The Impact of Devaluation on the Balance of Payments of the Less Developed Countries: A Monetary Approach

Parviz Asheghian*

I. Introduction

Currency devaluation is a highly controversial issue in many countries. Such controversies stem from both theoretical and empirical research that have imbued its rich body of literature.

The theoretical work in this area is enriched with the "Elasticity Approach" initiated by Bikerdike, the "Absorption Approach" launched by Alexander, the "Monetary Approach" developed by Hahn, Johnson, Mundell, and recently by the writings of Dornbush, Anderson and Takayama, and Gylfason and Schmid among many others.

The empirical studies in this area include:

1. the work by Jonson and Kierskowski on developed countries,
2. Genberg, and Connolly and Taylor (1979) on a mixed sample of developed and developing countries, and
3. Cooper, and Connolly and Taylor (1976) on developing countries.

The existence of such diverse theoretical and empirical work on the subject of devaluation has resulted in skepticism among many less developed countries (LDCs), regarding the usefulness of such a device. Unconvinced by economic arguments policy makers

* Department of Economics, St. Lawrence University, Canton, NY 13617.

of many LDCs have preferred to avoid devaluation where at all possible. However, some LDCs, mostly in Latin America and Asia, have been actively pursuing the exchange rate devaluation policy in an effort to maintain the balance of payments equilibrium. The pursuit of such policies have contributed to the IMF view that develuation is a useful policy in resolving the balance of payments problem (Kaldor, Nashashibi).

In view of the growing controversies on the subject, the purpose of this paper is to examine the impact of devaluation and the growth of the money supply on the balance of payments of the LDCs, using a monetary model framework and a sample of 21 independent devaluations that took place in 11 LDCs.

II. The model

The monetary approach to the balance of payments in Johnson's words is "basically human in spirit" (Johnson, 1972). David Hume's analysis of Price-specie-flow mechanism demonstrated that the surpluses and deficits in the balance of payments generate automatic forces that adjust the money in a country to the demand for it. In the same manner the monetary approach considers surpluses and deficits to be adjustment elements that establish equilibrium between the money stock and the money demand in an open economy. An expansion of the domestic money supply by the banking system (central or private), achieved by increased domestic credit creation, would result in a larger deficit wiping out the excess supply of money. A devaluation, on the other hand, increases domestic prices. This leads to an increase demand for money which results in a temporary improvement in the balance of payments. Thus, the monetarists argue that a devaluation improves the balance of payments deficit unless it is used along with a relatively equal proportionate increase in domestic credit.

To capture the essence of the above argument, this study uses the monetary model that was developed by Johnson and Mundell, and was set forth in Connolly and Taylor.

The demand for money is specified as:

$$(1) \quad M_d = \lambda P_d q$$

where q stands for the real value of permanent income, p_d domestic prices, and λ a constant that shows the fraction of yearly income that people desire to hold in the form of cash balances.

The purchasing power parity:

$$(2)\ P_d = EP_w$$

where P_w is world price and E is exchange.

The money supply:

$$(3)\ M_s = I + C$$

where M_s stands for money, defined as currency plus demand deposit, I international reserve, held by both central and private banks, and C domestic credit, defined as the net holdings of assets by both central and private banks.

Monetary Equilibrium:

$$(4)\ M_s = M_d$$

Permanent income valued at world prices:

$$(5)\ Q = P_w q$$

where Q is the nominal value of permanent income.

Substituting equations (2) and (4) into equation (1), we get:

$$(6)\ M_s = \lambda E P_w q$$

Substituting equation (6) into equation (3) we get:

$$(7)\ I + C = \lambda E P_w q$$

Substituting equation (5) into equation (7) we get:

$$I + C = \lambda EQ$$

or alternatively:

$$I = \lambda EQ - C$$

Noting that ΔI is by definition the balance of payments (P), that is, $\Delta I = P$ we can write:

$$P = \lambda \Delta(EQ) - \Delta C$$

Dividing both sides of M_s, and noting that $M_s = \lambda EQ$ we get:

$$\frac{P}{M_s} = \frac{\Delta E}{E} + \frac{\Delta Q}{Q} + \frac{\Delta Q}{Q}\frac{\Delta E}{E} - \frac{\Delta C}{M_s}$$

Letting $\frac{\Delta Q}{Q} = \delta$, we get:

$$\frac{P}{M_s} = (1 + \delta)\frac{\Delta E}{E} + \delta - \frac{\Delta C}{M_s}$$

If we assume that devaluation causes no change in the rate of growth of δ in the period before t-1 and the period after t devaluation, that is $\delta_{t-1} = \delta_t = \delta$, the improvement in the balance of payments as a proportion of the money stock could be represented in the following equation:

$$(8)\quad \frac{P^t}{M_s^t} = (1 + \delta)\left(\frac{\Delta E^t}{E^t} - \frac{\Delta E^{t-1}}{E^{t-1}}\right) - \left(\frac{\Delta C^t}{M_s^t} - \frac{\Delta C^{t-1}}{M_s^{t-1}}\right)$$

It is recognized that theoretically devaluation might result in a higher permanent income, due to a higher economic efficiency that might be caused by the easing of controls following devaluation. However, an examination of the sample data used in this study for four years before and after devaluations do not indicate such a tendency.

Assuming that change in the exchange rate is not preceded by a prior one, that is $\frac{\Delta E^{t-1}}{E^{t-1}} = 0$, equation (8) diminishes to the following form:

$$(9)\quad \frac{P^t}{M_s^t} = (1+\delta)\left(\frac{\Delta E^t}{E^t}\right) - \left(\frac{\Delta C^t}{M_s^t} - \frac{\Delta C^{t-1}}{M_s^{t-1}}\right)$$

The above equation, which expresses the improvement in the balance of payments as a function of money stock and exchange rate, provides the analytical framework for the regression analysis that is presented in this study.

III. The Data

The data consist of 21 independent devaluation episodes that took place in LDCs during 1959-1979 period. In compiling this data it was decided to include only those devaluations that occurred in small, open LDCs, ruling out cases such as Chili and Uruguay that have been experiencing devaluation almost continously over a long period time. To form such data, Cooper's study which provides a sample of 24 devaluations during 1959-1966 was consulted. This sample is basically the same as the one that was used by Connolly and Taylor in their study. However, for the purpose of this study it was decided to drop advanced countries such as Canada and Israel from observation, including only 11 LDCs in the data pool. Additionally, to expand observations, the data was updated to include those devaluations that took place until 1979. Availability of data clearly influenced the selection process. The countries and their dates of devaluations are given in Table 1.

Given the dates of devaluations the next task was to collect the data for the different variables that are used in the regression analysis. To achieve this task different issues of International Financial Statistics were consulted. This publication provides quarterly data for different countries in different years. To calculate the value of the balance of payments in each period, the value of the net holding of international reserve (I) by the consolidated banking system was derived. The change in I during the four quarters after the devaluation was used as a measure of the balance of payments in the years after devaluation. Similarly the change in I during the four quarters before devaluation was used as the measure of the balance of payments in the year preceding

Table 1

LDCs AND THEIR DEVALUATION DATES

Country	Dates of Devaluation
Argentina	January 1959, March 1975
Columbia	November 1962, September 1965
Costa Rica	September 1961, April 1975
Ecuador	July 1961, August 1970
India	June 1966, February 1973
Korea	May 1964, December 1974
Peru	October 1967, September 1975
Phillipines	January 1962, November 1965
	February 1970, February 1973
Tunisia	September 1964
Turkey	August 1970
Venezuela	January 1964

Source: Pick's Currency Year Book and International Financial Statistics

devaluation. Each of these measures were then divided by their respective M_s at the beginning of the period. The improvement in the balance of payments was simply found by subtracting the second measure from the first, thus providing for the left hand side of the equation (9). To provide for a two year comparison, the calculations were performed for eight quarters before and after devaluation. To measure money, the IMF definition was adopted, that is money was defined as currency plus demand deposit. Finally domestic credit (C) was measured by deducting international reserve asset (I) from the money stock (M_s).

The Estimation Results

The following equation was estimated by the Ordinary Least Squares method for the sample for 1 and 2 years:

$$\frac{P^t}{M_s^t} = \alpha\left(\frac{\Delta E^t}{E^t}\right) + \beta\left(\frac{\Delta C^t}{M_s^t} - \frac{\Delta C^{t-1}}{M_s^{t-1}}\right) + \varepsilon$$

where α and β are the coefficients associated with the rate of growth of devaluation and the rate of expansion of domestic credit, respectively. ε is an error term.

Table 2 shows the estimation results, where equations A and B show the one year and two year results, respectively. If one assumes that full adjustment in money stock and prices is implemented in one year, equation A will apply. However, if the adjustment is slower, equation B would be applicable.

An interesting result detected by both equations in table 2 is that for both equations (A and B) the absolute value of the β coefficient is greater than 1 (-1.07044 and -2.75347). Additionally as the value of t statistics for both regression indicates one could reject the null hypothesis that changes in domestic credit has no effect on the balance of payments.

The value of the α coefficient for the equation A, reported in table 2, is 0.83582. A simple t test for the hypothesis that this coefficient is equal to one is 1.06773, so one can not reject the hypothesis. The value of the same coefficient for the quation B is 2.02818, which is greater than one. As the value of the t statistics for both of these coefficients show one could reject the hypothesis that devaluation has no impact on improving the balance of payments.

Table 2

$$\frac{P^t}{M_s^t} = \alpha \left(\frac{\Delta E^t}{E^t}\right) + \beta \left(\frac{\Delta C^t}{M_s^t} - \frac{\Delta C^{t-1}}{M_s^{t-1}}\right) + \varepsilon$$

Equation	α	β	R^2	F
A	0.83582*	-1.07044*	0.47338	8.09014*
	(0.15427)	(0.0081)		
B	2.02618*	-2.75347*	0.71099	22.14049*
	(0.01692)	(2.02818)		

* Significant at five percent level

IV. Concluding Remarks

The analysis presented in this paper suggests the following conclusions:

1. Devaluation is successful in improving the balance of payments of LDCs.
2. Changes in the rate of growth of domestic credit have a significant effect on the balance of payments of LDCs.

The positive findings of this study are in accordance with the results reached by Connolly and Taylor regarding the monetary approach to the balance of payments. However, unlike their study that finds the coefficients of devaluation to be less than one for their sample, this study shows that the coefficients of devaluation for LDCs do not fall short of unity for both periods (1 and 2 years) under consideration.

Cooper reaches a negative conclusion. He reports that there is no correlation between the changes in the rate of growth of domestic credit and the improvement in the goods and services balance. However his study differs from this one on two accounts. First, his sample consists of "developing countries", including advanced countries such as Canada and Israel, whereas only LDCs are included in this study. Second, his analysis is based on merchandise account, while this study concentrates on the balance of payments.

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