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### Essays on Argentina's growth cycle and the world economy

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## Chapter 2: Adjustment and Growth with a Large Foreign Public Debt in a Semi-Industrialised Country\*

The majority of the semi-industrialised countries experienced a fast growth in their foreign public debt to output ratio during the nineteen eighties. The intention is to discuss the boundaries of the stabilisation of such a debt ratio. The focus is on the price and the quantity adjustments. The vast literature on the subject can be grouped in two main lines of thought. Authors assuming a fairly agile price mechanism would expect the adjustment to operate mostly through a sustained real devaluation with fiscal discipline (e.g. Krueger 1983 and 1987). Other writers argue that the adjustment would work mostly through quantities, with a decline in activity (e.g. Sachs 1986 and 1989). So far, however, there is no work comparing these two views of the problem. The main argument is that beyond a certain debt ratio these two forms of adjustment may become insufficient and an adjustment in the value of stocks operates.

### 1. The setting

What follow is a simple model to be used as a skeleton to discuss more complex issues.

$$(1) \quad \tau u - \gamma = \rho \chi - \rho m u$$

$$(2) \quad u = \frac{\rho \chi + \gamma + i}{1 - c + \rho m}$$

$$(3) \quad g = i k$$

$$(4) \quad \rho b p = \rho \chi - \rho m - (\theta - g) \rho z + d(\rho z)$$

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### Endogenous variables

$g$  : rate of growth of potential output  
 $u$  : activity ratio of real to potential output  
 $\tau$  : taxes to real output ratio  
 $bp$  : balance of payments to potential output ratio

### Exogenous variables

$c$  : propensity to consume  
 $i$  : investment to potential output ratio  
 $\kappa$  : potential output to capital ratio  
 $m$  : propensity to import out of real output  
 $\theta$  : international rate of interest + country's risk  
 $\chi$  : exports to potential output ratio  
 $\gamma$  : government expenditure to potential output ratio  
 $\rho$  : real exchange rate  
 $z$  : foreign debt to potential output ratio  
 $t$  : time  
 $d$  : differential operator

All the rates, ratios and propensities are positive and less than one (excepting  $u$  that may equal one and  $z$  that may exceed one respectively).

The propensities to consume  $c$  and to import  $m$  indicate a causal relationship from real output to consumption and imports respectively. The ratios  $i$ ,  $\chi$  and  $\gamma$  are used for convenience in the presentation and no stable relationship between the implicit exogenous variables (investment, exports and government expenditure) and potential output is suggested.

Given the productivity of capital  $k$ , the investment ratio  $i$  set the rate of growth  $g$  in (3). The differential expression (4) is obtained from the balance of payments identity.

In equation (1) the fiscal surplus equals the private trade surplus. Expression (1) and (4) taken together indicate that all of the foreign debt ratio  $z$  bears on the government. The implication is that the foreign debt is also a fiscal problem and any solution has to work simultaneously on the fiscal and the external sector of the economy. We abstract from terms of trade effects and exports and imports are in foreign currency. Thus the price effect of the exchange rate would be on the volume of trade by altering the relative price of traded vis-a-vis non-traded goods.

The limitations of this type of model are obvious. Most developing indebted economies also have a large domestic public debt but, in the model, domestic financial assets and

liabilities are not considered, There is no place for inflation either, although some of these economies have shown high rates of inflation along with the foreign debt problem in the eighties. For all its simplicity, the model will permit us to concentrate on the main point at issue.

## 2. The Foreign Debt Problem

We set out from a situation similar to that prevailing in many highly indebted developing countries during the debt crisis of the eighties (Dornbusch 1989, ECLA 1985, IMF 1991, Fanelli & Frenkel 1985 and Cooper 1992). Accordingly we assume that the rate of growth  $g=ik$  is smaller than the international rate of interest  $\theta$ . In combination with a trade surplus and a fairly large debt ratio, this fact implies the following initial condition:

$$(5) \quad (\theta - i k) \rho z > \chi - \rho m u > 0$$

From this initial condition (5) – based on the observation of the data – the foreign public debt ratio in (4) grows at an accelerating speed, as it did in the vast majority of the semi-industrialised countries during the nineteen eighties.

## 3. The Adjustment

Impose now the stability restriction

$$(6) \quad \rho b p_0 + d(\rho b p) = 0 \quad \text{with } dz = 0$$

the sudden stop of foreign lending ( $dz=0$ ) implies reversing the initial condition (5). The adjustment variables are different according to whether the stabilisation works mainly through prices or mostly through quantities. For clarity, let us isolate these two processes and discuss each of them in turn<sup>30</sup>. Moreover, we assume  $u_0=1$  and  $\rho_0=1$  in the remainder of this chapter.

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<sup>30</sup> The distinction between price (or expenditure switching) and quantity (or expenditure variations) adjustments has been widely used and for different purposes (e.g. Meade 1951 and Johnson 1961). The formal

### 3.1. The Price Adjustment

Relative price changes induce efficient changes in the structure of private demand and production. If such changes are accompanied by an adequate fiscal policy the activity ratio  $u$  need not be affected. Let us look into this.

The condition for  $du=0$  in (2) after a devaluation in the exchange rate is

$$(7) \quad d\gamma = [ -\delta c/\delta\rho - \delta i/\delta\rho - \chi(1+\varepsilon_{p,x}) + m(1+\varepsilon_{p,m}) ] d\rho$$

$$\text{with } \varepsilon_{p,x} > 0 ; \varepsilon_{p,m} < 0 ; \delta c/\delta\rho < 0 \text{ and } \delta i/\delta\rho \approx 0$$

$\varepsilon_{p,x}$  : exchange rate elasticity of supply of exports

$\varepsilon_{p,m}$  : exchange rate elasticity of demand for imports

The responsiveness of the overall investment ratio to relative price signals is negligible ( $\delta i/\delta\rho \approx 0$ ) for savings and investment flow rapidly from one sector onto another – in this case out of the domestic sector onto the export sector to meet the external demand which rises as the devaluation makes exports more competitive ( $\varepsilon_{p,x} > 0$ ). The devaluation also shifts relative prices against imports ( $\varepsilon_{p,m} < 0$ ). Consumption would fall ( $\delta c/\delta\rho < 0$ ) to the extent that it is elastic respect of tradeable goods. Thus, the resources demanded by the rise in the foreign trade ratio  $[\chi(1+\varepsilon_{p,x})+m(1+\varepsilon_{p,m})]d\rho$  arise partially from the fall in private consumption and the rest requires a cut in government expenditure as indicated by (7) above.

In order to keep the fiscal and the external surpluses in line – from (1) and (7) – the tax ratio would have to increase by

$$(8) \quad \delta\tau / \delta\rho = -\delta c / \delta\rho$$

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complications of representing both adjustments simultaneously would obscure the presentation (Chipman 1978).

which is positive and positively related with the fall in consumption (the rise in savings) for a given  $u$ . Expression (8) indicates that the government collects all the savings resulting from the devaluation.

Throughout this process, given the productivity of capital  $\kappa$ , the rate of growth remains unaltered. Should additional export production induce a rise in the productivity of capital  $\kappa$ , the rate of growth would improve.

Given the activity and investment ratios and, for simplicity  $\chi_0=m_0$ , in order to satisfy the stability restriction (6), assume a devaluation of amount

$$(9) \quad d\rho^* > d\rho = \frac{(\theta-g) z_0}{\chi (\varepsilon_{p,x} - \varepsilon_{p,m}) - (\theta-g) z_0} \quad \text{with } \chi_0=m_0 \text{ solely for simplicity}$$

where  $d\rho^*$  : threshold devaluation at which additional savings evade taxation and flow onto foreign assets because expected domestic earnings become sensitive to taxes levied to service the debt (Corden 1986 and Helpman 1989).

The stability condition (9) indicates that the lower the price elasticities  $\varepsilon_{p,x}$  and  $\varepsilon_{p,m}$  the larger the stability devaluation would have to be. Beyond  $\rho^*$  the tax ratio cannot be increased sufficiently to fulfil equation (8) and the fiscal adjustment would have to rely solely on a cut in government expenditure. To highlight the point assume a constant tax ratio and the level of activity would be affected by

$$(10) \quad du = \frac{(\tau + i) \delta c}{(1-c)^2 \delta \rho} d\rho < 0$$

which is obtained from (2) with  $di=0$ ,  $d\tau=0$  and the government expenditure ratio  $\gamma$  endogenously set by (1).

The price adjustment becomes ineffective due to tax evasion and capital flight, once a large debt burden in relation to the size of the price elasticities sets the devaluation beyond

the threshold  $d\rho^*$  in (9). At this point the fiscal-external adjustment must also operate through quantities (10).

### 3.2 The Quantity Adjustment

With a given exchange rate, assume that the adjustment variable is the activity ratio  $u$  (recall  $u_0=1$  and  $u_0m=\chi$ ).

In order to satisfy the stability condition (6) and hence reversing the initial condition (5), the activity ratio must fall from  $u_0$  to the external stability ratio  $u_s$  :

$$(11) \quad 0 < u^* < u_s = \frac{\chi - (\theta - g) z_0}{\chi} < u_0 = 1$$

where  $u^*$  is the threshold below which the economy would begin to tumble.

The larger the debt burden the lower the stability activity ratio  $u_s$ .

From (2) and (11) the stability fall in the activity ratio  $u_0-u_s$  could be achieved with a fall in government expenditure of

$$(12) \quad d\gamma_s = (1 - c + m) (u_s - u_0)$$

and from (1) and (12)

$$(13) \quad d\tau = (1 - c - \tau) (u_s - u_0)$$

this shows that the stability fall in government expenditure enables to reduce the tax pressure required to keep in line the fiscal and the external sectors respectively. The overall fiscal adjustment, however, relies mostly on a cut in government expenditure:  $d\tau$  in (13) is substantially smaller than  $d\gamma_s$  in (12).

Should the government not reduce the tax pressure ( $d\tau=0$ ), then from (1) expenditure would have to decline by

$$(12') \quad d\gamma = (\tau + m) (u_s - u_0)$$

that is less than  $d\gamma_s$  in (12) because with  $d\tau=0$  private consumption bears part of the adjustment effort as in

$$(13') \quad dc = i (u_s - u_0)$$

that is obtained from (2) with the activity ratio  $u$  set by (1).

#### **4. Permanent Recessive Disequilibrium**

Regardless of the depth of the adjustment, the problem would not be solved once the debt burden  $(\theta-g)z$  sets the required devaluation (9) above  $d\rho^*$  and the required activity ratio (11) below  $u^*$ . As investors perceive this the country's risk would inevitably increase affecting the investment ratio  $i$  and driving the stability levels (9) and (11) even further away which would, in turn, feed into the country's risk leading to a continuous fall in the investment ratio  $i$ . The economy would thus get caught into a self-feeding disequilibrium whatever the exchange rate and the activity ratio are.

Clearly, such disequilibrium cannot go on endlessly. Eventually some form of adjustment must occur. The experience of some highly indebted developing countries suggests that the debt problem could develop along with serious economic disorder (e.g. the cases of Argentina and Brazil at the beginning of the nineteen nineties) and eventually lead to some form of adjustment in the values of stocks.

#### **5. Conclusions**

The boundaries of the price and the quantity adjustments to a large foreign public debt have been discussed. In the price adjustment, beyond a certain devaluation in the exchange rate the government is not able to tax the savings arising from the fall in consumption. Consequently, the fiscal side of the adjustment must rely solely on a cut in government expenditure and the activity ratio declines (the quantity adjustment). Beyond a certain debt burden, however, as income evades further taxation and the required recession is too deep, the economy would not be able to stabilize its long term debt-output ratio. As investors perceive this, the country's risk would increase and investment would be affected which

would undermine growth and fuel the further rise in the debt ratio. This would, in turn, hamper growth and so on. The economy thus might fall into a self-perpetuating state of recession with growing indebtedness until some form of adjustment in the values of stocks – not discussed in this chapter – would operate.