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SEQUENCING AND WELFARE:
LABOR MARKETS AND AGRICULTURE

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ABSTRACT

Recent discussions on structural adjustment and market-oriented reforms in developing and Eastern European nations have addressed the issue of the appropriate sequencing of these reforms. Most of the traditional work on the subject has concluded that the preferred sequencing should include, as a first step, the opening up of the trade account. This "trade account first" literature, however, has been mostly macroeconomics in nature, without explicitly exploring the microeconomics and welfare consequences of alternative sequencing strategies. In this paper I develop a formal intertemporal model to investigate the welfare effects of different reform sequences. More specifically, I analyze whether the "trade account first" recommendation can be backed theoretically by welfare considerations. The analysis focuses on the role of labor market distortions and of the agricultural sector. I find that there are very weak **welfare-based** arguments in favor of the "trade account first" sequencing. The analysis also suggests that an early reform of the labor market will generally be welfare improving.

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I. Introduction

In the early 1990s the economics profession came to virtual agreement regarding the advantages of economic policies that favor openness and exports growth. The decades-old debate regarding inward vs. outward orientation seems to have been won by the proponents of outward-oriented policies.¹ The arrival at this quasi-consensus has, however, generated a score of important and pressing questions regarding the actual implementation of outward-oriented policies. Perhaps the questions that have attracted the greatest attention of policymakers and economic analysts are the ones related to sequencing and speed of structural reform: In what order should different markets be liberalized? Should a country tackle the inflationary problem before dealing with market-oriented reforms, or should the opposite sequence be pursued? How costly is it to undertake liberalization reforms if the labor market is still regulated and distorted? What is fascinating is that every day it becomes clearer that these issues are not only of relevance to the developing nations, but that they are increasingly important -- crucially vital we may even argue -- for those East European countries currently engaged in reform and restructuring. In fact it is not an exaggeration to say that in policy circles throughout the world there is a sense of urgency regarding issues of sequencing and speed of reform.

Although questions related to sequencing and speed, like the ones posed above, are faced every day by policymakers and their advisors, the academic literature on the subject has been sparse and somewhat scattered. Most of this literature has been rather informal and has concentrated on two broad issues:

¹There are, of course, some authors that are still skeptical about liberalization reforms. See, for example, Taylor (1988) and Banuri (1990).

(1) the evolution of aggregate macrovariables such as the current account, interest rates and output; and (2) questions related to the credibility and sustainability of reform.²

The traditional literature on the sequencing of reform has concentrated on the order of liberalization of capital and current accounts. Although there is no generalized consensus on the optimal sequencing of reform, the majority of authors have argued that the opening of the trade account should precede other liberalization policies.³ Perhaps the most persuasive argument for this "trade-first" sequence of reform is that opening the capital account will result in severe macroeconomic destabilization that could even generate a reversal of the liberalization process. If the domestic capital market is repressed, and interest rates are below world rates, the relaxation of capital controls will result in capital flight and a balance of payments crisis. If, on the contrary, the domestic financial market has already been reformed, the relaxation of capital controls will tend to result in massive capital inflows. These, in turn, will generate a real exchange rate appreciation and a loss of competitiveness that will reduce the chances of a successful trade reform. Recent empirical analyses on the determination of real exchange rates in developing countries have, in fact, provided support to the view that increases in capital inflows have generally resulted in appreciation (Edwards 1989).

²For early discussions on the sequencing issue see McKinnon (1982), Frenkel (1982, 1983) and Edwards (1984). More recent discussions can be found in Corden (1987), Edwards (1989d), and McKinnon (1991).

³See McKinnon (1982), Corden (1987), Edwards (1984, 1989d).

A number of authors have postulated that, in addition to these macroeconomic reasons there are welfare arguments that support the trade-first sequence. For example, Krueger (1984, p. 19) writes:

Since exchanges of assets are exchanges of capitalized values of income streams, income streams generated by distorted prices are probably the inappropriate ones at which to trade. It would then follow that the capital account liberalization should not be undertaken unless both current account and domestic financial transactions are already liberalized.

And, according to Frenkel (1983, p. 167):

When the trade account is opened first the cost of the remaining distortion (i.e., the closed capital account) ... is likely to be relatively small. On the other hand, when the capital account is opened up first the cost of the remaining distortion (i.e., the closed trade account) ... is likely to be very large. Thus a comparison of the costs of distortions ... supports the proposition that the trade account should be opened first.

However, both of these statements, as well as similar ones in the literature, are based on conjectures rather than on formal analyses. The purpose of this paper is to formally investigate under what circumstances a welfare criterion indicates that a particular sequencing is preferred to another. This is done by developing an intertemporal framework that focuses on two aspects of the sequencing question previously ignored in (most of) the existing literature: (1) the role of labor market distortions, and (2) the impact of structural reform on the agricultural sector. The explicit incorporation of labor markets into the analysis of the sequencing problem is important for at least three reasons: first, in most developing nations minimum

wage legislation and other distortions are quite pervasive;⁴ second, from a political perspective the fear of increased unemployment has generally retarded, or even frustrated, reform attempts; and third, labor market distortions are usually difficult to eliminate. This means that from a political economy point of view there will be a tendency for leaving the reform of this market at the end of the liberalization process. An interesting characteristic of labor markets in the developing countries is that the extent of distortions is very different in the manufacturing and agricultural sectors. For instance, in many countries minimum wages either don't cover the agricultural sector or, when they do, their level is significantly lower than in the manufacturing and services sector.⁵ This means, then, that structural adjustment reforms will tend to have different effects on agriculture and non-agriculture employment and wages. An additional important characteristic of the agriculture sector is that in a large number of LDCs it is -- or has the potential of being -- a net exporter. This means, then, that in these nations the export response expected from a trade liberalization reform will come from this sector.

It is important to state at the outset that the model presented in this paper does not attempt to describe every developing nation, nor that it is utterly "realistic". Rather, this model should be interpreted as providing a minimal, and yet rigorous, framework for dealing formally with the sequencing issue from a welfare perspective. Some of the specific assumptions, in fact, apply to only a particular type of country, while others are admittedly simplifications. The virtue of the model,

⁴See, for example, ILO (1988).

⁵For some interesting data on the Latin American case see, for example, PREALC (1978).

however, is that it can be easily manipulated as to incorporate alternative assumptions. In the rest of the paper I explicitly point out which assumptions are subject to controversy and discuss ways in which they can be modified.

The rest of the paper is organized as follows. In Section II, I develop a general intertemporal model of a small open developing economy subject to multiple distortions, that can be used to formally address the issues of sequencing and speed of reform. This model considers the existence of three broadly defined sectors -- agriculture, which is considered to be a net exporter; manufacturing, a net importer; and services -- and four initial (before reform) distortions. More specifically, it is assumed that imports are subject to an import tariff, that capital flows are restricted, that the services sector is distorted through a consumption tax, and that there is a minimum wage that affects the manufacturing and services sector. Section III is devoted to comparing the consequences of two specific sequences of reform. The emphasis here is on labor market reaction, the agricultural sector behavior and economy wide welfare. Section IV discuss the model's limitations and discusses some extensions, including tariffs on intermediate inputs. Section V is the conclusion.

II. The Sequencing of Structural Reforms: A General Welfare Approach

The purpose of this section is to develop a general optimizing intertemporal model to analyze the most important consequences -- and especially the welfare effects -- of policies aimed at structurally reforming the economy. The model explicitly considers the existence of multiple distortions, allowing to formally inquire into the consequences of alternative

sequencing scenarios.⁶ In this section a general version of the model is presented.⁷ In Section III the model is manipulated in order to analyze two sequencing scenarios, while in Section IV some extensions are discussed. In spite of its apparent generality, the model developed in this section provides the minimal structure required to formally analyze sequencing issues from a welfare perspective.

Assume that the country under consideration is a small open economy that faces given world prices of tradable goods and given world interest rates. There are three broadly defined sectors -- Agricultural (A), Manufacturing (M) and Services (S) -- and two periods, the present (period 1) and the future (period 2). It is assumed that, initially, agriculture is a net exporter and manufacturing a net importer.⁸ There is no trade in services, and its market has to clear in every period. In order

⁶Given its intertemporal nature, the model can also be used to formally investigate the important policy question of the appropriate speed of liberalization reforms.

⁷The model developed in this paper expands my 1989a working paper in several directions. Perhaps the most important ones are the incorporation of intermediate inputs (Section V) and the assumption that labor market distortions are market-specific. These assumptions indeed allow us to focus the attention on the agricultural sector.

⁸This is an important simplification. In many developing nations the agricultural sector is not homogeneous. In fact we can often find an import competing segment -- usually protected through quotas -- and an exportable segment. We leave the formalization of a model with these two agricultural segments for future research.

to simplify the setup of the model, in its general version we assume that there are no intermediate inputs. This assumption, however, is relaxed in Section IV where the case where agriculture uses imported intermediate goods is analyzed in some detail.

This economy is assumed to be subject to four basic distortions: (1) Financial sector regulations that take the form of a tax on borrowing and lending from abroad and, thus, in an interest rate differential between domestic and world interest rates. (2) There is a minimum wage, which in this version of the model is assumed to cover the manufacturing and services sectors. In this section I assume that this minimum wage is expressed in terms of the agricultural goods. In Section IV, however, we discuss the more general case of nominal wage indexation to a general price index. (3) There is a consumption tax on services; and, (4) there are tariffs on the importation of manufactures.

Assume that in this economy there are a large number of producers and (identical) consumers, and that perfect competition prevails.⁹ We assume that there are three factors of production: labor, capital and natural resources. Initially, and in order to simplify the discussion, we assume that there is no investment. Later, however, we discuss how the formal introduction of investment will affect the results.¹⁰

⁹Although formally it is easy to consider the case where many goods are produced, in order to simplify the presentation we focus on the three goods case.

¹⁰In this type of fully optimizing model with constant returns to scale technology, there is a problem with having both minimum wages in both periods and investment. See for example, Svensson (1984) and the discussion below.

II.1 The Consumer Problem

Consumers maximize utility subject to their intertemporal budget constraint. If the utility function is time separable, with each subutility function homothetic and identical, the representative consumer problem can be stated as follows:¹¹

$$\max V\{u(c_S, c_A, c_M); U(C_S, C_A, C_M)\},$$

subject to:

$$\begin{aligned} c_A + pc_M + fc_S \\ + \delta(C_A + PC_M + FC_S) \leq \text{Wealth}, \end{aligned} \quad (1)$$

where lower case letters refer to first period variables and upper case letters refer to second period variables. The price of agricultural goods has been taken to be the numeraire, (e.g., $p_A = P_A = 1$). V is the intertemporal welfare function; u and U are periods 1 and 2 subutility functions. $c_A, c_M, c_S, (C_A, C_M$ and $C_S)$ are consumption of A, M and S in period one (two); f and F and p and P are the prices of services and manufacturing relative to agriculture faced by consumers in periods 1 and 2, and are inclusive of the tax on S and 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: $r = r^* + \sigma$. The presence of this tax, then, captures the fact that initially the domestic capital market is regulated and distorted.

¹¹An upward sloping supply of labor can be added into the analysis simply by adding leisure to our utility function. See Edwards (1989d).

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, taxes on nontradables and capital flows in each period. The solution to the consumers optimizing problem is conveniently summarized by the following intertemporal expenditure function:

$$E = E\{\pi(1,p,f), \delta*\Pi(1,P,F),V\}. \quad (2)$$

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.

II.2 The Producers Problem

From the supply side the most important characteristic of this model is the existence of a minimum wage in the manufacturing (import competing) and services sectors. An elegant way of dealing with the case of sector-specific minimum wages is by introducing an equilibrium wage rate differential of the Harris-Todaro (1970) type.¹² In this setup the equilibrium condition is that the wage rate in the agricultural sector is equal to the expected wage in the sector protected by the minimum wage. In our case this means $W_A = E(W_U)$, where W^U is the wage rate in the urban sector and its equal to the minimum

¹²In spite of its elegance the Harris-Todaro model has a number of limitations. See, for example, Rosenszweig (1989) and Lindbeck and Snower (1991).

wage applicable to manufacturing and services.

Equilibrium under these assumptions of sector-specific minimum wage coverage is depicted by Figure 1. Here, total labor used in the manufacturing and services sectors is measured from the righthand side origin O_M ; the wage rate W_M is the minimum wage in the importables (manufacturing) and services sectors. Schedule (L_M+L_S) is the demand for labor by the manufacturing and services sectors, while (L_A) is the demand in agriculture. Schedule qq is a rectangular hyperbola known as the Harris-Todaro locus, along which the following equation is satisfied:

$$W_A = \left[\frac{L_M}{L_M+U} \right] W_P \quad (3)$$

where U unemployment and L_M is employment in the M sector. $L_M/(L_M+U)$ is, then, the probability of finding a job in the "covered" sector. In the absence of a minimum wage, equilibrium is attained at point Z , with full employment of labor resources. With a sectoral minimum wage, however, the intersection of L_A with qq at point R gives the wage rate in the uncovered (no minimum wage) sector, employment in each sector and total unemployment. The distance $O_R L_A$ is total employment in the exportables agricultural sector; the distance $O_M L_M$ is employment in manufacturing; the distance $L_M(L_M+L_S)$ is the initial employment in the covered services sector. Finally, distance $(L_M+L_S)L_A$ is the initial equilibrium level of unemployment.

We can formally deal with the case of sector-specific wage rigidity by using two revenue functions -- for the covered and

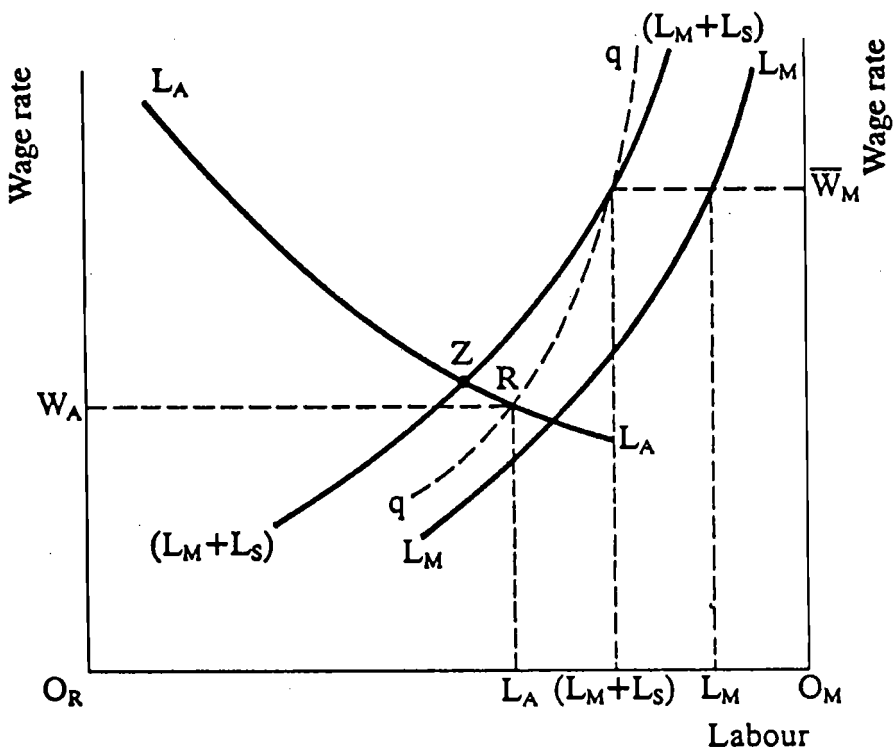


Figure 2.1 Labour market equilibrium with unemployment

uncovered sectors -- in each period.¹³ For the case of period 1 we can denote them in the following way (remember that lower case letters refer to period 1 variables; of course, for period 2 the case is perfectly analogous):

$$r^c = r^c(1, p, q, \ell^c); \quad r^u = r^u(1, p, q, \ell^u) \quad (4)$$

where \underline{c} and \underline{u} refer to covered and uncovered sectors and where ℓ^c and ℓ^u denote employment in the covered and uncovered sectors, and where q is the price of services faced by producers.¹⁴ The employment constraint is given by:

$$\ell^c + \ell^u + \mu = \ell^T, \quad (5)$$

where μ is period one unemployment and ℓ^T is the total (exogenously given) labor supply in that period.

The wage rate in the covered sector is exogenously set at the minimum level \bar{w} . Denoting partial derivatives by

¹³Since there now is a wedge between the return to labor in each sector, we cannot use a unique revenue function. We require a revenue function for the covered sector and a different one for the uncovered sector. Naturally, since there is a minimum wage the "covered" sector has a restricted revenue function.

¹⁴Notice that the fact that there is a tax on the nontradables market is captured by the inclusion of different prices of nontradables in the expenditure and revenue functions (f and q , respectively). The difference between producers and consumers prices is, of course, given by the tax on nontradables τ^1 : $f = q + \tau^1$; $F = Q + \tau^2$.

subindexes we can write:¹⁵

$$r_{\ell^c}^c = \bar{w} \quad (6)$$

On the other hand the Harris-Todaro equilibrium condition states that there is a relationship between the wage rate in the covered and uncovered sector:

$$r_{\ell^u}^u = \psi r_{\ell^u}^c \quad (7)$$

where $r_{\ell^u}^u = w^A$ is the wage rate in the uncovered sector, and

where

$$\psi = \frac{\ell^c}{\ell^T - \ell^u} \quad (8)$$

Naturally, the assumption of minimum wage coverage made here is a simplification of reality. In most countries, minimum wages cover only a segment of the urban sector and some parts of the agricultural sector. The model can be easily expanded to include that type of labor market configuration. The cost of doing so is that the number of sectors would be doubled, and the algebra will become more cumbersome. However, as the interested reader will readily verify the main thrust of the analysis presented here will be maintained.

¹⁵Remember that an important property of revenue functions is that their partial derivative with respect to a particular factor is equal to the marginal product of that factor. Thus, when evaluated at the actual level of employment, $r_{\ell^c}^c$ will be equal to the minimum wage rate in the covered sector.

II.3 Equilibrium

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

$$\begin{aligned}
 & r^u(1,p,q,\ell^u) + \delta R^u(1,P,Q,L^u) \\
 & + r^c(1,p,q,\ell_c(1,p,q,-w)) \\
 & + \delta R^c(1,P,Q,L^c(\bullet)) + \text{TRANS} \\
 & = E(\pi(1,p,f), \delta \Pi(1,P,F), V) \tag{9}
 \end{aligned}$$

$$\begin{aligned}
 \text{TRANS} & = \tau^1 r_q + \delta \tau^2 R_Q + b \text{CA} + \\
 & + t^1 M^1 + \delta t^2 M^2 \tag{10}
 \end{aligned}$$

$$b = \delta^* - \delta \tag{11}$$

$$\text{CA} = R^u + R^c + (\tau^2 R_Q + t^2 M^2) - \Pi E_{\delta \Pi} \tag{12}$$

$$f = q + \tau^1; \quad F = Q + \tau^2 \tag{13}$$

$$r_q^c = E_f \tag{14}$$

$$R_Q^c = E_F \tag{15}$$

$$p = p^* + t^1; \quad P = P^* + t^2 \tag{16}$$

$$M^1 = (E_p - r_p^c); \quad M^2 = (E_P - R_P^c) \tag{17}$$

These nine equations, plus the expressions describing labor market equilibrium (equations (4) through (8)) constitute our intertemporal model of this small distorted economy.

Equation (9) 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 (10). Here $\tau^1 r_q^c$ is period 1 tax revenue from the nontradables services market (τ^1 is the tax

rate in period 1 and r_q^c is the equilibrium quantity produced and consumed in that period); $\delta\tau^2R_Q^C$ is the present value of period 2 nontradables tax revenues, 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 (12) as total income minus expenditure in period 2. This means that, since in this model there is no investment, the current account is equal to savings in each period. Finally, t^1M^1 and δt^2M^2 in equation (10) are revenues from import tariffs; t^i is the tariff rate in period i , and M^i are imports in i and are defined in equation (17) as the excess demand for importables in each period. Equation (13) provides the linkage between consumer and producer prices for nontradables. Equations (14) and (15) state that the nontradables goods market has to clear in each period -- r_q^c and R_Q^C are quantities produced of these goods, while E_f and E_F are the quantities demanded.

Although the model presented above is quite general and flexible it still has some limitations. In addition to those already pointed out, the most important ones are: (1) the inelastic supply of labor; (2) the absence of intermediate inputs; (3) the presence of only one importable sector; and (4) having the minimum wage fixed in terms of the numeraire good rather than as a function of a (consumption) basket. The relaxation of some of these simplifying assumptions is discussed in Section IV.

II.4 The Welfare Effects of Structural Reform

The framework presented above can be used to analyze a number of important welfare questions related to the sequencing of structural reform. After manipulating the model, we obtain the following equation that captures the different channels through which structural reforms will affect welfare in this economy (where as before subindexes refer to partial

derivatives):

$$\begin{aligned}
 E_V dV = & t^1 dM^1 + \delta t^2 dM^2 \\
 & + \tau^1 r_{qq}^c dq + \delta \tau^2 R_{QQ}^c dQ \\
 & + bdCA + w^A d\ell^u + \delta W^A dL^u \\
 & + \bar{w} d\ell^c + \delta \bar{W} dL^c \\
 & + \tau^1 r_{qc}^c dt^1 + \delta \tau^2 R_{QP}^c dt^2 \\
 & - \tau^2 R_{Qdb}^c - t^2 M^2 db \\
 & + \tau^1 r_{q\ell}^c d\ell + \delta \tau^2 R_{QL}^c dL
 \end{aligned} \tag{18}$$

Although this is not a reduced form -- since many of the right hand side (RHS) variables are endogenous -- it is a very general and informative equation.¹⁶ In fact, it is possible to derive from it (as special cases) the welfare consequences of many combination of structural adjustment policies. The first two terms of the right hand side capture the welfare effects stemming from changes in imports in periods 1 and 2. If as a result of whatever reform we are analyzing either M^1 or M^2 increase we will have welfare gains. These, in turn, will be proportional to the initial distortions. The reason for these welfare gains are intuitively clear: since originally (in the pre-reform period) due to the existence of tariffs, this country was importing "too little", any policy action that increases imports, moving them closer to the optimum level, will be welfare-enhancing.

The next two terms in equation (18) ($\tau^1 r_{qq}^c dq$ and $\delta \tau^2 R_{QQ}^c dQ$) summarize the welfare consequences of changes in the equilibrium quantities transacted in the nontradables

¹⁶See Edwards (1989d) for the reduced form solution for many of the right hand side terms.

(services) sectors. Naturally, these changes operate via changes in the prices of S (or real exchange rate), q and Q . If, for example, a reform raises these prices (e.g., $dq > 0$ and $dQ > 0$) we will have positive social welfare effects (since r_{qq} and R_{QQ} are positive) which will be proportional to the initial distortions in this market.¹⁷ In fact, one of the important properties of this model is that it clearly shows that changes in the relative price of tradables (or real exchange rates) constitute one of the most important channels through which structural adjustment policies will affect welfare. Naturally, when evaluating the effects of a specific reform it would be necessary to evaluate precisely how the reform will affect nontradable relative prices.

The next term, $bdCA$, captures the welfare consequences of changes in period 2 current account; if the reform reduces the size of the current account, total welfare will decline. This is because reductions in the CA mean that total borrowing will decline, and thus will amplify the preexisting distortion stemming from the tax on capital mobility: initially this country was borrowing "too little" and, thus, reductions in borrowing will move it even further away from the first best. The next four terms ($w^A d\ell^u + \delta W^A dL^u + \bar{w} d\ell^c + \delta W dL^c$) deal with the labor market and state that if a reform increases employment in the covered and/or uncovered sectors, in either period, social welfare will increase. Naturally, since M^1 , M^2 , q , Q , CA , ℓ^u , ℓ^c , L^u and L^c are endogenous variables, in order to obtain the exact expressions for these welfare changes we will need to

¹⁷In order to maintain the simplicity of the presentation I have deliberately not solved for the real exchange rate terms dq and dQ . See, however, the discussion in Edwards (1989b) for a detailed analysis of RER consequences of different reforms.

solve the complete model.¹⁸ The reason for this, of course, is that due to the minimum wage, aggregate employment in this economy is too low. Any policy that results in an increase in employment will, thus, result in an increase in social welfare.

The final six terms of equation (15) -- $[\tau^c_{pq} dt^1 + \delta\tau^2_{QP} dt^2 - \tau^2_{Qdb} - t^2 M^2 db + \tau^1_{r_{ql}} dt^1 + \delta\tau^2_{QL} dL]$ -- are indirect terms related to changes in tariffs, taxes and employment which are originated from the interaction among the different distortions. Their magnitude, then, will basically depend on the sign of several cross elasticities. For our purpose the two terms involving the financial distortion b are particularly important. They state that increases in the tax on borrowing will impact welfare through changes in the amount of taxes collected in each period. In Section III this model is used to perform two exercises on the sequencing of reform. In Section IV the model is extended to incorporate imported intermediate inputs and investment.

IV. The Sequencing of Reform and the Agricultural Sector: Basic Results

In this section I use a variate of the model developed above to analyze the conditions under which the popular recommendation of liberalizing the "trade account first" is appropriate from a strict welfare perspective. Consequently, I abstract from the macroeconomic arguments of McKinnon, Corden and Edwards. Additionally, I investigate the welfare consequences of reforms that include labor market deregulation.

In order to facilitate the analysis, I assume that the services sector is undistorted ($\tau^1 = \tau^2 = 0$). This means that the three

¹⁸For the solution of similar -- although admittedly simpler -- models see Edwards (1989a,b,c).

fundamental distortions in this economy are import tariffs, a tax on foreign borrowing and the minimum wage.

IV.1 "Tariffs-First" Liberalization Sequence

In this subsection we assume that the economy is following the popular "tariffs-first" sequence, and ask what happens if this policy is altered. More specifically, we investigate how the key variables in the system will react if instead of liberalizing trade first, we relax trade and capital market distortions at the same time.

The initial conditions in this economy are summarized in Table 1. As can be seen it is assumed that the labor market remains distorted throughout the relevant run, that tariffs are eliminated (or reduced) at the beginning of period 1 and that the distortions on capital controls are eliminated at the very end.¹⁹ In the rest of this section I investigate how (a) agricultural employment, (b) agricultural production, (c) agricultural wages, (d) aggregate unemployment, and (f) total welfare are affected if, starting from the initial conditions in Table 1, we (somewhat) relax the extent of capital controls. Formally, this amounts to analyzing the way in which these variables react to an increase in the domestic discount factor δ .

¹⁹Strictly speaking the interest rate connects periods 1 and 2 and thus appears only once in our two periods model. Still we can interpret this analysis as referring to the case where at the end of period 2 the capital account restrictions have been lifted. In fact the results discussed here would still be obtained if we use a three periods model.

TABLE 1
 "Tariffs-First" Liberalization Sequence In The
 Presence of Labor Market Distortions

	P E R I O D		
	0	1	2
Manufact.	Distorted	Undistorted	Undistorted
Labor	Distorted	Distorted	Distorted
Capital	Distorted	Distorted	Undistorted

Agricultural Employment, Wages and Output

A relaxation of capital controls will affect the consumers rate of discount and, thus, the intertemporal allocation of consumption. This, in turn, will tend to affect agricultural employment and wages in both periods. The mechanism through which this will happen is the following: a reduction in the tax on borrowing σ will make present consumption relatively more attractive, generating an increase in period 1 expenditure and a reduction in period 2 expenditure. Let's first focus on period 1 and assume, for the time being, that labor is the only factor that can move across sectors. A proportion of this period's increase in expenditure will fall on services (nontradables) provoking an incipient excess demand that will be solved through a higher price of S .²⁰ This higher price of S (or real exchange rate appreciation) will, in turn, result in an increase (an upward shift) in the demand for labor and in higher

²⁰Formally it is not quite so simple, since in addition to the substitution effect described here there will also be an income effect. See Edwards (1989b) for a formal discussion on the effects of capital market reform on the real exchange rate. Formally, however, the final effect will be to generate a real exchange rate appreciation.

employment in the services sector. Employment in manufacturing, however, is not affected by this change in policy. Due to the existence of the labor market constraint, the higher employment in services will provoke a reduction in period 1 employment in agriculture.

Formally, and under the assumption that the economy is initially following the "tariffs-first" sequence of Table 1, the effect of an increase in δ on employment in agriculture is given by:

$$\frac{d\ell^u}{d\delta} = \left\{ r\ell^u - \frac{\psi\bar{w}}{(\ell^T - P^2)} \right\}^{-1} \left[\frac{\psi\bar{w}}{\ell^C} \right] \ell_q^C \left[\frac{dq}{d\delta} \right]. \quad (19)$$

By convexity of the revenue function $r_{\ell\ell}^u < 0$, and thus, the first term in the right hand side is negative; on the other hand, $(\psi\bar{w}/\ell^C) > 0$; ℓ_q^C is the derivative of employment in the covered sector with respect to the price of services and under the assumption that capital and natural resources are sector specific, it is also positive. In fact, with labor mobility only ℓ_q^C is equal to the parallel shift of the demand for labor that results from a change in q . Finally, $(dq/d\delta)$ is the change in the price of services in period 1 generated by the relaxation of the capital distortions, and, as explained above, is positive. Equation (19) as a whole is, then, negative, capturing the fact that a liberalization of capital controls will generate a decline in agriculture employment in period 1. This result is depicted in Figure 2, where L'_S is the demand for labor in the S service after the tax on foreign borrowing has been reduced, and where $(L_M + L'_S)$ is the demand for labor in the covered sector after

the reform. The new level of employment in the A sector is $O_A L'_A$, lower than $O_A L_A$. Also, as can be seen from Figure 2, the wage rate in the uncovered sector A increases after the reform. As is shown below, however, aggregate unemployment can either go up or down.

A key aspect of equation (19) is that the channel through which the structural reform affects agriculture (and for that matter aggregate) employment, is the real exchange rate. In fact, if the capital account liberalization doesn't impact the relative price of S ($dq/d\delta = 0$), there will be no change in period 1 employment. It is interesting to note that the type of effect discussed here will also take place in the case where there is a temporary tariff reform. Indeed, if the public believes that a tariff liberalization process will be reversed, there will be intertemporal substitution in consumption that will generate the same type of employment effect.

The expression for the change in period 2 agricultural employment is equivalent to equation (19):

$$\frac{dL^u}{d\delta} = \left\{ R_{LL}^u - \frac{\psi \bar{W}}{L^c} \right\}^{-1} \left[\frac{\psi \bar{W}}{L^c} \right] L_Q^C \left[\frac{dQ}{d\delta} \right] \quad (20)$$

where all right hand side terms refer to period 2 and have the same interpretation as in equation (19). The main difference, however, is that now it is not possible to sign $(dQ/d\delta)$ unequivocally.²¹ This means, then, that while the capital market

²¹The reason is that now the income and substitution effects will operate in opposite directions. See Edwards (1989a).

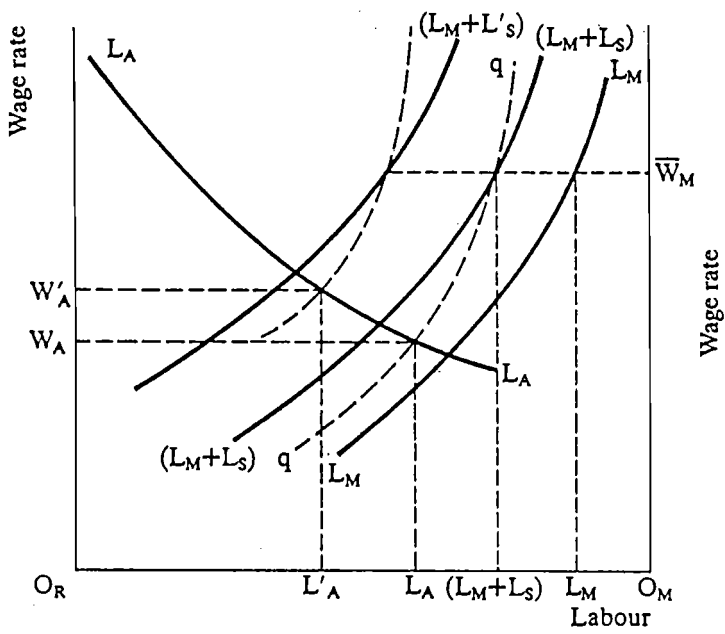


Figure 2.2 The effect of capital controls' liberalisation on employment

reform will clearly have a negative impact on period 1 agriculture employment, it can either increase or decrease period 2 agriculture employment.

To the extent that labor is the only mobile factor, agriculture's output will move in the same direction as employment. It will decline in period 1 and will either increase or decline in period 2. If, however, the other factors can be reallocated across sectors, the final effect of the capital market (and other) reforms on employment and output will depend on relative factor intensities.

Let us consider now the more general case where all factors of production can move across sectors. From an intuitive perspective it is easy to see what will happen: capital and natural resources will tend to move out of those sectors with lower after-reform profitability and into those sectors with higher return. Naturally, this process of factor reallocation will, in turn, have a further (or second round) impact on the labor market. Those sectors that expand will tend to increase their demand for labor, while those sectors that contract will experience further declines in their level of employment. In terms of our diagrammatical representation of Figures 1 and 2, the reallocation of capital and natural resources will induce additional shifts in the labor demand schedules: they will shift upward in those sectors attracting capital and natural resources and they will shift downward in those sectors releasing these factors. The final effect of this reallocation process on sectoral and aggregate employment will depend both on the direction and the magnitude of these schedules' shifts. In order to find out exactly the nature of this long run adjustment process, it is useful to turn, once again, to our benchmark model.

In the case of capital market liberalization, equations (19) and (20) still summarize the employment effects of a relaxation of capital controls under the assumption that all factors are

intersectorally mobile. However, the interpretation of the terms ℓ_p^c , ℓ_q^c , L_P^C and L_Q^C is now rather different and is related to relative factor intensities, which in turn will determine the magnitude shifts of the labor demand schedules discussed above. The exact expressions for each of these terms are:

$$\ell_p^c = \frac{-r_{p\ell}^c}{r_{\ell\ell}^c}; \quad \ell_q^c = \frac{-r_{q\ell}^c}{r_{\ell\ell}^c};$$

$$L_P^C = \frac{-R_{PL}^C}{R_{LL}^C}; \quad L_Q^C = \frac{-R_{QL}^C}{R_{LL}^C} \quad (21)$$

where $r_{\ell\ell}^c$ and R_{LL}^C are the slopes of the marginal products of labor schedules in the covered sector during periods 1 and 2 and are negative. On the other hand, the terms $r_{q\ell}^c$, $r_{p\ell}^c$, R_{QL}^C and R_{PL}^C are Rybczinski terms. They capture, for example, what will happen to period 1 output of manufacturing and services (r_p^c and R_q^c respectively) if there is an increase in the labor force (ℓ). Their sign will depend on relative factor intensities, which are difficult to determine in our 3×3 model. However, as Leamer (1987) has shown, if services are the most labor intensive sector -- both with respect to capital and with respect to natural resources -- $r_{p\ell}^c$ and R_{PL}^C will be positive. Terms $r_{q\ell}^c$ and R_{QL}^C , on the other hand, can be either positive or negative. A necessary (although not sufficient) condition for them to be positive is that the manufacturing sector is the second most labor intensive sector. This means that in the long run the relative factor intensities of the different sectors will be a key determinant of the employment effects of tariff reform. Consequently, those policymakers concerned with the way in which structural reform will impact the employment-

unemployment situation should monitor closely the (relative) factor intensities in the sectors involved.

If we assume that r_{pl}^C and R_{PL}^C are, in fact, positive, then we will obtain the result in which a capital market liberalization reduces employment in agriculture even in the long run. However, if manufacturing is the least labor intensive sector (as measured with respect to both of the other factors) R_{PL}^C will be negative. In the rest of the analysis we will indeed assume that the factor intensity configuration is such that r_{pl}^C and R_{PL}^C are positive.

Aggregate Unemployment

At the economy-wide level an important question is what happens with aggregate unemployment. We have shown that in period 1 agricultural employment declines. Moreover Figure 2 clearly indicates that covered sector employment will increase in period 1 as a result of the relaxation of the capital controls. It is not possible, however, to derive from this figure the net effect of the reform on period 1 unemployment. Formally this net effect will be given by:

$$\frac{d\mu}{d\delta} = -\ell_q^C \left[\frac{\ell_{rl}^C u / \psi - \bar{w}(\psi-1)}{\ell_{rl}^C u / \psi - \psi \bar{w}} \right] \frac{dq}{d\delta} \geq 0. \quad (22)$$

Whether this expression is positive or negative will depend on whether $\ell_{rl}^C u / \psi \leq \bar{w}(\psi-1)$. This, of course, means that unless we have more detailed knowledge of the initial conditions prevailing in the economy (including the parameter values) we cannot know whether the acceleration in time of the capital

market reform will increase or decrease unemployment.²² An expression equivalent to (21) can be derived for period 2 unemployment.

Sequencing From a Welfare Perspective

The key question in the current exercise is whether altering the initial (and traditional) sequencing path by moving the capital market reform to the first period, will be welfare enhancing. One way of dealing with this issue is to calculate the optimal value of b , the tax on foreign borrowing. If this turns out to be positive, then there will be a welfare criterion that justifies the traditional "tariffs-first" sequencing suggestion. From equations (18)-(22) we can calculate the optimal (second best) tax on foreign borrowing as:

$$\bar{b} = \tag{23}$$

$$-\left\{ \frac{w^A(d\ell^u/d\delta) + \bar{w}(d\ell^c/d\delta) + \delta * (W^A(dL^u/d\delta) + \bar{W}(dL^c/d\delta))}{(dCA/d\delta) + W^a(dL^u/d\delta) + \bar{W}(dL^c/d\delta)} \right\}$$

where $(dCA/d\delta)$ is the change in period 2 current account as a result of the relaxation of capital controls and is positive.²³

A simple inspection of the right hand side of equation (23) clearly shows that we cannot determine a priori whether \bar{b} will be positive. Under some specific constellation of parameters it

²²This type of result is present in static Harris-Todaro models. See, for example, Edwards (1988).

²³The reason, of course, is that the opening of the capital account will worsen period 1's current account, requiring a larger surplus in period 2 as a way to fulfill the intertemporal budget constraint.

is possible to generate an optimum positive b , indicating that there are some circumstances where the tariff-first sequence will be desirable.²⁴ This, however, will not be the general case. Consider, for example, the case when the labor market distortion is in effect in period 1 only the optimal tax on borrowing becomes:

$$\bar{b}' = - \frac{w^A(d\ell^U/d\delta) + \bar{w}(d\ell^C/dW)}{dCA/d\delta}. \quad (22')$$

If we additionally assume that the aggregate effect of the capital market reform on employment will be positive so that $(w^A(d\ell^U/d\delta) + \bar{w}(d\ell^C/d\delta)) > 0$,²⁵ then the optimal tax on capital borrowing is negative! This means that the optimal sequence not only will require that tariffs and capital markets are reformed simultaneously, but additionally that foreign borrowing is subsidized! The reason, of course, is that in this case the subsidy on capital inflows will have a positive effect on period 1 employment (partially) offsetting the existing labor market distortion. This result clearly indicates that the timing of labor market reform will have an important effect in determining

²⁴The important thing to notice here is that the only rigorous way to evaluate the proposition that a tariffs-first sequence is welfare superior, is by actually introducing an additional distortion into the system. If this is not done the optimal sequence is trivial: all distortions should be eliminated simultaneously and now. Whether the assumption of a distorted labor market is the most appropriate one is subject, however, to debate.

²⁵This will always be the case if the minimum wage affects every sector in the economy.

the appropriate sequence of reform of other sectors.

To summarize, then, this analysis shows that the welfare based arguments in favor of the tariffs-first sequence are not robust to the economy's structure. In fact, we have shown that even in this simple archetypical model, with fairly strong assumptions, the tariffs first sequence is not always welfare dominant. What is required to draw welfare based conclusions, is to undertake in depth analysis (preferably at the country-specific level) in order to find out the value of the different coefficients and effects. It is important to note, however, that this does not invalidate, in any way, those arguments in favor of tariffs first sequence that are based on macroeconomic instability effects.

IV.2 Labor Market Reforms and the Sequencing of Liberalization

Most studies that have explicitly incorporated labor market distortions into the analysis of structural reform have assumed that, for political or other reasons, the labor market is the last to be liberalized.²⁶ That is, most analyses have assumed, either explicitly or implicitly, a "labor market last" sequencing. Although it is indeed possible that political factors will delay the labor market reform, it is still important to investigate the way in which the key variables will react to a relaxation of the minimum wage. In this subsection I use the model of Section III to investigate the effects of a reform package that includes as one of its steps the reduction of the minimum wage in period 2. Formally, this amounts to investigating the effects of a fully anticipated future reduction of W on the key variables of our system. I assume that the only other policy measure in this

²⁶See, for example, the discussion in Edwards (1988, 1989d).

package is an early (beginning in period 1) and permanent reduction in import tariffs. Capital controls are assumed to remain in effect throughout the analysis.

Agriculture Employment, Wages and Production

A fully anticipated reduction in period 2 minimum wage will affect the agriculture labor market through a direct channel -- the actual change in the wage floor -- and through an indirect channel that will operate via changes in the relative price of services, or real exchange rate. A lower period 2 minimum wage will increase that period's aggregate income and, through consumption smoothing, it will result in higher expenditure in periods 1 and 2. This will, in turn, generate higher prices of nontradables (services) in both periods. Of course, this higher period 1 q will be accompanied by an increase in the demand for labor in services, a decline in agriculture employment in that period, and an increase in agricultural wages. Formally, the change in period 1 agricultural employment will be given by:

$$\frac{d\ell^u}{d\bar{w}} = \frac{\bar{w}}{(r_{\ell\ell}^u(\ell^T - \ell^u) - \psi\bar{w})} \ell_q^c \left(\frac{dq}{d\bar{w}} \right) \tag{24}$$

where under our maintained assumption of factor intensive $\ell_q^c > 0$. This equation highlights, once more, the importance of real exchange rate changes as a transmission mechanism. Indeed, it can be seen that if period 1's real exchange rate does not react to a change in future minimum wages ($dq/d\bar{w}$), the labor market reform will have no effect in today's agriculture (or for that matter any other) employment. What is particularly interesting about this result, then, is that an anticipated labor market deregulation will have an immediate negative effect on agriculture employment and output. Since $(dq/d\bar{w}) \geq 0$, from

equation (23) it follows that $(d\ell^U/d\bar{W}) \leq 0$.

A reduction in period 2's minimum wage rate will also affect covered employment in period 1. In this case, the channel will also be the change in the real exchange rate; since the anticipated wage rate reduction will have a positive impact on q , $(dq/d\bar{W}) < 0$, the service sector level of employment in period 1 will increase. It is not possible, however, to know what will happen to aggregate employment.

The effect of a fully anticipated change in the minimum wage on agricultural employment in period 2 is somewhat more complicated. In this case, in addition to the intertemporal effects discussed above, there will also be an intratemporal effect. More specifically, employment will also be affected through the period 2 Harris-Todaro equilibrium condition ($W^A = \psi W$). Since the policy reform affects W , the level of unemployment will have to change in order to reestablish labor market equilibrium. Formally, the effect of a change in W on period 2 agriculture employment will be given by:

$$\frac{dL^U}{d\bar{W}} = \frac{\bar{W}}{[R_{LL}^U(L^T - L^U) - \psi\bar{W}]} L_Q^C \left[\frac{dQ}{d\bar{W}} \right] + \psi(\eta+1), \quad (25)$$

where η is the wage demand elasticity of labor in the protected sector and is negative. The first term on the right hand side is the indirect employment effect and is equivalent to that in equation (24). The second term, however, captures the change in equilibrium unemployment and can be either positive or negative. If the demand for labor in the protected sector is inelastic $|\eta| < 1$, $\psi(\eta+1)$ will be positive, and equation (24) as a whole will be positive. This means that in this case a reduction in the protected sector minimum wage will also reduce agriculture employment in period 2, and will result in an increase in agriculture wages in that period.

The net effect on period 2 unemployment will be given by:

$$\frac{d\mu^2}{d\bar{W}} = -L_Q^c \frac{dQ}{d\bar{W}} (1+\phi) - L_{\bar{W}}^c - \psi(\eta+1) \quad (26)$$

where $\phi = - \frac{\bar{W}}{\left[\psi\bar{W} - R_{LL}^U (L^T - L^U) \right]} < 0$.

Two sufficient conditions for $d\mu^2/d\bar{W}$ to be positive -- that is for a minimum wage reduction to reduce period 2 unemployment -- are: (1) $|\phi| > 1$; and (2) $|\eta| > 1$.

IV. Extensions: Intermediate Inputs, Investment, and Alternative Indexation

The basic model presented above can be extended in several directions. However, due to space limitations I only sketch some of the directions in which the model can be taken.

V.I Imported Intermediate Inputs and the Sequencing of Tariff Reform

One of the simplifying assumptions of the model developed in Section III is that production is restricted to final goods. This assumption, however, is not fully satisfactory in a study on structural reforms and the agricultural sector, since in the vast majority of the developing countries agriculture uses important quantities of intermediate goods.

The incorporation of intermediate goods into the analysis requires that we modify the production side of our benchmark model. We now assume an importable intermediate good (only). Assume further that the importation of the intermediate commodity is subject to a tariff t^1 ; then its domestic price is

given by $p^i = p^{*i} + t^i$.²⁷ Finally, we assume that production of this intermediate good takes place in the "covered" sector which is subject to a minimum wage.

Formally, in order to incorporate intermediate inputs in our benchmark model it is necessary to distinguish gross output from net outputs. This is done by defining a new revenue function ρ as the maximum net output (or value added) that optimizing firms can obtain at given prices and available technology. For period 1 this net revenue function can be written in the following way (an equivalent function can be written for period 2):

$$\rho = \rho(1, p, p^i, q, \ell^c(\cdot)) \quad (27)$$

The properties of this "net output" revenue function ρ are (almost) the same as those of the conventional revenue function. The function is convex and its derivatives with respect to goods' prices are equal to the net output of each good. The derivatives with respect to factors of production, on the other hand, will also give the marginal product of that factor. Finally, our assumption that there are always net imports of the intermediate good implies that the net output of this type of good is negative $\rho_{p^i} < 0$.

In terms of the formal model the most important change is that the government transfers equation (10) is now rewritten as follows:

²⁷Another important assumption is that (at prevailing prices) domestic production of good i is not sufficiently large as to cover its total (derived) demand. Consequently, at every moment in time the amount imported of commodity i is positive.

$$\begin{aligned} \text{TRANS} = & \tau^1 \rho_q^c + \delta \tau^2 \Gamma_Q^c + bCA \\ & + t^1 M^1 + \delta t^2 M^2 + t^1 i I^1 + \delta t^2 i I^2 \end{aligned} \quad (10')$$

where ρ^c and Γ^c are periods 1 and 2 (restricted) net revenue functions; and where I^1 and I^2 are periods one and two net imports of the intermediate good and are given by:

$$I^1 = -\rho_p^c i; \quad I^2 = -\Gamma_p^c i.$$

Armed with this extended model we can explore additional issues, including the welfare consequences of a simultaneous reduction in all import tariffs and specific sequences of tariff reductions.

IV.2 Investment

The model developed in Section II ignores investment. Many times, however, the opening of the capital account results in an increase in direct foreign investment and, thus, in a higher productive capacity in the country. The easiest way to incorporate this into the analysis is to assume that there is an exogenous increase in the stock of capital. To the extent that foreign-owned capital earns its marginal productivity we will face a situation similar to the one developed in Brecher and Diaz-alejandro (1977) and discussed in detail in Edwards and van Wijnbergen (1983).²⁸ An alternative, and more elegant way to deal with investment is to explicitly incorporate an investment function. Assuming that firms maximize their present value, we can depict investment through the following Tobin "q" equation:

²⁸In this case, in the presence of tariffs an increase in the stock of capital reduces welfare in a country with capital intensive imports.

$$\frac{\delta R_k}{P_k} = 1. \quad (28)$$

where R_k is the (overall) marginal productivity of capital in period 2, and P_k is the price of machines. By combining equation (28) with the basic model in Section II, we are in a position to investigate how alternative liberalization reform strategies will affect welfare and other key variables in the economy.

IV.3 Wage Indexation

The analysis in Section IV and V.1, V.2 assumed that the (economy-wide) minimum wage was set in terms of the exportable agricultural good. Although this is a convenient assumption that facilitates the exposition, it may not be a very realistic one. If we assume instead that the minimum wage is fixed in terms of our exact consumption price indices (π and Π) we can write:

$$\frac{w}{\pi} = \text{constant}; \quad \frac{W}{\Pi} = \text{constant};$$

where $\pi = \pi(1,p,f)$ and $\Pi = \Pi(1,P,F)$ were defined in Section III. A consequence of this modification is that policy reforms that affect the nominal price of manufacturing and/or of services will exert an influence over the nominal wage rate, altering the final equilibrium.

It is easy to see intuitively the way in which the assumption of wage rate indexation will affect labor market adjustment following a trade liberalization reform. In order to focus the discussion let us concentrate on the short-run case where factors other than labor are sector specific. A permanent tariff reduction will directly result in a decline in the nominal prices of manufacturing in both periods (p and P); also, under most circumstances the relative price of nontradables (f and F) will

go down as a result of the tariff reform. These two effects imply that both consumption price indices, π and Π , will also decline. Thus, in order for the real wage relative to these indices (π and Π) to remain constant in both periods, the nominal wage will have to go down after the tariff liberalization reform.

V. Concluding Remarks

How to liberalize? This is a question that haunts policymakers and that confuses policy advisors. A particular pressing question refers to the sequencing of reform. Does the order in which markets are reformed affect the outcome of the adjustment package? In this paper I have developed a formal intertemporal framework to investigate how alternative sequencing scenarios affect some key variables. The approach taken here differs from previous work in several respects: first it provides a formal intertemporal model to investigate the welfare effects of reform; second, it explicitly incorporates the role of labor market distortions; and third, it attempts to analyze, in a stylized form, how reform will impact the agricultural sector.

The main result obtained in Section III is that the welfare based arguments in favor of the tariffs-first sequence are not robust to the economy's structure. In fact, we have shown that even in this simple archetypical model, with fairly strong assumptions, the tariffs first sequence is not always welfare dominant. What is required to draw welfare based conclusions, is to undertake in-depth analysis (preferably at the country-specific level) in order to find out the value of the different coefficients and effects.

The above result should not be interpreted, however, as leading to a completely skeptical view about economists ability to say more concrete things regarding sequencing. In fact, these

results are restricted to the welfare perspective, and say nothing regarding the macroeconomic arguments in favor of postponing the opening of the capital account. In fact, I believe that these arguments have lots of weight; the historical evidence also supports them.

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