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PART

I. Adjustment Processes and Policies: Theoretical Issues

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2 Import Competition and Macroeconomic Adjustment under Wage-Price Rigidity

Michael Bruno

A fall in import prices constitutes an improvement in the terms of trade and is welfare increasing when wages and prices are fully flexible. Problems of internal adjustment arise when they are downward sticky and the system is not otherwise in a process of rapid change. Two kinds of short-run unemployment may occur. (1) Workers may be thrown out of jobs in the directly competing domestic industry because of a rise in the product wage. (2) Unemployment may arise as a result of contraction in a home industry which is an imperfect substitute on the demand side. The second kind of unemployment can in principle be remedied by macroeconomic expansion. Since it comes from the production side, the first type of unemployment requires a transfer of workers from the import-competing industry to the home-goods sector. In the short run this means reducing the real product wage in that sector. If the nominal wage is downward sticky but prices are upward flexible, this could, in principle, be brought about by expansionary fiscal policy (coupled with a devaluation). Under certain conditions, however, even that may not be possible if it also entails a reduction in the real consumption wage. In this as well as the other case intervention on the supply side may be required.

In practice, the employment replacement effects of the exports of NICs (newly industrialized countries) seem to have been relatively small. Since import competition is nothing new, one may ask why it has received so much more attention in recent years. A possible answer is that its effects

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depend on the general economic environment. The supply shocks that affected industrial countries in the 1970s introduced structural adjustment problems of a kind that turn out to resemble those caused by import competition. At times of rapid growth and excess demand in both the goods and labor markets, such as the late 1960s and early 1970s, import competition could alleviate shortages and reduce inflationary pressure. By contrast, during a period of persistent slack, as after 1973, it may compound existing adjustment problems.

The aim of this paper is to clarify these issues in the context of a two-sector open economy macromodel which is analyzed in terms of the recent disequilibrium approach. Section 2.1 lays out a two sector model which incorporates a domestically producible import good and an exportable home good. The effect of a fall in import prices under nominal or real wage stickiness is analyzed within the main markets (goods, labor, and foreign exchange). We consider the differential response to import competition under the main disequilibrium regimes. We also discuss the extent to which demand management and exchange-rate (or tariff) policy can be applied. Wage subsidies and capital accumulation are discussed in section 2.3. Section 2.4 relates the theory to the environment of the 1970s and briefly considers the problem of import competition in final goods within a modified framework in which the price of key imported raw materials has risen. This helps to bring out the point that the adjustment problem depends crucially on the nature of the underlying macroeconomic environment.

2.1 Analytical Framework

The effect of import competition will here be analyzed within a conventional two-sector framework adapted to our specific purpose.[1] The import good can be produced by a perfectly competitive domestic industry whose output is denoted by X_1. With domestic consumption C_1, the excess $(C_1 - X_1)$ is imported. Producers and consumers will face a domestic price $p_1 = p_1^* e\tau$, where p_1^* is the international c.i.f. price, e is the exchange rate, and τ is a tariff factor (1 + rate of tariff).

The other sector produces a home good X_0 at price p_0. This can be used for private consumption (C_0), public consumption (G_0), or investment (I_0).[2] Unlike in the simplest two-sector model, we shall assume that this good is semitradable. It can be exported as an imperfect substitute (E_0) for a world export good whose price is p_0^*. This modification of the basic model is helpful in that it allows for a distinction between imports and exports and at the same time maintains the simplicity of a two-sector macromodel for the home economy. We now consider the main building blocks.

2.1.1 Production and Employment

We adopt the conventional short-run two-factor production framework: $X_i = X_i(L_i, K_i)$, $i = 0, 1$. Labor (L_i) is a variable factor whose total supply L is assumed to be fixed exogenously. Capital stock (K_i) in both sectors is fixed in the short run (capital accumulation is discussed in section 2.3). Labor and capital are gross complements. Denoting the nominal wage by w and allowing for a tax (subsidy) on wages ($\theta_i = 1 +$ tax rate or $1 -$ subsidy rate), we obtain the two notional labor-demand functions $L_i^d(\theta_i w/p_i, K_i)$ and the full-employment constraint

$$D_L = \underset{-}{L_0^d}(\theta_0 w/p_0, \underset{+}{K_0}) + \underset{-}{L_1^d}(\theta_1 w/p_1, \underset{+}{K_1}) - L \leq 0. \tag{1}$$

For simplicity, it is assumed that when there is excess demand for labor ($D_L > 0$), only home-good producers are rationed in the labor market, i.e., $L_0 = L - L_1^d(\theta_1 w/p_1) < L_0^d(\theta_0 w/p_0)$; in that case $\partial X_0/\partial L_0 > w/p_0$.

Figure 2.1 shows the two labor-demand curves in a box diagram whose length L marks the total labor supply. For given p_i, θ_i, K_i, the intersection

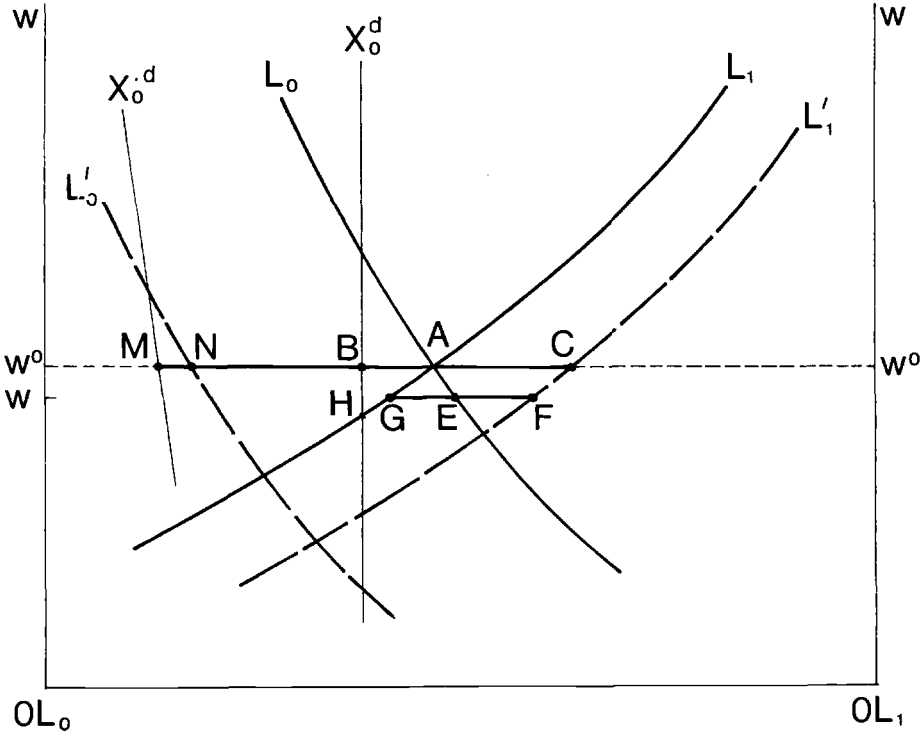

Fig. 2.1

of the two curves at A ($w = w^0$) gives the equilibrium allocation of labor between sectors. For example, a fall in the price P_1 will shift L_1 to L_1' and at the given wage w^0, unemployment of AC will emerge.[3] If the nominal wage were set at $w' < w^0$, there would be excess demand for labor of GE in the original position. By assumption, labor allocation would be represented by the point G, below the curve L_0, illustrating the case where $w/p_0 < \partial X_0/\partial L_0$ (and $w/p_1 = \partial X_1/\partial L_1$).

2.1.2 Product, Income, and Household Behavior

Nominal GNP is given by $p_0X_0 + p_1X_1$; real GNP in home-good units is $Y = X_0 + X_1/\pi$, where $\pi = p_0/p_1$ denotes the internal terms of trade between the two sectors. Disposable household income is $Y - T$, where T is total (direct and indirect) net taxes in the system measured in units of X_0.

Assume next that a given share c of disposable income is consumed (or $s = 1 - c$ is saved), while total consumption expenditure C is broken down into its components according to a standard consumption function $C_i^d = C_i(C, \pi)$, where $C = C_0 + C_1/\pi$. If both goods are normal and are also gross substitutes,[4] we have

$$
\begin{aligned}
&0 < C_{ic} < 1 && C_{0c} + C_{1c}/\pi = 1 \\
&C_{0\pi} < 0,\ C_{1\pi} > 0 && C_{0\pi} + C_{1\pi} = C_1/\pi \\
&C = C_0 + C_1/\pi = c(Y - T) = c(X_0 + X_1/\pi - T).
\end{aligned} \tag{2}
$$

2.1.3 Equilibrium in the Home-Goods Market

In addition to household demand for the home good C_0, there is exogenous demand for public consumption G_0, investment I_0 and export demand E_0. The last is assumed to be a positive function of world income Y^* and a negative function of the relative price ratio p_0/ep_0^*; its price elasticity is assumed greater than unity. Total demand for the home good is

$$
X_0^d = C_0[\underset{+}{c(Y - T)}, \underset{-}{\pi}] + G_0 + I_0 + E_0(\underset{+}{Y^*}, \underset{-}{p_0/ep_0^*}), \tag{3}
$$

where

$$
\begin{aligned}
&Y = X_0 + X_1^s/\pi,\ X_1^s = X_1(\theta_1 w/p_1, K_1), \\
&\text{and } X_0 = \min(X_0^d, X_0^s).
\end{aligned}
$$

The notional supply of X_0 is given by a supply function $X_0^s = X_0(\theta_0 w/p_0, K_0)$. Excess demand D_0 is defined as the difference $X_0^d - X_0^s$.

It is convenient to express all equilibrium conditions in terms of two endogenous relative price variables $\pi = p_0/p_1$ and $w_1 = w/p_1$ (as long as p_1 remains fixed this is the same as using the two nominal variables p_0 and w). The relative price of exports can be expressed in the form $p_0/ep_0^* = \tau\pi/\pi^*$, where $\pi^* = p_0^*/p_1^*$ is the given international relative price ratio and τ is the import tariff factor. Similarly, the real wage in home-

good units w/p_0 can be written as the ratio w_1/π. Equilibrium in the home-goods market can thus be defined as

$$D_0 = X_0^d - X_0^s = D_0(\pi, w_1; z) = 0, \tag{4}$$

where z is the set of exogenous variables ($\pi^*, Y^*, \theta_i, K_i$, etc.).

As shown in the appendix, the assumptions made so far guarantee that excess demand will be a negative function of π ($\partial D_0/\partial \pi < 0$), as is required by stability.

The sign of $\partial D_0/\partial w_1$ is ambiguous. While an increase in the wage rate reduces the supply of X_0, it also reduces disposable income and consumption through its effect on output in both sectors. There is no ambiguity when only wages are consumed (see Neary 1980). As shown in the appendix, $\partial D_0/\partial w_1 > 0$ iff $cC_{0c} < \beta$, where $\beta = L_0\eta_0/(L_0\eta_0 + L_1\eta_1)$ and η_i are the labor-demand elasticities. This means that the marginal propensity to consume home goods out of income is smaller than the weighted share of employment in the home-goods sector, a condition that will probably hold.[5] For convenience we shall indeed use the assumption $\partial D/\partial w > 0$, and, in the absence of a full-employment constraint, the elasticity of the D_0 curve will in that case be greater than unity.[6]

The relevant curve, marked D_0 in figure 2.2 (expressed in logarithms of π and w_1), divides the π–w_1 space into a region of excess supply (to the right of D_0) and an excess demand region (to the left of d_0). An increase in G_0, Y^*, π^*, τ, θ_0, or K_1 increases D_0, thus shifting the D_0 curve to the right, while an increase in T, θ_1, or K_0 shifts it to the left.

2.1.4 The Three Main Regimes

To give a fuller picture of the main disequilibrium regimes, the labor-market equilibrium condition is also drawn in figure 2.2, now expressed in terms of the transformed variables π and w_1:

$$D_L(\pi, w_1) = \underset{-}{L_0^d}(\theta_0 w_1/\pi, K_0) + \underset{-}{\underset{+}{L_1^d}}(\theta_1 w_1, K_1) - L \lesseqgtr 0. \tag{1'}$$

As can easily be shown, the equilibrium D_L curve in the figure is upward sloping with elasticity $\beta = (L_0\eta_0 + L_1\eta_1)^{-1} L_0\eta_0$, which is less than unity. Below D_L there is excess demand for labor; above it there is excess supply. The curve will be pushed up by an increase in K_i or a decrease in θ_i (the case of wage subsidies).

We can now combine the information about the markets for labor and home goods in order to consider the labor market under excess supply of home goods.

When producers are constrained by the home-goods market, employment L_0 will be a positive function of X_0^d, which in turn is a negative function of the domestic (relative) price π. To maintain equilibrium in the labor market, the wage w_1 will now have to fall, rather than rise, with

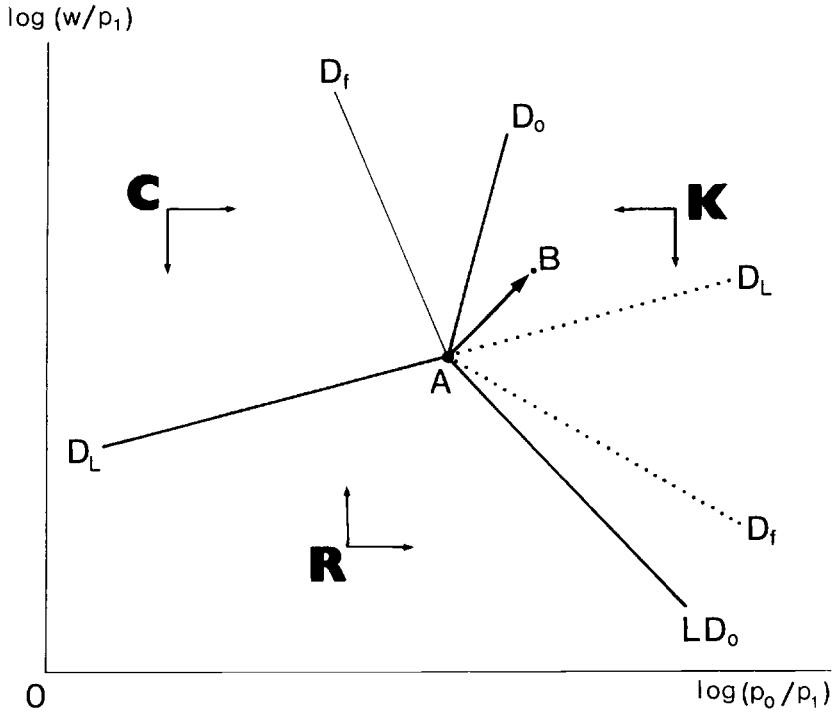

Fig. 2.2

an increase in the price π.[7] This leads to a downward sloping labor-equilibrium curve LD_0 when there is excess supply in the home-goods market. The whole of the region K, bordered by D_0ALD_0, is one of generalized excess supply in both the labor and home-goods markets (but only the part under D_L constitutes Keynesian unemployment).

Any exogenous change such as fiscal policy, shifting the D_0 curve to the right, will shift the curve LD_0 with it so that their intersection always moves along the notional full-employment line D_L (see, for example, the shift from D_0ALD_0 to $D_0'A'LD_0'$ in figure 2.3).

Next, note that by our assumption about labor allocation under rationing there will be no region in which excess supply of goods coincides with excess demand for labor.[8] The same downward sloping curve (LD_0) must thus also be the continuation of the commodity-equilibrium curve D_0 in the labor-rationing region. This leaves the whole of region R as that of generalized excess demand (Malinvaud's "repressed inflation" case).[9]

The third region C, is the familiar case of classical unemployment, combining excess demand for home goods with excess supply of labor. Since in this model the notional supply of labor is taken as fixed, demand

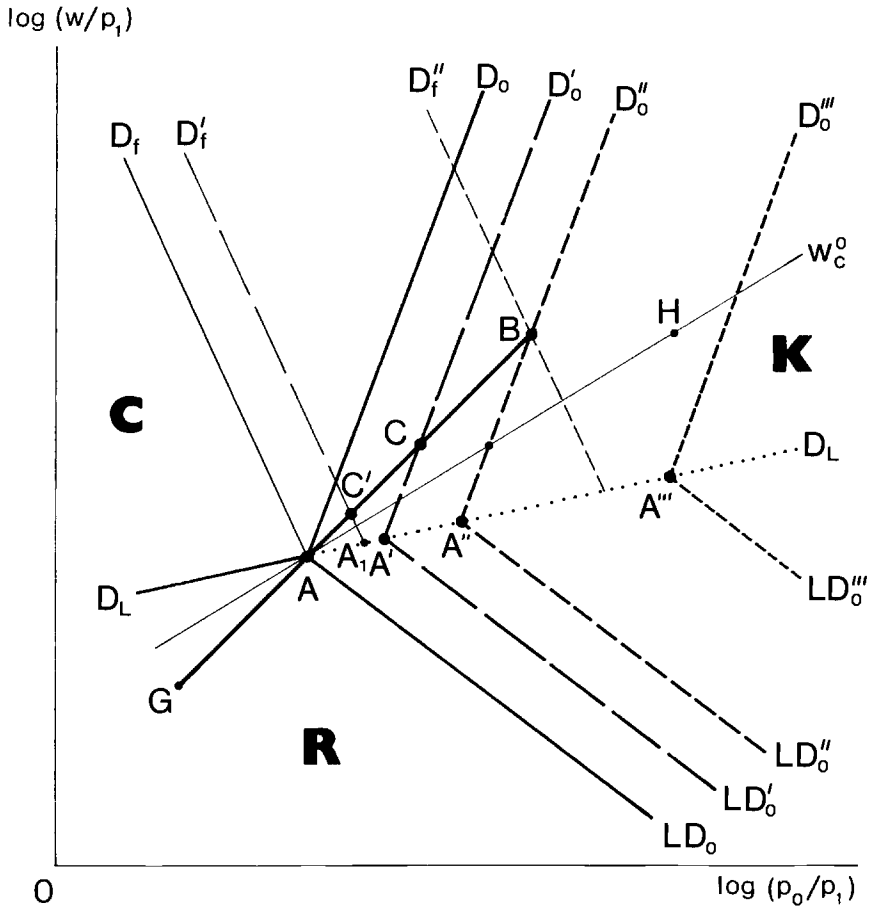

Fig. 2.3

for home goods will not depend on labor-market restrictions. The difference between actual output $X_0 = X_0^s(w_1/\pi)$ and the higher output demand X_0^d takes the form of forced private savings (i.e., $G_0 + E_0 + I_0$ will always be supplied).

2.1.5 The Current Balance of Payments

The current-account deficit is $p_1^*(C_1 - X_1) - (p_0/e)E_0$ in foreign currency terms. For convenience, we divide this by p_1^* and refer to excess demand for tradable goods D_f in real terms,

$$D_f = \underset{+\ +}{C_1(C, \pi)} - \underset{-\quad +}{X_1(\theta_1 w_1, K_1)} - \underset{+\quad -}{\tau\pi E_0(Y^*, \pi/\pi^*)} = D_f(\pi, w_1; z). \tag{5}$$

The signs of the derivatives of this excess demand function will, in general, be ambiguous with respect to the endogenous price ratios π and w_1. As shown in the appendix, under reasonable assumptions we have $-\partial D_0/\partial \pi > \partial D_f/\partial \pi > 0$.

Next, we have $\partial D_f/\partial w_1 \gtrless 0$ iff $1 - cC_{1c}/\pi = (1-c) + cC_{0c} \lesseqgtr \beta$. If $\partial D_f/\partial w_1 > 0$, D_f is negatively sloped.[10] If $\partial D_f/\partial w_1 < 0$, D_f is positively sloped and its slope is greater than that of D_0. The sign of the slope makes no difference to our subsequent analysis. In the K (or the R) region the slope of D_f is definitely negative.

The line D_f in figure 2.2 relating to the equilibrium condition $D_f(\pi, w_1) = 0$ is drawn negatively sloped with deficits ($D_f > 0$) on the right and surpluses ($D_f < 0$) on the left. This curve will shift in the same direction as D_0 for changes in the relevant exogenous variables (z), with the exception of the sector-specific G_0 and I_0. By assumption, X_1 is never rationed and the tradable-goods market need not clear.[11] The monetary effect of changes in foreign exchange reserves will be mentioned later.

2.1.6 The Government Budget

Two types of indirect taxes, a tax (subsidy) on wages (θ_i) and tariffs (τ), have already appeared in the system. Next, assume that the government can levy a direct tax T_d which forms part of total net tax receipts (T). (This helps to allow for the net effect of an indirect tax [θ_i or τ] with total T held constant.) Denoting the government deficit by D_g (measured in X_0 units), we have

$$D_g = G_0 - T, \tag{6}$$

where $T = T_d + (w/p_0)[(\theta_0 - 1)L_0 + (\theta_1 - 1)L_1] + (\tau - 1)(p_1^* e/p_0)(C_1 - X_1)$.

2.1.7 Savings, Investment, and Money

Full-fledged treatment of wealth formation requires detailed specification of supply and demand for physical as well as financial assets. This will not be attempted here. It is nonetheless of some help to mention the simplest links that might close the system in this respect. The savings-investment identity can be put in the form $I = S - D_g + D_f/\pi$, where $I = I_0$, $S =$ private savings, and all magnitudes are expressed in home-goods units (assume here that $\tau = 1$).

Suppose now that the current-account deficit is financed by running down reserves and the government deficit is financed by central bank credit, the sum of these assets forming the money base H. The total quantity of money M can be controlled through the money multiplier m. One can thus write

$$\begin{aligned} M = mH &= m[H_{-1} + p_0(D_g - D_f)_{-1}] \\ &= m[H + p_0(S - I)]_{-1}, \end{aligned} \tag{7}$$

where subscript -1 indicates one-period lag.

Total investment I equals gross capital accumulation in the two sectors. For simplicity one may assume that $\Delta K_i = I^i(R_{i\_1}, M/p_0) - \delta_i K_i (i = 0, 1)$ and $I = I^0 + I_1$, where R_i are profits in sector i, δ_i is the depreciation rate, and M/p_0 is a proxy for the negative effect of the rate of interest (on investment). In this way one can incorporate the effect of endogenous or planned changes in real balances in the short run as well as changes in profits on capital accumulation in the long run. Changes in K_i will only be mentioned very briefly (see section 2.3).

2.2 Analysis of Import Price Competition

Let us now consider the impact effect of a reduction in foreign prices. We begin with the case in which p_1^* and p_0^* both drop, leaving the relative price ratio π^* unaffected. The advantage of considering this case first is that such a change does not alter the general equilibrium curves in figure 2.2.[12] At given price p_0 and nominal wage level w, the effect of a fall in p_0^* is to increase the relative prices π and w by the same amount, thus moving the economy from an initial equilibrium point A along a 45° vector to, say, the point B. This point is in the Keynesian unemployment region K, with excess supply in the commodity and labor markets as well as excess demand for traded goods.

The intuitive explanation is straightforward. A fall in the import price raises the product wage in the X_1 industry, thus reducing employment and output in that sector. At given w/p_0 the potential output supply in the home-goods industry stays constant. However, the increase in the relative price of home goods reduces the demand for C_0 at a given income and the fall in product and income further reduces C_0. Also, exports must fall since p_0^* has dropped. Producers of X_0 are thus rationed in the home-goods market; employment and output drop.

Suppose the Walrasian general equilibrium point remains at A. If prices and nominal wages were fully flexible, a reduction in both of them by the rate of the decrease in foreign prices would return the economy to equilibrium. If nominal wages and prices are downward sticky, there is a policy tool that would have the same effect, namely, a devaluation (increase in e) by the amount required to bring the domestic price p_1, as well as π and w_1, back to its original value, in which case all markets return to equilibrium and all real magnitudes stay the same (the only difference now being that the foreign currency value of both imports and exports has been reduced).

Next, let us consider the more relevant case in which only the price of imports (p_1^*) falls while the price of exports (p_0^*) stays constant. This implies that the relative price π^* rises. In this case import substitutes but not exports are hurt. In terms of the general equilibrium system (see figure 2.3) the implication is that D_0 and D_f both shift to the right, to D_0' and D_f', respectively. As can be seen in the appendix, the relative shift is

as shown; namely, D_f shifts to the right by less that D_0 and both shift by less than the initial change in $\log p_1^*$. The intersection of D_f' and D_L is at A_1 and that of D_0' and D_L is at A'. If wages and prices were fully downward flexible, the new short-run Walrasian equilibrium would be at A', if the economy actively borrows to cover the remaining current-account deficit, or at A_1, if foreign currency reserves are allowed to drop and the money supply is allowed to contract correspondingly (shifting D_0' and LD_0' back to the left). At any rate the point B lies in the K region with respect to either A_1 or A' just as in the previous case. But to reach an equilibrium, prices must now fall by less than wages. If wages and prices are downward rigid, a devaluation cannot by itself return the system to equilibrium. A devaluation moving the system back from B to C will get only the home-goods market into equilibrium. A further move to C' will achieve current-account balance, but an inflationary gap emerges. A devaluation all the way to A will achieve full employment with excess demand in the home-goods market and a surplus in the current account. In theory both these gaps in the home-goods and foreign exchange markets can be closed by a suitable combination of fiscal (T_d, G_0) and monetary (m) policy so that full-employment equilibrium can be achieved at A. However, this is obviously a wrong policy from the point of view of optimum resource allocation since at A the original sectoral allocation of labor would only be artificially preserved.

What if wages and prices are flexible upward and are allowed to increase from A to A' (or A_1)? The resulting reduction in the real product wage in the home-goods industry may then bring about the required transfer of workers from L_1 to L_0. There are two qualifications to this solution. One is that the economy must be willing to pay the price of some inflation for this transfer (on the assumption that it would be enough to induce workers to move from the depressed industry into the more profitable one). The other qualification has to do with the possibility of *real*, rather than nominal, wage rigidity which may prevent such a reduction in the product wage.

Suppose the consumption basket of wage earners consists of proportions α and $1-\alpha$ of home and importable goods, respectively, so that the relevant consumption price index can be written in the form $Ap_0^{\alpha}\, p_1^{1-\alpha}$, and assume that $w \geq Ap_0^{\alpha}\, p_1^{1-\alpha}$. A minimum real wage line w_c^0 can thus be defined by

$$\log w_1 = \log A + \alpha \log \pi. \tag{8}$$

This may provide an effective constraint on adjustment to full employment iff $\alpha > \beta$ where $\beta = L_0\eta_0/(L_0\eta_0 + L_1\eta_1)$, the elasticity of the full-employment line D_L. In figure 2.3 it is represented by the line w_c^0 which lies between the 45° line (AB) and D_L.[13] The higher the share α of home goods in the wage earners' consumption basket and the higher the ratio

$L_1\eta_1/L_0\eta_0$, the less likely they will be to accept the real product wage cut, in home-good units, that is required to draw more employment into the X_0 sector so as to compensate for the employment loss in the X_1 sector. If, however, $\alpha < \beta$, this problem does not arise.[14]

What is to happen in practice depends on the particular context or phase in which import competition occurs. If only a small share of C_1 is initially imported and if X_1 is a relatively labor-intensive activity or $\eta_1 > \eta_0$, we may get $\alpha > \beta$. In that case, the real wage constraint will be effective in preventing the achievement of full employment by means of exchange-rate policy and demand management alone. If, however, a relatively large share of C_1 is already imported and if labor intensities are about the same, then the share of C_1 in the consumption basket will be higher than the share of L_1 in employment, and we get $\alpha > \beta$. In that case workers may be induced to move into the home-goods industry by an increase in prices and wages due to an expansionary policy while the real consumption wage (w_c) also rises. The welfare gain of import competition will not be wasted.

How would the analysis change if the import price fall went together with expansion of the external market? What it means is that the D_f and D_0 curves both shift further to the right. An extreme case would be one in which export expansion compensated fully for the rise in imports. In figure 2.3 this is shown by curve D_f' which passes through point B. The current account will now balance at B. If there is no intervention in the commodity market, the corresponding equilibrium curve for home goods (D_0'') must lie to the right of B so that point B will be in the classical unemployment (C) region from the start. However, with excess demand in the commodity market, prices may be free to adjust upward, while the nominal wage remains downward rigid. Whether full employment can or cannot be reached will again depend on whether a real wage constraint has to be violated. In terms of figure 2.3 the question is whether prices must go through a point such as H on the w_c^0 line (in the case $\alpha > \beta$) on the way to equilibrium.

The same consideration applies to the question whether in the absence of exchange-rate adjustments demand management alone could return the system to equilibrium. The curve D_0 can always be pushed far enough to the right from B so that at given nominal wage inflation will reduce w/p_0 sufficiently to reach full employment on the D_L line. In addition to the problem of the current account, which requires suitable fiscal treatment, the feasibility of such a policy will depend on whether a real wage constraint is or is not violated.

2.2.1 Response under Different Regimes

So far we have analyzed the effect of an import price reduction starting from an equilibrium. If the economy is initially in the K region, the

adjustment difficulties are more pronounced *a fortiori*. The import price change would then increase excess supply in both the home-goods and the labor market. Things look slightly different if the initial point happens to be in the C region. Say the equilibrium set of curves is given by D_L, D_0', and LD_0' while the economy, initially at point C, moves to point B. Here, an import price fall removes the need for the upward adjustment in the domestic price level that would be required to eliminate excess demand in the home-goods market. However, in moving from point C to B unemployment increases just the same.

One would get the best of both worlds if the initial point happened to be in the R region, that is, if the economy started from an inflationary, generalized excess demand, situation. An import price drop, for example, a move from G to A, might serve to eliminate excess demand in both the commodity and labor markets, thus automatically producing an anti-inflationary result!

The effect of an import price change on excess demand under the various regimes is of some interest in itself. Consider first the effect on excess demand (supply) in the home-goods market. We have $\partial D_0/\partial p_1^* = cC_{0c}(\partial Y/\partial p_1^*) - (\pi/p_1^*)C_{0\pi} - \partial X_0^s/\partial p_1^*$. Calculating $\partial Y/\partial p_1^*$ for each of the regions C, K, R and denoting the labor share in X_1 by ϕ_1, we get

$$
(9)\qquad
\begin{aligned}
\frac{\partial Y^C}{\partial p_1^*} &= (\pi p_1^*)^{-1} X_1(1+\phi_1\eta_1) && > 0,\\
\frac{\partial Y^K}{\partial p_1^*} &= (1-cC_{0c})^{-1}\frac{\partial Y^C}{\partial p_1^*} && > \frac{\partial Y^C}{\partial p_1^*},\\
\frac{\partial Y^R}{\partial p_1^*} &= \frac{\partial Y^C}{\partial p_1^*} - \frac{1}{p_1^*}\frac{\partial X_0}{\partial L_0}\,\eta_1 L_1 && < \frac{\partial Y^C}{\partial p_1^*}.
\end{aligned}
$$

Now $\partial X_0/\partial p_1^* = 0$ for the C and K regions but $\partial X_0^s/\partial p_1^* = -(\partial X_0/\partial L_0)\,\eta_1 L_1/p_1^* < 0$ in the R region since in this case $X_0^s = X_0(L - L_1)$.

A reduction in p_1^* thus causes income to fall and excess supply to increase more in the K than in the C region. In the R region, income either falls by less or even increases, while the increase in X_0^s (which is due to relaxation of labor rationing) helps to reduce excess demand in the R region by more than in the C region ($\partial D_0^R/\partial p_1^* < \partial D_0^C/\partial p_1^*$ by [9]) thus bringing out the potential anti-inflationary role of import price reduction under generalized excess demand.

Next, consider the current account under alternative regimes. Differentiating $(p_1^* D_f)$ with respect to p_1^*, one gets, after some manipulation,

$$
(10)\qquad \frac{\partial(p_1^* D_f)}{\partial p_1^*} = cp_1^* C_{1c}\frac{\partial Y}{\partial p_1^*} - X_1(1+\phi_1\eta_1) + \pi^2 C_{0\pi}.
$$

Applying the value of $\partial Y/\partial p_1^*$ given in (9) to each of the three regimes, we can conclude that (*a*) a fall in p_1^* increases the current-account deficit under all three regimes (the derivative in [10] is always negative); and (*b*) the ordering of the regimes by the size of the deficit increment is $R > C > K$.[15]

The stronger anti-inflationary effect of an import price reduction under the R regime is thus obtained at the cost of a greater deterioration in the current-account deficit, a trade-off which makes intuitive sense. The effect on excess supply of labor coming from an import price drop is the same under all three regimes ($\partial D_L/\partial p_1^* = L_1\eta_1/p_1^*$) since, by assumption, producers in the X_1 sector are always on their notional demand curve for labor.

2.2.2 Tariff Changes

The discussion of import price changes as an anti-inflationary device seems somewhat artificial since a change in p_1^* is an exogenous change over which the economy usually has no control. Suppose, however, that one applies the same argument to a planned change in the domestic price p_1 through a reduction in an existing tariff. Inspection of the underlying model shows that a change in τ works in almost exactly the same way as a change in p_1^* except for its different quantitative effect on the current account. (A 1 percent drop in τ worsens the current account by more than a 1 percent drop in p_1^*. The same applies in reverse, to the imposition of a tariff.) However, the geometrical analysis (movement along a 45° line plus rightward shift of D_0 and D_f curves) for the home-goods and labor markets works in the same way.[16]

In a similar way one can analyze the effect of a tariff imposed in order to counteract the effect of a fall in p_1^*. This is analogous to a devaluation (a move back from B along a 45° line) except that a simultaneous upward shift takes place in curves D_f and D_0. The distortionary effects of a tariff are well known and need not be repeated here.

The upshot of this section is that the effect of import competition and the problems of adjustment cannot be treated without considering the regime in which the economy happens to be when this change takes place. It will help to alleviate an inflationary situation (in both markets in an R regime and in the commodity market in a C regime). It may aggravate an existing unemployment situation (in the K or C regime) if the wage rate or the real consumption wage is downward sticky. The additional unemployment originating in the import-competing sector cannot always be removed by Keynesian demand management policies. In principle, a change in the exchange rate can be used, in conjunction with demand management, to cure unemployment, but there is always a price to be paid in terms of inflation. If the real wage constraint is effective ($\alpha > \beta$), a return to full employment would also involve resource misallocation

since the adjustment to a new efficient labor allocation would then be prevented.

2.3 Supply Management and Capital Accumulation

How should the previous analysis be modified if the response of investment to changes in profits is taken into account?[17] Consider the initial experiment in which the import price falls, starting from equilibrium at A. The same forces that reduced employment in both sectors will also reduce profits and investment. This has two effects. One is a further downward pressure on aggregate demand (pushing the D_0 curve to the left), thus increasing excess supply in the home-goods and labor markets.[18] The other, long-run, effect is a fall in K_i, which reduces the optimum level of employment in both sectors. In terms of the general equilibrium picture this expresses itself in a downward pull on the D_L curve, thus exacerbating or creating unemployment. A similar analysis will hold if the economy is initially in the *C* region. Only in the *R* region could a fall in p_1^* bring about an *increase* in profits, just as it could lead to an increase in total income.

The effect on capital accumulation can be discussed in the wider context of supply management policy. As we have seen, import competition under wage (and price) rigidity leads to unemployment (except in the *R* region) which demand management and exchange-rate policy may not be able to solve effectively; or else it might lead to inflation. Policy measures which push up the full-employment line D_L may thus be called for. The simplest tool, in the short run, is a wage subsidy (or a reduction in employment tax) in the X_1 sector. This introduces a wedge between the product wage and the consumption wage and may enable producers to continue production of X_1 without loss. In terms of our model this implies a reduction in θ_1 and a corresponding upward shift in the D_L curve (as well as a rightward shift in the D_0 and D_f curves).[19] In principle, employment L_1 can be kept at its original level (with equilibrium at point *B*) if θ_1 is determined so that θ_1/p_1^* stays constant. This wage subsidy would be superior to a tariff because it avoids the distortionary tax on consumption of C_1 (see Johnson 1962; Bhagwati and Ramaswami 1963). However, it shares with the tariff the distortionary feature of freezing the productive structure (together with profits and the composition of investment).

Any measure that would help workers move out of sector X_1 into sector X_0 would be better. One candidate in the present context is a wage subsidy (or reduced employment tax) in the home-goods industry. This would decrease the product wage $\theta_0 w/p_0$ (without having to raise p_0) and thus increase X_0^s. In order to be effective, however, it must be coupled with expansionary measures or a devaluation.[20]

Another choice might be investment promotion measures to increase K_0 (e.g., investment credits). Some combination of supply management

on $X_0^s(\theta_0, K_0)$, with devaluation cum fiscal policy, might be superior. To make this statement more precise involves a more extensive analysis of intertemporal choice, which is beyond the scope of this paper. (For an analysis centered on long-run adjustment, see chapters 3 and 4 of this volume).

2.4 Structural Problems of the 1970s: An Interpretation

When one leaves the theoretical framework for a moment and considers the world developments of the 1960s and 1970s, two riddles present themselves. One has to do with empirical estimates of the effect of NIC exports on employment in industrial countries. Empirical studies have invariably shown that employment-replacement effects of NIC exports are minute.[21] If they are so small, what is all the fuss about? The second riddle, which may be connected with the first, has to do with the timing of the debate. It would seem that in the 1960s, when NIC export penetration was at its most rapid, the issue of internal adjustment was not a major policy concern in OECD countries; more recently, however, it has become a major issue—at a time when the rate of penetration appears to have slowed down.[22]

A partial answer to the first question lies in the distinction between net and gross employment effects. A specific sector may be very badly affected while the net employment effect on the economy as a whole may be small or even positive (in terms of our model, consider a combination of a fall in p_1^* and a substantial increase in Y^* and K_0).

Another answer, which also relates to the second question, is the crucial role played by the general economic environment in which import competition takes place. During much of the 1960s and until 1973 industrial economies enjoyed rapid expansion of both productive capacity and external trade opportunities. More often than not, industrial economies found themselves in the $\bar{R}$ regime. Even if the business cycle would now and then throw an economy into a $\bar{K}$ regime, unemployment was never very prolonged and it was Keynesian—it could be eliminated by pure demand expansion[23] Moreover, it may be that investment behavior anticipated the need to adjust to changes in relative prices; in any event, such adjustments are easier to make when the system is expanding. The events of 1973–74 came as an unexpected shock to the system and started a period of prolonged unemployment, a good part of it classical. Under such conditions import competition imposes an extra strain on a system which is already stuck with a structural adjustment problem.

Our model can be modified so as to illustrate this point. Let us introduce an imported intermediate input N into the production of the home good; its international price is p_n^* and its relative price $\pi_n = p_n^*/p_1^* = p_n/p_1$ (with $\tau = 1$). Suppose the intermediate input and labor are cooperant factors.[24] In the labor market an increase in p_n^* will work like an

increase in θ_0: it will shift the D_L curve downward (see D_L' in figure 2.4). In the commodity market the increase in p_n^* will show as a shift to the right of the D_0 curve (see the move from D_0 to D_0' in figure 2.4).[25] Both these changes shift the economy from an initial equilibrium at A into the C region (relative to the new Walrasian equilibrium at E in figure 2.4). If at the same time world demand contracts and investment demand falls (in response to lower profitability in the X_0 industry), or if demand policy is contractionary, the D_0 curve may shift to the left by more than the impact effect of p_n (move to D_0'' in figure 2.4). In that case the economy may find itself in the K region (see A relative to F), but it is important to stress that the resulting unemployment is only partly Keynesian; i.e., given real wage rigidity, pure expansionary policy may fail to restore full employment.

If import competition in X_1 is superimposed on this situation, it only magnifies the existing structural problem. In terms of the analysis of the labor market (figure 2.1), this can be shown as follows: output in the X_0 sector is now constrained along the curve $X_0'^d$, with employment L_0 at point M.[26] The notional labor demand curve has shifted to the left (L_0'). Total unemployment (MC) at the nominal wage level w^0 now consists of some purely Keynesian unemployment (MN), classical unemployment originating in the home-goods industry (NA), and some unemployment from the X_1 industry (AC). In both types of external shock it is supply management policy that may be called for.

This brief discussion may help to show why import competition has played a leading role in policy discussions in the industrial countries in recent years, a role quite out of proportion to its real long-run relative importance.

One final qualification—we have assumed all along that import competition takes place in final goods while the rise in import prices was confined to intermediate goods. This seems, by and large, an empirically reasonable assumption to make, since the bulk of export penetration is in final goods. However, where there is also import competition in intermediate goods (e.g., steel or paper), the same framework can be turned round to show that a price drop may in fact increase total employment.[27]

Appendix

Slope of the D_0 Curve

Differentiating $D_0 = X_0^d - X_0^s$ (as defined in [3] and [4]) by π, we have

$$\partial D_0/\partial \pi = cC_{0c}\,\frac{\partial Y}{\partial \pi} + C_{0\pi} + E_{0\pi} - X_{0\pi}\,. \tag{A1}$$

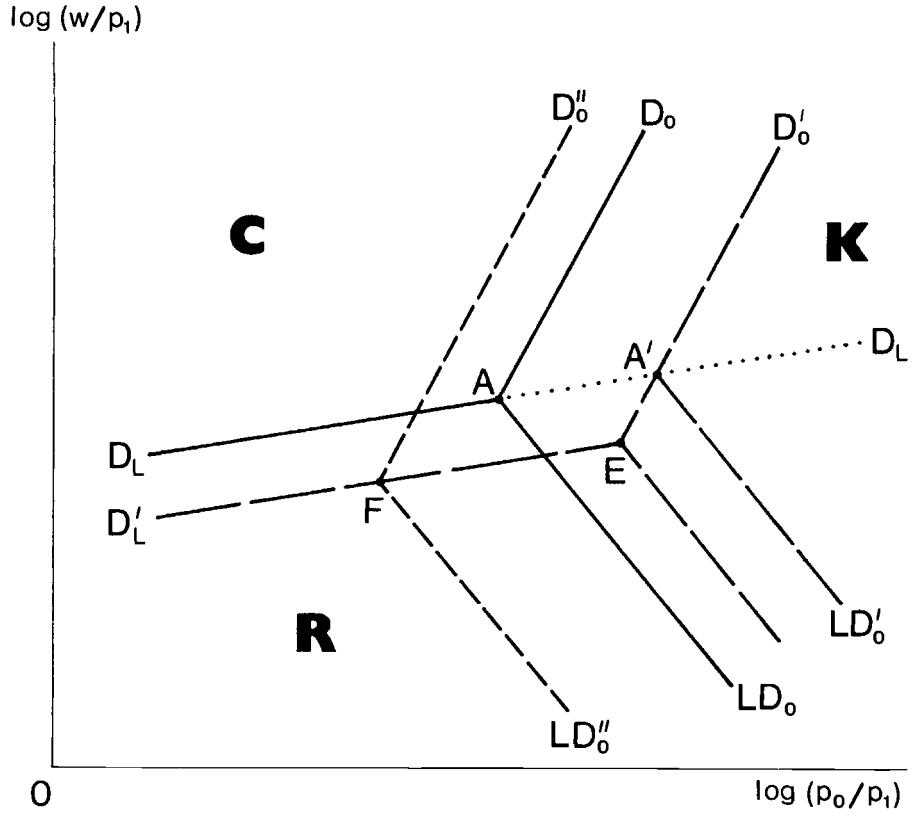

Fig. 2.4

Now $X_{0\pi} = X_0\phi_0\eta_0/\pi$, and since, in the unconstrained case, $Y = X_0[L_0(w_1/\pi)] + X_1(w_1)/\pi_1$, we have

(A2) $$\partial Y/\partial \pi = X_{0\pi} - X_1/\pi^2 = (X_0\phi_0\eta_0 - X_1/\pi)/\pi,$$

where ϕ_0 is the elasticity of X_0 with respect to L_0 and η_0 is the demand elasticity of L_0 with respect to w/p_0. Also, $E_{0\pi} < 0$, $C_{0\pi} < 0$, by assumption, and thus

(A3) $$\partial D_0/\partial \pi = -\pi^{-1}[cC_{0c}X_1/\pi + (1 - cC_{0c})X_0\phi_0\eta_0] + C_{0\pi} + E_{0\pi} < 0.$$

Similarly, since $X_{0w_1} = -L_0\eta_0/\pi$ and $X_{1w_1} = -L_1\eta_1$,

(A4) $$\partial Y/\partial w_1 = -(L_0\eta_0 + L_1\eta_1)/\pi < 0$$

and thus

(A5) $$\partial D_0/\partial w_1 = cC_{0c}\left(\frac{\partial Y}{\partial w_1}\right) - X_{0w_1}$$

$$= [(1 - cC_{0c})L_0\eta_0 - cC_{0c}L_1\eta_1]/\pi.$$

It follows that $\partial D_0/\partial w_0 > 0$ iff $cC_{0c}/(1 - cC_{0c}) < L_0\eta_0/L_1\eta_1$ or iff $cC_{0c} < \beta$, where $\beta = (L_0\eta_0 + L_1\eta_1)^{-1} L_0\eta_0$ (see section 2.1.3). When this condition holds, we also have

(A6) $$\left.\frac{\partial \log w_1}{\partial \log \pi}\right|_{D_0}$$

$$= -\frac{\pi}{w_1}\,\frac{\partial D_0/\partial \pi}{\partial D_0/\partial w_1}$$

$$= \frac{(1 - cC_{0c})X_0\phi_0\eta_0\pi + cC_{0c} - C_{0\pi} - E_{0\pi}}{w_1[(1 - cC_{0c})L_0\eta_0 - cC_{0c}L_1\eta_1]} > 1.$$

This is easily seen by recalling that $\phi_0 = w_1L_0/\pi X_0$.

Slope of the D_f Curve

Differentiating D_f in equation (5) with respect to π, we have

(A7) $$\partial D_f/\partial \pi = cC_{1c}\left(\frac{\partial Y}{\partial \pi}\right) + C_{1\pi} - \tau(E_0 + \pi E_{0\pi}).$$

Now $C_{1\pi} > 0$ and $E_0 + \pi E_{0\pi} < 0$ by assumption. By (A2), $\partial Y/\partial \pi > 0$ if $\phi_0\eta_0 > X_1/\pi X_0$. This is an empirically reasonable assumption. At any rate, it is a sufficient (but by no means necessary) condition for $\partial D_f/\partial \pi > 0$.

Next,

(A8) $$\partial D_f/\partial w_1 = cC_{1c}\,\frac{\partial Y}{\partial w_1} - X_{1w_1}$$

$$= (1 - cC_{1c}/\pi)L_1\eta_1 - (cC_{1c}/\pi)L_0\eta_0.$$

Thus $\partial D_f/\partial w_1 > 0$ iff $(1 - cC_{1c}/\pi)/(cC_{1c}/\pi) > L_0\eta_0/L_1\eta_1$ or iff $(1 - c) + cC_{0c} < \beta$ (see section 2.1.5). If both derivatives are positive, we get

$$\left.\frac{\partial(\log w_1)}{\partial(\log \pi)}\right|_{D_f} < 0.$$

The sign of the slope of D_f outside the C region is unambiguously negative. In the K region, we have $Y = X_0^d + X_1/\pi$ and thus $\partial Y^K/\partial w_1 = -L_1\eta_1/\pi(1 - cC_{0c}) < 0$ and $\partial Y^K/\partial \pi = (-X_1/\pi^2 + C_{0\pi} + E_{0\pi})/$

$(1 - cC_{0c}) < 0$. Then $\partial D_f/\partial w_1 = (1 - c)\eta_1 L_1/(1 - cC_{0c}) > 0$ and $\partial D_f/\partial \pi = [C_{1\pi} - (\tau E_0 + \pi E_{0\pi})](1 - \lambda) - (\tau - 1)\pi E_{0\pi}$, where $\lambda = (cC_{1c}/\pi)/[(1 - c) + cC_{1c}/\pi] < 1$. Thus $\partial D_f/\partial \pi > 0$ unambiguously in the K region and the slope of D_f must be negative. If D_f happens to pass through the R region (e.g., if D_f is shifted to the left in figure 2.2), a similar analysis shows that its slope is negative in that region too.

Relative Shifts of D_0 and D_f When p_1^* Changes

Let us denote by $(\partial \pi^{D_0}/\partial p_1^*)$ the shift of D_0 along the π axis due to a change in p_1^*. We get

$$\frac{\partial D_0}{\partial \pi} \frac{\partial \pi^{D_0}}{\partial p_1^*} + \frac{\pi E_{0\pi}}{p_1^*} = 0. \tag{A9}$$

Similarly,

$$\frac{\partial D_f}{\partial \pi} \frac{\partial \pi^{D_f}}{\partial p_1^*} - \pi\tau \left(\frac{\pi E_{0\pi}}{p_1^*}\right) = 0. \tag{A10}$$

Multiply (A9) by $\pi\tau$ and add to (A10) to get

$$\pi\tau \frac{\partial D_0}{\partial \pi} \frac{\partial \pi^{D_0}}{\partial p_1^*} + \frac{\partial D_f}{\partial \pi} \frac{\partial \pi^{D_f}}{\partial p_1^*} = 0,$$

and therefore

$$\frac{\partial \pi^{D_0}}{\partial p_1^*} = -\frac{1}{\pi\tau} \left(\frac{\partial D_f/\partial \pi}{\partial D_0/\partial \pi}\right) \frac{\partial \pi^{D_f}}{\partial p_1^*}. \tag{A11}$$

Now, from (A1) and (A7) we find $\partial D_0/\partial \pi + \pi^{-1}(\partial D_f/\partial \pi) = \pi^{-2}[(1 - c)(X_1 - \pi X_0 \phi_0 \eta_0) + E_{0\pi}(1 - \tau)] < 0$ for τ sufficiently close to 1, and assuming $\partial Y/\partial \pi > 0$ as before. Thus $-\partial D_0/\partial \pi > \pi^{-1}(\partial D_f/\partial \pi) \geq (\pi\tau)^{-1}(\partial D_f/\partial \pi)$. Therefore in (A11) $\partial \pi^{D_0}/\partial(p_1^*) > \partial \pi^{D_f}/\partial(p_1^*)$. Q.E.D.

Notes

1. See Helpman (1976), Bruno (1976), Brecher (1978), and Rødseth (1979) for applications of such a model in a Walrasian general-equilibrium setup. Neary (1980) has recently given a disequilibrium formulation of such a model along the lines of Malinvaud (1977). A similar approach also underlies Bruno and Sachs (1979). See also Liviatan (1979).

2. For simplicity we here assume there is no G_1 and I_1 in the X_1 sector, although these could easily be incorporated.

3. We shall show later that this is augmented by an additional contractionary effect on the demand for home goods (AB in figure 2.1).

4. This assumption could be relaxed; see Hanoch and Fraenkel (1979).

5. E.g., if $c = 0.8$, $C_{0c} = 0.9$, $C_{1c}/\pi = 0.1$, it will hold so long as $L_1\eta_1/(L_0\eta_0) < 0.39$, i.e., even if X_1 is very labor-intensive relative to X_0.

6. The alternative, with the above inequalities reversed, leads to a negatively sloped D_0 curve. This causes no particular problem, but will not be dealt with here.

7. This can be seen as follows from figure 2.1: a fall in X_0^d can be represented as a leftward shift of the vertical line X_0^d from the previous equilibrium point A to B (at given nominal wage w^0). Effective labor demand for L_0 is no longer represented by the demand curve L_0 (which will anyway shift up with a rise in p_0). Equilibrium in the labor market can take place only at the point H, where the nominal wage is below the marginal value product in the X_0 industry.

8. This would be the underconsumption (U) region in the terminology of Muellbauer and Portes (1978). The notation K, C, and R is taken from their paper.

9. If part of L_1 were also rationed, the continuation of the D_0 curve would lie to the left of LD_0 with the R region correspondingly truncated.

10. When c is close to 1, this is the same condition as in section 2.1.3, but there is no presumption that it is so here.

11. The only way in which rationing does come in is through the effect of various regimes on the income response, and thus on the demand for C_1 (see section 2.2).

12. For the moment we also assume that the external market (Y^*) remains unchanged.

13. In the labor market (figure 2.1) a fall in p_1 to p_1' will reduce the minimum nominal wage, which is consistent with a fixed real consumption wage, from $w^0 = Ap_0^{\alpha} p_1^{1-\alpha}$ to $w' = Ap_0^{\alpha}(p_1')^{1-\alpha} < w^0$. At given p_0 and w' and with equilibrium in the home-goods market, unemployment would be EF (this corresponds to the intersection of D_0'' and w_c^0 in figure 2.3).

14. When the expenditure elasticity for home goods is close to unitary and wage earners' consumption is representative of total household consumption, we have $\alpha \simeq C_{0c}$. The difference between the condition on the slope of w_c^0 and that on the slope of D_0 (see section 2.1.3) will thus depend mainly on how far c falls short of unity. The assumption $cC_{0c} < \beta$ and the case $\alpha > \beta$ are not mutually exclusive.

15. E.g., for the K regime we find, after substitution from (9), that $\partial(p_1^* D_f)/\partial p_1^* = \pi^2 C_{0\pi} - (1 - cC_{0c})^{-1}(1 - c)(1 + \phi_1\eta_1) < 0$ (since $C_{0\pi} < 0$). The rest follows from the fact that $\partial Y^R < \partial Y^C < \partial Y^K$.

16. In this case one has to assume a compensatory adjustment in direct taxes T_d so as to keep total tax receipts T constant.

17. We again ignore changes in real money balances.

18. We here ignore the reverse pull of new investment directed toward NICs.

19. Again it is assumed that T stays constant; thus T_d must be increased so as to finance the subsidies (or the reduction in employment tax). In terms of figure 2.1 curve L_1' will shift back.

20. The expansion must not only compensate for the fall in demand (X_0^d), but also take up the extra slack entailed by an increase in X_0^s. In terms of figure 2.3, D_L may be pushed up to pass through point B while demand management shifts D_0 to D_0''. Alternatively, one can devalue from B to C or C' and use wage subsidies to push the D_L curve up to pass through one of these points.

21. This literature is summarized in a recent OECD report (1979). See also Baldwin, Mutti, and Richardson (1978) and Krueger (1979).

22. Between 1963 and 1973 the share of NICs in OECD imports of manufactures increased from 2.6 to 6.8 percent. The figures for the following years, 1974–77, are, respectively 7.1, 6.8, 7.9, and 8.1 percent (see OECD 1979, p. 23, table 4).

23. In figure 2.4 the point A' relative to equilibrium at A is in the K region, but a shift from D_0 to D_0' returns the system to full employment. This would not be so if Walrasian equilibrium were, for example, at point E.

24. For a fuller discussion of such a model, see Bruno and Sachs (1979). The disequilibrium formulation of that model is analyzed in an unpublished working paper by the present author.

25. An increase in p_n^* shifts X_0^s supply downward. Similarly, real income will now fall [it is now measured as $Y = X_0(1 - \mu\pi_n/\pi) + X_1/\pi$, where μ is the intermediate import ratio]. With a sufficiently strong supply effect, D_0 shifts to the right, as with an increase in θ_0.

26. There are now two variable inputs in the X_0 sector, and it can be shown that cost minimization at a given output level gives a downward sloping output-constrained labor-demand curve which is steeper than the notional L_0 demand curve but is not vertical unless intermediate inputs are used in fixed proportions.

27. In this case the fall in L_1 must be weighed against an increase in L_0 coming from gross complementarity of a variable input whose price has dropped. The net effect on total employment is an empirical matter.

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Comment J. Peter Neary

Anyone interested in macroeconomic theory who crosses the Atlantic these days suffers not merely from jet lag but from a strong sense of intellectual dislocation, such are the differences between the two continents in the accepted ground rules for macroeconomic debate. Michael Bruno's extremely rich and interesting paper has spared me some of this sense of dislocation, but since the "disequilibrium" (or, more accurately, "temporary equilibrium with rationing") approach which he pursues is much less acceptable to North American audiences, I want to begin by making some general comments on this class of models.

The main target for criticism of these models is of course their assumption of fixed prices. Whenever I am asked, "Who sets prices?" in such a model, I am tempted to reply facetiously that prices are set by—a little green man! This is no ordinary little green man, however, but the same one who in many other models moves prices costlessly and instantaneously to their Walrasian or market-clearing levels, except that he is on an off day! In other words, I know of no macromodel which provides a satisfactory choice-theoretic basis for its assumptions about price determination. Devotees of an efficient Walrasian auctioneer do not have a monopoly of virtue in this field and tend to forget that "tâtonnement" literally means "groping," which may be many things but is certainly not instantaneous.

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The same point may be made differently using a parallel which should appeal to specialists in international economics. In the literature on devaluation theory a great many papers assume that external payments are initially balanced. Naive commentators sometimes suggest that these models are fatally flawed, for why would an economy which starts off in external balance ever have recourse to devaluation? But this criticism is of course misplaced, since the same analysis applies whatever the initial situation. Starting in a situation of payments imbalance may introduce some additional complications (as pointed out, for example, in the note by Hanoch and Fraenkel 1979 cited by Bruno), but the gain in analytic clarity of assuming initial balance more than outweighs the loss in realism. In the same way, although the fixed-prices models do in fact pick prices out of the air, it is unfair to interpret this literally. Rather, they should be seen as examining a snapshot of a dynamic economy in which the current wage-price vector is inherited from the past, perhaps from an earlier Walrasian equilibrium which was disturbed by exogenous forces. Although wages and prices do not respond immediately, pressures to change them will build up over time, and in the medium run they are likely to converge toward a new Walrasian equilibrium. However, before this happens (and there is as yet virtually no basis in economic theory for asserting how long the process will take) there is plenty of time for the short-run phenomena emphasized by Michael Bruno to take their course.

In opposition to these arguments there is, especially in North America, a widely held view that rapid, if not instantaneous, price adjustment is an almost inevitable concomitant of rationality and, in particular, of rational expectations. However, I would argue that these are two quite distinct issues. For example, in a paper by Joe Stiglitz and myself it is shown that, if prices are fixed and expected to remain so, not only will agents face quantity constraints today but rational agents will foresee constraints in the future, and such perfect foresight—or "rational constraint expectations" as we call it—enhances rather than emasculates the effectiveness of perfectly anticipated government policy. (Of course, not everyone is convinced by the model in that paper—indeed, since it assumes that prices are fixed both now and for the rest of time, a monetarist colleague of mine, Colm McCarthy, has dubbed it a model of Albania!)

As for the argument that rational expectations in themselves will lead either to instantaneous price flexibility or, more subtly, to rational fix-price contracts which fully embody all available *ex ante* information leaving no role for discretionary policy, this appears to me to reflect an unconvincing jump from one level of reasoning to another. Rationality of expectations or its absence is an assumption about individuals and their perceptions, whereas the process of price formation reflects a much wider range of institutional features, including the rate at which information is disseminated between, and the incentives for coordinating the actions of,

atomistic agents. In an infinitely repeated steady state it is conceivable that market institutions which come to reflect rational expectations will embody price flexibility, and the conditions under which this will occur are an important topic for research; however, in the moving temporary equilibria with which macroeconomics must be concerned there is no logical reason why one should imply the other.

Turning at last to Michael Bruno's paper itself, it is one of a growing number which apply the Barro-Grossman-Malinvaud approach to an open economy. In trying to compare it with other contributions, I found it helpful to ask the question, Does Bruno's model describe a small open economy? At one level the answer is trivially no, for Bruno explicitly assumes that the "home" good X_0 is an imperfect substitute for a foreign good and that the level of exports of X_0 is a decreasing function of their relative price. Bruno's economy can thus in principle influence its terms of trade, which distinguishes it from the disequilibrium models of Dixit (1978), Liviatan (1979), Kennally (1979), Neary (1980), and Steigum (1980), in which the world prices of all traded goods are assumed to be parametric. However, while Bruno's assumption of some monopoly power in export markets may well be more appropriate, even for relatively small economies such as Ireland or Israel, I do not believe that this is a crucial feature of his model. In the first place all prices in his model are fixed over the short-run horizon which he considers, so that the terms of trade do not in fact change endogenously, even in response to substantial excess supply of exports. Second, the implications of his model would be unaffected if he assumed that the world price of X_0 was exogenously given, but replaced the export demand function in equation (3) by an exogenous export sales constraint $\bar{E}_0$. This draws attention to the fact (which also emerges from Steigum's model) that there are two distinct dimensions to the usual assumption of a small open economy: first, world prices of traded goods are fixed, and second, it is possible to buy or sell an infinite amount at these prices (i.e., there are no export sales or import supply constraints). Putting this another way, the familiar device of aggregating exportables and importables into a composite traded good requires that their *shadow* prices to domestic agents rather than their market prices stand in fixed proportions to one another, and this will not be the case if agents face quantity constraints. Thus it is the presence or absence of quantity constraints, rather than the fixity or variability of prices, which determines whether disequilibrium phenomena will emerge in traded goods markets. Of course, it is possible to retain both components of the small-open-economy assumption and still generate goods-market disequilibrium by postulating a purely nontraded good whose price is sticky. This is the approach adopted in my own paper, and except for this difference in interpretation and some relatively minor differences in specification (for example, I assume that profits are not redistributed

instantaneously, that labor supply is endogenous, and that savings are not separable from commodity expenditures), the two models are extremely similar.

Another way of putting Bruno's paper in perspective is to compare it with similar models of a broadly "neoclassical" kind. Doing this makes it clear that many models share the same basic structure, however we may label them: for example, the condition derived by Bruno in his appendix for the effect of an increase in wages on the excess demand for home goods has also been derived by Helpman (1977) and Noman and Jones (1979) in two papers which ignore explicit disequilibrium considerations such as Clower's dual decision hypothesis and simply append a rigid wage to an otherwise orthodox neoclassical model. Moreover, these models are actually more similar than Bruno's to that of Dixit, which, though it pays careful attention to the consequences of quantity constraints, exhibits extremely "classical" properties, since all goods can be freely traded at fixed world prices. Indeed, there seems to be a general principle operating here, reminiscent of the general theory of the second best: the failure of one market to clear by price adjustment in an otherwise neoclassical environment (as in the models of Dixit, Liviatan, and Kennally) does not of itself give rise to distinctively disequilibrium properties. Rather, it takes at least two sets of quantity constraints to produce these, and it is the simultaneous relaxation of quantity constraints on two sets of agents which gives rise to such quintessentially disequilibrium phenomena as the Keynesian (or perhaps I should say "neo-Keynesian") demand multiplier.

While I am extremely sympathetic to Michael Bruno's model in general, I have some reservations about his treatment of investment. Like Pentti Kouri I found the inclusion of real balances in the investment function as "a proxy for the negative effect of the rate of interest" somewhat unconvincing. More satisfactory methods of endogenizing investment would be either to include a bond market with an explicit interest rate or to try to model the firm's intertemporal decision problem (the approach explored in Neary and Stiglitz 1982). The latter method would also avoid an implication of Bruno's model that investment decisions are unrelated to firms' production decisions and in particular are independent of the regime which prevails in the current period. Dropping this feature of the model would permit a regime of "underconsumption" in which firms were rationed on both labor and goods markets. (Of course, proliferation of regimes is not desirable in itself, but the failure to allow for an underconsumption regime can lead to problems in studying price dynamics, problems which I believe to be of more mathematical than economic interest.) Allowing investment to be regime-dependent would also avoid the implication that it is always profit-constrained. With persistent Keynesian unemployment, or when firms have pessimistic

expectations, we would expect desired investment to fall below the profit-constrained level, which would eliminate the additional depressive effect of a fall in import prices mentioned in section 2.3.

Finally, the policy implications of Bruno's model, as with many other disequilibrium models, are very similar to those of traditional Keynesian analysis, though with more satisfactory microfoundations and more careful consideration of the circumstances in which particular policy measures are or are not appropriate. Thus one of his main conclusions, that adjustment is easier when labor and commodity markets are tight, is hardly novel; however, it derives new force from being expressed in terms of a contrast between an economy alternating between states of Keynesian unemployment and repressed inflation, and one pushed deeply into classical unemployment by large exogenous rises in input prices. As far as the specific topic of this conference is concerned, Bruno adds a third justification for adjustment assistance to the allocative and distributional arguments which have been put forward in other papers—namely, the use of adjustment assistance as a supplement to macroeconomic policies in the presence of wage and price rigidities. This may well come closest to a positive economic explanation of why adjustment assistance has been provided in practice, but any attempt to base a welfare-theoretic case for adjustment assistance on it brings us back to the question of how wages and prices are set in the first place, which has been extensively discussed in earlier sessions. As with so many other things, it all depends on what you believe about the little green man!

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