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TERMS OF TRADE DISTURBANCES, REAL EXCHANGE RATES AND WELFARE: THE ROLE OF CAPITAL CONTROLS AND LABOR MARKET DISTORTIONS

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ABSTRACT

Many arguments that have been advanced in favor of maintaining capital control within the EEC have not paid sufficient attention to the welfare consequences of this type of market intervention. Our paper provides a simple, optimizing framework in which the welfare consequences of capital controls can be assessed.

Two main issues are considered. First, how do capital controls affect the adjustment of macroeconomic variables to real disturbances? Second, what is the nature of second best arguments for maintaining capital controls given that certain distortions will remain after the European single market is in place in 1992?

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I. Introduction

The relaxation of remaining restrictions on international asset trade scheduled to take place in the EEC countries by 1992 has generated renewed interest both among researchers and policymakers as to the likely consequences of such liberalization. One issue that has figured prominently in the policy debate concerns how certain macroeconomic variables of interest are likely to respond to foreign disturbances in economies with and without capital controls. This paper presents a simple choice-theoretic framework in which the interaction of exogenous disturbances with capital controls can be assessed.

Many important issues surrounding the European single market program can only be addressed within the context of explicitly monetary models. These include, for example, the relationship between government revenue from the inflation tax (seignorage) and financial integration, and the relationship among the exchange rate mechanism (ERM), monetary policy credibility, and the dismantling of capital controls. Other issues of concern to the European countries seem less tied to purely monetary considerations, and can therefore be analyzed within the context of real models. Such issues may include, e.g., how (the lack of) fiscal harmonization affects the location of production facilities within Europe, or the relationships among various distortions that exist in many European countries, the process of relaxing capital controls, and the welfare effects of exogenous real disturbances. While monetary considerations may also impact upon these questions, researchers have found that useful insights can nevertheless be obtained by using purely real models, and

thereby abstracting from monetary considerations which are taken to be of secondary importance. Further, it should also be noted that some European countries (notably Britain, Greece, Spain 1/ and Portugal)--while participating in the single market program--are not, for the moment, members of the EMS. It follows, therefore, that for such countries, the costs and benefits of Project 1992 may be addressed in models that do not explicitly incorporate the exchange rate bands that govern monetary policy within the EMS.

The present paper employs a real, optimizing model to consider two issues which may be of interest to the European countries participating in the single-market program, whether or not they are members of the EMS. First, how will relaxing remaining controls on the movement of financial capital 2/ within Europe affect an economy's response to exogenous real disturbances taken, for the purposes of this paper, to be terms of trade shocks? Second, is there any reason to believe that the process of financial integration will exacerbate other, pre-existing distortions--notably in the labor market--that are unlikely to be removed within the time frame of the single market program? We feel that both the issue of the effects of terms of trade shifts--experienced by many European countries in recent years, and labor market rigidities--also prevalent in many of these countries--may be affected by the process of financial

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1/ The authorities of Spain have indicated their intention to join the EMS in the course of 1989.

2/ For the purposes of this paper, capital controls will be modelled as taxes on international borrowing. An alternative way of modelling such controls would be to consider a quota on borrowing (see, e.g., Greenwood and Kimbrough (1985)).

integration, and that such effects can be analyzed in models whose main focus is not the purely monetary aspects of these issues.

One advantage of employing an optimizing model over traditional reduced form models (see, e.g., Argy and Porter (1972) and Flood and Marion (1982)) is that it permits a meaningful discussion of normative issues. Capital controls introduce a distortion into the economy which can only be justified on welfare grounds to the extent that the welfare cost associated with the introduction of the distortion is smaller than the welfare gain that can be achieved through the capital control's effect in reducing other distortions in the economy. This is an important point because policymakers frequently justify the imposition or maintenance of capital controls without clearly specifying the nature of the distortion that the capital control is designed to offset.

That capital controls introduce a distortion into the economy has important implications for the economy's response to exogenous disturbances. In particular, the welfare cost associated with a given shock will depend on whether the disturbance magnifies or mitigates the intertemporal consumption distortion created by the capital control. This point is illustrated in the paper with reference to terms of trade disturbances experienced by a small country. Shocks that limit consumption opportunities in periods when these are already restricted because of capital controls will generate an additional welfare cost relative to the case of free intertemporal trade. This distortion-magnification effect makes it possible that terms of trade changes will generate "perverse" effects on welfare (e.g., an improvement in the terms of trade which always increases potential welfare under free trade may

actually be immiserizing in an economy with capital controls). Of course, the effect of the terms of trade disturbance on welfare has important consequences for the response of other macroeconomic variables such as the real exchange rate and current account balance.

In addition to the direct interaction between capital controls and exogenous disturbances, we argue that an additional important component of the welfare cost of disturbances stems from the endogenous response of the real exchange rate to such disturbances 1/. When nontradable goods are present in the model, movements in real exchange rates induced by various disturbances will in general interact with the existing capital controls in affecting domestic variables. The reason is essentially that capital controls distort the allocation of consumption over time by driving a wedge between the domestic and foreign returns to saving. Real exchange rate movements, through their effects on domestic real (consumption based) rates of interest 2/, are an additional determinant of the intertemporal allocation of consumption. The welfare effects of macroeconomic disturbances will therefore depend in part on whether the real exchange rate movements they induce magnify or mitigate the existing distortion created by the capital control.

An additional issue raised in the paper is the extent to which capital controls may be welfare-increasing in the presence of other distortions. One possible distortion that can be easily modeled in our

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1/ In this respect, our model differs from previous choice-theoretic models of capital controls--e.g., Adams and Greenwood (1985) and Greenwood and Kimbrough (1985)--in which the role of the real exchange rate is not considered.

2/ On the consumption rate of interest, see, e.g., Dornbusch (1983), Svensson and Razin (1983), and Frenkel and Razin (1987).

set-up and that does not seem to conflict with the proposed liberalizations scheduled to take place by 1992, is an economy-wide minimum wage that generates unemployment 1/. Taxes or subsidies on international borrowing 2/ may be optimal (in a second best sense) in our set-up because, by distorting the intertemporal pattern of demand, capital controls alter the time path of the equilibrium real exchange rate and, hence, real wages and aggregate employment. We find that, in the absence of real exchange rate effects, capital controls can never increase welfare for a small country with labor market distortions.

The paper is organized as follows. Section II presents a real, intertemporal, perfect foresight model of a small open economy with optimizing consumers and producers, in which there are capital controls. This economy produces and consumes three goods in each period: Importables, exportables and nontradables. The equilibrium conditions are then used to solve for the response of real exchange rates, welfare, and the current account balance to various macroeconomic disturbances, including terms of trade shocks (Section III). We compare the adjustment of these variables to the case without capital controls. Section IV extends the benchmark model to the case in which there is an economy-wide minimum wage and unemployment. This section also computes the optimal tax

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1/ But see also Section V in which the introduction of trade distortions is briefly discussed. Even though remaining restrictions on intra-European trade are scheduled to be removed by 1992, distortions caused by non-optimal commercial policies followed by Europe as a whole may still be relevant.

2/ We model capital controls as a tax on international borrowing. An alternative way of modelling capital controls is to assume a borrowing ceiling (see, e.g., Adams and Greenwood (1985)).

(subsidy) on international capital flows. Section V presents some possible extensions and the main conclusions.

II. The Model

This section develops a real, general equilibrium, small country model which is used to analyze the way in which capital controls affect the adjustment of welfare, real exchange rates and the current account to terms of trade shocks. The exposition is based on Edwards (1987, 1989a,b,c), Ostry (1988a,b) and Edwards and Ostry (1989) and represents an extension to the basic model of Svensson and Razin (1983).

Consider the case of a small country that produces and consumes three goods--importables (M), exportables (X), and nontradables (N). There are two periods--the present (period 1) and the future (period 2)--and producers and consumers are assumed to have perfect foresight. Consumers maximize an intertemporal utility function subject to a lifetime budget constraint which states that the present value of expenditure not exceed lifetime wealth. From the point of view of the economy as a whole , this constraint is equivalent to the condition that, over the lifetime of the economy (namely during periods 1 and 2), the discounted sum of the trade account balances is zero 1/.

There are a large number of identical producers and perfect competition prevails in goods markets. Firms are assumed to maximize

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1/ We are assuming that there is no historical debt commitment so that initial current and trade account balances are identical.

profits subject to existing technology and availability of factors of production.

In addition to consumers and producers, there is a government that imposes capital controls in the form of a tax on international borrowing. The tax creates a wedge between the exogenous world rate of interest, r^*, and the internal cost of borrowing, $\bar{r}$. It is assumed that the revenue from the capital control is redistributed back to consumers in a lump sum fashion. There are no other taxes and no government spending on goods or services.

Preferences are assumed to be weakly time separable, i.e., the intertemporal welfare function, $W'(c_N, c_M, c_X, C_N, C_M, C_X)$, may be written as $W[u(c_N, c_M, c_X), U(C_N, C_M, C_X)]$. Lower case letters refer to period 1 variables while upper case letters refer to their period 2 counterparts. Thus, period 1 subutility is denoted by u and period 2 subutility is denoted by U. Similarly, c_N, c_M, c_X (C_N, C_M, C_X) represent period 1 (2) consumption levels of goods N, M, and X, respectively. We assume that u and U are homothetic. This allows us to view the consumer's optimization problem as taking place in two stages. In the first stage, the consumer minimizes within-period spending in order to achieve a given level of subutility. The resulting first stage expenditure function may be written as the product of an exact price index, π for period 1 and Π for period 2, and the corresponding level of subutility or real spending. The exact price indexes or unit expenditure functions depend on the temporal relative prices, p and q (P and Q), where p is the relative price of importables and q the relative price of nontradables in period 1 (period 2). Exportables are taken as numeraire so that p (P) is the period 1 (2)

terms of trade and q (Q) is the period 1 (2) exportables real exchange rate 1/.

In the second stage, the discounted sum of present and future spending is minimized subject to the attainment of a given level of utility, W. This yields the overall intertemporal expenditure function:

$$E = E(\pi(1,p,q),\ \delta\Pi(1,P,Q,);\ W), \tag{1}$$

where δ is the domestic discount factor equal to $(1 + \bar{r})^{-1}$. Note that the internal discount factor appearing in equation (1) differs from the world discount factor, δ^* $(= (1 + r^*)^{-1})$, because of the capital control. Finally, recall that, among the properties of the expenditure function, is that the partial derivative of E(.) with respect to one of the prices, p, q, P, Q, yields the Hicksian (compensated) demand for the corresponding good, c_M, c_N, C_M, C_N.

In each period, firms choose output supplies that maximize total profits. In the absence of investment, firms' decisions are completely specified by two revenue functions, one corresponding to each period. The revenue functions give the maximum value of output obtainable from the production of the three goods, given the factor supplies, technology and.

1/ In general, there are as many possible measures of the real exchange rates as tradable goods. In the set up presented here, there is the exportables real exchange rate, 1/q (1/Q), and the importables real exchange rate, p/q (P/Q). In what follows, we deal only with the former definition although it is easy to compute the response of alternative measures of the real exchange rate, such as the importables measure, or the consumption based measure, which is a weighted average of the importables and exportables measures, within our framework.

prices. We denote the period 1 revenue function by r and the period 2 revenue function by R, viz.:

$$r = r(1, p, q; v)$$

$$R = R(1, P, Q; V),$$

where v (V) represents a vector of factor supplies in period 1 (2) 1/. We assume that the dimension of v (V) exceeds two so that factor price equalization does not prevail in either period. Note also that among the properties of the revenue functions is that the supply functions of the goods are given by the partial derivative of the revenue function with respect to the good's price, e.g., r_p denotes the supply of importables in period 1, while R_Q denotes the supply of nontradables in period 2.

Equilibrium is fully characterized by the following system of three equations:

$$r(1,p,q;v) + \delta R(1,P,Q;V) + bNCA = E(\pi(1,p,q), \delta\Pi(1,P,Q,); W) \quad (2)$$

$$E_q = r_q \quad (3)$$

$$E_Q = R_Q, \quad (4)$$

1/ As is usual in these models, factors are assumed to be intersectorally, though not internationally, mobile.

where $b = \delta^* - \delta$ and NCA is the noninterest current account or trade balance in period 2. Equation (2) is the intertemporal budget constraint and states that the present value of lifetime expenditures, E, is equal to the present value of income. Income in turn consists of the present value of current and future GDP, $r + \delta R$, and transfer payments received from the government. These in turn correspond to the rebated revenues from the tax on international borrowing. To see this, recall that the tax rate is equal to the difference between the domestic and world rates of interest, $\bar{r} - r^*$. The tax base is equal to the current account (= trade account) balance in period 1, which must equal minus the present value of the trade balance in period 2. Thus, revenue accruing to the government in period 2 equals the product of the tax rate and the tax base, the present value of which is easily seen to be bNCA.

Equations (3) and (4) are the market clearing conditions for nontradable goods in periods 1 and 2, respectively.

The endogenous variables in equations (2) - (4) are the level of welfare, W, and the current and future relative price of nontradables, q and Q. The exogenous variables are the factor supplies in each period, v and V, the present and future terms of trade, p and P, the world discount factor, δ^*, and the tax on international borrowing, b. Solutions for these variables determine the level of the current account balance in period 1, ca, where

$$ca = r(1, p, q; v) - \pi E_{\pi}, \tag{5}$$

where πE_{π} represents the value of expenditure in period 1.

III. Terms of Trade Disturbances in the Presence of Capital Controls

In this section, we consider the effects of exogenous terms of trade disturbances on welfare, real exchange rates, and the current account balance in an economy that restricts foreign borrowing below the optimal level through the use of capital controls. The results are compared with the case in which the country follows optimal (welfare-maximizing) policies, which, in the absence of additional distortions, involves setting the tax on international borrowing equal to zero. In Section IV, however, we consider the case in which an optimal policy may require a nonzero tax on international borrowing. This result emerges because a (constrained) welfare maximum in the presence of an initial distortion (assumed to be in the labor market) does not necessarily require unrestricted access to the international credit market.

III.1 Welfare Effects

A temporary change in the terms of trade affects welfare as follows:

$$\frac{dW}{dp} = (E_W+b\Pi E_{\Pi W})^{-1}\{-(E_p-r_p)-b\Pi E_{\Pi\pi}\pi_p-(b\Pi E_{\Pi\pi}\pi_q)\frac{dq}{dp} -(b\Pi\delta E_{\Pi\Pi}\Pi_Q)\frac{dQ}{dp}\}. \qquad (6)$$

In the absence of capital controls, $b = 0$, and equation (6) reduces to:

$$\frac{dW}{dp} = -E_W^{-1}\,(E_p-r_p) < 0.$$

This is of course the usual result in which a temporary deterioration in

the terms of trade reduces welfare in proportion to the volume of period 1 imports at initial terms of trade 1/.

Equation (6) reveals that in the presence of capital controls, there are three additional channels through which a terms of trade disturbance affects welfare 2/. First, there is an intertemporal substitution effect ($-b\Pi E_{\Pi\pi}\pi_p$) which is negative in terms of its impact on welfare. The intuition is simply that the temporary rise in the relative price of imports raises the cost of current in terms of future consumption, i.e., raises the consumption rate of interest (or equivalently lowers the consumption based discount factor, $\delta\Pi/\pi$). As a result, consumers will substitute consumption intertemporally, consuming less in period 1. However, due to the tax on international borrowing ($b > 0$), consumption in period 1 is already below its optimal free trade level. Therefore, the terms of trade shock magnifies an initial distortion and there is an additional reduction in welfare due to the interaction of the terms of trade disturbance with the existing capital control.

In a model without nontradable goods, the direct import revaluation effect (first term in the numerator of equation (6)) and the intertemporal substitution effect (second term) are the only channels through which a terms of trade disturbance affects welfare in the presence of a capital control. However, once a nontradables sector is introduced

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1/ It is straightforward to show that in the case of a permanent deterioration in the terms of trade, the welfare loss is proportional to the present value of imports in both periods.

2/ Note also that, in the presence of capital controls, the denominator, which represents the marginal cost of utility, has the additional term, $b\Pi E_{\Pi W}$. This additional term is positive for $b > 0$ and vanishes if $b = 0$.

into the model, it is necessary to incorporate the endogenous response of real exchange rates to the terms of trade shock and the feedback of these real exchange rate changes to the level of welfare. Real exchange rate responses are captured in the last two terms in equation (6) 1/.

Consider the third term, $-b\Pi E_{\Pi\pi}\pi_q$ dq/dp, which is negative if there is a real appreciation in period 1 (dq/dp > 0), and conversely in the case of a real depreciation. An increase in q raises the consumption rate of interest (CRI) which induces substitution of aggregate real spending from period 1 to period 2. Since period 1 (2) consumption is already too low (high) relative to the optimum, the movement in the period 1 real exchange rate magnifies the existing distortion created by the capital control and thereby contributes to a further decline in welfare. If, on the other hand, the deterioration in the terms of trade is associated with a real depreciation in period 1, the CRI falls, agents consume more in period 1 relative to period 2, and the movement in the real exchange rate favors an improvement in the level of welfare.

The final term in equation (10), $-b\Pi\delta E_{\Pi\Pi}\Pi_Q$ dQ/dp, captures the effect of the future real exchange rate. In general, even though the terms of trade disturbance is confined to period 1, the real exchange rate will respond in period 2 as well, even though no "fundamental" changes in that period. A real appreciation in period 2 (dQ/dp > 0) favors an improvement in the level of welfare whereas a real depreciation in the future favors a

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1/ In the absence of distortions, real exchange rate changes do not affect welfare. The reason is simply that nontradable goods are neither in excess demand nor supply so that, from the point of view of the economy as a whole, there can be no aggregate welfare effects due to changes in their relative price.

reduction in the level of welfare. The intuition is the same as the one just presented: A real appreciation (depreciation) in period 2 lowers (raises) the CRI, inducing agents to substitute current (future) for future (current) consumption, and thereby reducing (magnifying) the distortion created by the capital control.

It is useful to notice that if the initial equilibrium is stationary so that $\pi = \Pi$, then the real exchange rate effects reduce to

$$-(b\Pi E_{\Pi\pi}\pi_q)(\frac{dq}{dp} - \frac{dQ}{dp}).$$

This formulation emphasizes the fact that a key determinant of the effect of a terms of trade disturbance on welfare is whether the real exchange rate over- or undershoots its new long run equilibrium value. In the case of equilibrium overshooting, $|dq/dp| > |dQ/dp|$, and the real exchange rate contributes to a further decline in welfare as a result of the terms of trade shock. Conversely, in the case of equilibrium undershooting, $|dq/dp| < |dQ/dp|$, and the endogenous response of the real exchange rate favors an improvement in welfare.

Finally, it is worth mentioning that, whereas in the absence of capital controls, a terms of trade deterioration (improvement) is always welfare-reducing (increasing), this may not be the case once capital controls are present. Equation (10) reveals that factors which favor the immiserization outcome as a result of a terms of trade improvement are an initial equilibrium close to the autarky equilibrium, a large expenditure share of nontradables relative to tradable goods, and equilibrium undershooting of the real exchange rate.

This perverse outcome of a terms of trade improvement being welfare-reducing (the immiserization case) can also occur in the case of an anticipated future disturbance. Moreover, in this case, the result does not hinge on the behavior of the real exchange rate. To see this, suppose agents expect an improvement in the terms of trade in period 2, i.e., $dP < 0$. In this case, the change in welfare is given by:

$$\frac{dW}{dP} = (E_W + b\Pi E_{\Pi W})^{-1}(-(E_P - R_P) - b\Pi E_{\Pi\Pi}\Pi_P - (b\Pi E_{\Pi\pi}\pi_q)\frac{dq}{dP} - (b\Pi\delta E_{\Pi\Pi}\Pi_Q)\frac{dQ}{dP}) \qquad (7)$$

An anticipated future terms of trade improvement unambiguously raises welfare if $b = 0$, the magnitude being governed by the volume of period 2 imports at initial terms of trade (first term in equation (7)). However, when capital controls are present, agents cannot smooth their consumption path by the optimal amount (i.e., they increase consumption in period 1 by a smaller amount than is optimal given the increase in lifetime resources), and are forced to consume more in period 2 (the period in which the terms of trade change takes place) than would be the case under free trade. Because the increase in period 2 consumption magnifies the existing distortion created by the capital control (second term in equation (7)), the anticipated future improvement in the terms of trade may actually cause actual welfare to decrease even though, in the absence of capital controls, potential welfare unambiguously increases. Finally, the last two terms in equation (7) represent the real exchange rate effects which may contribute to a welfare gain or loss, depending on whether they lower or raise the consumption rate of interest.

III.2 The Real Exchange Rate

Equation (6) in the previous section is not a reduced form since the real exchange rate is an endogenous variable, the solution for which is obtained by solving simultaneously the system of equations (2)-(4), which yields:

$$\frac{dq}{dp} = \Delta^{-1}\{[(E_p - r_p) + b\Pi E_{\Pi\pi}\pi_p][E_{qQ}\Pi_Q E_{\Pi W} + \pi_q E_{\pi W}(R_{QQ} - E_{QQ})] + b\Pi E_{\Pi\Pi}\Pi_Q[(r_{qp} - E_{qp})\Pi_Q E_{\Pi W} + E_{pQ}\pi_q E_{\pi W}] + [E_W + b\Pi E_{\Pi W}][(r_{qp} - E_{qp})(R_{QQ} - E_{QQ}) - E_{pQ}E_{qQ}]\} \quad (8)$$

$$\frac{dQ}{dp} = \Delta^{-1}\{[(E_p - r_p) + b\Pi E_{\Pi\pi}\pi_p][(r_{qq} - E_{qq})\Pi_Q E_{\Pi W} + E_{qQ}\pi_q E_{\pi W}] - b\Pi E_{\Pi\pi}\pi_q[(r_{qp} - E_{qp})\Pi_Q E_{\Pi W} + E_{pQ}\pi_q E_{\pi W}] - [E_W + b\Pi E_{\Pi W}][(r_{qq} - E_{qq})E_{pQ} - E_{qQ}(r_{qp} - E_{qp})]\}, \quad (9)$$

where $\Delta < 0$. In general, the expressions in equations (8) and (9) cannot be signed so that a temporary deterioration in the terms of trade may cause either a real appreciation or depreciation of the real exchange rate in periods 1 and 2. Further, notice that even though the terms of trade shock is temporary, part of the adjustment in the real exchange rate occurs in period 2, when there is no change in any "fundamental." In the absence of capital controls, $b = 0$, and there are three main channels through which a temporary terms of trade change affects the real exchange rate. Consider equation (8). First, there is the welfare effect, $(E_p - r_p)[E_{qQ}\Pi_Q E_{\Pi W} + \pi_q E_{\pi W}(R_{QQ} - E_{QQ})]$, whose magnitude depends on the volume of imports at initial terms of trade, and which favors a real depreciation. Second, there is the direct substitution effect, $(r_{qp} - E_{qp})(R_{QQ} - E_{QQ})$, which

has an ambiguous effect on q because the sign of E_{qp} is itself ambiguous 1/. This reflects a conflict between intratemporal substitution, which favors a real appreciation (depreciation) in the substitutes (complements) case, and intertemporal substitution which always favors a real depreciation because the rise in p raises the CRI. Third, there is an indirect intertemporal substitution effect, $-E_W E_{pQ} E_{qQ}$, which arises because the rise in the CRI shifts demand toward period 2, and thereby requires a rise in Q to clear the period 2 nontradables sector. The rise in Q generates a fall in the CRI and thereby favors a real appreciation today (a rise in q) 2/.

In addition to these effects, the presence of capital controls creates some additional channels through which a terms of trade disturbance affects the real exchange rate. First, because the rise in p magnifies the initial distortion created by the capital control (by raising the CRI), there is an additional reduction in welfare (equal to $b\Pi E_{\Pi\pi}\pi_p$ as explained in equation (6)). This additional welfare loss reduces demand for current period nontradables and therefore favors a fall in q (a real depreciation). This explains the expression, $(b\Pi E_{\Pi\pi}\pi_p)$ $[E_{qQ}\Pi_Q E_{\Pi W} + \pi_q E_{\pi W}(R_{QQ}-E_{QQ})]$, in equation (8).

Second, the rise in p has a further impact on the CRI via its effect on the future demand for nontradables and hence the real exchange rate in period 2. Specifically, if the intertemporal substitution effect $(E_{pQ}\pi_q E_{\pi W} > 0)$ is small relative to the intratemporal substitution effect

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1/ $E_{qp} = E_{\pi}\pi_{qp} + \pi_q E_{\pi\pi}\pi_p$, where $E_{\pi\pi} < 0$ and $\pi_{qp} \gtrless 0$.

2/ The intra- and intertemporal elasticities are multiplied by the marginal cost of utility, which is equal to E_W if $b = 0$, but becomes $E_W + b\Pi E_{\Pi W}$, for $b \neq 0$.

$((r_{qp}-E_{qp})\Pi_Q E_{\Pi W} \gtrless 0)$ so that the expression, $[(r_{qp}-E_{qp})\Pi_Q E_{\Pi W}+Ep_Q\pi_q E_{\pi W}]$, is negative, the rise in p will create excess supply for future nontradables relative to current nontradables, the elimination of which will require a fall in Q (relative to q), and hence an additional increase in the CRI. This further rise in the CRI magnifies the existing distortion created by the capital control, lowering welfare (by the amount $b\Pi E_{\Pi\Pi}\Pi_Q$) and hence favoring a real depreciation in period 1 (a fall in q). Conversely, if the intertemporal elasticity is large relative to the intratemporal elasticity, the rise in Q necessary to restore market clearing in the period 2 nontradables sector confers a welfare gain and thereby raises demand for nontradables today. In this case, the expression on the second line of equation (8) favors a real appreciation in period 1 (a rise in q). Finally notice that if $b = 0$, the expression on the second line of equation (8) vanishes completely: The reason is simply that when there are no distortions in the economy, changes in the real exchange rate, Q, have no aggregate welfare effect (since nontradable goods are neither in excess demand nor in excess supply domestically). However, changes in Q do affect welfare when $b > 0$ because they magnify (if $dQ < 0$) or mitigate ($dQ > 0$) an initial distortion. Finally, the interpretation of the various expressions in equation (9) is completely analogous to the one just given for equation (8).

III.3 The Current Account

Using equations (5) and (6), it can be verified that the response of the current account to a temporary terms of trade shock is given by:

$$\frac{dca}{dp} = -(E_p - r_p) - \pi E_{\pi\pi}\pi_p - \pi E_{\pi W}\frac{dW}{dp} - \pi E_{\pi\pi}\pi_q\frac{dq}{dp} - \pi E_{\pi\Pi}\Pi_Q\frac{dQ}{dp} \qquad (10)$$

The first two terms in equation (10) represent effects that would be present in models without nontradable goods or capital controls (e.g., Svensson and Razin (1983)) while the last three terms depend both on the presence of nontradables and capital controls (as discussed in the previous two subsections)

The expression, $-(E_p - r_p)$, is the import revaluation effect and is negative in terms of its impact on the current account. The amount originally imported has become more expensive and, as a result, the current account deteriorates. The basic intuition has to do with consumption-smoothing: Because the loss in real income due to the terms of trade deterioration is temporary, agents will spread this loss out over time by borrowing in the international capital market (i.e., by running a current account deficit). The second term, $-\pi E_{\pi\pi}\pi_p$, is a direct intertemporal substitution effect and is positive. The rise in p makes current consumption more expensive (i.e., raises the CRI) and causes agents to substitute spending from period 1 to period 2. This consumption-tilting motive improves the current account. Note that the consumption-smoothing and consumption-tilting motives are always opposite in sign so that a temporary deterioration in the terms of trade has an ambiguous effect on the current account 1/.

1/ It can be shown (see Frenkel and Razin (1987) or Ostry (1988)) that the current account will actually improve if the intertemporal elasticity of substitution exceeds the ratio of imports to consumption of importables at initial terms of trade.

The third term in equation (10) is the welfare effect. We have already seen (section 3.1) that, in the absence of capital controls, $dW/dp < 0$. In this case, therefore, the welfare effect contributes to an improvement in the current account. However, we cannot ignore the possibility that, when capital controls are present, a terms of trade shock could be immiserizing, so that $dW/dp > 0$. In this case, the welfare effect would contribute to a deterioration in the current account.

Finally, the last two terms in equation (10) represent indirect intertemporal substitution effects caused by real exchange rate changes. Accordingly, a real appreciation in period 1 raises the CRI and renders the third term in equation (10) positive. This is because the higher CRI increases saving and thereby improves the current account. In contrast, a rise in Q lowers the CRI and renders the fourth term negative. The lower CRI encourages spending in period 1 and therefore favors a worsening in the current account position. Notice that if the initial equilibrium is stationary, so that $\pi = \Pi$, then the impact of the real exchange rate on the current account depends only on whether there is equilibrium under- or overshooting. In the former case, the CRI falls and the real exchange rate favors a worsening of the current account, and conversely. Finally, note that the behavior of the real exchange rate differs in models with and without capital controls, as indicated in section 3.2.

IV. Labor Market Distortions, Capital Controls, and Terms of Trade Shocks

The model derived above assumes that capital controls are the only distortion in the economy. In a number of countries, however, capital

controls coexist with other rigidities. In particular in many of the EEC countries the labor market is severely distorted. Consequently, in this section we extend the model to take this fact into account. More specifically, we assume that there is an economy-wide minimum wage that is initially set above the market clearing real wage. In order to simplify the analysis we assume that this minimum wage is expressed in terms of the numeraire.

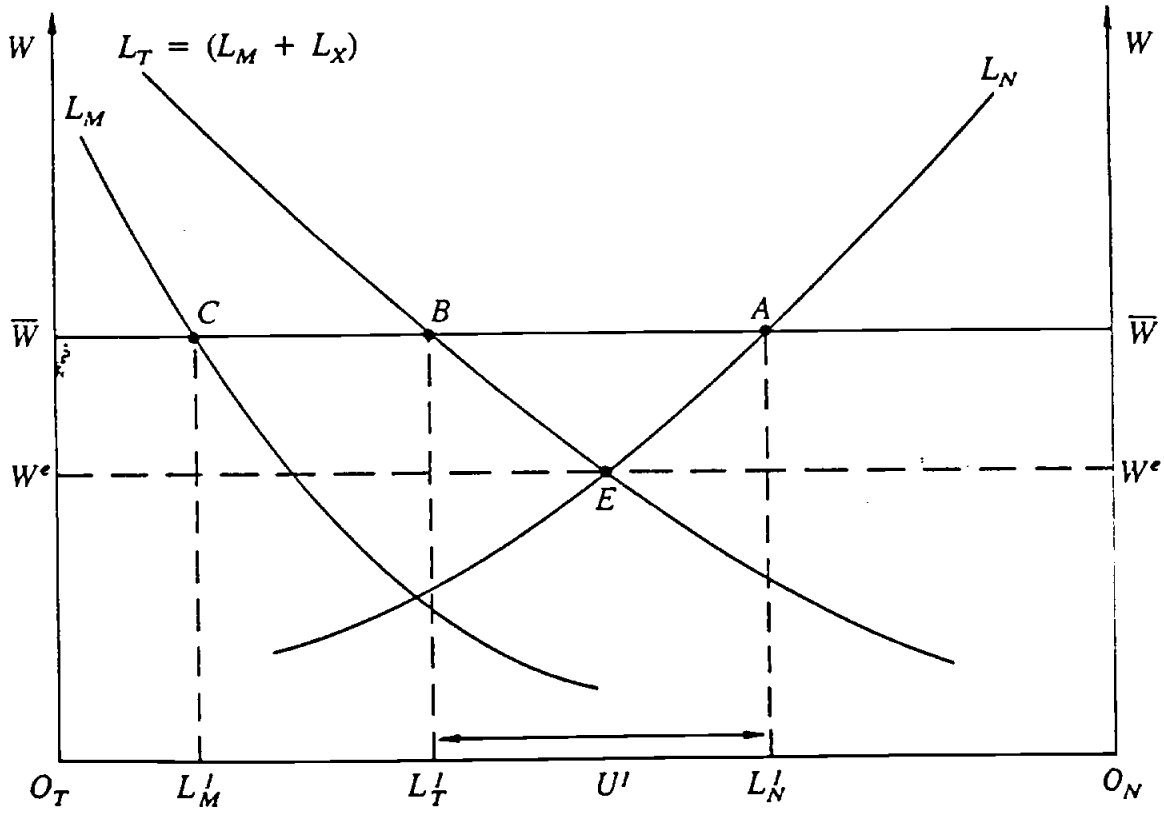
The nature of the initial labor market equilibrium is captured by Figure 1, in which the horizontal axis measures total labor available in the economy, and the vertical axis depicts the wage rate in terms of exportables. Demand for labor by the tradable goods sectors (L_T) is equal to the horizontal sum of the demand for labor by the exportables sector (L_X), and the demand for labor by the importables sector (L_M). Demand for labor by the nontradable sector is given by the L_N schedule. If there is a minimum wage rate equal to $\bar{w}$, unemployment will result. The amount of labor demanded by the nontradables sector is determined by point A and is equal to the distance $O_N L_N^1$; the amount of labor demanded by the M sector is given by distance $O_T L_M^1$; and that demanded by the X sector is equal to $L_M^1 L_T^1$. Initial unemployment is, then, given by the distance $(L_T^1 L_N^1)$ 1/.

In terms of our model the existence of the minimum wage is captured by the use of restricted revenue functions (Neary (1985)):

1/ If we assume that capital is sector specific, the full employment equilibrium real wage will be given by w^e in Figure 1. If, however, we allow the flexible price factors to be mobile across sectors, the labor demand schedules will shift once $\bar{w}$ is removed. See the discussion below.

Figure 1

The Initial Equilibrium in the Labor Market



$$\tilde{r}(\bar{w},p,q;k) = \max_{s,\ell} \{s_X+qs_N+ps_M) - \bar{w}\ell\} \quad \text{for period 1, and}$$

$$\tilde{R}(\bar{W},P,Q;K) = \max_{S,L} \{(S_X+QS_N+PS_M) - \bar{W}L\} \quad \text{for period 2,}$$

where s_i (S_i), i = X, M, N, refer to output of exportables, importables, and nontradables, respectively, in period 1 (2), and k (K) refers to the vector of non-labor (flexible-price) inputs in period 1 (2). Now the nontradable market equilibrium conditions need to be replaced by:

$$\tilde{r}_q = E_q \tag{11}$$

$$\tilde{R}_Q = E_Q \tag{12}$$

An important question is whether the minimum wage prevails in both periods or in only one of them. Svensson (1984) has argued that a realistic assumption is to consider that the labor market is distorted in period 1 (the short run) but that full employment prevails in the long run (period 2). In what follows, we will analyze both the general case with the minimum wage prevailing in both periods, as well as the case with period 1 labor distortions only.

IV.1 The Optimal Degree of Capital Controls

Naturally, once we introduce a second distortion we enter the world of the second best and there is no reason why, as in Section 3, a zero tax on capital mobility will be optimal. The purpose of this subsection is to investigate the way in which the intertemporal distortion on capital mobility interacts with the distortion in labor markets. In particular we

ask whether the existence of a labor market distortion provides (second best) welfare grounds for imposing capital controls.

In its simplest form our question can be posed as follows: what will be the welfare effects of increasing the extent of capital controls (i.e., raising the tax on international borrowing) if the labor market is distorted? In order to capture the essentials of this exercise we start with the simplest case in which the minimum wage prevails only in the first period, and where the initial tax on foreign borrowing is equal to zero. This means that Figure 1 captures the conditions prevailing in the labor market in period 1, and that initially the intertemporal allocation of expenditures is undistorted.

The imposition of a small tax on foreign borrowing--that is a reduction of δ below δ^*--will tilt the intertemporal allocation of expenditure towards the future. A proportion of the reduced expenditure in period 1 will come from lower expenditure on nontradables in that period. This will result in a decline in q (a real depreciation in period 1) and, thus, will generate a reduction in the demand for labor in the nontradables sector in that period. Since employment in that period was initially "too low," the imposition of a tax on foreign borrowing will tend to magnify that distortion, generating a negative welfare effect. The story, however, does not end here, since the decline in the relative price of nontradables will trigger a reallocation of the flexible-price factors from the N sector to the X and M sectors. Depending on the relative labor intensities across sectors this reallocation effect may result in a net reduction or a net increase in aggregate employment. If we assume that the tradables sectors (exportables and importables) are <u>as</u>

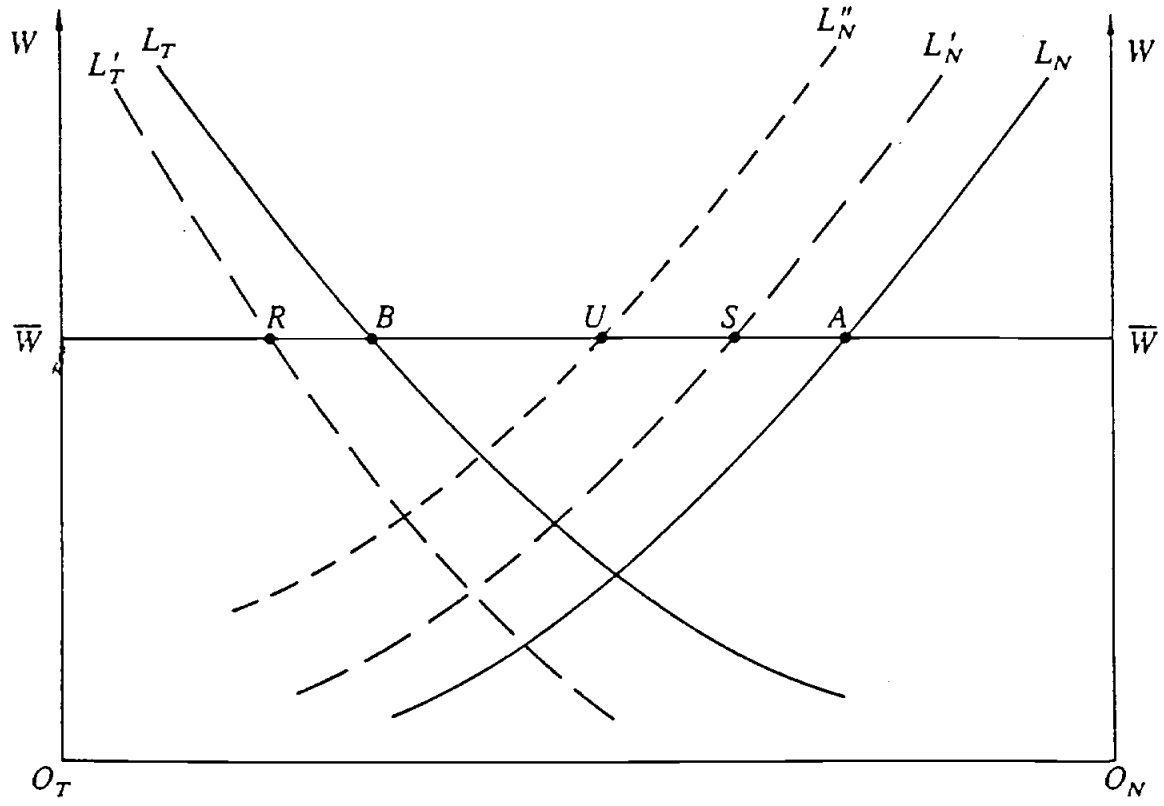
a group, less labor intensive than the N sector, the factor reallocation effect will amplify the real exchange rate effect and, as a consequence of the lowering of δ, total unemployment in period 1 will increase. As a result, in this case, the net effect of the imposition of a (small) tax on foreign borrowing has been welfare reducing; the existence of unemployment and (real) wage rate rigidity in period 1 provides no justification for capital controls.

A direct consequence of the previous analysis is that in an economy characterized by (a) a minimum wage in terms of X in period 1 only, (b) no initial distortions on capital flows ($b = 0$), and (c) nontradables being more labor intensive than tradables as a group, a small subsidy on foreign borrowing will be welfare-improving. The intuition is straightforward: the minimum wage has resulted in a lower than optimal level of employment in period 1. The subsidy on foreign borrowing will tilt expenditure towards period 1; part of this extra expenditure will fall on nontradables driving their price up and thus generating an increase in employment in that period. Moreover, since we assume no initial tax (or subsidy) on borrowing, the small subsidy will not generate a first order welfare effect. The effect of this small subsidy on foreign borrowing on the labor market is captured in Figure 2, where the shift of L_N to L_N' is the result of the 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. Given our assumptions regarding labor intensities the net effect on employment of this reallocation is positive.

Formally, the welfare effect of this small subsidy on borrowing, or small increase in δ, is given by

Figure 2

The Effect of a Small Subsidy to Foreign Borrowing on Aggregate Employment



$$\frac{dW}{d\delta} = E_W^{-1}\ \tilde{r}_\ell\ \ell_q\left(\frac{dq}{d\delta}\right), \tag{13}$$

where $\tilde{r}_\ell$ is the derivative of the period 1 (constrained) revenue function with respect to ℓ, and is positive 1/; ℓ_q is the derivative of the employment function with respect to the relative price of nontradables and under our assumptions on labor intensities is positive; finally, $(dq/d\delta)$ is the real exchange rate effect of relaxing capital controls and is also positive 2/. A crucial characteristic of equation (13) is that all the action comes through the effect of the change in δ on the real exchange rate. This underscores the importance of inorporating nontradable goods in discussions of linkages between capital controls and labor market distortions.

The preceding discussion has established that under certain conditions it may be optimal (in a second best sense) to impose a subsidy on foreign borrowing 3/. In the more general setting, however, this need not be the case. The optimal level of the tax (subsidy) on foreign borrowing is obtained from a generalized version of equation (13). After simple manipulations we find that the change in welfare resulting from a higher δ is given by:

$$\frac{dW}{d\delta}\left(E_W + b\Pi E_{\Pi W}\right) = -b\Pi^2 E_{22} - b\Pi E_{2\pi}\pi_q\left(\frac{dq}{d\delta}\right)$$

1/ Since $\tilde{r}_\ell$ is evaluated at the actual level of employment, it is equal to the minimum wage $\bar{w}$.

2/ See Edwards (1989a).

3/ A similar result is obtained in Rodrik (1987) although the channels through which it operates, the conditions under which it holds, as well as the structure of the model are quite different from what is presented here.

$$- b\Pi E_{2\Pi}\Pi_Q \left(\frac{dQ}{d\delta}\right) + \tilde{r}_{\ell}\ell_q \left(\frac{dq}{d\delta}\right) + \delta^*\tilde{R}_L L_Q \left(\frac{dQ}{d\delta}\right), \qquad (14)$$

where $\ell_q = -\tilde{r}_{\ell q}/\tilde{r}_{\ell\ell}$, $L_Q = -\tilde{R}_{LQ}/\tilde{R}_{LL}$ 1/, and $r_{\ell q}$, R_{LQ} are Rybczinski type terms that summarize relative factor intensities. If, as was assumed above, nontradables are more labor intensive than tradables as a group, $r_{\ell q} > 0$, $R_{LQ} > 0$ and, consequently $\ell_q > 0$ and $L_Q > 0$.

The intuition behind equation (14) is simple. The first three terms have a "b" attached to them and capture the effects of a higher δ on the intertemporal allocation of expenditure. For instance, the first term, $-b\Pi^2 E_{22}$ is positive; the reason is that due to the existence of a positive initial b, expenditure in period 1 is "too low". A higher δ will result in an increase in period 1 expenditure, moving it towards the optimal level. The second and third terms capture indirect expenditure terms that operate via the effects of changes in δ on the equilibrium real exchange rates. Their interpretation is similar to that of the first term. The last two terms in equation (14) are the employment effects. They state that to the extent that lowering the tax (raising δ) generates an appreciation of the real exchange rate, there will be positive employment (and hence welfare) effects.

From equation (14), one can compute the optimal tax (subsidy) on foreign borrowing, b^*, viz.:

1/ These expressions are obtained by totally differentiating the labor market equilibrium condition $\tilde{r}_{\ell}(1,p,q,\ell(q,p,\bar{w})) = \bar{w}$ (see Neary (1985) and Edwards (1989b)).

$$b^* = \frac{\tilde{r}_{\ell}\ell_q \left(\frac{dq}{db}\right) + \delta^* \tilde{R}_L L_Q \left(\frac{dQ}{db}\right)}{-\Pi^2 E_{22} + \Pi E_{2\pi}\pi_q \left(\frac{dq}{db}\right) + \Pi E_{22}\Pi_Q \left(\frac{dQ}{db}\right)}, \tag{15}$$

which can be positive or negative 1/. Notice that, as before, the real exchange rate plays a crucial role in the sense that $b^* = 0$ if the real exchange rate responses are equal to zero (as in models without nontradables). It can be shown that, around b^*, an increase in b will result in a real depreciation in period 1 (i.e., $dq/db < 0$), and a real appreciation in period 2 (i.e., $dQ/db > 0$). From this equation it is easy to establish the conditions required for b^* to be positive 2/.

IV.2 Terms of Trade Disturbances and Welfare in an Economy With Capital Controls and Labor Market Distortions

The analysis in section 4.1 illustrated the way in which the intertemporal distortion on foreign borrowing interacts with labor market distortions stemming from the existence of an economy-wide minimum wage. We now turn to the subject of Section 3, and examine the response of welfare, and the current account (section 4.3), to terms of trade disturbances. Since the effects are, in many respects, similar to those discussed in Section 3, the analysis that follows is rather brief.

1/ Note that the real exchange rate responses in equation (15) are evaluated around b^*, so that small changes in b do not affect welfare (to first order).

2/ Obviously, the fact the $b^* > 0$ does not mean that a tax on foreign borrowing will be the optimal way to deal with labor market distortions.

From equation (2) and the definition of the restricted revenue functions, we obtain the following expression for the change in welfare as a result of a temporary (current) terms of trade shock:

$$\frac{dW}{dp} = (E_W + bIIE_{IIW})^{-1} \{-(E_p - \tilde{r}_p) - bIIE_{\pi II}\pi_p - bIIE_{\pi II}\pi_q(\frac{dq}{dp}) - bIIE_{2II}\Pi_Q(\frac{dQ}{dp}) + [\tilde{r}_{\ell}\ell_p + \tilde{r}_{\ell}\ell_q(\frac{dq}{dp}) + \delta^*\tilde{R}_L L_Q(\frac{dQ}{dp})]\}. \quad (16)$$

The main qualitative difference between equation (16) and the corresponding equation for an economy with full employment (equation (6)) is the presence of the three terms,

$$[\tilde{r}_{\ell}\ell_p + \tilde{r}_{\ell}\ell_q(\frac{dq}{dp}) + \delta^*\tilde{R}_L L_Q(\frac{dQ}{dp})],$$

that capture the effect on current period aggregate employment of the terms of trade disturbance 1/. The sign of this employment effect cannot be determined <u>a priori</u> and, as pointed out above, will depend on factor intensities, and on the way the real exchange rate reacts to changes in p.

1/ In addition to employment effects, other (quantitative) differences between equations (6) and (16) are: First, the import revaluation effect, $-(E_p - \tilde{r}_p)$, is evaluated usirg the derivative of the constrained rather than the unconstrained revenue function. Neary (1985) has shown that under fixed factor prices the following relation exists between restricted and unrestricted revenue functions:

$$\tilde{r} = r[p,q,\bar{\ell}(p,q,\bar{w})] - \overline{w\ell}(p,q,\bar{w}),$$

fro period 1, and similarly for period 2. Second, the real exchange rate responses, dq/dp and dQ/dp, now embody additional welfare effects caused by changes in current and future employment. Since these additional effects represent a rather straightforward extension to the discussion of section 3.2, they are not considered in any detail here.

It can also be verified that, as in the case without labor market rigidities, a terms of trade improvement can be immiserizing. In this case, the result depends not only on magnifying the intertemporal distortion created by the capital control, but also on the terms of trade induced changes in current and future employment.

If there are no restrictions to capital movements, b = 0, and equation (16) reduces to:

$$\frac{dW}{dp} = E_W^{-1} \{-(E_p - \tilde{r}_p) + \tilde{r}_{\ell}\ell_p + \tilde{r}_{\ell}\ell_q \left(\frac{dq}{dp}\right) + \delta^* \tilde{R}_L L_Q \left(\frac{dQ}{dp}\right)\}.$$

It can be seen that, even in the absence of a tax on international borrowing, a deterioration in the terms of trade can result in an increase in welfare. This would be the case, for example, if the initial period 1 equilibrium is near the autarky equilibrium (i.e., $(E_p - \tilde{r}_p) \approx 0$), and the terms of trade shock increases the net present value of aggregate employment.

IV.3 The Current Account

In the case with capital controls and labor market distortions the current account response to a temporary terms of trade disturbance will be given by:

$$\frac{dca}{dp} = -(E_p - \tilde{r}_p) - \pi E_{\pi\pi} \pi_p - \pi E_{\pi\pi} \pi_q \left(\frac{dq}{dp}\right) - \pi E_{\pi\Pi} \Pi_Q \left(\frac{dQ}{dp}\right) + \tilde{r}_{\ell}\ell_p + \tilde{r}_{\ell}\ell_q \left(\frac{dq}{dp}\right) \qquad (17)$$

The first four terms of the RHS of equation (17) are the same as those obtained in the absence of labor market distortions, and their intuition was discussed in Section 3. The only caveat is that now we are dealing with restricted revenue functions and that the real exchange rate responses, (dq/dp) and (dQ/dp), are evaluated for the case with a minimum wage. The last two terms in the RHS of equation (17) capture the employment effects of the terms of trade shock. If the terms of trade deterioration reduces employment in period 1, the expression, $\tilde{r}_{\ell}(\ell_p + \ell_q \, dq/dp)$, will be negative. Since lower employment in period 1 means reduced income in that period, the current account, which is income minus expenditure, will deteriorate. In fact, this employment effect on income is the only substantial difference between the case with and without labor market distortions.

V. Extensions and Concluding Remarks

The model developed above provides a very general framework for analyzing the role of capital market distortions. Our analysis has deliberately focused on a few simple cases. It is easy, however, to introduce a number of interesting extensions.

V.1 Investment

The first obvious extension involves introducing investment. The role of capital controls on investment decisions is straightforward and, thus, was excluded from the previous discussion. Consider first the case

without a labor market distortion. Then the intertemporal budget constraint is given by:

$$r(1,p,q;k,\ell,t) + \delta R(1,P,Q;k+I(\delta,Q),L,T) + bNCA - I(\delta,Q) = E(\pi(1,p,q),\delta\Pi(1,P,Q),W) \tag{18}$$

where k is the inherited capital stock; $K = k + I(.)$ is the period 2 capital stock (assuming no depreciation); $I(.)$ is the investment function, and t (T) refer to non-labor or capital factors of production (e.g., natural resources) in period 1 (2). The equilibrium condition for investment is that the discounted value of period 2's marginal product of capital is equal to the price of the capital good. If, for simplicity, we assume that the capital good corresponds to the numeraire we have that, in equilibrium,

$$\delta R_K = 1. \tag{19}$$

By differentiating equations (18) and (19), we can determine how different disturbances will affect welfare in an economy with investment. Naturally, changes in the extent of capital controls given by changes in δ will have a direct impact on investment. There will also be additional indirect effects stemming from the real exchange rate changes generated by the relaxation of the extent of capital controls.

Things are more complicated, however, if we assume that the labor market is also distorted. Suppose, for example, that the production technology is constant returns to scale. Then, as pointed out by Svensson (1984), because investment and future employment are jointly determined, any given minimum wage in period 2 may be incompatible with the discount

factor imposed by the tax on international borrowing. There are two ways to get around this problem. The first is to assume that the minimum wage is restricted to period 1; the second is to assume, as in Svensson (1984, p. 664) that the period 2 production function is strictly concave.

V.2 Import Tariffs

A second extension refers might involve incorporating trade distortions in the form of import tariffs. In this case the domestic price of imports will differ from the world price by the extent of the tariff. In addition, we have to make some assumption regarding the use of tariff proceeds. If, as in traditional trade theory, we assume that these revenues are handed back to consumers in a lump sum fashion, we have to add the following term to the RHS of equation (2):

$$t(E_p - r_p) + \delta T(E_p - R_p),$$

where t (T) is the period 1 (2) (specific) tariff rate.

As in the previous cases, changes in the real exchange rate provide important additional channels affecting the response of welfare and the current account to various disturbances (including tariff changes). For an analysis of the effects of commercial policies on the vector of equilibrium real exchange rates, see Edwards (1987a,b, 1989b) and Ostry (1988a,b).

V.3 Summary

In this paper, we have developed an intertemporal, optimizing, perfect foresight, real model of a small open economy to investigate several aspects of capital controls. In particular, we were interested in analyzing formally how the presence of capital controls (in the form of a tax on international borrowing) alters the way in which the economy is affected by terms of trade shocks. Additionally, we examined possible interactions between intertemporal distortions in the form of a tax on international borrowing, and labor market rigidities. Our purpose here was to determine the "optimal" (second best) degree of capital controls, and to inquire as to the ways in which the presence of an economy-wide minimum wage will modifies the results obtained for terms of trade shocks in the absence of such rigidities.

Although the analysis presented in this paper is highly abstract, it has some important implications for the current debate on the possible effects of capital market liberalization to be undertaken in 1992 by the EEC countries within the context of the EMS. In that regard, then, in deriving the model we focused on an abstract economy that captures some of the most salient features of the EEC countries, abstracting from other complications such as the existence of trade distortions and capital accumulation. An advantage of our approach is that by focusing on a real fully optimizing model, we can abstract from the purely financial effects of capital controls, concentrating instead on the important welfare consequences of different policies and disturbances.

The main conclusions of our paper may be summarized as follows:

1. In the presence of capital controls, terms of trade disturbances may have a perverse effect on welfare. That is, a terms of trade deterioration (improvement) may be welfare-improving (immiserizing). The reason is that, under certain conditions, a deterioration (improvement) in the terms of trade will induce intertemporal substitution of expenditures towards (away from) its optimal (undistorted) level, thereby mitigating (magnifying) the existing distortion created by the capital control. Naturally, the overall effect on welfare requires that we compare this distortion-mitigation (magnification) effect with the usual (import revaluation and intertemporal substitution) effects associated with changes in the terms of trade that are present even in the absence of capital controls.

2. The way in which terms of trade disturbances affect welfare and the current account in an economy with capital controls will depend on the behavior of real exchange rates. The reason is that the path of the real exchange rate is a key determinant of agents' intertemporal consumption decision. Since it is through distorting saving and investment decisions that capital controls affect welfare and the current account, it should not be surprising that the interaction of real exchange rate changes with existing capital market distortions will be an important component in the overall response of the real economy to terms of trade shifts.

3. It is not possible to know a priori whether a terms of trade deterioration will result in an equilibrium real exchange rate appreciation or depreciation. This indeterminacy is at the heart of the possibility of obtaining unorthodox results in economies with capital controls.

4. In the presence of capital controls it is possible that a temporary terms of trade disturbance will result in a current account improvement. However, the conditions required for this result are different from those that generate such a result in economies without capital controls. This is because the welfare effect associated with the terms of trade disturbance depends on the presence of capital controls.

5. The interaction between the tax on foreign borrowing and the labor market distortion arises exclusively through the response of the equilibrium real exchange rate. If the real exchange rate does not change when the tax on borrowing is altered, the employment level will remain unchanged.

6. There is no presumption that, in the presence of a labor market distortion in the form of economy-wide minimum wages, the optimal tax on foreign borrowing will be positive.

7. Under some plausible assumptions--the labor market is distorted in period 1 only, and there is no initial tax on borrowing--the optimal (second best) intervention in the capital market consists of a subsidy to foreign borrowing. This result suggests that, by concentrating on monetary and financial effects, previous studies of capital controls may have missed some important welfare consequences of this type of market intervention.

8. The presence of labor market distortions creates additional channels through which terms of trade disturbances affect welfare and the current account, namely employment effects. Whether terms of trade disturbances will result in higher or lower employment will depend on factors intensities, as well as on the response of the real exchange rate.

The possibility of obtaining unorthodox welfare effects depends in this case on the response of employment to changes in the terms of trade.

REFERENCES

Adams, C., and J. Greenwood, "Dual Exchange Rate Systems and Capital Controls: An Investigation," Journal of International Economics, Vol. 18 (1985), pp. 43-63.

Aizenman, J., "On the Complementarity of Commercial Policy, Capital Controls, and Inflation Tax," Canadian Journal of Economics, Vol. 19, No. 1 (February 1986), pp. 114-33.

Argy, V., and M. Porter, "The Forward Exchange Market and the Effects of Domestic and External Disturbances Under Alternative Exchange Rate Systems," Staff Papers, International Monetary Fund (Washington), Vol. 19 (November 1972), pp. 502-28.

Dixit, Avinash K., and Victor Norman, Theory of International Trade: A Dual, General Equilibrium Approach (Cambridge: Cambridge University Press, 1980).

Dornbusch, Rudiger, "Real Interest Rates, Home Goods, and Optimal External Borrowing," Journal of Political Economy, Vol. 91 (February 1983), pp. 141-53.

Edwards, Sebastian, "Tariffs, Terms of Trade, and the Real Exchange Rate in an Intertemporal Optimizing Model of the Current Account," Working Paper, No. 2175 (Cambridge, Massachusetts: National Bureau of Economic Research, March 1987).

_____, Real Exchange Rates, Devaluation and Adjustment (Cambridge, Massachusetts: MIT Press, 1989a).

_____, "Tariffs, Capital Controls and the Equilibrium Real Exchange Rate," Canadian Journal of Economics, (forthcoming, 1989b).

_____, "Temporary Terms of Trade Disturbances, the Real Exchange Rate, and the Current Account," Economica, (forthcoming, 1989c).

_____, and Jonathan D. Ostry, "Anticipated Protectionist Policies, Real Exchange Rates and the Current Account," Revised version of NBER Working Paper No. 2214, February 1989.

Flood, Robert P., and Nancy Peregrim Marion, "The Transmission of Disturbances Under Alternative Exchange Rate Regimes with Optimal Indexing," Quarterly Journal of Economics, Vol. 96 (1982), pp. 41-66.

Frenkel, Jacob A., and Assaf Razin, "The Limited Viability of Dual Exchange Rate Regimes," Working Paper, No. 1902 (Cambridge, Massachusetts: National Bureau of Economic Research, April 1986).

Frenkel, Jacob A., and Assaf Razin, Fiscal Policies and the World Economy: An Intertemporal Approach (Cambridge: MIT Press, 1987)

Giavazzi, Francesco and Alberto Giovannini, Limiting Exchange Rate Flexibility: The European Monetary System (manuscript, 1988a).

Giovannini, Alberto, "International Capital Mobility and Tax Avoidance" (unpublished manuscript, 1988b).

Greenwood, Jeremy and Kent P. Kimbrough, "Capital Controls and Fiscal Policy in the World Economy," Canadian Journal of Economics, Vol. 18, No. 4 (November 1985), pp. 743-65.

Harberger, Arnold C., "Currency Depreciation, Income and the Balance of Trade," Journal of Political Economy, Vol. 58, No. 1 (February 1950), pp. 47-60.

Laursen, Svend and Lloyd A. Metzler, "Flexible Exchange Rates and the Theory of Employment," Review of Economics and Statistics, Vol. 32, No. 4 (November 1950), pp. 281-99.

Neary, J. Peter, "International Factor Mobility, Minimum Wage Rates, and Factor Price Equalization: A Synthesis," Quarterly Journal of Economics, Vol. 100, No. 3 (August 1985), pp. 551-70.

_____and Frances Ruane, "International Capital Mobility, Shadow Prices, and the Cost of Protection," International Economic Review, Vol. 29, No. 4 (November 1988), pp. 571-85.

Ostry, Jonathan D., "Intertemporal Optimizing Models of Small and Large Open Economies with Nontradable Goods," Ph.D. Dissertation, University of Chicago (August 1988a).

_____, "The Balance of Trade, Terms of Trade and Real Exchange Rate: An Intertemporal Optimizing Framework," Staff Papers, International Monetary Fund (Washington, December 1988b).

Rodrik, Dani, "Trade and Capital Account Liberalization in a Keynesian Economy," Journal of International Economics 23, no. 1/2 (August 1987), pp. 113-130.

Svensson, Lars E.O., "Oil Prices, Welfare, and the Trade Balance," Quarterly Journal of Economics, Vol. 99, No. 4 (November 1984), pp. 649-72.

_____and Assaf Razin, "The Terms of Trade and the Current Account: The Harberger-Laursen-Metzler Effect," Journal of Political Economy, Vol. 91, No. 1 (February 1983), pp. 97-125.

Van Wijnbergen, Sweder, "Tariffs, Employment and the Current Account: Real Wage Resistance and the Macroeconomics of Protectionism." International Economic Review 28, no. 3 (October, 1987): 691-706.

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