Philippine Review of Economics and Business
Volume XXVIII, No. 1, June 1990

THE EFFECT OF AN EXCHANGE RATE DEVALUATION ON A SMALL OPEN ECONOMY WITH AN EXTERNAL DEBT OVERHANG

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One reason a developing country with a relatively open economy would be hesitant to devalue its currency is the effect of the change in the official exchange rate on the government budget items related to the external debt overhang. It is shown that in an economy characterized by mark-up pricing behavior, a currency devaluation would be stagflationary if a particular condition is satisfied. The latter relates the movement of the peso-equivalent interest payments on external debt to the exchange rate response of the trade balance. Assuming a devaluation is necessary to correct for distortions in the economy, one can conclude that potential short-term contractionary effects may be avoided if meaningful debt forgiveness will accompany the adjustment in the exchange rate.

1. Introduction

Different factors have been cited as causes of the present international debt crisis. In one extreme, critics point to the imprudent lending practices of commercial banks, wherein they cite the capital-asset ratios as having fallen to 5 percent or less during the 1980s (Kettel and Magnus, 1986). On the other hand, debtor nations have been accused of severe economic mismanagement and, to some extent, corrupt practices among government officials. The real reasons for the debt crisis would, of course, fall somewhere in between, with exogenous shocks such as the deterioration in the terms of trade of developing countries also figuring in the argument.

One significant factor attributed to the myopic policies of economic ministers of developing countries is the pegging of exchange rates despite the rise of the domestic inflation rate relative to the world inflation rate. This leads to what is termed as an overvalued currency resulting primarily in a lower export revenue and a greater propensity

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to import. An overvalued currency has been isolated as the chief cause of the external debt problem of Chile (Dornbusch, 1985) and as an important consideration in the case of the Philippines (de Dios, 1984).

In the current debt rescheduling negotiations involving either the Paris Club or commercial banks, it is usually required that the debtor nation, if it is an IMF member, has in force a stabilization program with the IMF before rescheduling provisions become effective. Part of the IMF program usually includes an item for the devaluation of the exchange rate for it to reflect a more realistic figure.

The traditional basis for this approach to devaluation as a tool for stabilization and growth is the textbook theory that a fall in the exchange rate, if it has any real effects at all, would be expansionary, i.e., the resulting increase in competitiveness of a country's exports and the simultaneous rise in the cost of imports would switch foreign and domestic demand toward domestic goods. If there are unemployed resources, then a devaluation is expected to lead to a rise in output; otherwise, only domestic prices would rise.

The more recent literature deals with the absorption and monetary approaches to an exchange rate devaluation with IMF models putting more emphasis on the latter.[1] The general idea associated with both these approaches is that an exchange rate devaluation will reduce domestic absorption which simultaneously frees resources for expansion in the export sector and reduces demand for imports. The net result is an improvement in the current account and, at least, the same level of output (as the fall in aggregate demand in the domestic sector is translated into a rise in export revenue and a fall in import expenditure).

Reservations, however, have been raised as to the efficacy of an exchange rate devaluation to close the gap in the current account (examples of which are presented in Bird, 1983). Moreover, there is a possibility that a fall in output will accompany the reduction in expenditure. Krugman and Taylor (1978) summarize and extend the branch of research that deals with the various channels through which a decline in real output is brought about by contractionary influences on

[1]In the monetary approach, an exchange rate devaluation is an expenditure switching device working mainly through the real balance effect. The increase in the price of foreign exchange reduces real balances. Assuming that the demand for money is exogenously determined, the excess demand for money is translated into a reduction in absorption and a balance-of-payments surplus which is the vehicle by which money balances are replenished.

aggregate demand. In their view, the three most important circumstances wherein a devaluation ultimately brings about a fall in output are the following (Krugman and Taylor, p. 446):

a) When devaluation takes place with an existing trade deficit, price increases of traded goods immediately reduce real income at home and increase it abroad, since foreign currency payments exceed receipts. Within the home country, the value of "foreign savings" goes up *ex ante,* aggregate demand goes down *ex post,* and imports fall along with it. The larger the initial deficit, the greater the contractionary outcome.

b) Even if foreign trade is initially in balance, devaluation raises prices of traded goods relative to home goods, giving rise to windfall profits in export and import-competing industries. If money wages lag the price increase and if marginal propensity to save from profits is higher than from wages, *ex ante* national savings goes up. The magnitude of the resulting contraction depends on the difference between the savings propensities of the two classes.

c) Finally, if there are ad valorem taxes on exports or imports, devaluation redistributes income from the private sector to the government, which has a saving propensity of unity in the short run. Once again, the final outcome is reduction in aggregate demand.

Krugman and Taylor develop these arguments within the framework of a simple Keynes-Kalecki model of an open-economy. In a recent paper, Barbone and Rivera-Batiz (1987) utilize a similar framework and show that even if the above effects do not operate, devaluation can still be contractionary when the economy is host to a substantial amount of foreign investment.

Approaching the problem from the opposite end of the spectrum, van Wijnbergen (1986) brings into focus the ways by which a devaluation can exert a contractionary effect on aggregate supply. The first channel arises when, as is typical in many developing countries, imported goods play a significant role in the production process. A devaluation raises the relative price of imported input versus domestic final goods. The ensuing rise in variable costs induces a fall in the output that firms are willing to produce. This contractionary effect may be partly offset by possibilities of substitution between imported inputs

and domestic factors of production and by the expansionary effects of expenditure switching. A second contractionary channel is created when real wages are indexed to some figures like the consumer price index, which accounts for both domestic and foreign goods. An increase in competitiveness implies that foreign goods become more expensive than domestic goods. If real wages are indexed to a consumption asset that includes foreign goods, this implies that real product wages rise and that the improvement in competitiveness occurs at the expense of domestic production. The third contractionary channel is a result of the effect of the increase in the price level on the real volume of bank credit. In many developing countries, firms finance fixed and working capital requirements through bank loans. The rise in the price level associated with a devaluation leads to a rise in nominal demand for bank credit, which, given a fixed nominal money supply, leads in turn to a rise in real interest rates and thus a rise in the interest component of costs.[2]

This paper draws mainly on the aggregate demand approach to address the issue of the effects of an exchange rate devaluation on the economy of a developing country with an external debt overhang. Bird has mentioned this as an increasingly important source of demand deflation while van Wijnbergen has incorporated this possibility in his analysis. The latter, however, considers only the case of privately owed debt; in the case of Bird, he does not refer to a formal model that elaborates on the conditions that lead to a contraction in output following an exchange rate devaluation. We will consider only the case where the external debt is owed by the government or is government guaranteed; hence, the possible contractionary channel will be similar to the fiscal effects described as the third case by Krugman and Taylor.

In a developing country, given the present level of external debt and the fact that much of it is owed by the government or is government-guaranteed, an exchange rate devaluation may also lead to strong inflationary pressure. Dornbusch (1986) describes this condition as one where:

> ...debt service is immensely inflationary in a country that cannot afford it. Blaming inflation on budget deficits is not wrong but misses the point that when the resources for debt service without recourse to money creation are not available then they must come out of the inflation tax. Needless to say, the inflation tax is highly regressive so that in the end debt service is either financed by cuts

[2]This is the summary of van Wijnbergen's main results as presented by Edwards and Ahamed (1986).

in social spending, increased social security taxes or increased seignorage.

In section 2, we will present a model that will deal formally with the problem just described. Comparative static results are derived in the third section. It will be shown that a devaluation in the presence of an external debt will generally lead to a fall in real output and a rise in prices. The short-run political implications of such a stagflationary situation are discussed in the last section.

2. The Model

The following structural model will be used to analyze whether or not a fall in the exchange rate will prove detrimental to the economy in the sense of a lower growth rate of real output and a higher price level, given an existing level of external debt.

(1) $Y = C(Y-tY, M/P) + I(r-\pi^E, Q) + G/P + X(ePx/P) - Q(Y,ePm/P)$

(2) $M/P = L(Y, r)$

(3) $\Delta M = G + G^D - tPY$

(4) $P = Z(M/Y, ePm, w)$

where:

Y – output (income) at constant prices

C – consumption expenditure at constant prices

I – investment expenditure at constant prices

G – government spending for productive endeavours, at current prices

X – export revenue at constant prices

Q – import expenditure at constant prices

M – money supply

G^D – interest expenditure on current external debt, equivalent to $e(iD)$ where i is the interest rate on the debt D

which is measured in units of foreign currency (usually in dollars).

P – overall price index (can be taken as GNP deflator)
Pm – import price index
Px – export price index
π^E – inflationary expectations; for purposes of simplification, we assume that π^E is equal to π, the actual rate of inflation.
e – nominal exchange rate
r – interest rate
t – tax rate
w – wage rate

The model represents a small open economy which produces and trades one good, but the imported good and the exported good are not highly substitutable. The consumption function incorporates the real balance effect but does not differentiate among the various types of consumer groups. Investment expenditures depend on the real interest rate and on the availability of imports (particularly capital goods). We assume complete sterilization of movements in the level of foreign exchange reserves; hence, the change in money supply results solely from the financing of the budget deficit. The latter is done purely by seigniorage.

The price equation is specified to reflect mark-up behavior on the part of the firms. The relevant costs of production are due to cost of imports and wages. The mark-up rate is influenced by excess aggregate demand, modelled here as M/Y.[3] Both the investment equation and

[3]Krugman and Taylor specify the equation as

$$P = (a_L w + a_m Pm)(1 + s)$$

where a_L and a_m are input coefficients of labor and imports, respectively, into home goods and s is the markup rate. In our analysis $s = s(M/Y)$, and we generalize the price equation as in (4) for the sake of clarity and simplicity.

In justifying this method Taylor (1983) states:

> "The markup specification broadly fits the data and is far simpler to manipulate than neoclassical cost functions." (p. 9)

the price equation are developed along the lines of structuralist macroeconomics (see Taylor, 1983), which is slowly being accepted as the appropriate tool for policy analysis in developing countries. The exchange rate and the tax rate are policy variables and we assume the absence of an indexation policy; hence, the wage rate is taken to be exogenous.

Using the model as our framework, we could situate some of the more important issues at hand. An exchange rate D devaluation would result in an increase in G. Assuming that both tax revenues (tPY) and G remain constant, then the budget deficit would increase, leading to an unequivocal rise in the price level. The resulting inflation rate and budget deficit may be inconsistent with other provisions in the IMF stabilization program.

On the other hand, if the government attempts to maintain a certain budget deficit, it may decide to lower G or increase t, both of which have recessionary effects on the economy in terms of a lower level of Y. It must be noted that P may still increase as a result of the increase in e and this, coupled with a lower Y, leads to a stagflationary situation.

Finally, if the government is constrained by political reasons to maintain G and the present tax structure, the only means by which it may keep the budget deficit within a certain level is to postpone interest payments on external debt obligations.

For the purpose of comparative statics, we assume that the budget deficit is fixed at a certain fraction g of real output at current prices.[4] This may be taken to be a policy directive of the IMF. Hence, the budget deficit is equal to gPY. Furthermore, only G, government expenditures for productive endeavors, is adjusted to maintain the appropriate ceiling on the budget deficit. We also abstract from exogenous foreign capital flows in this model. This process is captured by the following equation:

$$(5) \quad G = gPY + tPY - e(iD)$$

[4]In the model presented by Dornbusch (1986), g is an increasing function of the inflation rate and the real exchange rate. This specification may be relevent in a situation characterized by chronic hyperinflation as is the case in Argentina. However, in developing countries like the Philippines the financing of budget deficits by money creation has had limited effect on the price level and this may be explained by a relative constant value of g.

In equation (5), while it is clear that tax revenues are fully indexed to price increases, an implicit condition is that the marginal propensity to save of the government out of additional revenues due to price changes is equal to zero. By incorporating this condition into our model, we obtain the modified versions of equations (1) and (3):

(1') $Y = C(Y-tY, M / P) + I(r-\pi, Q) + gY + tY - e(iD) / P + X(ePx / P) - Q(Y, ePm / P)$

(3') $\Delta M = gPY$

3. Comparative Statics

The results of the differentiation of the system of equations consisting of (1'), (2), (3') and (4) are shown in Figure 1.[5]

We assume the usual signs of partial derivations, thus: $C_1, C_2, I_2, X', Q_1, L_1, Z_1, Z_2 > 0$, and $I_1, Q_2, L_2 < 0$.

From equation (3') we derive the condition that $M > gPY$ and using this inequality, we can show that a sufficient condition for the Jacobian determinant to be positive is:

(6) $iD > [X'Px + Q_2PM(I_2 - 1)]$

For reasons to be specified later, the above inequality should hold.

By applying Cramer's rule we can obtain expressions for $\delta Y / \delta e$ and $\delta P / \delta e$. The inequality in (6) is one of two sufficient conditions for $\delta Y / \delta e$ to be less than zero with the other being:

(7) $1 - Z_1 g - Z_2 ePm / P > 0$

The expression in (7) is a weighted average of the factors influencing the price level. It can also be interpreted as a stability condition for the model. Assuming that both Z_1 and Z_2 are less than unity, and since g is a relatively small number (in the order of .04), the inequality should hold.

An expenditure switching effect and the contractionary influence

[5]We employ the following convention in presenting partial derivatives. For example, C_1 is the partial derivative of C with respect to the first argument in the function which in this case is $(1-t)Y$.

$$\begin{bmatrix} 1-C_1(1-t)-Q_1(I_2-1)-g-t & -I_1 & \frac{-C_2}{P} & \frac{-C_2M}{P^2}+\frac{I_1}{P_{-1}}-\frac{e\,(iD)}{P^2}+\frac{X'e\,Pm}{P^2}+Q_2(I_2-1)\frac{e\,Pm}{P^2} \\ -L_2 & -L_2 & \frac{1}{P} & \frac{-M}{P^2} \\ -gP & 0 & 0 & -gY \\ \frac{Z_1M}{Y^2} & 0 & \frac{-Z_1}{M} & 1 \end{bmatrix} \begin{bmatrix} dY \\ dr \\ dM \\ dP \end{bmatrix} = \begin{bmatrix} X'\frac{Px}{P}-Q_2(1-I_2)\frac{Pm}{P} \\ 0 \\ 0 \\ -Z_2\,Pm \end{bmatrix} de$$

Figure 1

of an external debt overhang are the prominent elements in the equality expressed in (6). Increases in Y come by way of a rise in export earnings and a decrease in expenditures for imports. On the other hand, a fall in income could arise due to the decrease in imports which results in a decline in investment outlays, and the increase in the debt service burden. The following stylized facts regarding many developing countries lead to the conclusion that the inequality depicted in (6) is satisfied.[6]

a) the low elasticity of export revenue with respect to the exchange rate;

b) the large amount of external debt outstanding; and

c) the heavy dependence of the economy on imports for investment and production purposes, both for the domestic and export sectors.

We thus have a situation where a devaluation of the exchange rate results in an unambiguous decline in income. It is quite surprising that the real balance effect has no significant role in determining the sign of $\delta Y / \delta e$ although it does affect the magnitude of the derivative. Another interesting point is that, despite taxes being fully indexed to prices and a government marginal propensity to save equal to zero, the above result is obtained. Such is the strength of the effect of an external debt overhang.

In the case of $\delta P / \delta e$, (6) is also a sufficient condition for the derivative to be greater than zero. In addition the inequality $L_1 > g$ must be satisfied which should be true given the magnitude of g and the fact that money supply generally keeps pace with income.

4. Politics, Debt and Devaluation

The model as developed is useful only for analysis of the short-

[6]To be more accurate the condition stated in (6) should appear as follows,

(6') $(iD)e_0 > [X'Px + Q_2Pm(I_2 - 1)]$

where e_0 is the exchange rate for a chosen base period. The exchange rate e should be in index form so as to be consistent with the price variables in the model. If we apply (6') instead of (6) then it may be the case that only a modest level of external debt would make $(iD)e_0$ swamp the value of the right-hand side of the inequality.

term effects of a devaluation of the exchange rate as the dynamics have not been worked out. IMF programs may have long-term beneficial effects in terms of greater efficiency in investment projects, the streamlining of import restrictions that are consistent with an exchange rate devaluation, and general improvements in productivity. However, it must be pointed out that for several developing countries, political conditions dictate that the short-term be of utmost priority. Prescriptions for a devaluation that lead to a fall in real output and a rise in the price level may have disastrous effects on the stability of democratic governments such as in Argentina and the Philippines.[7]

In order to avoid a stagflationary situation without exceeding the limit on the budget deficit, the only recourse is to increase G while at the same time reduce debt service payments.[8] In other words, what is called for is a debt relief program which, unfortunately, commercial banks are hesitant or even unwilling to undertake.

[7]Monsod (1987) has a similar theme but she deals directly with the burden of the existing debt overhang and its potential destabilizing effects on the present Philippine government.

[8]We assume of course that an exchange rate devaluation is a necessary economic policy. This view can be supported on the grounds that such a move eliminates distortions in the trade sector and leads to greater efficiency. Also we do not consider the possibility of changing the tax structure (i.e. increasing t) even if the model yields the result that $\delta Y/\delta t > 0$ and $\delta P/\delta t < 0$. The model already makes the assumptions of full indexation of tax revenues with respect to changes in price and a zero marginal propensity to save on the part of the government. These assumptions imply some sort of automatic adjustment in the tax structure to compensate for declining real government expenditure.

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