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low levels: total real credit to the private sector was 11.7 percent lower in 1986 than in 1978, and the share of M4 in GDP was at its lowest level since 1965. Finally, private investment was further depressed by the manner in which fiscal cuts were achieved. No doubt a substantial reduction in parastatal investment spending was necessary, but investment expenditures for infrastructure capital were also severely slashed. As many types of infrastructure capital enhance the productivity of private sector capital, the latter cutbacks, like import compression and the reduction in bank lending, lowered the profitability of private investment.

Once investment declines, it is easy for the economy to slip into a downward spiral in which capital decumulation, rising inflation, and growing fiscal deficits become mutually reinforcing. As lower investment rates take their toll on the capital stock, output declines and inflation accelerates. For a given level of real government expenditures, the decline in real output widens the fiscal deficit by lowering real tax revenues. If the larger deficit is financed by printing money, inflation rises further (the budget is "balanced" by the inflation tax), triggering a new round of financial disintermediation and capital decumulation. If an attempt is made to contain inflationary pressures by covering the revenue shortfall through greater bond sales, the bond rate jumps upward and again the outcome is further financial disintermediation, capital decumulation, and intensified inflationary pressures.

In the next two chapters, formal theoretical models are developed in an attempt to gain a fuller understanding of the factors that seem to be driving the Mexican economy into a low growth, low real wage, high inflation, high underemployment equilibrium. In chapter 6 I analyze the repercussions of import compression on real wages and underemployment, while chapter 7 is an investigation of the links between capital accumulation, inflation, fiscal deficits, and financial disintermediation.

6 Import Compression, Real Wages, and Underemployment

Perhaps the most striking aspect of the post-1982 adjustment process has been the imposition of an extreme and unprecedented degree of import compression upon the private sector. Highly restrictive quotas were placed on imports of all types between 1982 and 1984 as part of a comprehensive stabilization program aimed first and foremost at eliminating the current account deficit. On 25 July 1985, a large number of quotas were eliminated, but, until very recently, import controls (licenses, high "reference" prices

and domestic content requirements) were widespread. Even now that liberalization is quite far along, a severely depreciated peso has kept the import volume heavily depressed.

In this chapter, I construct a simple model showing how import quotas affect the price level, underemployment, and the payments balance. The model suggests that import compression has been one of the critical causal factors underlying the post-1982 slide into low growth, declining real wages, and worsening underemployment. Under very weak conditions, a tighter quota on imported inputs used by the protected (or nontradables) manufacturing sector produces open unemployment in the short run. Over time, open unemployment diminishes and is eventually eliminated altogether as the nominal (and real) wage outside the manufacturing sector declines. Even in the long run, however, the contractionary effects of import compression do not fully disappear; if the import restrictions are maintained, the economy settles into a new steady-state equilibrium characterized by permanently higher underemployment and lower real output.

The economy is not necessarily recompensed for tolerating high underemployment and low real wages by a strong improvement in the trade balance. In fact, if quotas are highly restrictive (in the sense of generating large implicit tariffs) and nontradables and tradables are relatively good substitutes in consumption, the trade balance worsens. This is, perhaps, an extreme result, but it serves to underscore the point that the cumulative trade surplus generated by a prolonged recession may be disappointingly small. This seems to be roughly consistent with recent Mexican experience: sizable trade surpluses were achieved in 1983 and 1984, but payments difficulties resurfaced by the end of 1985, when the economy was still deeply mired in recession.

In section 6.3 I demonstrate that higher internal energy prices are also likely to have contributed to the protracted post-1982 recession. An increase in the domestic price of oil exacerbates underemployment in much the same fashion as import compression. The overall impact on output and the payments balance may be either positive or negative depending on how the magnitude of the loss from a more severely distorted labor market compares to the direct efficiency gain brought about by reducing the gap between the domestic and world market price of oil.

Given the difficulties associated with using import restrictions to redress payments deficits, it is natural to ask whether other policies offer more favorable macroeconomic tradeoffs. This issue is tackled in sections 6.4 and 6.5, where the effectiveness of devaluation and export subsidies is analyzed. Devaluation succeeds in improving the trade balance but is contractionary: real output always declines, and if tradables sector technology is relatively inflexible, the adjustment process entails open unemployment and declining real wages over the short and medium run. Export subsidies usually exert a more favorable effect upon labor demand and have the potential to simul-

taneously improve the payments balance and reduce underemployment provided they are financed by tax increases.

6.1 A Simple Macroeconomic Model With Import Quotas

The main message I wish to convey is that import compression gives rise to severe macroeconomic problems largely through adverse effects operating on the supply side. Accordingly, the model that follows has a very simple macroeconomic structure along the lines of models found in the monetary approach to the balance of payments (Dornbusch 1973, 1974; Frenkel and Johnson 1976). The economy produces two goods, a nontraded/quota-protected manufactured good and an export good. (An exogenous, oil-earning sector may be added to the model, in which case the economy may be a net importer of the so called "export" good.) Each good is produced by labor, a noncompetitive imported input, and fixed, sector-specific capital under conditions of constant returns to scale. Consumer imports have already been banned (or are negligible), so that when balance of payments problems arise, foreign exchange rationing necessarily entails a reduction in imports of intermediate inputs.[1] (In 1986, consumer imports were 5.5 percent of total private sector imports.) There is no government sector, no banking system, and no capital accumulation. In addition, it is assumed that all wealth is held in the form of high-powered money; nothing substantive changes if domestic residents are also permitted to hold a foreign currency denominated asset.

The economy is small in world markets, and units are chosen so that all world market prices equal unity. The peso price of the export good, P_x, thus equals the exchange rate, e:

$$P_x = e. \tag{1}$$

Firms in each sector are perfectly competitive. Perfect competition together with constant returns to scale implies that the zero profit condition obtains:

$$P_i = C^i(w^i, g^i, r^i), \quad i = n,x, \tag{2}$$

where C^i, w^i, g^i, and r^i are, respectively, the unit cost function, the nominal wage, the price of the imported input, and the capital rental in sector i. Different g^i are specified in order to allow for the possibility that quotas will be imposed in one sector but not the other; in particular, many governments appear to find the direct but naive policy of rationing imported inputs to the nontradables sector—the sector that does not earn foreign exchange—to be an attractive method of treating a payments deficit.

The wage also differs across sectors. This reflects the functioning of a dualistic labor market. In the protected manufacturing sector, the bargaining

power of unions or adjustments in a binding minimum wage ensure that the nominal wage responds at least partially to general increases in the price level:

$$\hat{w}^n = \alpha(\gamma_n \hat{P}_n + \gamma_x \hat{P}_x), \quad \gamma_x + \gamma_n = 1, \quad \alpha \leq 1, \tag{3}$$

where γ_i is the consumption share of good i; α is the wage indexation parameter, and a circumflex denotes the percentage change in a variable. I treat α as an exogenous, politically determined variable and characterize later results in terms of cuts in the real wage required to avoid a worsening in underemployment. It would be preferable, of course, to have a more complete model in which α was determined endogenously. Unfortunately, empirical knowledge about the wage-setting process in Mexico is very limited and does not permit one to choose with much confidence any of the competing theories of wage rigidity (implicit contracts, the efficiency wage hypothesis, optimizing unions, etc.).

Although wage rigidity is not confined exclusively to the protected manufacturing sector, it is clear that labor markets are considerably more competitive elsewhere in the economy. In 1977 average earnings of agricultural laborers were 34 percent of those in the industrial sector and 70.8 percent of the labor force in agriculture earned less than the minimum wage.[2] In view of these stylized facts, I assume both that w^x is substantially below w^n and that w^x adjusts so as to clear the labor market.[3] The degree of wage flexibility in the export sector, however, is asymmetric; w^x rises instantaneously to eliminate any excess demand but is inflexible in the downward direction, declining slowly in response to the pressure created by open unemployment:

$$\dot{w}^x \Big|_{L^x + L^n < L} = \beta(L^n + L^x - L), \quad \beta > 0, \tag{4}$$

where L^i stands for employment in sector i, L is the fixed supply of labor, and an overdot signifies a time derivative.

Employing Shephard's lemma, the sectoral labor demands may be stated as

$$L^i = C^i_w Q^i, \tag{5}$$

where Q^i is output in sector i. Similarly, the market-clearing conditions for the sector-specific capital stocks, K^i, and the sectoral allocation of imported inputs, I^i, are

$$K^i = C^i_r Q^i \tag{6}$$

$$I^i = C^i_g Q^i. \tag{7}$$

Equations (1)–(7) characterize supply behavior. The remaining equations complete the model by specifying the demand side of the economy and the dynamics of wealth accumulation.

Preferences are homothetic, and demand depends upon prices and total consumption expenditure, E. P_n fluctuates to continuously clear the market:

$$D^n(P_n, P_x, E) = Q^n . \tag{8}$$

Expenditure, by definition, is the difference between income, Y, and savings, S:

$$E = Y - S, \tag{9}$$

where income is the sum of private sector value-added and import premiums accruing to license holders:

$$Y = R(P_n, P_x, g^x, g^n, L^n, L^x) + (g^x - e)I^x + (g^n - e)I^n . \tag{10}$$

R is the private sector value-added function and possesses the properties: $\partial R/\partial P_i = Q^i$, $\partial R/\partial g^i = -I^i$, $\partial R/\partial L^i = w^i$.

Finally, saving is motivated by the difference between the desired and the actual stock of wealth. In the current model, wealth is held entirely in the form of domestic money, M. Assuming desired wealth is a fixed multiple, h, of income, the savings function takes the form

$$S = \Phi(hY - M), \quad \Phi > 0. \tag{11}$$

The nominal money stock is fixed in the short run but changes over time through the trade balance, B. From (9) and (10):

$$\dot{M} = B = S. \tag{12}$$

Equation (12) is the classic specie-flow mechanism: the trade balance is the vehicle through which saving brings the actual stock of wealth into equality with its desired level.

6.2 Import Compression

Suppose the government finds itself faced with increased debt service obligations and attempts to engineer a series of trade balance surpluses by restricting the supply of imported inputs to firms operating in the nontradables sector. The rationale typically put forward on behalf of this policy is that the imposition of quotas is less inflationary than a comparable devaluation of the currency (though this is far from obvious) and that the export sector should be exempt from restrictions since it processes imported inputs in order to earn foreign exchange. What, if any, are the merits of this argument?

To figure out the repercussions on employment and prices, differentiate (5) and utilize Uzawa's result that $\sigma_{ij} = C_{ij}C/C_iC_j$, where σ_{ij} is the Allen partial elasticity of substitution between factors i and j. While it is not difficult to work out a set of fully general results, little of interest is lost if, for algebraic simplicity, production functions are assumed to be separable between primary factors and imported inputs, viz.: $\sigma_{LI} = \sigma_{KI} = \sigma_{VI}$, where σ_{VI} is the elasticity of substitution between value-added and imported

inputs. Letting θ_j^i represent the cost share of factor j in sector i, in the appendix to this chapter I show that in the separable case

$$\hat{L}^n = a_1\hat{P}_n - a_2\hat{g}^n \tag{13}$$

$$\hat{I}^n = b_1\hat{P}_n - b_2\hat{g}^n, \tag{14}$$

where

$$a_1 \equiv [1 - \alpha\gamma_n(1 - \theta_I^n)][\sigma_{LK}^n(1 - \theta_I^n) + \sigma_{VI}^n\theta_I^n]/\theta_K^n > 0$$

$$a_2 \equiv \theta_I^n[\sigma_{LK}^n(1 - \theta_I^n) + \sigma_{VI}^n\theta_I^n]/\theta_K^n > 0$$

$$b_1 \equiv \{\sigma_{LK}^n\theta_L^n[1 - \alpha\gamma_n(1 - \theta_I^n)] + \sigma_{VI}^n[\theta_K^n + \theta_I^n(1 - \theta_L^n\gamma_n\alpha)]\}/\theta_K^n > 0$$

$$b_2 \equiv [\sigma_{VI}^n(1 - \theta_L^n) + \theta_L^n\theta_I^n(\sigma_{KL}^n - \sigma_{VI}^n)]/\theta_K^n > 0.$$

As expected, a_1, b_1, and b_2 are all positive. The unconditional cross-price elasticity $(-a_2)$ is negative. A higher price for the imported input both contracts the profit-maximizing level of output and induces substitution toward labor. With a separable production function (or any production function for which $[\sigma_{LI} - \sigma_{KI}]$ is not extremely large), the output effect dominates, making L^n and I^n gross complements.

In the export sector, the output price and the price of the imported intermediate are fixed at e, the nominal exchange rate. Employment, therefore, varies only insofar as the nominal wage changes:

$$\hat{L}^x = -a_3\hat{w}^x, \tag{15}$$

where

$$a_3 \equiv (1 - \theta_I^x)\,[\sigma_{LK}^x(1 - \theta_I^x) + \sigma_{VI}^x\theta_I^x] > 0.$$

When labor demand in the nontradables sector increases, w^x is bid upward to clear the labor market and L^x declines. If L^n falls, w^x is temporarily rigid and L^x is unchanged in the short run.

The equilibrium value of P_n is found from the market-clearing condition (8). Choosing units so that $P_n = 1$ initially and noting that $\hat{Q}^n = \theta_L^n\hat{L}^n + \theta_I^n\hat{I}^n$, (8), (9), and (11) yield

$$(D_1^n - Q^n\theta_L^n a_1 - Q^n\theta_I^n b_1)\hat{P}_n + Q^n(\theta_L^n a_2 + \theta_I^n b_2)\hat{g}^n = c_n(1-s)dY, \tag{16}$$

where c_i denotes the marginal propensity to consume good i, and $s \equiv \Phi h$, the short-run marginal propensity to save. Defining $t \equiv g^n - 1$, the implicit tariff on I^n, from (10) and (13) we have

$$dY = Q^n(1 - \theta_L^n a_1)\hat{P}_n - Q^n\theta_L^n a_2\hat{g}^n + tdI^n \tag{17}$$

in the case where L^n declines.[4] Substituting for Y in (16) from (17), employing the Slutsky decomposition, and collecting terms yields

$$f_0\hat{P}_n + f_1\hat{g}^n = c_n(1 - s)tdI^n, \tag{18}$$

where

$$f_0 \equiv Q^n[\epsilon + c_n s + \theta_L^n a_1(c_x + c_n s) + \theta_I^n b_1] > 0$$
$$f_1 \equiv -Q^n[\theta_L^n a_2(c_x + c_n s) + \theta_I^n b_2] < 0$$

and ϵ is the compensated own-price elasticity of demand for nontradables and is defined to be positive.

Equations (14) and (18) can be solved for P_n and P_I. Unsurprisingly, a more restrictive quota always raises both prices:

$$\frac{\hat{P}_n}{\hat{I}^n} = -\Delta^{-1}\left\{\theta_L^n a_2(c_x + c_n s) + \theta_I^n b_2\left[1 - \frac{c_n(1 - s)t}{1 + t}\right]\right\} < 0 \tag{19}$$

$$\frac{\hat{g}^n}{\hat{I}^n} = -\Delta^{-1}\left\{\epsilon + c_n s + \theta_L^n a_1(c_x + c_n s) + \theta_I^n b_1\left[1 - \frac{c_n(1 - s)t}{1 + t}\right]\right\} < 0, \tag{20}$$

where

$$\Delta \equiv (\epsilon + c_n s)b_2 + \theta_L^n(c_x + c_n s)\sigma_{VI}^n(1 - \gamma_n\alpha)[\sigma_{LK}^n(1 - \theta_I^n) + \sigma_{VI}^n\theta_I^n]/\theta_K^n > 0.$$

Turning back to (13) and substituting the above solutions for P_n and g^n, we obtain, after simplification, the following critical condition:

$$\frac{\hat{L}^n}{\hat{I}^n} \lesseqgtr 0, \text{ as } \epsilon + c_n s \gtreqless \sigma_{VI}^n(1 - \gamma_n\alpha)\left[1 - \frac{c_n(1 - s)t}{1 + t}\right]. \tag{21}$$

Figure 6.1 illustrates the conflicting factors influencing nontradables labor demand. The reduction in imported intermediates simultaneously shifts the marginal product schedule leftward and cuts the product wage $\bar{w}^n$ by pushing up P_n. If there is little substitutability between imported intermediates and domestic factors (σ_{VI} small), employment is likely to fall as the labor demand curve is steeply sloped and the leftward shift of the schedule is large. The extent to which P_n increases depends on the degree of substitutability between nontradables and exportables (ϵ), the reduction in demand elicited by the fall in real wealth ($c_n s$), and the contraction in demand stemming from the direct fall in real income caused by the tightening of the quota $[c_n(1 - s)t(1 + t)^{-1}]$. For any given decline in P_n, the product wage falls by the amount $(1 - \gamma_n\alpha)$. Large values of ϵ, c_n, t, α, and γ_n thus limit the fall in the product wage and increase the probability of a decline in labor demand.

Though there are circumstances in which employment increases, in my view (21) argues that a contractionary outcome is likely. On the right side, σ_{VI} is scaled down by the product of two fractions. Thus, employment

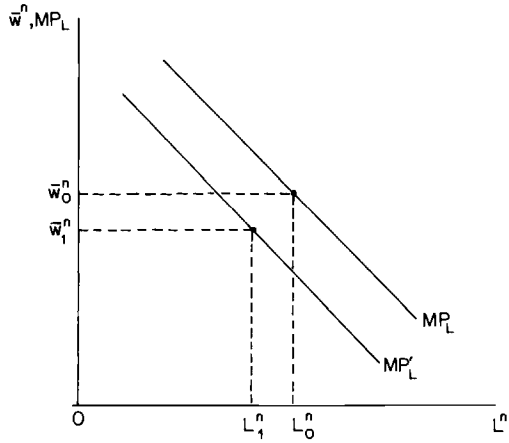

Fig. 6.1 The impact of a tighter quota on labor demand in the nontradables sector

contracts unless the degree of substitutability is considerably greater on the supply side than on the demand side. Observe as well that deindexation of wages does not necessarily suffice to prevent a reduction in labor demand—a nominal wage cut may be required. The value of α that leaves employment unchanged is

$$\alpha^* = \gamma_n^{-1}\left[1 - \frac{\epsilon + c_n s}{[1 - c_n(1 - s)t/(1 + t)]\sigma_{VI}^n}\right],$$

which is negative, for example, when $(\epsilon + c_n s) > \sigma_{VI}$. Even when σ_{VI}^n is relatively large, the requisite value of α will often be extremely low, particularly if t is initially nontrivial in magnitude. Table 6.1 shows how α^* varies with σ_{VI}, ϵ, and t when $c_n = \gamma_n = 0.50$ and $s = 0.20$. In all cases where $\sigma_{VI} \leqslant 2\epsilon$ and $t \geqslant 0.20$, α^* is far below unity.

Consider next the question of whether import restrictions are efficacious in strengthening the trade balance. From (11) and (12) it is seen that the trade balance improves when nominal income rises, inducing increased savings. The general solution, therefore, may be obtained by replacing P_n and g^n in (17) by the expressions in (19) and (20). However, given that my objective is only to show that there is no strong presumption in favor of an improvement in the trade balance, in the remainder of this section I shall derive results under the following two simplifying assumptions: (1) there is a rigid real wage in the protected manufacturing sector ($\alpha = 1$), and (2) the nontradables sector production function is fully separable ($\sigma_{VI} = \sigma_{LK} = \sigma^n$). In this case, it turns out that the trade balance worsens if and only if

Table 6.1 **Critical Degree of Real Wage Rigidity (α^*)**

	t						
σ_{VI}	0	.2	.4	.6	.8	1.0	ϵ
.2	0	NV	NV	NV	NV	NV	
.4	1.0	.93	.87	.82	.78	.75	
.6	>1	>1	>1	>1	>1	>1	.10
.8	>1	>1	>1	>1	>1	>1	
1.0	>1	>1	>1	>1	>1	>1	
.2	NV	NV	NV	NV	NV	NV	
.4	0	NV	NV	NV	NV	NV	
.6	.67	.57	.49	.43	.38	.33	.30
.8	1.00	.93	.87	.82	.78	.75	
1.0	>1	>1	>1	>1	>1	1.00	
.2	NV	NV	NV	NV	NV	NV	
.4	NV	NV	NV	NV	NV	NV	
.6	0	NV	NV	NV	NV	NV	.50
.8	.50	.39	.31	.24	.18	.12	
1.0	.80	.71	.65	.59	.54	.50	

NV = negative value.

$$\epsilon > \frac{1 + tc_x + \theta_L^n(\sigma^n\gamma_x - c_n)}{\theta_L^n + t}. \tag{22}$$

The trade balance is likely to deteriorate when the impact upon the price level is comparatively weak and the reduction in real income due to lower employment and the worsening of the trade distortion is comparatively large. As expected in light of the previous analysis of the employment outcome, the rise in P_n is small relative to the real income loss when ϵ, t, and θ_L^n are large and σ^n is small. Viewed from another angle, under these circumstances the trade balance worsens because the rise in P_n induces an increase in consumption of the exportable that lowers export earnings by an amount exceeding the enforced reduction in intermediates imports.

What is surprising about the condition stated in (22) is that, if existing quotas are somewhat restrictive, there is no general presumption that the trade balance will improve. For $t = 0$, (22) requires implausibly large values of ϵ. But when t is on the order of 0.30 or more, the trade balance may worsen when ϵ assumes believable values. For example, with $\gamma_x = c_x = 0.25$, $\theta_L^n = t = 0.40$, and $\sigma^n = 0.50$, trade deficits arise whenever $\epsilon > 1.06$.

So far, I have dealt only with the short run. Beyond the short run, the payments balance alters the stock of money balances and w^x begins to decline as workers laid off in the nontradables sector seek employment in the export sector. Can it be hoped that after these adjustments are complete the contractionary effect of import compression will be reversed or at least substantially blunted?

Figure 6.2 depicts the nature of the adjustment process. The MM and LL schedules reflect, respectively, the set of points for which the trade balance is zero and the labor market clears. These schedules are derived by substituting the reduced-form solutions for Y and L^i into (4) and (11):

$$\dot{M} = B = \Phi[hY(M, w^x) - M] \tag{23}$$

$$\dot{w}^x = \beta[L^n(M, w^x) + L^x(w^x) - L], \tag{24}$$

$$L_1^n > 0, \quad Y_2, L_2^n, L_1^x < 0, \quad hY_1 - 1 < 0.$$

A higher level of wealth reduces savings ($hY_1 < 1$), thereby worsening the trade balance. The MM schedule, therefore, is negatively sloped: a fall in w^x to encourage exportables production is needed when M rises if a trade balance deficit is to be averted. To the right of MM there is a payments deficit and M is falling, while to the left the payments balance registers a surplus and M is rising.

The LL schedule is positively sloped as a larger money stock drives up P_n and stimulates employment in the high-wage nontradables sector, thus drawing labor out of the export sector and bidding up w^x. Above LL, open unemployment exists and w^x is falling. Points below the LL schedule are irrelevant since w^x is upwardly flexible; once the economy arrives at a point on LL south of B, the adjustment path moves up the LL schedule until the long-run equilibrium is reached. The adjustment process is thus globally stable.

Following the imposition of a tighter quota, the long-run value of the export sector wage is obtained by the requirement that the labor market clear when saving is zero. Since w^x and L^n move in the same direction in the long run, the qualitative outcome can be determined simply by setting $s = 0$ in (21). This yields dL^n/dI^n, $dw^x/dI^n < 0$ if and only if

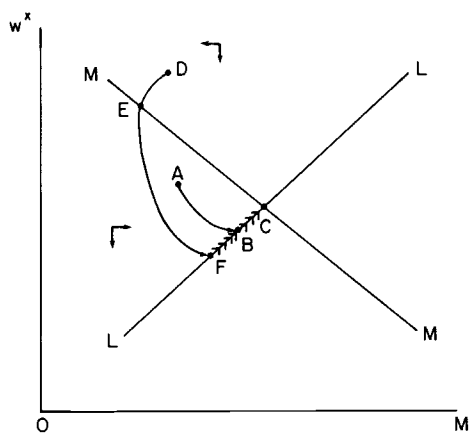

Fig. 6.2 Import compression in the nontradables sector

$$\epsilon > \sigma^n \gamma_x \left(1 - \frac{c_n t}{1 + t}\right). \tag{25}$$

Given that s is usually small, the prospects for reducing underemployment do not improve much in the long run. As with the short-run outcome, real income will be lower and underemployment greater in the new steady state unless the degree of substitutability on the supply side far exceeds that on the demand side.

The cumulative impact upon the payments balance turns on whether nominal income rises after w^x has adjusted to clear the labor market. From (10) and (13), the change in nominal income in the long run is

$$dY = \sigma^n Q^n \theta_L^n (1 - \psi) \{[(\gamma_x + \gamma_n \theta_I^n)/\theta_K^n]\hat{P}_n - (\theta_I^n/\theta_K^n)\hat{g}^n\} + t dI^n, \tag{26}$$

where $\psi \equiv w^x/w^n < 1$. Solving for the long-run changes in P_n and g^n and substituting these into (26) yields

$$\epsilon < \frac{1 + tc_x + [1 - \psi(1 + t)](\sigma^n \gamma_x - c_n)}{\theta_L^n(1 - \psi) + t(1 - \theta_L^n \psi)} \tag{27}$$

as the necessary and sufficient condition for a cumulative payments surplus. The condition for a cumulative surplus is less stringent than that for a short-run surplus, reflecting the fact that, in the long run, those laid off in the high-wage manufacturing sector find employment in the export sector. The likelihood of an initial payments deficit being reversed in the long run is sensitive to the magnitude of the sectoral wage gap. Inspection of (27) suggests that, whatever may happen in the short run, if the labor market is not extremely distorted ($\psi > 0.50$), wage flexibility in the export sector eventually succeeds in generating a cumulative payments surplus. In subsequent analysis, I assume (27) is satisfied so that the nominal money stock rises across steady states.

In figure 6.2, path *ABC* portrays the nature of the adjustment process when (25) holds and the payments balance improves in the short run. Point *A* is the initial equilibrium. When the import quota is reduced, the *LL* and *MM* schedules shift horizontally to the right and *C* becomes the new long-run equilibrium. A payments surplus emerges, but labor demand contracts in the nontradables sector and the economy immediately goes into a recession, experiencing open unemployment. Over phase *AB*, payments surpluses increase the money supply and the soft labor market depresses w^x. Higher employment in the export sector and expansion in the money supply both raise nontradables demand. Consequently, P_n continues to rise and L^n begins to recover from its initial decline. By the time point *B* is reached, open unemployment has been eliminated but the trade balance still exhibits a surplus. As the money stock increases further, the path moves up the *LL* schedule. During this second phase, there is continuous full employment and P_n, L^n, and w^x all increase steadily. The payments surplus finally disappears

at point C and the economy then settles into a new steady-state equilibrium characterized by a lower nominal (and real) export sector wage and higher underemployment.

It was demonstrated earlier that when import quotas are already in place and are generating sizable implicit tariffs, it is quite possible that further import compression will, paradoxically, worsen the payments balance in the short run. Path $DEFC$ corresponds to this case. On impact, the MM schedule shifts downward and LL shifts horizontally to the right. The trade balance deteriorates at the same time as employment and real output contract, and the economy heads off on a southwesterly path with both w^x and M declining. The payments deficits persist until the recession has extracted a sufficiently large decrease in the real export sector wage and the economy finds itself at point E on the MM schedule. Thereafter, further decreases in w^x give rise to payments surpluses and the remainder of the path is similar to that of ABC.

6.3.1 Import Rationing in the Export Sector

In the preceding section I assumed that import controls were imposed only on firms operating in the protected manufacturing sector; export sector firms continued to have access to imported inputs at world market prices. In fact, it is improbable that exportables production will not be affected to some extent by import restrictions. When import compression assumes the massive proportions it did in Mexico in 1982–83, some export sector firms will inevitably be subject to controls. Furthermore, the government may not be able to completely segment the market, in which case higher prices for intermediates used by firms in the nontradables sector will spill over and raise input prices for firms engaged in export production.

To see how this affects the macroeconomic repercussions of import restrictions, reverse the treatment of firms in the export and nontradables sectors: let import restrictions fall entirely upon export sector firms and allow nontradables sector firms unrestricted access to imports at world market prices. In terms of the model developed in section 6.1, set $g^n = e$ and treat I^n and g^x as endogenous variables and I^x as an exogenous variable.

Clearly, import compression is now an unmitigated disaster. Under the usual, weak assumption that intermediate inputs and labor are gross complements, employment in the export sector contracts. The reduction in export sector value-added lowers the demand for nontradables, depressing P_n and causing employment in the nontradables sector to also contract. To make matters still worse, the payments deficit widens. (Nominal income falls, including a decrease in savings.) The new long-run equilibrium in figure 6.3 (D) thus lies southwest of the initial equilibrium (A), and after the import quota is tightened, both w^x and M start decreasing. If the export wage does not exhibit substantial downward flexibility, w^x and M overshoot

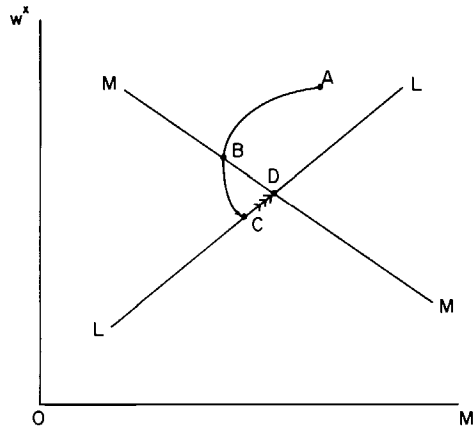

Fig. 6.3 Import compression in the export sector

their new, lower steady-state values and the adjustment process entails a protracted recession with open unemployment prevailing over the entire *ABC* stretch of the transition path.

In practice, of course, import restrictions are seldom confined to firms operating in one sector or the other. The main point of this analysis is that import compression is more likely to be contractionary and less likely to improve the payments balance the more import controls impinge upon export production. Clearly, one could argue on the basis of these results that the large trade surpluses Mexico achieved in 1983 and 1984 reflected primarily the impact of extremely contractionary monetary and fiscal policies and that the surpluses would have been larger had import controls been loosened instead of tightened. While a careful empirical study would be needed to evaluate this argument, at the very least the recent Mexican experience strongly suggests that point *C* in figure 6.2 is way south but not far to the east of point *A;* import compression purchases a small cumulative payments surplus at the very dear price of much greater underemployment and much lower real wages.

6.3 Raising Internal Energy Prices

In recent years, the internal price of petroleum has been increased substantially in Mexico. The usual justification for this policy is that Mexican users should pay a price closer to (ideally, equal to) the world market price, which presumably reflects the opportunity cost of domestic oil consumption. By now it should be clear that this line of reasoning overlooks the possibility that higher energy prices will lessen overall efficiency by increasing the extent of underemployment. To avoid excessive taxonomy, in

this and the following two sections the analysis is limited to the case where the real wage is rigid in the manufacturing sector ($\alpha = 1$).

The model employed earlier is easily adapted to analyze the impact of higher domestic oil prices. Set $g^n = g^x = g$, where g is the common internal price of energy, and interpret I^i in equation (7) as domestic consumption of oil in sector i. (I^i is endogenously determined.) Also, let Q^I denote the fixed level of oil production and redefine R to be the gross output function $R(P_x, P_n, I^x + I^n, L^n, L^x)$. With these changes, (10) becomes

$$(10') \qquad Y = R(P_x, P_n, I^x + I^n, L^n, L^x) + e(Q^I - I^x - I^n).$$

Equation (10′) defines national income as output of final goods and services plus oil exports. Differentiating with respect to g yields

$$(28) \qquad \frac{dY}{\hat{g}} = Q^n\left(\frac{\hat{P}_n}{\hat{g}} + \theta_L^n \frac{\hat{L}^n}{\hat{g}}\right) + w^x L^x \frac{\hat{L}^x}{\hat{g}} - (e - g)\left(I^x \frac{\hat{I}^x}{\hat{g}} + I^n \frac{\hat{I}^n}{\hat{g}}\right).$$

The last term measures the *direct* efficiency gain from lowering the domestic subsidy. Due to this direct efficiency gain, the case for raising internal energy prices is inherently more favorable than that for imposing import controls (where the corresponding term involves an efficiency loss). The overall outcome, however, is highly uncertain as the direct efficiency gain has to be weighted against potential losses from decreased employment. Since labor and oil are gross complements, L^x always declines. In the nontradables sector, employment rises or falls depending on whether

$$(29) \qquad \frac{\theta_I^n}{\theta_K^n}[\sigma_{LK}^n(1 - \theta_I^n) + \sigma_{VI}^n\theta_I^n][\epsilon + c_n s - \sigma_{VI}^n\gamma_x(1 + \tau)]$$
$$\lesseqgtr \frac{a_1^n c_n(1 - s)\theta_I^x e Q^x}{\theta_K^x Q^n}\{\sigma_{VI}^x\tau - \theta_L^x(1 - \tau)[\sigma_{LK}^x(1 - \theta_I^x) + \sigma_{VI}^x\theta_I^x]\},$$

where $\tau \equiv e/g - 1 > 0$. The right-side term picks up the impact on nontradables sector employment of the change in export sector value-added measured at world market prices $[e(Q^x + Q^I - I^x)]$. On the left side, the presence of τ in the term multiplying σ_{VI}^n reflects the favorable impact on nontradables demand of the rise in income produced by the direct efficiency gain associated with lower usage of I^n.

Given that the labor market cannot be reformed, it is unwise to completely eliminate the domestic subsidy. Trivially, for $\tau \approx 0$, an increase in the domestic price of oil has the same effect as tightening import quotas (when $t \approx 0$ and $g^x = g^n = g$). Export sector employment and value-added decline. Nontradables sector employment and value-added also decline unless, as usual, the degree of substitutability is much greater on the supply side than on the demand side. With the term on the right side in (29) negative, $\sigma_{VI}^n > (\epsilon + c_n s)/\gamma_x$ is a *necessary* condition for L^n to increase.

While second-best considerations will normally call for a domestic price below the world market price, it should be stressed that there are distinct limits to the magnitude of the subsidy that can be justified. Note that when the domestic price is less than half the world price ($\tau > 1$), export sector value-added always increases and

$$\epsilon + c_n s < \sigma_{VI}^n 2\gamma_x$$

is a *sufficient* condition for L^n to increase. Thus, there appears to be a presumption that the very large subsidies of the Lopez Portillo years were excessive and that some increase in internal prices was warranted after 1982.

Several remarks are in order about the proper interpretation of these results. First, the analysis applies only to energy consumption by firms; there is no justification for keeping the price of oil to consumers below the world price. Second, the size of the optimal, second-best energy subsidy might be considerably larger when the repercussions on capital accumulation are taken into account. If other policies are not manipulated to maintain the profitability of investment, higher internal energy prices will trigger capital decumulation (on the usual assumption that capital and oil are gross complements) and impose welfare losses in the future by worsening the extent of underemployment. (Even ignoring the adverse interaction with the labor market distortion, capital decumulation will give rise to welfare losses if the private discount rate exceeds the social discount rate.) Third, since the optimal policy entails balancing the gain from less underemployment against the direct efficiency loss created by driving a wedge between domestic and world prices, the optimal subsidy will obviously be larger once distributional effects are incorporated into the welfare calculations. Indeed, given the current levels of underemployment and real wages in Mexico, distributional considerations may carry as much or more weight than concerns about efficiency.

6.4 Devaluation

Import controls, as we have seen, have little to recommend them. In exchange for suffering permanent decreases in real output and real wages and a permanent increase in underemployment, the economy obtains nothing more than a problematic impact on the payments balance—there is no guarantee that the payments balance will improve, or if it does, that the cumulative payments surplus will be sizable. (Of course, if it were known that a payments deficit would result, the appropriate policy would be to relax import quotas.) Needless to say, this is not exactly a bargain, and it is worthwhile to consider alternative policies in the hope of finding a better deal. In the remainder of this section, I analyze the merits of the IMF and World Bank's favorite remedy, devaluation of the currency. Section 6.5 is an investigation of the case for export subsidies.

Viewed over the long run, devaluation compares favorably with import rationing. With a rigid real wage in the nontradables sector, the real equilibrium is clearly not affected by equiproportionate increases in e, P_n, w^x, and M. Hence devaluation is neutral in the long run. This is shown in figure 6.4. The post-devaluation, long-run equilibrium lies at point C on the ray running from the origin through the initial equilibrium A. In the long run, all real variables are unchanged and the cumulative payments surplus as a fraction of the money supply equals the percentage devaluation.

Unfortunately, though devaluation ultimately succeeds in generating a cumulative payments surplus without disturbing the real equilibrium of the economy, the adjustment process is painful and involves traversing a path in which real output is continuously below its previous level. In the short run, a nominal devaluation generates a real devaluation (i.e., e/P_n rises) by reducing the level of real money balances. The real devaluation, in turn, lowers L^n both by raising the product wage ($\hat{P}_n < \hat{w}^n < \hat{e}$) and by increasing the real price of imported inputs to the nontradables sector.[5] More formally, set $e = g^x = g^n$ and treat I^i as endogenous in the model of section 6.1. Grinding through the usual manipulations then yields[6]

$$\hat{L}^n/\hat{e} = -sa_1/\Delta_1 < 0, \tag{30}$$

where

$$\Delta_1 \equiv \{\epsilon + c_n s + \theta_I^n b_1 + a_1\theta_L^n[c_x + c_n s + c_n\mu\psi(1 - s)]\} > 0$$

and $\mu \equiv -dL^x/dL^n \leqslant 1$ is the fraction of workers laid off in the nontradables sector who gain employment in the export sector.

Whether or not contraction in the nontradables sector leads to open unemployment depends in large measure on the flexibility of export sector

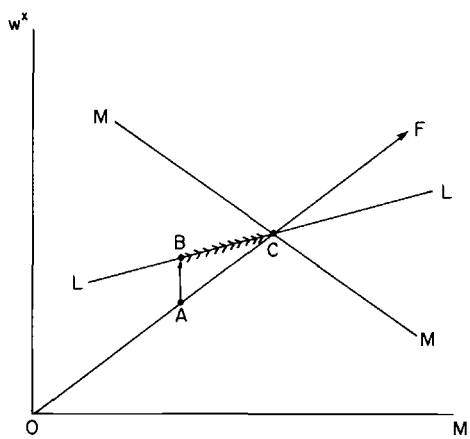

Fig. 6.4 The impact of a devaluation when export sector technology is relatively flexible

technology. The rise in P_x increases labor demand in the export sector at a given nominal wage. If technology is relatively flexible, job creation in the export sector exceeds layoffs in the nontradables sector and, though real output declines (by the amount $[w^n - w^x]dL^n$), open unemployment is averted. The flexibility condition that export sector technology must satisfy is

$$\sigma^x_{LK}(1 - \theta^x_I) + \sigma^x_{VI}\theta^x_I > \theta^x_K s a_1 L^n/L^x(1 - \theta^x_I)\Delta_1, \tag{31}$$

where Δ_1 is evaluated at $\mu = 1$. When (31) holds, the economy follows a path such as *ABC* in figure 6.4. Devaluation produces a strong increase in export sector labor demand that bids up w^x by *AB* in the short run. The balance of payments shifts to a surplus, and as the money stock rises over time, P_n and L^n increase. The tightening of the labor market pushs w^x up further as the economy moves toward the long-run equilibrium *C* along the *LL* schedule. Open unemployment never emerges, but the worsening in underemployment on the transition path results in real output being everywhere below its predevaluation level.

Figure 6.5 applies when export sector technology is relatively inflexible and fails to satisfy (31). The *LL* schedule is steeper in slope than the ray *OF*, reflecting the fact that the export sector is incapable of absorbing all of the labor released by the nontradables sector without a decrease in the nominal wage. There is an initial phase *AB* of open unemployment and falling nominal (and real) wages in the export sector; over the medium run, devaluation works principally by reducing import demand and has effects similar to import controls. Once point *B* is reached, full employment prevails and on the remainder of the path w^x rises steadily, eventually surpassing its previous steady-state level.

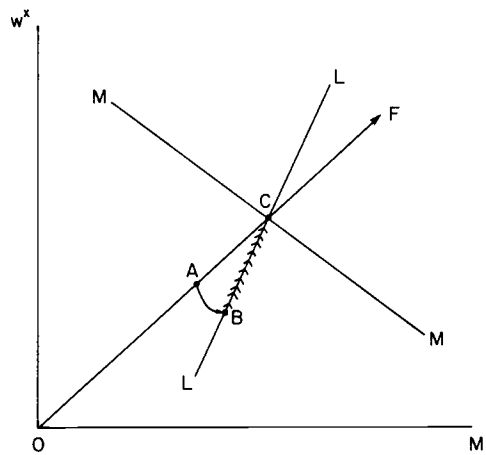

Fig. 6.5 The impact of a devaluation when export sector technology is relatively inflexible

6.5 Export Subsidies

The basic problem with using quotas or devaluation to remedy current account deficits is that the import volume contracts. Under weak conditions, the curtailment in the import volume reduces labor demand in the high-wage manufacturing sector, thereby exacerbating underemployment. Conversely, if underemployment is to be lessened, import flows must be increased, not reduced. This makes it natural to consider export subsidies as an alternative policy that might reconcile the potentially conflicting objectives of expanding import flows and improving the trade balance.

When analyzing the repercussions of an export subsidy, some assumption must be made about how the subsidy is financed. Consider first the rather optimistic case in which the subsidy is financed by an increase in lump-sum taxes. Letting v denote the ad valorem subsidy, the basic model (without import restrictions) changes only in equations (1) and (10)[7]

$$P_x = e(1 + v) \tag{1'}$$

$$Y = R(P_x, P_n, L^n, L^x) - evX, \tag{10''}$$

where $X \equiv Q^x - D^x$, the export volume. Upon the introduction of a small export subsidy[8]

$$\hat{L}_N/\hat{P}_x = a_4\Delta_1^{-1}[\epsilon - \gamma_x(\sigma_{VI}^n + s/\theta_I^n)] \gtrless 0. \tag{32}$$

where

$$a_4 \equiv \{\sigma_{VI}^n[\theta_K^n + (1 - \theta_L^n)\theta_I^n] + \sigma_{LK}^n\theta_L^n\theta_I^n\}/\theta_K^n.$$

The impact on underemployment is uncertain, reflecting the conflicting effects on manufacturing sector labor demand of a higher product wage and a lower real price of imported intermediates ($e/P_n \downarrow$). Unlike with a devaluation, L_n may increase. Furthermore, when labor demand contracts, a comparison of (30) and (32) shows that the decline in L_n is smaller under an export subsidy if and only if

$$\epsilon + c_n s > \sigma_{VI}^n\gamma_x\ . \tag{33}$$

This is precisely the condition for a tighter quota on intermediates utilized by the nontradables sector to lower L_n (when the implicit tariff is initially zero). The condition reappears here because an export subsidy differs from a devaluation only in that it lowers instead of increases the real price of imports. A duality proposition thus links the employment effects of quotas, devaluation, and export subsidies: if a more restrictive quota on imported inputs used by the nontradables sector exacerbates underemployment, an export subsidy has a less adverse (and possibly favorable) impact on underemployment than a devaluation.[9]

Export subsidies also compare favorably with devaluation in being less likely to create open unemployment. This is not only because manufacturing sector employment is likely to decline less. Rather, in addition, an export subsidy provides greater stimulus to labor demand in the export sector by lowering the real price of imported intermediates, generating a favorable cross-price effect that is absent under a devaluation. The counterpart to (31) is

$$\sigma_{LK}^{x}(1 - \theta_l^x) + \sigma_{Vl}^{x}\theta_l^x > \theta_K^x a_2[\epsilon - \gamma_x(\sigma_{Vl}^n + s/\theta_l^n)]L^n/L^x\Delta_1 ,$$

which is less stringent than (31) even when (33) holds as an equality so that an export subsidy and a devaluation contract manufacturing sector employment to the same extent.[10]

The long-run outcome may be found by setting $s = 0$ in (32). This yields the conclusion that L^n rises whenever

$$\epsilon > \sigma_{Vl}^n\gamma_x . \tag{34}$$

Again, this is the condition for a tighter quota on imports used by nontradables sector firms to lower L^n. Thus, in the long run, an export subsidy has qualitatively the same effect on underemployment as import liberalization in the nontradables sector (when $s,t \approx 0$ initially).

Figure 6.6 extends the comparison of export promotion and devaluation to cover the entire adjustment process. The initial equilibrium is A, and ABC is the transition path on the assumption that export sector technology is flexible enough (i.e., [31] is satisfied) to prevent the emergence of open unemployment. Since devaluation is neutral in the long run, the new steady state lies on the ray OF.

The $M''M''$ and $L''L''$ schedules define the transition path following the introduction of an export subsidy. Extremely weak conditions suffice to

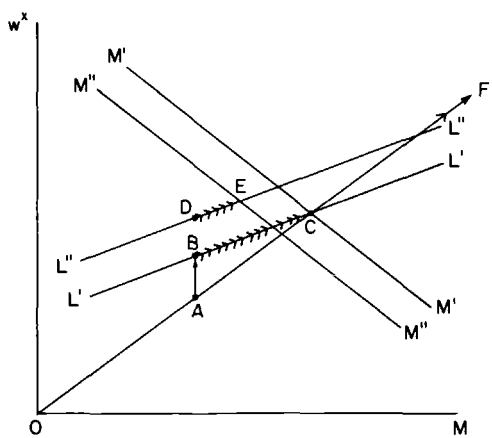

Fig. 6.6 Export promotion compared with devaluation

guarantee an improvement in the payments balance. It can be shown, however, that the cumulative payments surplus is always smaller than under a comparable devaluation.

If (34) holds, underemployment diminishes and the real export sector wage increases unambiguously in the long run ($\hat{w}^x > \hat{P}_x > \hat{P}_n$). The new long-run equilibrium, therefore, lies to the northwest of C. At all points on the transition path, the real wage in the export sector and real income are higher than under a devaluation. The cumulative payments surplus is smaller, but this merely reflects the fact that the price level rises less. The real money supply is higher at E than at C (and the initial steady state A).[11]

It is more difficult to compare export subsidies and devaluation when (33) holds but not (34). Figure 6.7 depicts the time paths of real income Y^r in this case. In the short run, a devaluation results in greater underemployment and lower real income than an export subsidy. At some point, however, this ranking is reversed. Over the long run, real income declines under an export subsidy but eventually returns to its previous steady-state level under a devaluation.

I end on two cautionary notes. First, these results demonstrate only that under certain conditions an infinitesimally small export subsidy compares favorably with a devaluation. As such, they show that a plausible case can be made for the introduction of some export subsidy; they do not, however, indicate how large a subsidy can be justified (i.e., the size of the optimal export subsidy).

Second, although export subsidies may expand the tax base by increasing real income, they normally will not be self-financing. Active measures to increase tax revenues or cut expenditures will be needed in order to avoid a

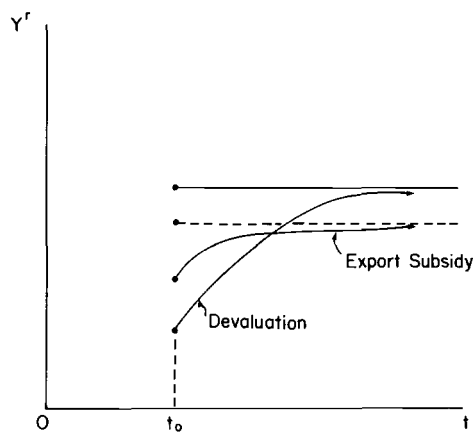

Fig. 6.7 The short- and long-run effects upon real income of an export subsidy and a devaluation

deterioration in the fiscal deficit and a possible worsening in the payments balance. Suppose, for example, that the government expenditures are fixed in real terms and that revenues derive from a proportional income or value-added tax z. In this case, if the fiscal budget FB is initially in balance[12]

$$Y^{-1}dFB/\hat{P}_x = \frac{P_xX}{Y}(1 - z) - z\frac{P_nQ^n}{Y}\theta_L^n(1 - \psi)\eta, \tag{35}$$

where $\eta \equiv \hat{L}^n/\hat{P}_x$. The second term reflects the revenue gain from the reduction in underemployment. For believable values, this gain is very small compared to the direct worsening of the deficit caused by the introduction of the subsidy. For instance, if $z = 0.20$ and the share of nonoil exports in GNP is 0.05, then the direct revenue loss equals 0.04. Turning to the indirect gain, it can be checked that, extreme cases aside, the employment elasticity η will not exceed 0.20.[13] With this large value for η, $\theta_L^n = \psi = 0.50$, and $P_nQ^n/Y = 0.60$, the indirect revenue gain is still only 0.006, leaving a large residual deficit.

6.6 Concluding Observations

Since the end of 1981, employment growth has virtually ceased despite reductions in real wages in excess of 30 percent. In this chapter I have put forward the thesis that conventional microtheoretic factors can account for much of the extreme worsening in underemployment seen in the first five years of adjustment to the debt crisis. Tight import quotas (until July 1985), a heavily depreciated currency, and huge increases in internal energy prices have greatly reduced usage of intermediate inputs complementary to domestic labor. In short, as regards job creation, relative prices were wrong. More moderate increases in internal energy prices (for industrial users) and greater use of export subsidies instead of real devaluation to attain external balance would have allowed adjustment to proceed with at least a lesser increase in underemployment. Unfortunately, each of these policies would have conflicted with the task of reducing the fiscal deficit, a task already made very difficult by increased debt service and sharply declining terms of trade.

Appendix

To derive the expressions for L^n and I^n given in (13) and (14), first substitute for Q^n in (5) from (6):

$$L^n = C_w^nK^n/C_r^n\ . \tag{A1}$$

Now differentiate (A1) and note that $C_{ij}C/C_iC_j = \sigma_{ij}$, where σ_{ij} is the Allen partial elasticity of substitution between factors i and j. This gives

$$\text{(A2)} \quad \hat{L}^n = \theta_L^n(\sigma_{LL}^n - \sigma_{LK}^n)\hat{w}^n + \theta_K^n(\sigma_{LK}^n - \sigma_{KK}^n)\,\hat{r}^n + \theta_I^n(\sigma_{LI}^n - \sigma_{KI}^n)\hat{g}^n\,.$$

Substituting for $\hat{w}^n$ from (3) and utilizing the adding-up restrictions, $-\sigma_{LL}\theta_L = \sigma_{LK}\theta_K + \sigma_{LI}\theta_I$ and $-\sigma_{KK}\theta_K = \sigma_{LK}\theta_L + \sigma_{KI}\theta_I$, (A2) becomes

$$\text{(A3)} \quad \hat{L}^n = -\alpha\gamma_n[\sigma_{LK}^n(1 - \theta_I^n) + \sigma_{LI}^n\theta_I^n]\hat{P}_n + [\sigma_{LK}^n(1 - \theta_I^n) + \sigma_{KI}^n\theta_I^n]\hat{r}^n + \theta_I^n(\sigma_{LI}^n - \sigma_{KI}^n)\hat{g}^n\,.$$

In the case where the production function is separable between primary factors and imported inputs, $\sigma_{LI} = \sigma_{KI} = \sigma_{VI}$ and (A3) simplifies to

$$\text{(A4)} \quad \hat{L}^n = [\sigma_{LK}^n(1 - \theta_I^n) + \sigma_{VI}^n\theta_I^n](\hat{r}^n - \alpha\gamma_n\hat{P}_n).$$

From equations (2) and (3):

$$\hat{r}^n = [(1 - \alpha\gamma_n\theta_L^n)\hat{P}_n - \theta_I^n\hat{g}^n]/\theta_K^n\,.$$

Substituting this expression into (A4) gives equation (13) in the text

$$\text{(A5)} \quad \hat{L}^n = a_1\hat{P}_n - a_2\hat{g}^n\,,$$

where

$$a_1 \equiv [1 - \alpha\gamma_n(1 - \theta_I^n)][\sigma_{LK}^n(1 - \theta_I^n) + \sigma_{VI}^n\theta_I^n]/\theta_K^n$$
$$a_2 \equiv \theta_I^n[\sigma_{LK}^n(1 - \theta_I^n) + \sigma_{VI}^n\theta_I^n]/\theta_K^n\,.$$

The expression for I^n stated in (14) is obtained by the same procedure.

7 Fiscal and Monetary Policy, Financial Intermediation, Inflation, and Growth

In previous chapters I have often emphasized the self-reinforcing and stagflationary nature of the various macroeconomic mechanisms linking large fiscal deficits, high inflation, financial disintermediation, and slow growth. At present, Mexico, like so many other Latin American countries, seems to be trapped in a self-perpetuating spiral of this sort: high inflation provokes a flight of funds from the banking system; the low level of financial intermediation curtails the supply of bank loans for productive investment