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DEVALUATION

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Abstract: The devaluation of the rupee in 1991 has been hailed as a success in India since soon thereafter, the trade balance improved and capital flight was arrested. Since non-traded goods are likely to be labor-intensive in India compared to importables, the paper demonstrates that the devaluation could have actually worsened the trade balance by reducing the domestic relative price of traded *vs* non-traded goods. The partial devaluation embedded in a subsequent policy called LERMS (Liberalized Exchange Rate Management System) seems more likely to be the instrument that was successful in improving the trade balance.

1. INTRODUCTION

In developing countries mainstream opinion on devaluation coalesces around the view that by raising the domestic relative price of traded *vs* non-traded goods, a devaluation can improve the trade balance. The argument rests on the assertion that a developing country is usually "small" in the sense that it takes the world prices of traded goods as given. When this is true, a devaluation raises the domestic currency prices of the traded goods by the stroke of a pen. If the subsequent change in the price of the non-traded good is not such that it outweighs the initial impact of the devaluation on the prices of tradeables, the relative price of traded *vs* non-traded goods will rise. The latter guides the allocation of both consumption as well as productive resources between the traded and the non-traded sectors in a country. When the relative price of traded *vs* non-traded goods rises, consumers tend to consume more of the non-traded good than before. Also, producers find it profitable to produce more traded goods than before. Thus, the domestic production of traded goods rises and the domestic consumption of the same falls, leading either to a surplus in the trade balance, or, a reduction in an existing trade

[†] This article forms part of a chapter of my dissertation at the University of Rochester. Comments from Ronald W. Jones were extremely helpful. I also thank an anonymous referee for useful suggestions. All errors are mine.

deficit.

In their 1976 article Jones & Corden (1976) analyze the effect of a devaluation on the relative price of traded *vs* non-traded goods (P_T/P_N) in a small open economy where nominal wages are fixed in the short run. Their analysis reveals that in the Heckscher–Ohlin model[1] a devaluation will increase the relative price of tradeables, although by a smaller percentage than the devaluation itself if tradeables are capital-intensive. If not, a devaluation can worsen the trade balance by reducing the relative price of traded *vs* non-traded goods. The argument runs thus. Given fixed nominal wages, a devaluation will raise the return to capital by a magnified amount in the tradeables sector. So, if the non-traded good is capital-intensive, its price will rise proportionately more than the devaluation and offset the initial effect of the latter on the relative price of tradeables. In the Specific–Factors model[2] with fixed nominal wages, a devaluation raises the price of sector-specific capital in the traded goods sector and induces labor-intensive techniques. Under full employment, labor can only be pulled out of the non-traded sector, reducing the labor-capital ratio there. This leads to a fall in the reward to capital specific to that sector: with wages unchanged, the price of the non-traded good falls, leading to a magnified improvement in the relative price of tradeables. In the Specific–Factors model a devaluation *inevitably* succeeds in raising the relative price of traded *vs* non-traded goods when nominal wages are rigid. In the Heckscher–Ohlin model a devaluation succeeds under the assumption that traded goods are capital-intensive which seems plausible for a developing country. However, this predicted outcome (from both of these models), i.e., a devaluation raises the relative price of traded goods, is not strongly supported by empirical evidence (Edwards, 1989).

Under equally reasonable assumptions about factor-intensities, *viz.*, that non-tradeables are labour-intensive compared to importables, in Section 2 I show that a devaluation may actually lower the domestic relative price of traded versus non-traded goods in a small open economy such as India. This may lead to the wrong reallocation of domestic consumption as well as productive resources: if the price of the traded good falls relative to the non-traded good, domestic consumers are likely to consume more traded goods and producers are likely to produce less of the same, leading to a deterioration of the balance of trade of the country. The Liberalized Exchange Rate Management System (LERMS) which followed the devaluation reveals a greater likelihood of improving the trade balance.

[1] The Heckscher-Ohlin model is characterized by two goods produced by two inter-sectorally mobile factors of production. Perfect competition prevails in both the goods as well as the factor markets and the technology exhibits constant returns to scale.

[2] In the Specific-Factors model there are two goods as well. However, in addition to sharing the use of a mobile factor, say, labor, with the other sector each sector also uses a factor that is tied to it in the short run. By ruling out intersectoral mobility the possibility of differing rewards to the specific factors is opened up. Thus, capital that is employed in the traded sector may not earn the same as its non-traded sector counterpart.

The topic of devaluation has exerted a strong attraction for economists for many years and in many countries. For someone interested in the Indian economy, currently in pursuit of liberalization, the motivation behind the present analysis may be ascribed to the devaluation of its currency by roughly 22% in July 1991. The devaluation was followed by a second phase of currency reform called LERMS (Liberalized Exchange Rate Management System). Under LERMS, initially 60% of the foreign exchange earned from exports could be converted at the market determined exchange rate and the rest at the official rate which fetched less Rupees per Dollar. Over time, this percentage was raised until one were allowed to convert the full amount of one's export earnings at the market determined rate. Throughout the period of transition, imports were made at the fixed official rate. Thus, LERMS implied a partial or selective devaluation of the Rupee. The model in Section 2 traces the possible effects of both the universal devaluation of 1991 and the subsequent selective devaluation (LERMS) on the Indian balance of trade.

2. THE ROLE OF FACTOR INTENSITIES

Certain salient features of the Indian economy were kept in mind in choosing the model. Traditional items such as tea, cotton and silk textiles, leather and leather products form the bulk of Indian exports. A huge pool of unskilled labor is employed chiefly in such traditional sectors. The nominal wages of unskilled labor is rigid in the short run as they are not tied to any conventional economic indicator such as the Consumer Price Index. By contrast, skilled labor is employed chiefly in the formal sectors and normally have their compensation tied to the price index (e.g., the dearness allowance scheme). In the model, unskilled wages are taken as fixed in the short run and it is assumed that those workers cannot move across sectors as their skills are extremely specialized. In addition to unskilled labor, the exportables sector also uses skilled labor in the form of managers and supervisors. There are two other sectors in the economy, importables and the non-traded goods sectors. These sectors use skilled labor and capital. Returns to these factors are fully flexible and they are also mobile across sectors. In order to keep the exposition simple it is assumed that the exportables sector does not use any capital. The structure of production described above have features common with both the Heckscher–Ohlin and the Specific–Factors model[3] and was discussed for the first time by Gruen & Corden (1971) in a different context.

2.1 The Model

The model retains the assumptions of the classical paradigm in trade theory. That is, trade takes place only in final goods and perfect competition prevails in all the markets. Technology exhibits constant returns to scale in each sector. The

[3] The importables and the non-traded goods sectors using mobile labor and capital represent a Heckscher–Ohlin pattern. By using a specific factor, *viz.*, unskilled labor, the exportables sector lends the flavor of the Specific–Factors model to the overall system.

country is assumed to be "small": it takes the world prices of its traded goods, denominated in the foreign currency as given. Hence, the domestic price of a traded good is simply the given world price multiplied by the nominal exchange rate.

The following notations are used.

E: the nominal exchange rate (domestic currency per unit of the foreign currency).

X: the quantity of the exportable good.

M: the quantity of the importable good.

N: the quantity of the non-traded good.

P_X, P_X^*: domestic and world prices of exportables, respectively.

P_M, P_M^*: domestic and world prices of importables, respectively.

P_N: price of the non-traded good.

e: relative price of traded *vs* non-traded goods.

L_1, L_2: skilled and unskilled labor, respectively.

K: capital.

w_1, w_2: the wages of skilled and unskilled labor, respectively.

r: the reward to capital.

a_{ij}: the amount of the ith factor used in the jth sector.

θ_{ij}: share of the ith factor in the jth sector. For instance, θ_{L_1M} is the share of skilled labor in the importable sector and is equal to $w_1 a_{L_1M}/P_M$. Also, in the discussion to follow, a '$\hat{}$' over a variable will denote a proportionate change. That is $\hat{E}=dE/E$ and so on.

The small-country assumption implies that $P_X = EP_X^*$ and $P_M = EP_M^*$. Also, since world prices of the traded goods are assumed to be fixed it is legitimate to introduce a composite price index P_T for all traded goods (including exportables as well as importables). Thus, $e = P_T/P_N$. The only source of change in P_T in this model is a change in E. Therefore, $\hat{e} = \hat{E} - \hat{P}_N$.

The competitive, or zero profit conditions in the three sectors are given in Equations 1–3:

$$a_{L_1M}w_1 + a_{KM}r = EP_M^* \tag{1}$$

$$a_{L_1N}w_1 + a_{KN}r = P_N \tag{2}$$

$$a_{L_1X}w_1 + a_{L_2X}w_2 = EP_X^* \tag{3}$$

The competitive profit equations may be differentiated in order to obtain the following.[4]

$$\theta_{L_1M}\hat{w}_1 + \theta_{KM}\hat{r} = \hat{E} \tag{4}$$

$$\theta_{L_1N}\hat{w}_1 + \theta_{KN}\hat{r} = \hat{P}_N \tag{5}$$

[4] The expressions are simplified as the terms involving the $\hat{a}_{ij}$'s vanish since the producers minimize unit costs. For a complete description, see Jones (1965).

$$\theta_{L_1X}\hat{w}_1+\theta_{L_2X}\hat{w}_2=\hat{E} \tag{6}$$

The right hand sides of the first and third equations are simply $\hat{E}$ since the world prices are fixed. From the third equation, with w_2 fixed in the short run,

$$\hat{w}_1=\frac{\hat{E}}{\theta_{L_1X}}$$

That is, skilled wages rise proportionately more than the exchange rate. From Equation (4), therefore, the gains to capital, $\hat{r}$, is proportionately less than the devaluation. Hence,

$$(\hat{w}_1-\hat{r})>0$$

Next, substracting Equation 5 from Equation 4 and using the fact that for each industry the $\theta's$ add up to unity, we get

$$(\hat{w}_1-\hat{r})(\theta_{L_1M}-\theta_{L_1N})=\hat{E}-\hat{P}_N=\hat{e}$$

Given that the first parenthetical expression on the left hand side is positive, $\hat{e}$ can be positive if and only if

$$\theta_{L_1M}>\theta_{L_1N}$$

Chiefly owing to the general paucity of capital in developing countries, it seems natural to assume that importables in a developing country are likely to be capital-intensive and *not* labor-intensive. Therefore, the above inequality is likely to hold in the reverse. Thus, $\theta_{L_1M}<\theta_{L_1N}$ is a necessary and sufficient condition for a devaluation to worsen the trade balance by reducing e.

2.2 LERMS

A few additional notations are required.

E_m: the market rate of the nominal exchange rate.

E_0: the official version of the same. $E_m>E_0$.

k_m: the fraction of foreign exchange earnings that may be converted at the market rate.

k_0: equal to $1-k_m$.

This second phase of currency reform implied a rising k_m (i.e., $\hat{k}_m>0$, or, equivalently, $\hat{k}_0<0$) over time until it became unity. The domestic prices of exportables must now be redefined as:

$$P_X=(k_mE_m+k_0E_0)P_X^* \tag{7}$$

Subject to the official rate alone, the domestic price of importables may be written as:

$$P_M=E_0P_M^* \tag{8}$$

The change in P_T may now be defined as a weighted average of the changes in P_X and P_M. That is,

$$\hat{P}_T = \alpha \hat{P}_X + (1-\alpha)\hat{P}_M \tag{9}$$

where α and $(1-\alpha)$ denote the weights. Substituting the expressions for P_X and P_M and keeping in mind that the only variable that changes under LERMS is k_0, the expression for $\hat{P}_T$ is obtained as follows:

$$\hat{P}_T = \alpha k_0 \hat{k}_0 P_X^*(E_0 - E_m)/P_X \tag{10}$$

The change in P_N may be derived by following the same procedure as under universal devaluation and is not repeated here for the sake of brevity. The expression for the change in e (i.e., $\hat{P}_T - \hat{P}_N$) is given by

$$\hat{e} = k_0 \hat{k}_0 \frac{P_X^*}{P_X}(E_0 - E_m)\left[\alpha - \frac{\theta_{L_1N} - \theta_{L_1M}}{\theta_{KM}\theta_{L_1X}}\right]$$

Under LERMS $\hat{k}_0$ is negative. Also, $(E_0 - E_m)$ is negative since the market rate fetches more domestic currency per unit of the foreign currency. The sign of $\hat{e}$ hinges on the *magnitude* of the second expression, involving the factor-intensity terms, inside the square brackets. As argued earlier, since the non-traded good is likely to be labor-intensive compared to importables in a developing country (i.e., $\theta_{L_1N} - \theta_{L_1M} > 0$), this expression is positive. However, if the capital-intensity of the importable sector is *more* (i.e., θ_{KM} is very large) than the labor-intensity of the non-traded sector (i.e., a moderate θ_{L_1N}), the gradual move towards full convertibility through the successive partial devaluations implied by LERMS may raise e.

3. FINAL REMARKS

According to some policy-makers a devaluation can improve a country's trade balance by raising the relative price of traded *vs* non-traded goods in the economy. Even before one begins to evaluate that opinion analytically, it may be noted that if all the nominal variables were fully flexible; a devaluation would affect the *levels* of these variables in a uniform fashion, leaving the *ratios* of the same (such as P_T/P_N in the present case) unaffected. Nevertheless, the advocates of this policy may be justified on a short-term basis since certain nominal variables are indeed rigid in the short run providing a policy-driven rationale behind this and similar analyses. The devaluation of the Rupee in 1991 has been hailed as a success in India since the depletion of its international reserves got arrested soon after. On the basis of the analysis presented here it may be claimed that even if one were to attribute that improvement to the commonly proposed channel (according to which the devaluation raises P_T/P_N first, and that in turn improves the trade balance) the successful instrument was LERMS and not the devaluation. A reasonable assumption about factor intensities drives the result: in India non-traded

goods are likely to be labor-intensive compared to importables. Hence, a universal devaluation is likely to have a perverse effect on the domestic relative price of traded *vs* non-traded goods. When the importable sector is extremely capital-intensive, the selective devaluation implicit in LERMS has the potential of moving the relative price in the right direction.

However, much of modern economics is about what *signals* are generated by certain policies and how credible they are. It is entirely possible that the devaluation of 1991 generated signals about the durability of the reform process in India and triggered appropriate investments in the economy. If that were true, the improvement of the trade balance and the arrest of capital flight may be attributed to entirely different reasons. The analysis and measurement of the possible signalling content of devaluation is beyond the scope of this paper but offers the scope of interesting future research.

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