restore equilibrium. Welfare rises, with production of $Y$ unchanged and that of $X$ higher. With broad-based efficiency gains, the effects are more complicated; if efficiency gains occur primarily in the covered sector, equilibrium unemployment may rise. Efficiency improvement in the uncovered sector reinforces the presumption of employment and welfare gains from liberalization.

V. Conclusions

This paper has offered a simple model for analyzing the effects of trade liberalization on employment, earnings, and welfare in the short run when capital cannot be shifted between sectors. The model integrates the well-known static allocational effects of liberalization with broad-based efficiency gains that boost productivity of one or both sectors.
The presence of broad-based efficiency effects tends to reinforce the presumption of welfare gains from liberalization even when carried out in a second-best context of a minimum wage. However, these effects may reverse the direction of labor movement between sectors, the impact on unemployment, or the incentives facing foreign investors in the previously sheltered sector. The incorporation of these effects into the analysis thus tends to strengthen theoretical support for recent policy prescriptions favoring a market-oriented approach even when some domestic distortions cannot be immediately eliminated. On the other hand, the unexpected patterns of induced resource movement may offer an additional explanation of the difficulties encountered by countries that follow the liberalization prescription.
REFERENCES


