NBER WORKING PAPER SERIES

LABOR MARKET DISTORTIONS AND STRUCTURAL ADJUSTMENTS IN DEVELOPING COUNTRIES

Sebastian Edwards

Alejandra Cox Edwards

Working Paper No. 3346

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
May 1990

This is a revised version of a paper presented at the University of Warwick-Economic Development Institute Conference on "Labor Markets in an Era of Adjustment" Warwick, August 7-10, 1989. We are grateful to John Knight, Ravi Kanbur, Miguel Savastano, Ed Buffie, Luis Riveros and the conference participants for helpful comments. Alejandra C. Edwards acknowledges support from the California State University-Long Beach Research Office. Sebastian Edwards acknowledges support from UCLA's Academic Senate and from the NSF. This paper is part of NBER's research program in International Studies. Any opinions expressed are those of the authors and not those of the National Bureau of Economic Research.

NBER Working Paper #3346
May 1990

LABOR MARKET DISTORTIONS AND STRUCTURAL ADJUSTMENT IN DEVELOPING COUNTRIES

ABSTRACT

The purpose of this paper is to provide a typology of different labor market configurations and investigate how two major structural adjustment policies, namely a trade liberalization reform and the relaxation of capital controls, affect the level of aggregate employment and the rate of unemployment. We consider a number of models starting from the traditional Australian approach. We then analyze a multiple sectors intertemporal setting and a model with uncertainty and search. We identify situations under which structural adjustment results in unemployment.

Sebastian Edwards
Department of Economics
UCLA
Los Angeles, CA 90024-1481

Alejandra Cox Edwards
Department of Economics
California State University
Long Beach, CA 90840

I. Introduction

Most "official" plans to deal with the debt crisis contemplate significant economic reforms in the developing countries. In particular, the Baker plan, the Brady plan, and the programs sponsored by the International Monetary Fund and the World Bank include as one of their key components significant reforms aimed at opening up these economies to the rest of the world. In fact, it is not an exaggeration to say that at this time a reform of their trade regime is one of the most important policy prescriptions being considered by the authorities of the developing nations.[1]

A number of observers have noted that in spite of clear theoretical arguments and of the insistence with which trade liberalization is pushed by the multilateral agencies, many countries vehemently resist it. How can we explain this? If trade reform is as desirable as economists have argued, why do we see so few sustained efforts at opening up the developing countries? There is no doubt that trade liberalization entails adjustment costs, which often take the form of increased aggregate unemployment. The question though is: Why do these costs induce so much resistence? particularly in light of the expectation of future social benefits. Why does the road to protectionism, which also entails an adjustment process, appear so much smoother?

Surprisingly, most of the policy literature on structural reform and liberalization of the external sector has tended to sidestep the question of unemployment.[2] Moreover, in those studies that take the simple Heckscher-

---

[1] A recent study by Thomas (1989) shows that the great majority of World Bank Structural Adjustment Loans (SALs) have had a trade liberalization component as a condition for releasing funds.

[2] There are, however, a few exceptions. Krueger (1983), for instance, discusses the empirical relation between trade orientation and employment in the long run. The World Bank study directed by Michaely, Choksi and Papageorgiou (1986) deals with the employment effects of trade reforms,

Ohlin model as a benchmark the issue is completely nonexisting. In fact, according to the simplest textbook approach, in a small developing economy with capital intensive imports, fully mobile factors of production and flexible prices, the reduction of import tariffs will have no effect on total employment even in the short run. In this setup the only labor market effects of trade liberalization will be a reallocation of labor out of the importables sector and an increase in the real wage rate.[3] In reality, however, there exist a number of reasons why these textbook condition will not hold, and why tariff reforms can result in a decline of employment in the short run. In fact, existing historical evidence suggests that in many cases trade liberalization reforms have been associated with short-run increases in unemployment (Edwards 1990).

The Ricardo-Viner model with real wage rigidity provides the simplest framework for illustrating the possible short run employment consequences of a tariff reform. In this model capital is, in the short-run, fixed to its sector of origin; only slowly through time (and possibly via investment) can capital be reallocated. Contrary to the more traditional textbook case with full flexibility of prices and resource movements, in this more realistic setting a tariff reduction can result in a decrease of the equilibrium real wage rate required to maintain full employment. However, if for some reason the economy's labor market is distorted -- due to a government imposed minimum wage, or to the existence of indexation clauses -- there will be downward inflexibility of real wages, and the required reduction in the wage

---

while Edwards (1990) discusses the unemployment ramifications of a cross section of liberalization attempts.

[3]This result, of course, is what is predicted by the Stolper-Samuelson theorem under the (plausible) assumption that imports are relatively capital intensive.

rate will not take place. As a result of this rigidity, some fraction of the labor force will become unemployed.

This paper is motivated by the crucial role that labor markets behavior may play in determining the success of liberalization policies and provides a theoretical survey on the ways labor markets can react to structural adjustment reforms. More specifically, we provide a typology of different labor market configurations and investigate how two main liberalization policies -- a reduction of import tariffs and the relaxation of capital controls -- will affect the level of aggregate employment and the rate of unemployment. Our analysis is based on the exploration of the employment implications of several models proposed in the literature.[4] We start with a brief discussion of the standard Australian or dependent economy model with flexible wages and prices, pointing out its deficiencies (Section II). This model provides a benchmark case that is then used to discuss different extensions. In Section III we incorporate labor market distortions in the form of wage rigidities to the discussion. Here we make a distinction between economy-wide and sector-specific wage rigidity. The analysis in this section assumes that capital is sector-specific. In that regard, this discussion should be interpreted as referring to short-run situations. Section IV incorporates an intertemporal dimension and deals with both the employment effects of relaxing capital controls and the employment implications of anticipated trade liberalization reforms. In Section V we relax the standard trade theory assumption of a fixed labor supply, and consider a model with upward-sloping labor supply and queuing. In this section we pay

---

[4] We survey and summarize a number of existing models including some we have used in our previous work such as Edwards (1988, 1990) and Cox-Edwards (1986).

closer attention to the initial labor market conditions of a typical protected economy. We assume that along with trade protection the economy is characterized by labor unions or some other institutionalized form of labor protection.[5] Thus, ironically, the factor of production that is supposed to gain from freer trade is actually gaining from trade restrictions. Needless to say, it is not the entire labor force that benefits from protectionism but only the more organized sectors. It is perhaps within this setting that the resistance to trade liberalization can be better understood. Finally, Section VI contains the concluding remarks.

II. Tariff Liberalization and Labor Market Adjustment in the Standard Australian Model

In this section we discuss the way in which a tariff liberalization reform affects the labor market in the standard Australian model with flexible prices and no market distortions.[6] In the following sections we will use these results as a benchmark to be compared with those obtained from alternative specifications of the labor market.

Consider the case of a small country that produces and consumes three goods -- importables (M), exportables (X), and nontradables (N).[7]

---

[5]Labor unions have a stronger negotiating power and sometimes even monopsony power in a closed economy.

[6]This model has a long tradition in international trade theory. See the discussion of it in Mussa (1974) and Dornbusch (1974, 1980). Edwards (1988) provides a diagrammatical discussion of this standard model.

[7]The distinction between two types of tradable goods (X and M) and a nontradable good (N) is analytically convenient, and is at the very core of modern open economy macroeconomics. In practice, however, it is not easy to determine which goods are actually tradables and which are nontradables. Indeed, statistics for the vast majority of countries do not make such a distinction. Although this practical difficulty does not invalidate the usefulness of the dependent economy model, it does imply that analysts and policymakers should be particularly careful (and creative) when using this model. At the simplest level it can be argued that (at least) a large

Households consume all three goods and maximize a utility function subject to a constraint which states that the value of expenditure does not exceed income. There are a large number of identical producers and perfect competition prevails in the goods markets. Firms are assumed to maximize profits subject to existing technology and to the available factors of production: labor, capital and natural resources.[8] In addition to consumers and producers, there is a government that imposes a tariff on imports. Following traditional trade theory it is assumed that the revenue from the tariff is handed back to consumers in a lump-sum fashion.[9] There are no other taxes and no government spending on goods or services. Finally, we use the price of exportables as the numeraire.

Denoting the revenue function by R, the expenditure function by E, the price of nontradables relative to exportables by q, and that of importables relative to exportables by p, the equilibrium in this simple economy can be represented by the following set of equations (where a subindex refers to a partial derivative):[10]

$$R(1,p,q;L,K,G) + \tau(E_p - R_p) = E(1,p,q,U), \qquad (1)$$

---

percentage of the services sector of an economy is constituted by nontradables. It is important to note, however, that the importance of this nontradable sector will vary across countries. For instance, some authors have argued that, strictly speaking, in the case of Uruguay there are no nontradables: at least for Argentinian consumers all Uruguayan goods are tradable.

[8] Alternatively, we can assume that there are two factors only -- capital and labor -- and that capital is sector specific in the short-run. In fact this formulation is much simpler than the one used in this section. On three-factor models of international trade see Leamer (1987).

[9] For a model where the government uses tariff proceeds to finance its own consumption, see Edwards (1989a).

[10] For a detailed exposition of traditional trade theory using duality see Dixit and Norman (1980).

$$E_q = R_q, \tag{2}$$

$$p = p^* + \tau, . \tag{3}$$

where L, K, and G are labor, capital and natural resources, respectively. τ is the specific import tariff, $(E_p - R_p)$ are imports, and U is total utility. Equation (1) is the budget constraint and establishes that total income -- stemming from factors' income and government transfers -- has to equal expenditure. Equation (2) is the nontradables equilibrium condition, while equation (3) establishes the relation between the domestic price of importables and the import tariff τ.

As in most traditional trade models we assume that factors supplies -- and in particular the supply of labor -- are inelastic.[11] The initial labor market equilibrium is illustrated in Figure 1, where the horizontal axis measures total labor available in the economy and the vertical axis depicts the wage rate in terms of exportables. Schedule L_T denotes the demand for labor by the tradable goods sector and is equal to the horizontal sum of the demand for labor by the exportables sector, (schedule L_X), and the demand for labor by the importables sector. Demand for labor by the nontradable goods sector is shown by schedule L_N. The initial equilibrium is characterized by full employment and a wage rate equal to w_0. At this position $0_T L_A$ labor is used in the production of exportables, $L_A L_B$ labor is employed in the production of importables, and $0_N L_B$ labor is used in the production of nontradables. In what follows we will assume that in the short-run only labor can move across sectors, although in the long-run, all three factors are assumed to be mobile. However, since our main interest is

[11] We relax this assumption in Section V where we analyze queuing models. See also Edwards (1990).

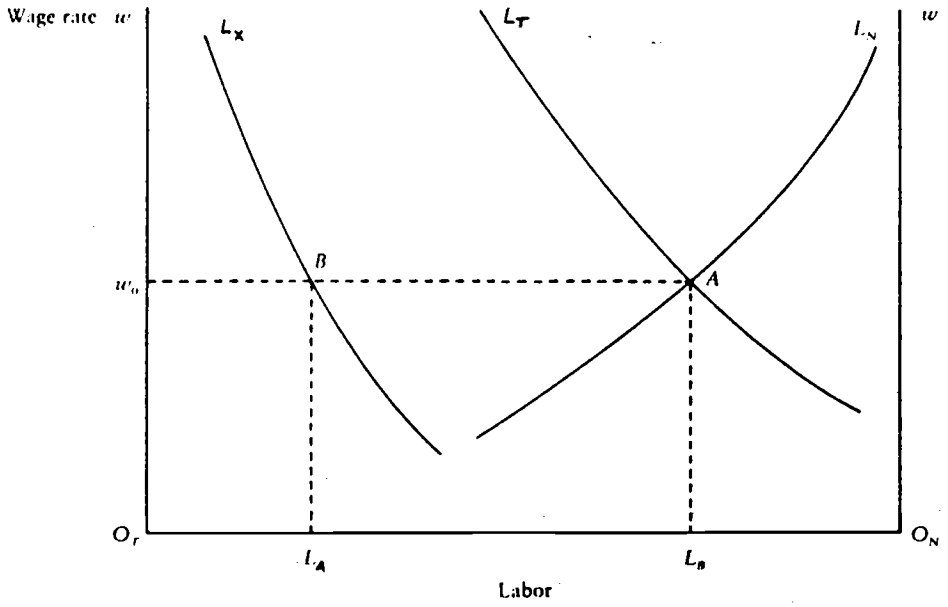


FIGURE 1.—

on the short run consequences of structural reform, most of our discussion will focus on the Ricardo-Viner case with factor specificity.

Consider now a tariff liberalization reform that reduces the import tariff and, thus, causes a reduction in the domestic price of importables. In this simple general equilibrium framework this reform will affect a number of variables including relative prices. With regard to employment, the tariff reduction will provoke changes in the allocation of labor across sectors.

In order to track down the full effect of the reform on the labor market it is first necessary to determine the effect of the reduction in tariffs on the price of nontradable goods. Only then we will be able to know the direction of the shift of schedule L_N in Figure 1. From the manipulation of equations (1)-(3) it is easy to show that the direction in which the price of nontradables will change is going to depend on the assumptions made regarding substitutability in demand and on the magnitude of the income effect. Assuming that the three goods are gross substitutes in consumption and that the income effect does not exceed the substitution effect, it can be shown that as a result of the tariff reform the price of nontradables will <u>fall</u> relative to that of exportables: that is $dq/d\tau > 0$.[12]

The labor market adjustment process under these assumptions is illustrated in Figure 2. The reduction in the tariffs will result in a lower domestic price of importables, generating a downward shift of the L_T curve (with the L_X curve constant). The new L_T' curve will intersect the L_N curve at R. However, since as pointed out above the reduction in the world price of importables will also result in a <u>decline</u> in the price of

---

[12]For a formal and more complete analysis of the effects of tariff reforms and terms of trade disturbances on the equilibrium real exchange rate see Edwards and van Wijnbergen (1989).

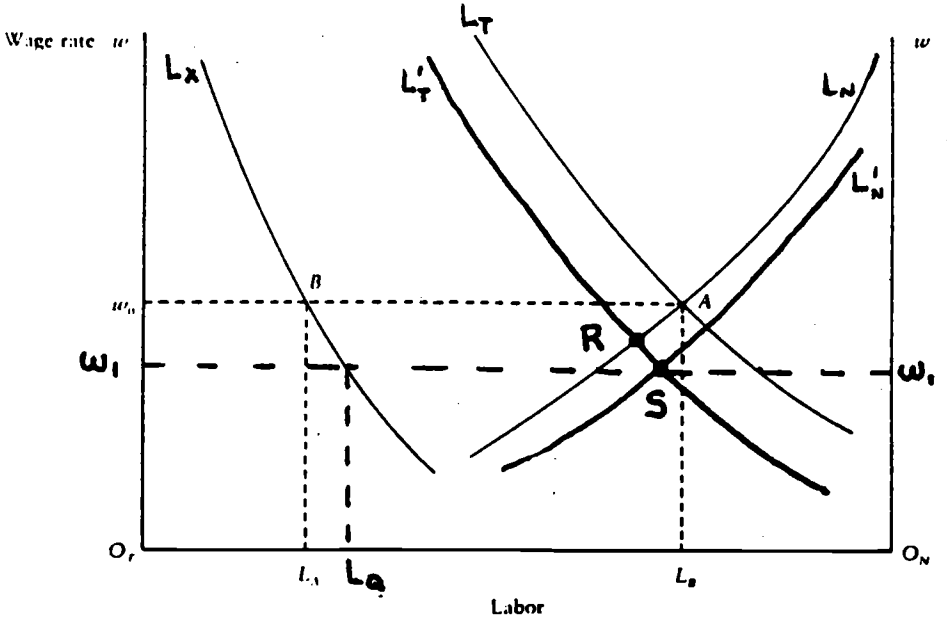

Wage rate w
L_T
L_X
L'_T
L_N
L'_N
B
A
R
S
ω_1
ω_2
O_T
O_N
L_1
L_2
L_3
Labor

FIGURE 2

nontradables (relative to exports), this is not the final equilibrium. As a consequence of the decline of q, L_N will shift downward (by less than the shift in L_T), and the final short-run equilibrium will be achieved at S with a lower wage rate w_1. In this new equilibrium, production of exportables has increased -- with labor used by this sector increasing by $L_A L_Q$. The production of nontradables may either increase or decrease, and production of importables will fall. In the case depicted in Figure 2, labor has moved out of the importables sector and into the exportables and nontradables sectors.

What has happened to factor rewards in the short run? Wages have declined in terms of exportables (from w_0 to w_1 in Figure 2). Wages have also declined in terms of nontradables because the vertical distance between the L_N and L_N' curves is smaller than the reduction in w from w_0 to w_1. Wages, however, have increased relative to importables because the domestic price of these goods has fallen by more than the decline in wages. In the exportables sector, the real return to the sector specific factors has increased. However, the real return to these fixed factors in the importables and nontradables sectors could either increase or decrease.[13]

In summary, in the standard Ricardo-Viner model with wage flexibility, the short-run effects on production, prices, and factor rewards of a tariff liberalization reform will be as follows: (1) production of exportables will increase; (2) production of importables will decrease; (3) production of nontradables may increase or decrease; (4) prices of nontradables will decrease; (5) wages will increase in terms of importables and

---

[13]Formally, the real return on the sector specific factors allocated to the importables sector will decrease in terms of importables and could either increase or decrease in terms of the other two goods. See Edwards (1988).

decrease in terms of exportables and nontradables; (6) the real return to the sector specific factors allocated to the exportables sector will increase relative to all goods; (7) the real return to factors specific to the importables sector will decrease relative to importables but could increase or decrease relative to the other goods; and (8) the real return to factors specific to the nontradables sector will increase relative to nontradable goods but could either increase or decrease relative to the other two goods.

Until now we have assumed that the main difference between the short- and long-run effects of a trade liberalization is that in the short-run capital and natural resources are locked into its sector of origin. As time passes, however, capital will (slowly) move between sectors. To simplify the exposition, let us assume that the movement of capital does not require the use of resources. However, the analysis could be modified by introducing a "moving industry", which uses labor and a specific factor, as in Mussa (1978). The transition period will be characterized by factors moving between sectors, until the new long-run equilibrium (that is, post trade liberalization) capital-labor ratios and production levels are attained.

The analysis of the long run equilibrium when the three factors are mobile can be rather complicated. The reason, of course, is that with three factors the concept of factor intensities becomes somewhat ambiguous. However, as Leamer (1987) has shown, if we assume that a particular sector is more intensive in a factor relative to both of the other factors, then the Stolper-Samuelson theorem will still hold.[14] In terms of our discussion, if we assume that the importables sector is the least labor

[14] A formal and detailed discussion of the long run case is given in Edwards (1990).

intensive sector, relative to both capital and natural resources, then we can conclude that in the long-run real wages will increase, as occurred in the two-factors case analyzed in Edwards (1988).

Although the dependent economy framework presented here provides a useful starting point for analyzing the way in which a trade reform affects the labor market, it has a number of shortcomings. Among these, perhaps the most important one is the assumption of factor price flexibility. In fact, in many developing nations there exist some kind of (real) wage rigidity. A second shortcoming of this model is that it ignores all intertemporal considerations. In that regard, within this framework it is not possible to analyze issues related to restrictions to capital movements, or to the way in which the level of employment reacts to anticipated changes in tariffs. A third limitation of this standard formulation is that it assumes, within the tradition of trade theory, that the labor supply is completely inelastic. Finally, the assumption of no-search activities on behalf of workers is also quite stringent and unrealistic. In the following sections we present several models that attempt to overcome (some of) these limitations.

II.1 Sector Specific Human Capital

So far we have referred to labor as a homogeneous factor. However, for the type of question we are studying, allowing for differences in general human capital would not change the results qualitatively. In fact, we could easily incorporate differences in general human capital by introducing the distinction between units of labor and number of workers. That is, some workers would have embodied more units of labor than others. However, if we assume the existence of sector-specific or industry-specific human capital (Oi (1962)) our conclusions would be affected because in that case labor mobility would be costly.

One of the consequences of a trade liberalization reform is that it wipes out entire industries, destroying the value of industry-specific human capital. This loss of productive factors, in different degrees, has to be considered as part of the adjustment costs of trade liberalization. In practice, this cost translates into a type of unemployment that reflects differences between the market value of a given worker's human capital and the same worker's perception of what that value is, based on his or her recent experience and expectations. This type of phenomenon will affect more seriously the more experienced groups of the labor force.

Moreover, the change in relative prices brought about by a trade liberalization not only changes the market value of sector-specific human capital, but also affects the geographical allocation of labor demand. Mobility costs associated to labor reallocation across areas can thus become an additional barrier to full employment immediately after a trade reform takes place. In fact, the labor economics literature has given attention to this type of adjustment barrier in an effort to explain wage differentials and unemployment across geographical areas or sectors of economic activity (see, for example, Topel (1986)). These ideas, although not yet applied to the question of trade reform, can be very useful in an empirical analysis of trade liberalization experiences.

III. Wage Rigidities and Labor Market Adjustment

The discussion in Section II has followed the traditional Australian model of international trade, which assumes that all factor prices, including wages, are perfectly flexible. However, as said before, this is a simplifying assumption that does not correspond to reality in many developing countries where minimum wage laws or other types of rigidities affect

the whole economy or some parts of it.[15] In the past ten years or so, a number of international trade models that assume some type of factor price rigidity have been developed (see Brecher 1974; Bruce and Purvis 1984). These models have been useful and have added considerable realism to the analysis, but most of them have concentrated on the case in which the economy produces only two goods, and have not addressed specifically the way in which trade liberalization reforms will affect aggregate employment. This section extends these results to the three-goods model used in the previous section and discusses the effects of tariff liberalization under both economy-wide and sector-specific wage rigidities stemming from exogenously imposed minimum wages. Again, the analysis concentrates mainly on the short-run case in which capital and natural resources are locked into their sector of origin. Although the discussion emphasizes the case of minimum wages, the analysis is also useful for understanding the effects on employment of other mechanisms widely applied in developing countries, such as wage indexation arrangements, and disequilibrium real wages set by powerful labor unions.

III.1 Economy-Wide Wage Rigidities

Consider first the case of an economy-wide minimum wage. In order to facilitate the diagrammatical exposition, this minimum wage is assumed to be expressed in terms of our numeraire (exportables).[16] The incorporation of an economy-wide minimum wage into the analysis requires that we modify the model given by equations (1)-(3) above. Specifically, we now need to define

[15] For a review of practices used in different countries to determine minimum wages, see Starr (1981).

[16] The results presented below are fairly sensitive to this assumption. Edwards (1990) discusses in detail how using different price indexes to set the minimum wage will affect the results from the model.

a "restricted" revenue function that considers the existence of wage rigidities and initial unemployment such as:[17]

$$\tilde{R}(\tilde{W},p,q;V) = \max_{S,L} \{(S_X+qS_N+pS_M)-\tilde{W}L\} \tag{4}$$

where $\tilde{W}$ is the minimum wage; L is employment; S_i, $i = X,M,N$, refers to output of exportables, importables, and nontradables, respectively; and V refers to the vector of non-labor (flexible-price) factors of production. This restricted revenue function can be conveniently written in the following way:

$$\tilde{R} = \tilde{R}(1,p,q,L(1,p,q,\tilde{W})) \tag{5}$$

where $L(\ )$ is an employment function (see Neary (1985)).

In this case the nontradable market equilibrium condition also has to incorporate in an explicit way the existence of wage rigidity and of initial unemployment. This is done by computing the supply of nontradables as the derivative of the restricted revenue function relative to the price of nontradables q:

$$\tilde{R}_q = E_q \tag{6}$$

The nature of the initial labor market equilibrium is now captured by Figure 3 which is similar to Figure 1. Demand for labor by the tradable goods sectors (L_T) is equal to the horizontal sum of the demand for labor by the exportables sector (L_X), and the demand for labor by the importables sector (L_M, not shown). Demand for labor by the nontradables sector is given by the L_N schedule. If there is a minimum wage rate equal to $\tilde{W}$, unemployment of magnitude U' will result; the amount of labor demanded by the nontradables

---

[17] See Neary (1985) for a detailed discussion of the properties of restricted revenue functions.

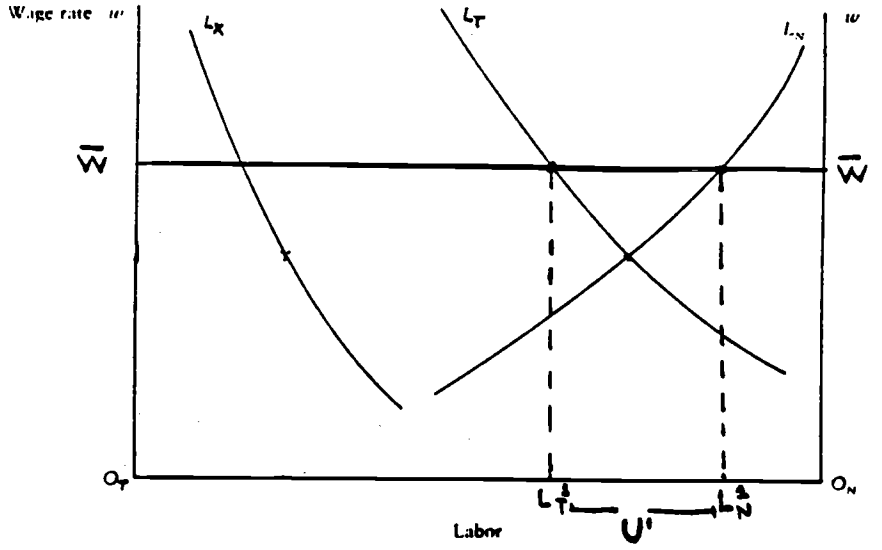


FIGURE 3

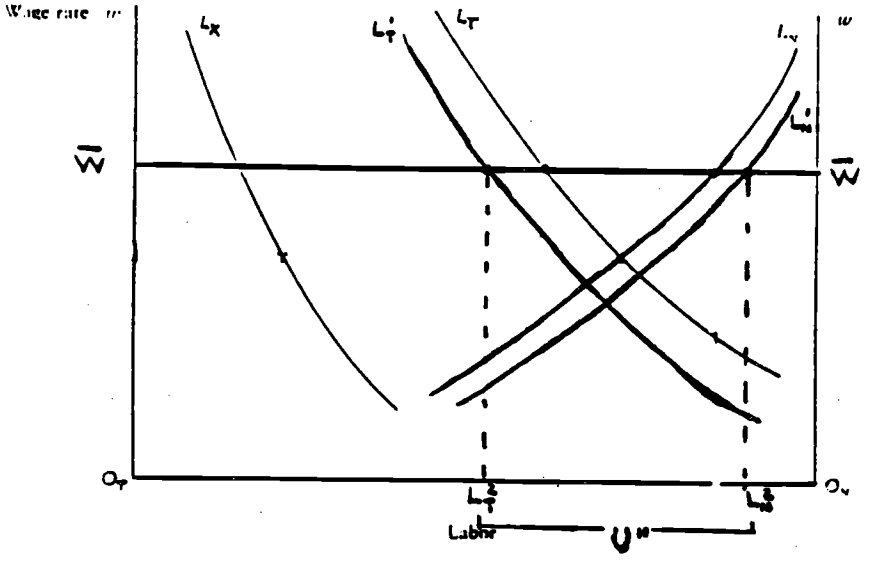


FIGURE 4

sector is now determined by the minimum wage and is equal to $O_N L^1_N$.[18]

Figure 4 shows that when labor is the only mobile factor, and there is a minimum wage in real terms (expressed in terms of the exportables) a tariff reduction will result in an <u>increase</u> in the extent of unemployment which is then given by U". As shown in the previous section, the reason for this is the decline in the (real) wage that a trade liberalization will require in order to maintain the pre-reform level of employment. If, due to institutional factors, this reduction cannot take place, the adjustment will occur via quantities and total employment will be reduced. The extent of the change in employment will in turn depend on: (1) the magnitude of the tariff reduction; (2) the amount by which the price of nontradables goes down; and (3) the employment elasticities in the different sectors.

Formally, the effect of a tariff change on total employment is given by the expression:

$$\frac{dL}{d\tau} = L_p + L_q\left(\frac{dq}{d\tau}\right) \tag{7}$$

where L_p and L_q are the derivatives of the employment function with respect to the domestic price of importables and the relative price of nontradables respectively, and where $(dq/d\tau)$ is the "real exchange rate effect" of the tariff change. Within our Ricardo-Viner framework with initial unemployment both L_p and L_q are positive, indicating that increases in domestic prices will result in higher employment.[19] On the other hand, as discussed in Section II, under the most plausible set of

---

[18] Notice, however, that if the minimum wage is fixed in terms of the importable good, the tariff reform will not generate any unemployment. This is because in order for the wage rate to remain constant in terms of M, it will have to decline in terms of the exportable (see Edwards (1990)).

[19] As seen below, in the case of full factor mobility it is rather difficult to sign these derivatives.

assumptions $(dq/d\tau)$ will be positive, indicating that a tariff increase (liberalization) will result in a real exchange rate appreciation (depreciation). Consequently, equation (7) as a whole has a positive sign, implying that with rigid (real) wages and factor specificity a trade liberalization reform will result in unemployment.

What will happen in the long-run? In this case all factors will move across sectors and the interpretation of terms L_p and L_q in equation (7) is more complicated and will be related to the direction of the Rybczynski effects. Formally:

$$L_p = \frac{-R_{pL}}{R_{LL}}$$

$$L_q = \frac{-R_{qL}}{R_{LL}} \qquad (8)$$

where R_{LL} is the slope of the marginal product of labor schedule and is negative. R_{pL} and R_{qL}, on the other hand, are Rybczynski terms that capture what will happen to output of M and N (R_p and R_q respectively) if there is an increase in the labor force. Their sign is undetermined *a priori* and depend on relative factor intensities, which are difficult to determine in our 3x3 model. However, as Leamer (1987) has shown, if nontradables is the most labor intensive sector -- both with respect to capital and with respect to natural resources -- R_{qL} will be positive. This means that R_{pL} can be either positive or negative. A necessary (although not sufficient) condition for it to be positive is that importables is the second most labor intensive sector. If we assume that R_{pL} is also positive, then we will obtain the result in which a tariff liberalization reduces employment. If, however, importables is the least labor intensive sector (as measured with respect to both of the other factors) R_{pL} will be

negative and we can obtain the more standard result where, starting from an initial condition of unemployment, a trade liberalization reform will increase total employment in the economy.

III.2 Sector Specific Wage Rate Rigidity

In most countries wage rigidity is not generalized, but rather affects a subgroup of sectors in the economy. In this subsection we will briefly use our diagrammatic apparatus to analyze two cases where the above-equilibrium wage affects only one sector in the economy.[20]

Case 1: Sector-Specific Wage Rigidity With No Unemployment

This configuration of the labor market has recently been used by Burda and Sachs (1987) to analyze the structure of unemployment in Germany. It is assumed that one sector, say nontradables, is subject to an above-equilibrium wage rate, and that the wage rate in the rest of the economy -- the so-called uncovered sector -- takes the level required to assure full employment in the economy as a whole. The initial conditions under these assumptions are summarized in Figure 5, where $\bar{W}_N$ is the minimum wage in the protected sector (the nontradables sector) and W_T is the wage rate in the uncovered (tradables) sector. Employment in tradables is equal to the distance O_TA, while employment in nontradables is equal to O_NA.

Under these conditions, and assuming that capital and natural resources are sector-specific, a trade liberalization reform will result in an increase in the wage gap between the protected and the uncovered sectors, in a reduction in employment in nontradables and importables and in an increase in employment and output in exportables (see Figure 6).

---

[20]The formal analysis of a sector-specific wage rate rigidity is somewhat complicated. See the discussion in Edwards (1990).

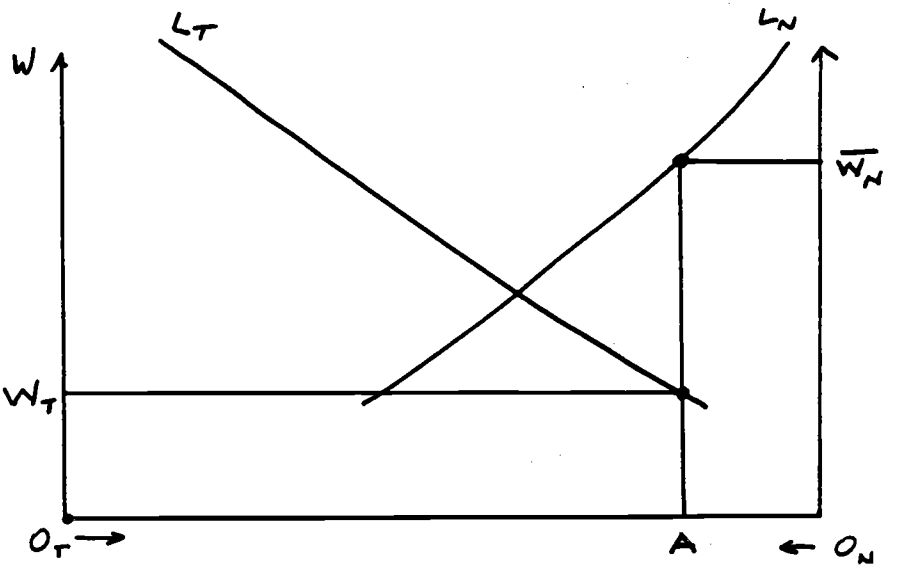


FIGURE 5

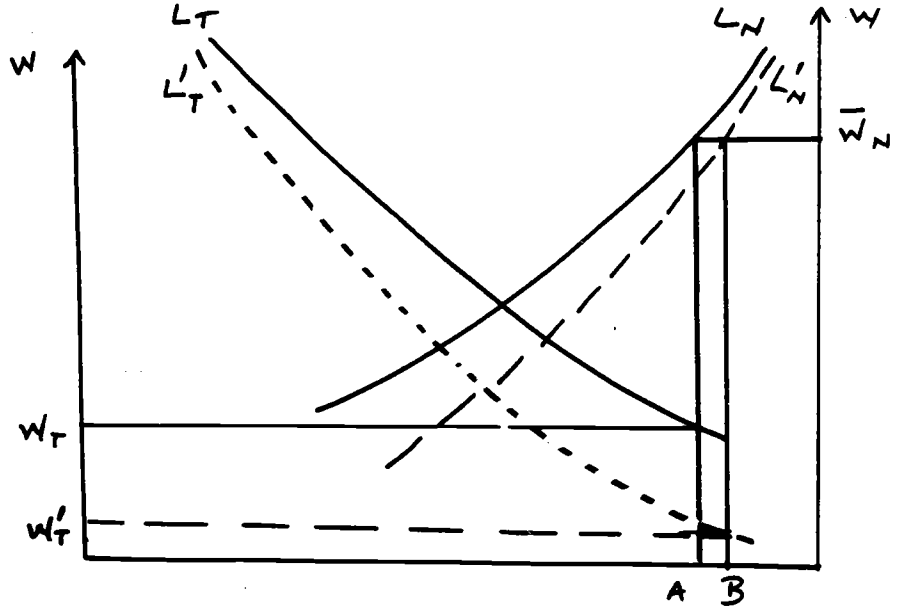


FIGURE 6

The main limitation of this approach is, indeed, that it is characterized by a non-equilibrium wage rate differential $(\bar{W}_N - W_T)$ that can only be maintained if there are severe barriers to entry to the protected sector. Only in this way it can be reconciled having a major distortion in the labor market, in the form of intersectoral wage differentials, and no unemployment. An elegant way of solving this problem is by introducing, as we do below, a Harris-Todaro type of mechanism to generate an equilibrium wage rate differential.

Case 2: Sector-Specific Minimum Wages With Unemployment

Consider now the case where there is a binding minimum wage in the importables sector only. In order to analyze this case, the diagrams used previously must be somewhat modified. Figure 7 is similar to Figure 5, except that in Figure 7, total labor used in the importables sector is measured from the right-hand side origin O_M. The wage rate $\bar{W}_M$ is the minimum wage in the importables sector (say, manufacturing); $\bar{L}_M$ is employment in this sector. Curve qq is a rectangular hyperbola known as the Harris-Todaro locus, along which the following equation is satisfied:

$$W_N - W_X = \frac{L_M}{L_M + U} W_M, \tag{9}$$

where U is the equilibrium level of employment.[21] In the absence of a minimum wage, equilibrium is attained at point Z. With a minimum wage, however, the intersection of $(L_X + L_N)$ with qq at point S gives the wage rate in the uncovered (no minimum wage) sectors, employment in each sector,

---

[21] This is based on Harris and Todaro (1970) and Harberger (1971). For the use of this framework in the context of a two-sector economy, see Corden and Findlay (1975) and Neary (1981). The discussion that follows draws from Edwards (1988).

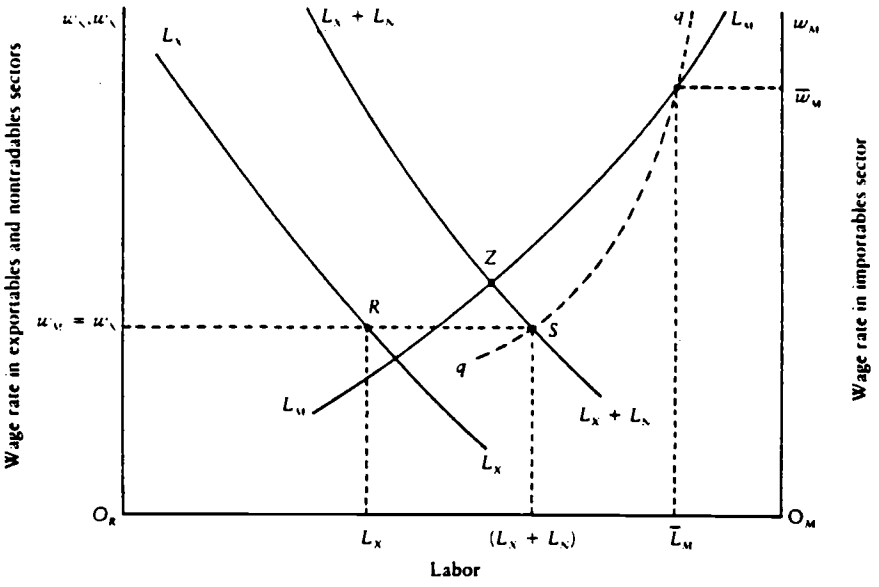

Wage rate in exportables and nontradables sectors
Wage rate in importables sector
Labor
L_N
$L_X + L_N$
L_M
q
w_M
$\bar{w}_M$
Z
R
S
L_X
O_R
O_M
$(L_X + L_N)$
$\bar{L}_M$

FIGURE 7 .—

and total unemployment. The distance $O_R L_X$ is total employment in the exportables sector; the distance $L_X(L_X+L_N)$ is employment in nontradables; the distance $(L_X+L_N)\bar{L}_M$ is the initial equilibrium level of unemployment; and the distance $O_M\bar{L}_M$ is employment in the covered sector.[22]

The short-run (with capital immobile across sectors) effects of a reduction in the world price of importables are illustrated in Figure 8. As a result of the decline in the world price of importables, demand for labor in that sector shifts downward. At the given minimum wage, $\bar{W}_M$, total demand for labor in the importables sector will decline. The new demand for labor in the importables sector (not drawn) will intersect $\bar{W}_M T$ at A. A new rectangular hyperbola $q'q'$ passes through this point and labor demanded by the importables sector is now reduced to $O_M\bar{L}'_M$.

What will happen to wages and employment in the uncovered sectors, and to unemployment? Under the assumption that the price of nontradables remains constant, curve (L_X+L_N) remains at its original location, and point B, given by the intersection of $q'q'$ and (L_X+L_N), is the new equilibrium. This position is characterized by a lower wage and higher employment in the uncovered sectors. As discussed above, however, the reduction of tariffs will affect the price of nontradables and (L_X+L_N) will not remain constant. Under the assumptions discussed before, the lower tariffs will generate a reduction in the price of nontradables, which is, however, smaller than the decline in the price of importables. As a result, in the final short-run equilibrium, (L_X+L_N) will shift downward to $(L_X+L_N)'$ (not drawn). The intersection of $(L_X+L_N)'$ and the $q'q'$ rectangular hyperbola at point C

[22] There is an important difference between this type of minimum wage model in which total availability of labor to the economy is given and models with an upward sloping aggregate supply of labor. On this last type of model, see A. Cox-Edwards (1986), and Section V of this paper.

is the final equilibrium when capital is locked in its sector of origin.

Under the given assumptions, the post-tariff reduction equilibrium is characterized by the following: (1) lower employment in the sector covered by the minimum wage (importables); (2) lower wages in the uncovered sectors, expressed in terms of exportables; (3) either higher or lower equilibrium unemployment; (4) either lower or higher employment in nontradables; and (5) higher employment and production in exportables.[23]

Not surprisingly, a tariff liberalization in the case of partial minimum wage coverage generates a different outcome than that obtained in the case of an economy-wide minimum wage. First, under partial coverage, there is an increase in production and employment in exportables. Second, employment in nontradables may also increase. Also, in the short-run, the reduction in tariffs can result in a decline in the equilibrium level of unemployment in the case of partial minimum wage coverage, whereas greater unemployment always results after such a policy in the case of an economy-wide minimum wage. This illustrates an important finding: in the presence of labor market distortions, trade liberalization policies usually considered to be beneficial may generate nontrivial (short-run) unemployment problems.

What will happen in the long-run in the presence of this type of sector-specific minimum wage? In the short-run, after the domestic price of importables has gone down, the real return to (sector-specific) capital will be different across sectors. The reduction in tariffs reduces the return to capital in the importables (manufacturing) sector and increases it in the exportables and nontradables sectors. Of course, this situation with

---

[23] In this setting, unemployment is given by $U = L_M(\tilde{W}_M/W_N - 1)$. Because L_M declines and $\tilde{W}_M/W_N$ goes up, it is not possible to know a priori which way U will go. The final direction will depend on the elasticities of demand for labor in each sector.

different real returns to capital cannot continue in the long run. As time goes by, capital will be reallocated, moving out of importables and into the other sectors. In terms of Figure 8, this means that L_M will shift further downward -- and with it the rectangular hyperbola qq -- while demand for labor in the uncovered sectors will shift upward. Moreover, these curves will shift in such a way that the final outcome will be characterized by a higher equilibrium wage in the absence of wage rigidities.

The final long-run equilibrium will have to satisfy two conditions: the return to capital will be equalized across sectors and the labor market will be in equilibrium, in the sense that $W_N = W_X = (L_M/(L_M+U))\bar{W}_M$. As capital is reallocated, employment in the importables sector declines and employment in the exportables and nontradables sectors increases in relation to the short-run levels depicted in Figure 8. It is not possible, however, to know a priori whether wages in the uncovered sectors (nontradables and exportables) will be higher or lower in the long-run than their initial levels. This will depend on the elasticities of substitution and on the relation between the slopes of the L_M, qq, and (L_X+L_N) curves.

IV. The Liberalization of the Capital Account, Anticipated Tariffs and Employment

The preceding framework has ignored intertemporal decisions and, thus, is unable to handle some important questions related to issues such as the employment effects of relaxing capital controls, or the employment consequences of an anticipated change in tariffs. The purpose of this section is to extend the dependent economy model to an intertemporal setting and to investigate how the presence of more than one period modifies the results

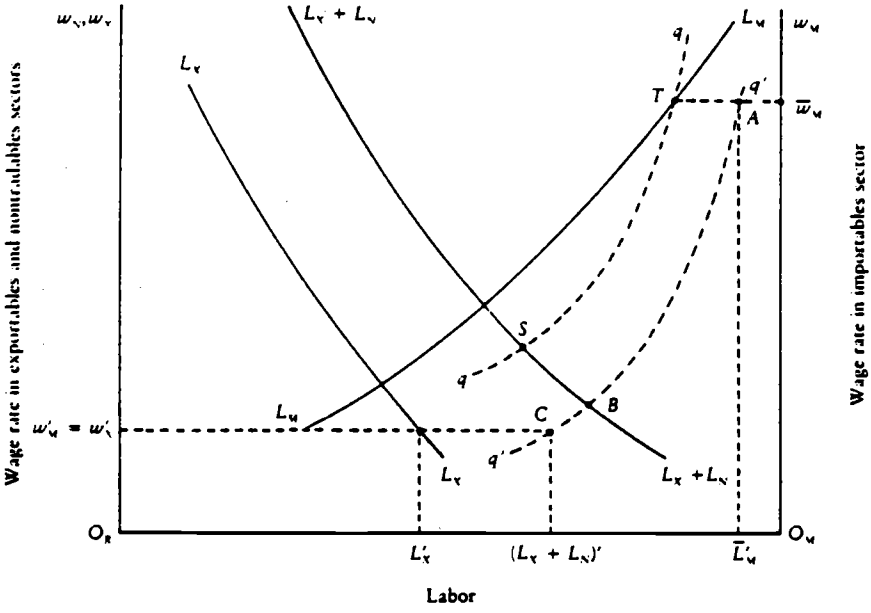

Wage rate in exportables and nontradables sectors
Wage rate in importables sector
Labor
w_N, w_X
w_M
$L_X + L_N$
L_M
q_1
L_X
T
q'
A
$\bar{w}_M$
S
q
B
C
$w'_M = w'_1$
L_M
q'
L_X
$L_X + L_N$
O_R
O_M
L'_X
$(L_X + L_N)'$
$\bar{L}'_M$

FIGURE 8

from the static model analyzed before.[24]

V.1 The Intertemporal Dependent Economy Model

The simplest way to incorporate intertemporal aspects is by considering the existence of two periods -- the present (period 1) and the future (period 2). If we now want to look at capital account liberalization we must assume that initially there are capital controls that are reflected in a differential between the domestic real interest rate (r) and the foreign real interest rate (r*). As before, it is assumed that there are a large number of producers and (identical) consumers, and that perfect competition prevails. The labor market is distorted by a minimum wage $\bar{w}$, which we first assume is in effect in both periods.

In this 2-period model consumers maximize utility subject to their intertemporal budget constraint, whereas firms maximize profits subject to the existing constant returns to scale technology, availability of factors of production, and the predetermined minimum wage. Assuming that the utility function is time separable, with each subutility function homothetic and identical, the representative consumer problem can be stated as follows:

$$\max V\{u(c_N, c_X, c_M);\ U(C_N, C_X, C_M)\},$$

subject to:

$$c_X + pc_M + qc_N + \delta(C_X + PC_M + QC_N) \leq \text{Wealth}, \qquad (10)$$

where now the lower case letters refer to first period variables and the upper case letters refer to second period variables. The price of exportables has

[24] The discussion that follows focuses on the role of intertemporal substitution in consumption. Some macroeconomic models that became popular in the 1970s also emphasized intertemporal substitution in the supply of labor. However, recent empirical work by Altonji (1982) and Mankiw et al. (1985) have shown that the type of effect is not empirically relevant.

been taken to be the numeraire, (e.g., $p_X = P_X = 1$). V is the intertemporal welfare function; u and U are periods 1 and 2 subutility functions assumed, as pointed out, to be homothetic and identical. c_X, c_M, c_N, (C_X, C_M and C_N) are consumption of X,M and N in period one (two). q and Q, and p and P are the prices of nontradables and importables relative to exportables faced by consumers in periods 1 and 2, and are inclusive of the tariff on M. δ is the domestic discount factor equal to $(1+r)^{-1}$. Since there is a tax on foreign borrowing, the domestic real interest rate r is higher than the world interest rate. The differences between these two rates is given by the tax (σ) on capital movements: $r = r^* + \sigma$.

Wealth is the discounted sum of consumer's income in both periods. Income, in turn, is given by: (1) income from labor services; (2) income from the renting of capital stock, and of natural resources that consumers own to domestic firms; and (3) income obtained from government transfers. These, in turn, correspond to the government's revenue from tariffs, and from taxes on capital flows in each period. The solution to the consumers optimizing problem is conveniently summarized by the following intertemporal expenditure function:

$$E = E(\pi(1,p,q),\ \delta^*\Pi(1,P,Q),V). \qquad (11)$$

where π and Π are exact price indexes for periods 1 and 2. Under the assumptions of homotheticity and separability these price indexes correspond to unit expenditure functions (Svensson and Razin, 1983; Edwards and van Wijnbergen, 1986). Given our assumption of a time separable utility function, total expenditure in periods 1 and 2 are always substitutes.

As before the producers maximization problem can be summarized with the aid of restricted revenue functions, which give us the maximum revenue that

firms can obtain after making all the optimal decisions in terms of hiring and production given the distortion in the labor market (see Neary 1985). Denoting r and R as periods 1 and 2 restricted revenue functions, we have:

$$r = r(1,p,q,\ell(1,p,q,\tilde{w})) \tag{12}$$

and

$$R = R(1,P,Q,L(1,P,Q,\tilde{W})) \tag{13}$$

where $\ell(\ )$ and $L(\ )$ are employment functions in periods 1 and 2

The complete model is then given by the following set of equations (where subindexes refer to partial derivatives with respect to that variable):

$$r(1,p,q,\ell(1,p,q,\tilde{w})) + \delta R(1,P,Q,L(1,P,Q,\tilde{W}))$$

$$+ \text{TRANS} = E(\pi(1,p,q),\delta\Pi(1,P,Q),V) \tag{14}$$

$$\text{TRANS} = bCA + \tau^1 M^1 + \delta\tau^2 M^2 \tag{15}$$

$$b = \delta^* - \delta \tag{16}$$

$$CA = R - \Pi E_{\delta\Pi} \tag{17}$$

$$r_q = E_q \tag{18}$$

$$R_Q = E_Q \tag{19}$$

$$p = p^* + \tau^1; \quad P = P^* + \tau^2 \tag{20}$$

$$M^1 = (E_p - r_p); \quad M^2 = (E_p - R_p) \tag{21}$$

Equation (14) is the intertemporal budget constraint, and says that the present value of income (the left hand side) has to equal the present value of expenditure (the right hand side). TRANS is the present value of government transfers to the public and is given by equation (15). Here bCA is the present value of the tax on foreign borrowing, where b is the present

value of the tax per unit borrowed and is equal to $(\delta^*-\delta)$, and CA is the current account in period 2, which is defined in equation (17) as period 2 income minus expenditure. This means that, since in this model there is no investment, the current account is equal to savings in each period. Finally, $\tau^1 M^1$ and $\delta\tau^2 M^2$ in equation (15) are revenues from import tariffs; τ^i is the tariff rate in period i, and M^i are imports in i and are defined in equation (21) as the excess demand for importables in each period. Equations (18) and (19) state that the nontradables goods market has to clear in each period -- r_q and R_Q are quantities produced of these goods, while E_q and E_Q are the quantities demanded.

An important characteristic of this model is that there is initial unemployment. In fact, we can think of Figure 3 in Section III as capturing the initial conditions prevailing in the labor market in each period. Notice that, as presented above, the model assumes that the minimum wage $(\bar{w})$ is expressed in terms of the numeraire and is in effect in both periods. Of course, this need not be the case, and we can easily handle the case where there is a minimum wage in one period only.

In the rest of this section we will illustrate the functioning of this model for the case of two liberalization policies: (1) the relaxation of capital controls and, (2) an anticipated tariff liberalization. In order to facilitate the discussion, in each case we will make some simplifying assumptions that will allow us to focus on the problem at hand.

IV.2 Capital Account Liberalization and Employment

The model presented in equations (14) through (21) is very general and can be used to analyze how a number of structural adjustment policies will affect welfare, output and employment. In order to organize the discussion in this subsection we will focus on the employment effects of reducing

capital controls under a set of simplifying assumptions.[25] In particular we will assume that:

(1) the minimum wage is in effect during period 1 only;[26]

(2) there are no import tariffs in either period.

Thus, under these simplifying assumptions the only distortions in the economy under analysis are a minimum wage in period 1 and a tax on foreign borrowing.

A reduction in the extent of capital controls implies that the domestic discount factor δ increases, moving closer to its international level δ^*. As a result of this the consumption rate of interest $\delta\Pi/\pi$ will increase making current consumption relatively more attractive than future consumption. Thus, households will substitute expenditure into the present. Since some of this increase in expenditure in period 1 will fall on nontradables there will be an incipient excess demand for N which will result in an increase in the price of N in that period (q). This means, then, that period 1 real exchange rate will experience an equilibrium appreciation as a result of the liberalization of the capital account (Edwards, 1989b). This, in turn, will shift the demand for labor in the N sector upward, generating an increase in employment in period 1. This effect will be reinforced by the positive welfare effect of reducing the existing distortion on foreign borrowing.

In a Ricardo-Viner framework with sector specific capital and natural resources this is the final effect of a capital account reform. However, if we assume that capital and natural resources can move across sectors we will

---

[25] The liberalization of capital controls has played an important role in recent reform programs, as those of the Southern Cone of Latin America and Korea.

[26] This assumption is also made by Svensson (1984) in a different context.

have additional indirect effects that will shift further the labor demand schedules. The direction and magnitude of these induced shifts will depend on the sign of the Rybczynski effects. If we assume that the nontradable sector (N) is the most labor intensive of all sectors and that the importable sector (M) is the least labor intensive, the final effect of a capital account reform will be an <u>increase</u> in period 1 employment (see Edwards 1989b, for a formal expression). This labor market adjustment is captured in Figure 9 where the shift of L_N to L'_N is the result of the (impact) real exchange rate effect of a higher δ, and the shift of L'_N to L''_N and of L_T to L'_T are the consequences of the reallocation of the cooperative factors.

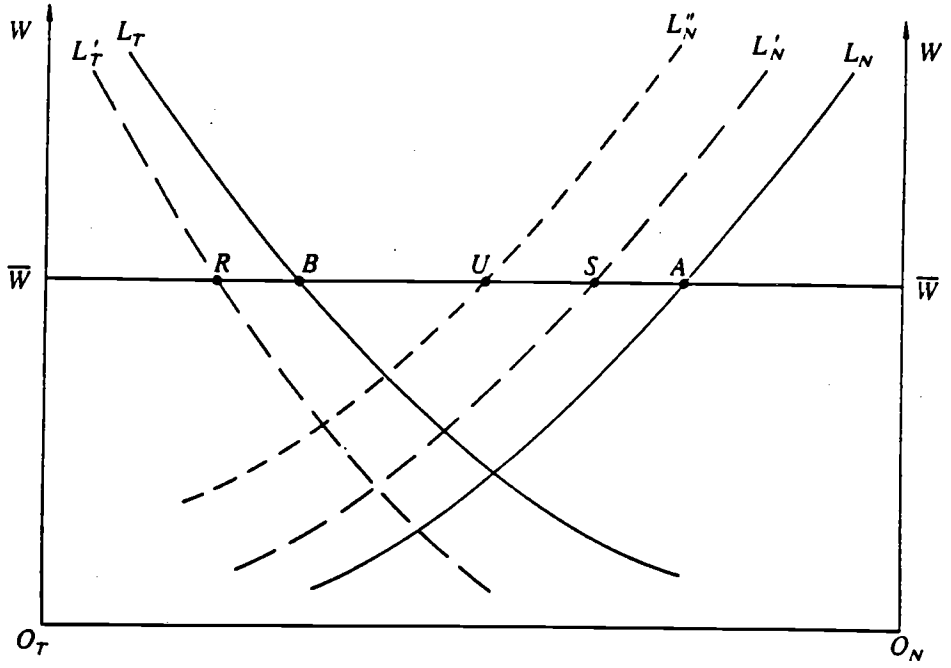
A very interesting consequence of this analysis is that under our assumptions the optimal government policy would be to impose a <u>small</u> subsidy on foreign borrowing. The reason for this result is that, under these conditions, a small subsidy on external borrowing results in higher consumption, and thus employment, in period 1. Since initially employment in this period was "too low", the small subsidy will tend to correct this distortion. The magnitude of this subsidy will be given by:

$$b^* = \frac{r_{\ell}\ell_q(\frac{dq}{db}) + \delta^* R_L L_Q(\frac{dQ}{db})}{-\Pi^2 E_{\Pi\Pi} + \Pi E_{\pi\Pi}\pi_q(\frac{dq}{db}) + \delta\Pi E_{\Pi\Pi}\Pi_Q(\frac{dQ}{db})} \tag{22}$$

where r_{ℓ} and R_L are the marginal product of labor in periods 1 and 2. ℓ_q and L_Q are the derivatives of each period employment function with respect to that period's relative price of nontradables and, as before, are equal to:

$$\ell_q = \frac{-r_{q\ell}}{r_{\ell\ell}}; \quad L_Q = \frac{-R_{QL}}{R_{LL}}.$$

Figure 9



R_{LL} and $r_{\ell\ell}$ are, in turn, the slopes of the marginal product of labor schedules for N and are negative; $r_{q\ell}$ and R_{QL} are the Rybczynski terms that capture what will happen to output of N (r_q and R_Q) when there is an increase in labor supply. Under our assumptions of labor intensities they are positive. Finally (dq/db) and (dQ/db) are the "real exchange" rate effects of the capital account liberalization and measure the reaction of the equilibrium relative prices of N to a lowering of the tax on foreign borrowing and are positive (Edwards 1989b).

IV.3 Anticipated Tariff Reform and Employment

The model developed in this section can be used for analyzing how the expectations or anticipations of a tariff reform -- that is a reduction in τ^2 -- will affect employment in an economy with initial unemployment. As in the case of capital account liberalization the main channel through which these anticipations will generate an effect will be the intertemporal substitution of expenditure and its effects on the real exchange rate. To the extent that an anticipated tariff reform results in a postponement of current expenditure we will observe, in the Ricardo-Viner case, a reduction in the price of nontradables in the current period, q, and a decline in employment.

Formally, under Ricardo-Viner assumptions of sector-specific capital and natural resources, the aggregate employment effects of an anticipated tariff reform are given by:

$$\text{period 1:} \quad \frac{d\ell}{d\tau^2} = \ell_q\left(\frac{dq}{d\tau^2}\right) \tag{23}$$

$$\text{period 2:} \quad \frac{dL}{d\tau^2} = L_p + L_Q\left(\frac{dQ}{d\tau^2}\right) \tag{24}$$

These expressions capture several important results. First, as can be seen from equation (23), a future (anticipated) tariff reform will affect

A crucial difference between the current model and that discussed in Section II is that in this case we will have an equilibrium level of queuing unemployment. In equilibrium, the expected wage in the protected segment, for those who choose to queue, will be equal to the alternative wage in the free segment. Figure 11 shows the presence of both types of unemployment.

The presence of wage "protection" results in a very elastic labor supply to the "protected" sector (M) and a less elastic labor supply to the rest of the labor market. As a result, the general trend will be for quasi-voluntary unemployment to fall when labor demand increases in the M sector and for the free sector wage to increase when labor demand increases in the N and X sectors.

In what follows we develop a formal model for analyzing the way in which tariff liberalization will affect unemployment and wages in our framework with upward sloping supply and queuing. We define L_N, L_X and L_M as the general equilibrium demand functions for labor in the nontradables, exportables and importables sectors. The aggregate supply of labor to the economy L_S is a function of (real) wages, and can in fact be expressed as depending on the wage rate in manufacturing. We call β the proportion of the total labor supply employed in sector M at W_M:

$$\beta = \frac{L_M}{L_S(W_M)} \tag{26}$$

The fraction $(1-\beta)$ of individuals with supply price lower or equal to W_M have three alternatives: (a) to become part of the total supply of labor to the nonprotected sectors. We assume, however, that in spite of having jobs in the unprotected sector, this group can still apply to jobs in sector M and has a probability p of being chosen; (b) spend the present period queuing, so that the probability of getting a job in sector

M increases to γp ($\gamma>1$); (c) become voluntarily unemployed with respect to sectors N and X and involuntarily unemployed with respect to M.

Assuming risk neutrality and no unemployment compensation, the present value of the first two alternatives for the marginal worker has to be the same. There will thus be an equilibrium queuing unemployment level for each possible value of W_M. To simplify the notation, we present here the case in which all jobs turn over each period. Thus the value of (a) is $(1-p)W_N + pW_M$; the value of (b) is γpW_M, and the equilibrium condition becomes:

$$(1-p)W_f = p(\gamma-1)W_M \tag{27}$$

with

$$p = \frac{L_M}{L_N+L_X+U^{qv}+\gamma U^e+L_M} \tag{28}$$

where L_N is the number of workers employed in the nontradables sector, L_X is the number of workers employed in the exportables sector, U^{qv} is the level of quasi-voluntary unemployment, U^e is the level of equilibrium queuing unemployment, and L_M is the number of workers employed in the importables sector. Using the expression $u^e = U^e/L_S(W_M)$ for the rate of equilibrium unemployment, and combining expressions (26), (27) and (28), we find:

$$u^e = \frac{W_M}{W_f}\beta - \left(\frac{1-\beta}{\gamma-1}\right) \tag{29}$$

as well as the effective supply of labor to the nonprotected sectors of the labor market that is equal to:

$$L_S''(W_f) = (1-\beta)L_S(W_f) - \left[\frac{W_M}{W_f}\beta - \left(\frac{1-\beta}{\gamma-1}\right)\right]L_S(W_M) \tag{30}$$

employment in the first period, when the reform has not taken place yet. This effect takes place exclusively through the change in period 1 real exchange rate which is induced by the future tariff reform. Edwards (1989b) has shown that under plausible assumptions a future tariff liberalization will result in a real exchange depreciation: that is, $dq/d\tau^2 > 0$.[27] Under Ricardo-Viner assumptions ℓ_q is positive and, thus, $d\ell/d\tau^2$ in equation (23) is also positive.[28] This means, then, that a future tariff reform will result in a decline in today's aggregate employment.

Second, according to equation (24), there will be two channels through which an anticipated tariff reform will affect period 2 aggregate employment. The first one, captured by the term L_P, is the direct effect which, under Ricardo-Viner assumptions, will be positive. The second channel is given by the term $L_Q(dQ/d\tau^2)$ and operates via changes in the equilibrium real exchange rate in period 2. Under the most plausible assumptions a tariff reform will result in a real exchange rate depreciation in the period when the reform actually takes place; that is $(dQ/d\tau^2) > 0$. Given that under Ricardo-Viner assumptions L_Q is also positive, expression (24) will be unambiguously positive. This indicates that, if capital and natural resources are sector-specific, an anticipated tariff reform will result in an increase in unemployment in periods 1 and 2.

If instead of a Ricardo-Viner setting we assume that capital and natural resources can move freely across sectors, the interpretation of equations (23)

---

[27] The conditions required for this result are that all goods are substitutes in consumption and that the income effects do not offset the substitution effect.

[28] Remember that ℓ_q is the derivative of the employment function with respect to the price of nontradables. In a Ricardo-Viner setting the only effect of a change in q is a parallel shift in the L_N schedule.

and (24) will be different. As said before, the signs of ℓ_q and L_Q will then depend on the Rybczinski terms and, thus, on relative factor intensities.

V. Trade Restrictions, Labor Market Protection and Elastic Labor Supply

One of the shortcomings of the dependent economy model discussed in the previous sections is that it assumes an inelastic labor supply. The purpose of this section is to relax this assumption and to introduce a different type of involuntary unemployment. Another simplification of the model previously discussed is the lack of connection between the level of the minimum wage and the trade orientation of the economy. In this section we assume that there is some form of institutional wage protection (unions, government, or other) that becomes stronger in an economy that is more closed to the rest of the world.[29] Thus, the minimum wage that prevails for the importables sector tends to be relatively higher when there are high trade restrictions. In order to maintain our presentation at a simple level, we greatly simplify other aspects of the problem, concentrating on a one period partial equilibrium representation. This, however, proves sufficient for our purposes.

Consider, once again, a three-goods economy with exportables (X), importables (M) and nontradables (N). Contrary to Section II we now assume that there is a minimum wage that affects only one sector. More specifically, we assume that the importables sector (M) is subject to a minimum wage and that wages are market determined in the nontradables (N) and exportables (X) sectors. In order to simplify the exposition we consider only two factors: capital and labor. While capital is fixed in its sector of origin in the short-run, it is perfectly mobile in the long-run.

---

[29] Monopsony power will tend to increase in the same way as monopoly power under trade protection.

We relax the assumption that labor supply is inelastic by considering the existence of a distribution of labor supply prices, and by assuming that labor force participation is determined by the market wage. Since wages in the M sector are higher than in the rest of the economy, labor supply to that sector exceeds demand. We assume for simplicity that firms in the M sector select the workers they employ randomly (i.e., in a way that is uncorrelated with labor supply prices) from the pool of applicants. As a result, there will be some potential workers that would be willing to take a "protected" job but are unwilling to settle for a lower wage in the N or X sectors. This situation is described in Figure 10, where schedule L_s represents a labor supply derived from a linear distribution of supply wages. At the minimum wage (W_M), employment in M is equal to $L_M < L_S(W_M)$. By assumption, employment in M is a random sample of $L_S(W_M)$, which in turn implies that the labor supply to the rest of the labor market (L_S') is a fraction $(1-L_M/L_S(W_M))$ of the original supply L_S. The interaction between labor demand in X and N, denoted by (L_N+L_X) in Figure 10, and the "residual" labor supply to those sectors will determine the free segment wage $W_f = W_N=W_X$ and the level of employment in $X(L_X)$ and $N(L_N)$. Individuals with supply price above W_f and below W_M are <u>voluntarily</u> unemployed with respect to X and N and <u>involuntarily</u> unemployed with respect to M. We refer to this group as <u>quasi-voluntary unemployed</u> (U^{qv}).

With a linear distribution of supply prices, the amount of quasi-voluntary unemployment is given by:

$$U^{qv} = \frac{W_M - W_f}{W_M - \underline{W}} (1-\beta)L_s(W_M) \qquad (25)$$

where $\underline{W}$ is the smallest reservation wage for which the supply of labor to the market is positive.

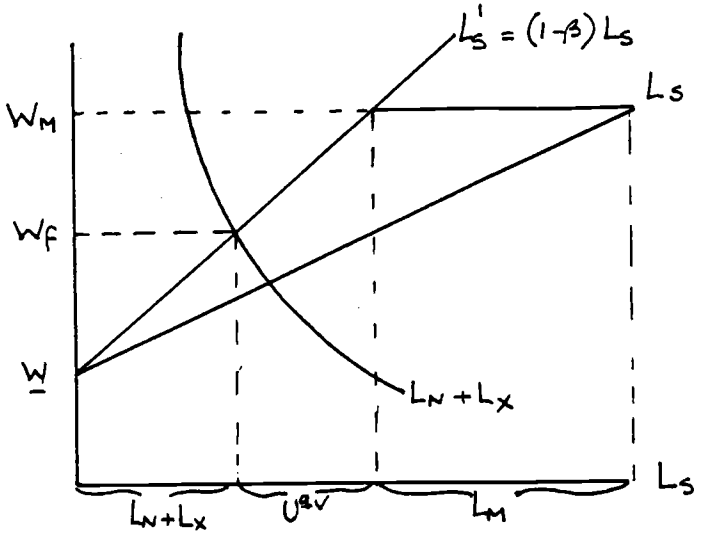


Figure 10

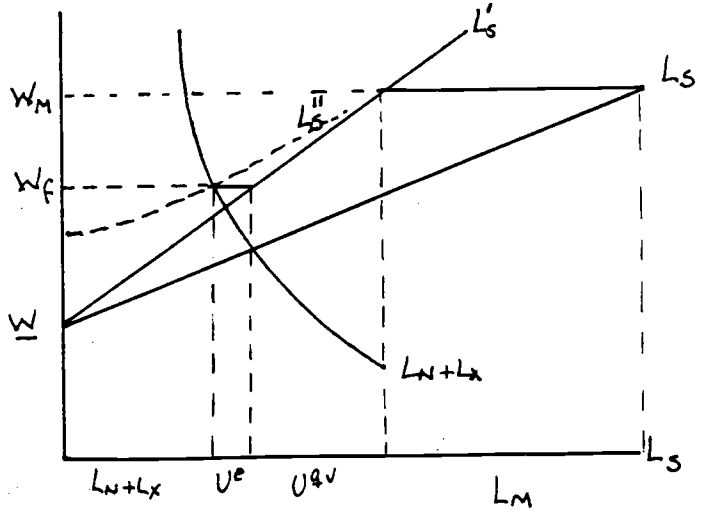


Figure 11

V.1 A Reduction in Import Tariffs

A reduction in import tariffs implies a decrease in the domestic price of M falls relative to X. Additionally, as discussed in Section II, the reduction of the import tariffs will have an effect on the relative price of nontradables: if nontradables are substituted with importables and exportables in consumption, the reduction of the tariff will result in a decline in the price of nontradables.[30]

Assuming, at least for the short-run, that the protected wage W_M remains constant, we expect no change in labor force participation. A reduction in L_M -- generated by the reduction in the tariff -- with a given $L_S(W_M)$ means that the fraction β defined in (26), falls. In turn, a reduced fraction of workers employed in M increases the quasi-voluntary unemployment and signals a lower probability of finding a protected job, triggering a reduction in queuing unemployment.[31] Thus, labor supply to the free segment will shift downward inducing a reduction in the free sector wage rate W_f. If we now consider the reduction in L_f induced by the decline in relative prices of nontradables (the real exchange rate effect), we get an even larger reduction in the nonprotected wage rate W_f.

In order to simplify the presentation in the derivations that follow we will ignore the change in L_f and estimate the impact on u^e of a change in β induced by a reduction in the extent of trade protection. Since, as pointed out above, a tariff liberalization will result in a reduction in β, our analysis will deal with the way in which changes in this parameter will

---

[30] Notice that if trade liberalization is accompanied by a large amount of foreign aid or foreign credit capable of inducing a large income effect, the impact of the relative price of nontradables may be positive.

[31] See Cox-Edwards (1986).

affect unemployment and wages in the unprotected sector. Imposing the equilibrium condition in the free market sectors (X and N), we can find how the changes in the demand for labor in the protected sector will affect unemployment and the freely determined wage rate:

$$\frac{du^e}{d\beta} = \frac{1}{\gamma-1} + \frac{W_M}{W_f} - \beta \frac{W_M}{W_f^2} \frac{dW_f}{d\beta} \tag{31}$$

with

$$\frac{dW_f}{d\beta} = \frac{L_s(W_f) + \left[\frac{W_M}{W_f} + \frac{1}{\gamma-1}\right] L_s(W_M)}{(\varepsilon^f - \eta^f) L_f / W_f} \geq 0 \tag{32}$$

where $L_f = L_X + L_N$, ε^f is the elasticity of labor supply to the free sectors of the labor market, and η^f is the elasticity of labor demand to the free sectors.

The wage reduction in the non-protected or free sectors (X and N) induces an increase in labor use in those sectors, but at the same time more potential workers become quasi-voluntary unemployed. Therefore, the immediate effect of trade liberalization is a loss of employment in the M sector; the sector we associate with more "attractive" or "better paid" jobs. This will increase the level of quasi voluntary and queuing unemployment and will exert downward pressure on the level of wages as workers seek employment in the free segment.

The above discussion assumes that the protected wage segments are maintained after the trade liberalization. This is not a fully plausible assumption. In the long run we could indeed expect that trade liberalization would weaken the capability of governments to grant protection to certain sectors of the labor market, and that wages would come down in line

with labor market conditions.[32]

What will happen if W_M is reduced? First, β will increase not only through the numerator (depending on η^M) but also through the denominator, because aggregate labor force participation will fall with W_M. The magnitude of this fall will depend on ε, the elasticity of labor supply to the market. At the same time, the equilibrium level of queuing unemployment will be affected by changes in β and W_M. This, in turn, will affect labor supply to the non-protected sector and W_f.

From (29) we have:

$$\frac{du^e}{dW_M} = \frac{\partial U^e}{\partial W_M} + \frac{\partial U^e}{\partial \beta}\frac{\partial \beta}{\partial W_M} + \frac{\partial U^e}{\partial W_f}\frac{\partial W_f}{\partial W_M} \tag{33}$$

where:

$$\frac{\partial W_f}{\partial W_M} = \frac{L_M W_M + L_f W_f \frac{\varepsilon W_f}{W_M} + (\varepsilon - \eta^M)\frac{L_M W_f^2}{W_M}}{\eta^f L_f W_f - L_M W_M} \leq 0 \tag{34}$$

Combining these expressions we obtain:

$$\frac{du^e}{dW_M} = \underset{(+)}{\frac{\beta}{W_f}} + \underset{(-)}{\left[\frac{1}{\gamma - 1} + \frac{W_M}{W_f}\right](\eta^M - \varepsilon)\frac{\beta}{W_M}} -$$

$$\underset{(-)}{\frac{L_M \cdot W_M \cdot \beta}{L_M W_M - \eta^f L_f W_f}\left(\frac{\varepsilon - \eta^M}{W_M} + \frac{W_M}{W_f^2} + \frac{\varepsilon L_f}{L_M W_M}\right)} \tag{34'}$$

---

[32] Notice that here we are assuming that the minimum wage affects the importable sector and, thus, that its level will be affected by changes in the tariff. However, as John Knight pointed out to us at the conference, this does not need to be the case for every country. Indeed, it is possible that in some countries the exportables sector has a protected labor market. This, of course, would change our result.

For the particular case where $\eta^M = 0$ and $\eta^f = -\infty$ we have that a change in W_M will affect u^e in the following way:

$$\frac{du^e}{dW_M} = \frac{\beta}{W_f}\left[1-\varepsilon\left(1+\frac{1}{\gamma-1}\left(\frac{W_f}{W_M}\right)\right)\right] \tag{35}$$

Notice that this expression states that a reduction in W_M will generate two offsetting effects on queuing unemployment. On the one hand, with the reduction in W_M the gains from queuing decrease, but at the same time the probability of getting a job in the M sector rises. The higher is ε, the more important is the second (positive) effect. In fact, if

$$\varepsilon < \frac{(\gamma-1)W_M}{(\gamma-1)W_M+W_f} \quad \text{then} \quad \frac{du^e}{dW_M} > 0.$$

We can then state:

$$\frac{du^e}{dW_M}\begin{cases} > 0 & \text{if } \varepsilon \sim 0 \\ < 0 & \text{if } \varepsilon > 1 \end{cases} \tag{36}$$

and for $0 < \varepsilon < 1$ the effect of W_M on queuing unemployment will depend on how close W_M and W_f are at the initial level of W_M. That is, the expression du^e/dW_M will be positive for a very inelastic labor supply and will be negative for an elastic labor supply.

In short, the more time we allow for the adjustment of the labor market (the more elastic is labor supply), the larger will be the reduction in u^e induced by a downward adjustment of the protected sector wage rate W_M. At the same time, the level of quasi-voluntary unemployment will fall as the difference between W_M and W_f shortens:

$$\frac{dU^{qv}}{dW_M} = \left(\frac{W_f-\underline{W}}{W_M-\underline{W}}\right)(1-\beta) - \frac{U^{qv}}{W_M}(\eta^M-\varepsilon) \cdot \frac{\beta}{1-\beta} - \frac{1-\beta}{W_M-\underline{W}}\frac{\partial W_f}{\partial W_M} \geq 0 \tag{37}$$

Summarizing, a reduction of tariffs that induce a reduction of employment in the protected sector (importables) will result in higher quasi-voluntary unemployment, lower free sector wages and higher free sector employment in the short run. In the long run, we assume that the strength of the wage protection weakens and W_M falls. With the reduction of W_M, labor force participation falls, the labor market tightens, quasi-voluntary unemployment falls and queuing unemployment ultimately falls as the difference between free sector wages and protected wages disappears. To complete the previous analysis the effect of trade liberalization on labor demand in the free segment would have to be included. In this case, however, the final result will depend on the factor intensities, on the income elasticity of demand for nontradables, and on the size of the income effect generated by the reduction in employment in the importables sector.

In general it is not possible to determine analytically if the average level of wages falls or rises with the trade liberalization effort. This will depend on how distorted the labor market was initially and how we weight the wage contribution of different groups.

VI. Concluding Remarks

The purpose of this paper has been to provide an analytical survey of a number of international trade models that can deal with the employment consequences of trade reforms. Within the most basic trade framework -- the Heckscher-Ohlin model -- a trade liberalization does not generate any employment problems in a developing nation where exports are labor intensive. In fact this will be the case independently of whether wages are flexible or rigid. We started our discussion with an evaluation of the standard dependent economy model. However, contrary to traditional treatments we

considered the case where there are three factors of production. This extension introduced some non-trivial problems since in that case it is not possible to determine unequivocally factor intensities. In this setting and assuming wage flexibility, we showed that the short-run effects on production, prices, and factor rewards of a tariff liberalization reform will be as follows: (1) production of exportables will increase; (2) production of importables will decrease; (3) production of nontradables may increase or decrease; (4) prices of nontradables will decrease; (5) wages will increase in terms of importables and decrease in terms of exportables and nontradables; (6) the real return to the sector-specific factors allocated to the exportables sector will increase relative to all goods; (7) the real return to factors specific to the importables sector will decrease relative to importables but could increase or decrease relative to other goods; and (8) the real return to factor-specific nontradables sector will increase relative to nontradable goods but could either increase or decrease relative to the other two goods. In the long run factor rewards are equalized across sectors and under the assumption that the importables sector is the least labor intensive sector, real wages will increase.

The same model indicates that trade liberalization results in unemployment if wages do not adjust downward. If the wage rigidity is limited to the importables sector only, there will be equilibrium unemployment initially and a trade liberalization will tend to increase the gap between wages in the importables and the other sectors, the labor force in this case will tend to be reallocated between nontradables and exportables. The effect of trade liberalization on total unemployment is not clear because there are two forces that affect the equilibrium level of unemployment in opposite directions. On the one hand the probability of finding a

"high wage" job is reduced by the reduction in labor demand in M, but, on the other hand, the wage in the rest of the labor market falls, reducing the opportunity cost of unemployment.

The effect of capital account liberalization on the labor market was studied using an intertemporal framework. Under the assumption that the economy is distorted by controls to capital mobility and a minimum wage, we find that the removal of capital controls tends to increase employment in nontradables through a positive expenditure effect. In a similar framework we also showed that an anticipated tariff reform can generate a negative effect on the level of employment.

In the last section we paid closer attention to the starting conditions of a typical protected economy. We modified the assumption of a given minimum wage and assumed that the degree of wage distortion in the importables sector was directly related to the degree of trade protection. In this case, one of the implications of trade reform is the consequent reduction of the predetermined wage in the importables sector to a level compatible with market conditions. At the same time, we relax the assumption of a fixed labor supply and thus allow labor force participation to be a function of wages. We define labor force participation as determined by all those workers willing to take a job in the high wage sector. In this context we define quasi-voluntary unemployment as that which is involuntary with respect to the importables sector, and voluntary with respect to the rest of the labor market. Under these assumptions, the immediate effect of a trade liberalization is a decline in the level of employment in the importables sector, which will increase the level of quasi-voluntary unemployment and will tend to reduce wages in the rest of the economy as some workers seek employment there. In the long run we expect that trade

liberalization would weaken the capability of governments to grant protection to unions or certain sectors of the labor market, and that wages would come down in line with labor market conditions. The structure of the labor market will then change and the difference between protected wages and free sector wages will tend to disappear, eliminating the distinction between the two types of unemployment described in the text.

In this framework it is clear that wages in the importables sector fall, although it is not clear how aggregate average wages behave. However, it is perhaps in this setting that the opposition to trade liberalization can be better understood. Labor, which is the factor of production that is supposed to gain from freer trade is negatively affected in the short run and the long term gains are hard to perceive when compared to the initially distorted situation of the economy.

References

Altonji, J. 1982. "The Intertemporal Substitution Model of Labor Market Fluctuations: An Empirical Analysis." Review of Economic Studies (November): 507-22.

Brecher, R.A. 1974. "Minimum Wage Rates and the Theory of International Trade." Quarterly Journal of Economics 88 (February): 98-116.

Bruce, N., and D. Purvis. 1984. "The Specification of Goods and Factor Markets in Open Economy Macroeconomic Models." In R.W. Jones and P.B. Kenen, eds., Handbook of International Economics. Amsterdam: North-Holland.

Burda, M., and J. Sachs. (1987). "Institutional Aspects of Unemployment in Germany." NBER Working Paper.

Corden, W.M., and R. Findlay. 1975. "Urban Unemployment, Intersectoral Capital Mobility and Development Policy." Economica 42: 59-78.

_____, and J.P. Neary. 1982. "Booming Sector and De-industrialization in the Small Open Economy." Economic Journal 92 (December): 825-48.

Cox-Edwards, A. 1986. "Economic Reform, External Shocks, and the Labor Market: Chile 1974-83." Paper presented at World Bank Conference on Adjustment of Labor Markets in LDCs to External Shocks. June.

Dixit, A., and V. Norman 1980. Theory of International Trade, Cambridge University Press.

Dornbusch, R. 1974. "Tariffs and Nontraded Goods." Journal of International Economics: 177-85.

_____. 1980. Open Economy Macroeconomics. New York: Basic Books.

Edwards, S. 1986a. "Are Devaluations Contractionary?" Review of Economics and Statistics (August).

_____. 1986b. "Economic Liberalization and the Real Exchange Rate in Developing Countries." Paper presented at the Carlos Diaz Alejandro Memorial Conference, Helsinki, August.

_____. 1986c. "The Liberalization of the Current and Capital Accounts of the Balance of Payments." In A. Choksi and D. Papageorgiou, eds., Economic Liberalization in Developing Countries. Oxford: Blackwell.

_____ 1988. "Terms of Trade, Tariffs and Labor Market Adjustment in Developing Countries." World Bank Economic Review, 2, 165-85.

_____. 1989a. Real Exchange Rates, Devaluation, and Adjustment. MIT Press.

_____. 1989b. "Tariffs, Capital Controls and Equilibrium Real Exchange Rates." Canadian Journal of Economics.

_____. 1990. "Structural Reforms and Labor Market Adjustment." UCLA Dept. of Economics Working Paper.

_____, and A. Cox-Edwards. 1987. Monetarism and Liberalization: The Chilean Experiment. Cambridge, MA: Ballinger.

_____, and J. Ostry. 1985. "Tariffs, Capital Controls and Real Exchange Rates: The Case of Wage Rate Resistance." IMF Working Paper.

Edwards, S., and S. van Wijnbergen. 1986. "The Welfare Effects of Trade and Capital Market Liberalization." International Economic Review, 27, 1411-48.

_____ and _____ 1989. "Structural Adjustment and Disequilibrium." In H. Chenery and T.N. Srinivasan, eds., Handbook of Development Economics. New York: North-Holland.

Harberger, A.C. 1971. "On Measuring the Social Opportunity Cost of Labor." ILO Review 103, no. 6: 559-79.

Harris, J., and M.P. Todaro. 1970. "Migration, Unemployment and Development: A Two Sector Analysis." American Economic Review 60: 126-42.

Jones, R.J. 1971. "A Three Factor Model in Theory, Trade and History." In J. Bhagwati and others, eds., Trade, Balance of Payments, and Growth. Amsterdam: North-Holland.

Komiya, Ryutaro. 1967. "Nontraded Goods and the Pure Theory of International Trade." International Economic Review 8: 132-51.

Krueger, A. 1983. Trade and Employment in Developing Countries. Chicago: University of Chicago Press.

Leamer, E. 1987. "Paths of Development in the Three-Factors, N-Goods General Equilibrium Model." Journal of Political Economy, 95.

Mankiw, G., J. Rotemberg and L. Summers. 1985. "Intertemporal Substitution in Macroeconomics." Quarterly Journal of Economics 100 (February): 225-53.

Mayer, W. 1974. "Short Run and Long Run Equilibrium for a Small Open Economy." Journal of Political Economy 82, no. 5: 955-67.

Melvin, J. 1968. "Production and Trade with Two Factors and Three Goods." American Economic Review 58: 1249-68.

Michaely, M., A. Choksi, and D. Papageorgiou. 1986. "The Phasing of a Trade Liberalization Policy: Preliminary Evidence." Paper presented at annual meeting of American Economic Association, New Orleans, December.

Mussa, M.L. 1974. "Tariffs and Distribution of Income: Importance of Factor Specificity, Substitutability and Intensity in Short and Long Run." Journal of Political Economy 82, no. 6: 1191-203.

_____. 1978. "Dynamic Adjustment in the Heckscher-Ohlin-Samuelson Model." Journal of Political Economy: 86, no. 5: 775-91.

_____. 1979. "The Two Sectors Model in Terms of its Dual: A Geometric Exposition." Journal of International Economics (November): 513-26.

_____. 1982. "Government Policy and the Adjustment Process." In J. Bhagwati, ed., Import Competition and Response. Chicago: University of Chicago Press.

_____. 1986. "The Adjustment Process and the Timing of Trade Liberalization." In A. Choksi and D. Papageorgiou, eds., Economic Liberalization in Developing Countries. Oxford: Blackwell.

Neary, P. 1978a. "Dynamic Stability and the Theory of Factor-Market Distortions." American Economic Review: 671-82.

_____. 1978b. "Short-Run Capital Specificity and the Pure Theory of International Trade." Economic Journal 88: 448-510.

_____, 1981. "On the Harris-Todaro Model With Intersectoral Mobility." Economica 48, no. 191: 219-34.

_____. 1982. "Capital Mobility, Wage Stickiness and the Case for Adjustment Assistance." In J. Bhagwati, ed., Import Competition and Response. Chicago: University of Chicago Press.

_____. 1985. "International Factor Mobility, Minimum Wage Rates and Factor Price Equalization: A Synthesis." Quarterly Journal of Economics 100 (August): 551-70.

Oi, W. 1962. "Labor as a Quasi-Fixed Factor." Journal of Political Economy 70, 538-55.

Starr, G. 1981. Minimum Wage Fixing: An International Review of Practices and Problems. Geneva: International Labor Office.

Svensson, L. 1984. "Oil Prices, Welfare and the Trade Balance." Quarterly Journal of Economics. 99: 649-72.

_____ and A. Razin. 1983. "The Terms of Trade and the Current Account: The Harberger-Laursen-Meltzer Effect." Journal of Political Economy. 91: 97-125.

Thomas, V. 1989. "Extent of Trade Reforms in the 1980s," unpublished ms., Washington, DC: World Bank.

Topel, R. 1986. "Local Labor Markets." Journal of Political Economy.

van Wijnbergen, S. 1986. "Exchange Rate Management and Stabilization Policies in Developing Countries." In S. Edwards and L. Ahamed, eds., Economic Adjustment and Exchange Rates in Developing Countries. Chicago: University of Chicago Press.