

MODELLING THE EFFECTS OF DEVALUATION ON
PRICES, OUTPUT AND THE TRADE BALANCE:
THE PHILIPPINE EXPERIENCE

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This paper is a partial output of the on-going PIDS research project entitled "Philippine Balance of Payments: A Model and Analysis of Payments Policy." It outlines suggested approaches in measuring the effects of devaluation on prices, output and trade balance in the Philippines.

INTRODUCTION

The nominal (official) exchange rate between the Philippine peso and the U.S. dollar rose by 600 percent between 1946 and 1982. It was ₱2.00 per U.S. dollar in 1946 when the Philippines became politically independent from the United States. By the end of 1983, thirty-eight years later, it had risen to ₱14.00 per U.S. dollar.

The fall in the international value of the peso has been far from smooth and uneventful. The first major exchange rate adjustment was made in April 1960 with the introduction of a multiple exchange-rate system. Together with the existing 25 percent margin fee on the sale of foreign exchange, the new set-up raised the peso-dollar rate by 100 percent to ₱4.00 for non-essential imports, by 25 percent to ₱2.50 for essential imports and by 15 percent to ₱2.30 for exports. In February 1962, the plan for a gradual adjustment of the exchange-rate was abandoned and the peso was allowed to float. By the end of the year, it had reached the ₱3.90 mark and stayed there. This was made the official par value in November 1965 and maintained until February 1970 when the peso was floated again. Within eight months, the relative value of the peso had fallen by 64 percent to ₱6.435 per U.S. dollar.

For the next ten years, the exchange rate which was actually more of a crawling peg than a free float, fluctuated up and down, but hardly ever by more than five percent. The irreversible decline of the value of the peso started in 1981, gained momentum through 1982 and came to a head in June 1983 when an official devaluation of 78 percent was announced, bringing the parity rate to ₱11.00 per dollar. Another devaluation of 27 percent, just three months later, pegged the exchange rate at ₱14.00 per dollar.

A. Effects of Devaluation on Prices, Output and the Trade Balance

These sudden and sizeable adjustments in the exchange rate have had significant effects on key macroeconomic variables like the domestic price level, gross domestic product and the trade balance as well as on the sectoral profitability and output. Table 1 presents the growth trends of major macroeconomic variables before, during and after the devaluations in 1960-62 and 1970. It can be observed that there was a dramatic slowdown in the growth of output from 6.2 percent in 1957-59 to 0.2 percent in 1960. By 1961, however, the economy had recovered from the impact of higher domestic prices of imports and grew quite rapidly in the next few years. The domestic price level which had been quite stable before 1960 also responded to the devaluation by

increasing by an annual rate of about five percent in the early 1960s. The trade balance took a while longer to respond to the exchange rate, improving as it did only in 1962. From an average of US\$94 million during 1957-61, the trade deficit fell to US\$10 million in 1962.

The changes in the economy brought about by the 1970 devaluation were a little different. Gross domestic output grew slightly faster during 1970 and doubled its pre-devaluation growth rate of 3 percent during 1971-73. The trade balance improved considerably within the year, from a deficit of nearly US\$200 million in 1969 to just US\$17 million in 1970. The inflation rate alone exhibited the same response. It increased from an average of 3 percent in 1967-69 to 14 percent in 1970 for the consumer price index and 24 percent for the wholesale price index.

TABLE 1

GROWTH TRENDS OF OUTPUT, PRICES AND TRADE BALANCE, 1957-1973.

	1957-59	1960 ^{1/}	1961	1962	1963-65	1967-69	1969	1970 ^{2/}	1971	1971-73
Real GDP ^{3/} (% change)	6.2	0.2	7.3	6.8	7.4	3.1	3.7	4.4	4.6	6.3
CPI in RP ^{4/} (% change)	0.6	5.0	4.3	3.3	6.7	3.0	1.2	14.8	21.9	15.5
CPI in NCR (% change)	0.8	4.2	1.5	5.9	5.4	3.5	2.1	14.4	14.5	12.9
WPI in NCR (% change)	3.0	4.2	4.8	5.2	5.5	2.2	1.4	23.6	15.7	16.5
Trade Balance ^{5/} (US\$million)	-99.9	-89.1	-81.4	-9.9	125.2	-200.4	-198.6	-17.1	-71.6	1.3

^{1/}1960-62 constitute the devaluation period under consideration and 1957-59 and 1963-65 the pre-devaluation and post-devaluation periods, respectively.

^{2/}1970 is the year of devaluation.

^{3/}From National Income Accounts, National Accounts Staff, NEDA.

^{4/}From Statistical Bulletin, Department of Economic Research, Central Bank.

^{5/}From Foreign Trade Statistics, National Census and Statistics Office, NEDA.

B. Review of Literature

A survey of the existing literature on devaluations of the Philippine peso (Annex II) shows that some of these effects have already been analyzed. The inflationary effects of the 1962 and 1970 devaluations have been noted by Ranis (1974), Bautista (1974, 1976, 1983), Ross (1966), Alano (1978) and Nguyen (1979). They identified exchange rate adjustments along with foreign inflation as sources of Philippine inflation in the 1960s and 1970s. A better understanding of the inflationary process could be obtained by looking at the price movements of various groups of commodities, some of which may respond faster to devaluation than others. For example, a study of the price response of importables, exportables and non-tradables to exchange-rate changes may indicate how and why the general price level increases after a devaluation.

The effects of devaluation on the allocation of resources between industry and agriculture and between subsectors were discussed by Legarda (1962), Treadgold and Hooley (1967), Sicat (1972), Power and Bautista (1979) and David (1983). However, the net effect of shifts in production on gross domestic output has not been measured or analyzed. The impact of devaluation on overall economic activity has to be studied since devaluation may very well be deflationary and the choice of appropriate monetary

and fiscal policies to accompany a devaluation would largely depend on this.

The effects of devaluation on the trade balance also needs further study. Only Dowling (1973) studied the impact of the 1962 devaluation on the trade balance. A similar study for the 1970 devaluation has not been made. Since one of the main reasons for devaluing a currency is to improve the trade balance, it is important that evidence be gathered as to how effective a devaluation really is in improving the trade balance. A study of the other factors which affect the demand for imports and the performance of exports would also be useful in assigning devaluation its appropriate role in improving the trade balance.

In addition to the partial equilibrium studies suggested above, a general equilibrium approach would also be highly desirable in interrelating the effects of devaluation on prices, output and trade balance. For instance, a devaluation would tend to increase the production of exportable goods which in turn could increase total output as well as improve the trade balance. In the first place, the expansion of output in the exportables sector would be induced by an increase in its absolute or relative price in terms of importables and non-tradables. The overall effect on the price level should therefore be studied together with the resulting change in real income or expenditure. A look into the mechanisms by which devaluation brings about changes in gross domestic product, prices and the trade balance

is therefore worth making and will be the starting point of this paper.

C. Relative-Price and Real-Balance Effects of Devaluation

The effects of devaluation on key macroeconomic variables like the general price level, gross domestic product and trade balance in foreign currency will be the main focus of this study. They are quite readily observable and measurable. Not as easily identifiable are the mechanisms through which a devaluation brings about these changes. For the most part, they can be hypothesized and tested only to a certain extent. Such an attempt will be made in this paper through the specification of three models which incorporate what will be referred to as the relative-price and real-balance effects of devaluation.

An upward adjustment of the exchange rate is certain to bring about a change in the domestic prices of goods which are traded in world markets. If there are goods which are also produced and consumed domestically but not traded internationally, a devaluation will bring about a change in the relative price of the tradable goods in terms of the non-traded goods to the extent that the price of the latter is fixed or less flexible than that of the former. The devaluation therefore has what is called a relative-price effect. The change in relative prices will be the means through which the devaluation affects the allocation of production and consumption between the

tradable and non-tradable goods. Since the price of tradable goods will be higher relative to that of non-tradables, production will shift from the latter to the former while consumption patterns will be shifted from the former to the latter. Thus, the relative-price effect of devaluation brings about substitution in both production and consumption.

Since the prices of tradable goods increase after a devaluation, the general price level would also tend to increase unless offset by a fall in the price of non-traded goods which is unlikely in most cases. The increase in the general price level would lower wages and money supply in real terms if their nominal values are kept constant. The fall in either real wages or real money balances is likely to bring about a fall in real expenditure. In the models to be developed, the change in real balances rather than the fall in real wages is emphasized in order to bring into the model the role of money. Money is considered an important variable in the study of devaluation in the light of the monetary approach to the balance of payments.

When the real balances held fall relative to the desired level, people are hypothesized to reduce their real spending in order to accumulate the desired real balances. The real-balance effect of devaluation therefore reduces real expenditure. The fall in real expenditure would decrease the demand for both tradable and non-tradable goods.

In summary, the demand for tradables and non-tradables would depend on both relative-price and real-balance effects of devaluation. The two effects decrease the demand for tradables while they move demand for non-tradables in opposite directions. The supply of tradables and non-tradables would depend on the relative-price effect of devaluation and on the availability of unemployed resources. If all productive resources were initially employed, a devaluation would not affect the level of total output but only the relative share of the two sectors in it. If there were idle resources before the devaluation, total output could rise or fall depending on the net effect of the changes in the supply of the two classes of goods. The supply of traded goods would definitely increase in response to their higher prices. The supply of non-traded goods would depend on the demand for them which, as observed earlier, depends on the net effects of the relative-price and real-balance effects of devaluation.

The relative-price and real-balance effects of devaluation are the building blocks of the models to be developed and tested in this paper. The process through which they bring about changes in gross domestic output and the trade balance will be explained in detail in the following models.

MODELS SPECIFICATION

The short-run effects of devaluation on the trade balance, domestic prices and real output of a small open economy can be analyzed with the use of the three models which will be presented here. The first model is the monetarist small-country model with importables and exportables but without non-tradables. The second model is the same monetarist model with non-traded goods. Both models assume that domestic prices are flexible and adjust instantaneously to maintain the full-employment level of income. The third model considers the possibility that the price of non-traded goods is rigid in the short-run and that output has to adjust to any excess demand for or supply of non-traded goods.

In all three models, general equilibrium will be attained if all the markets for importables, exportables and non-tradables clear. This can be achieved by changes in the level of real expenditure as well as substitution among the components of domestic expenditure and production.

Following Dornbusch (1974), real expenditure, Z , is defined as that part of real income, Y , which is not saved. Hoarding or saving is assumed to be a proportion, β , of the stock excess demand for money, $(L - M/P)$, where L is the demand for real balances, M is the nominal money supply and P the domestic price level. In the absence of well-developed capital markets, the

quantity theory of money yields a suitable money demand function, $L = kY$, where k is the fraction of yearly income that the public desires to hold in the form of cash balances. Thus, the expenditure function can be written as:

$$Z = Y - H = Y - \beta(L - M/P) = Y - \beta(kY - M/P) = (1 - \beta k)Y + \beta(M/P)$$

The trade balance, TB , is the excess of export earnings over import spending evaluated at world prices. Thus, $TB = P_X^* S_X - P_M^* V_M$ where P_X^* and P_M^* are the world price indices for exportables and importables, respectively. The supply of exports, S_X , is the excess of domestic production of exportables, Y_X , over domestic consumption of exportables, D_X , thus $S_X = Y_X - D_X$. The volume of imports, V_M , is the excess of domestic demand, D_M , over domestic production, Y_M , thus $V_M = D_M - Y_M$. The trade balance can therefore be written as:

$$TB = P_X^* S_X - P_M^* V_M = P_X^* (Y_X - D_X) - P_M^* (D_M - Y_M)$$

A. Flexible Prices without Non-traded Goods (Model I)

In the perfectly open economy producing and consuming only importable and exportable goods, real expenditure and real income can be defined as:

$$Z = (1 - \beta k) Y_P + \beta(M/P) = D_M(R_T, Z) + R_T D_X(R_T, Z)$$

$$Y = Y_P = Y_M(R_T) + R_T Y_X(R_T)$$

Since prices are flexible, domestic production will always be at the full-employment level, Y_P , but the composition of output will depend on the price of exportables in terms of importables, $R_T = P_X/P_M$. P_M and P_X are the domestic price indices for importables and exportables, respectively. They are kept in line with their respective foreign price indices, P_M^* and P_X^* , via the exchange rate, E , but do not exhibit perfect purchasing power parity because of distortions produced by commercial policies like import tariffs and export subsidies, collectively denoted by T_M and T_X . Thus, the domestic price indices are:

$$P_M = E (1 + T_M) P_M^*$$

$$P_X = E (1 + T_X) P_X^*$$

By taking the total differential of the above price equations, dividing through by P_M or P_X and defining the percentage change in P_M as $\hat{P}_M = d P_M/P_M$ and in P_X as $\hat{P}_X = d P_X/P_X$ and the percentage change in the other variables in a similar fashion, we obtain $\hat{P}_M = \hat{E} + \hat{T}_M + \hat{P}_M^*$ and $\hat{P}_X = \hat{E} + \hat{T}_X + \hat{P}_X^*$. If commercial policies and foreign price indices are assumed to be constant, the domestic price indices for importables and exportables change proportionately with the exchange rate or $\hat{P}_M = \hat{E}$ and $\hat{P}_X = \hat{E}$. Thus, there will be no change in their relative price since $\hat{R}_T = \hat{P}_X - \hat{P}_M = 0$.

The absolute price level, P , is a weighted average of the domestic price indices for importables and exportables, with the weights determined by their relative shares in domestic production or consumption, λ and $1 - \lambda$, respectively. Utilizing a Cobb-Douglas function, the domestic price level can be defined as $P = P_M^\lambda P_X^{1-\lambda}$ and its percentage change as $\hat{P} = \lambda \hat{P}_M + (1-\lambda) \hat{P}_X$. Since the prices of importables and exportables change proportionately with the exchange rate, so will the general price level or $\hat{P} = \hat{E}$.

The level of real expenditure can be expected to decrease when the price level rises after a devaluation. The price increase lowers the real money supply and therefore, real expenditure. The percentage change in real expenditure, \hat{Z} , due to a change in the exchange rate is derived to be:

$$\hat{Z} = \frac{-\hat{P}}{\left(\frac{1}{\beta} - k\right) V + 1} = \frac{-\hat{E}}{\left(\frac{1}{\beta} - k\right) V + 1}$$

where $V = PY/M$ is the income velocity of money.

The fall in real expenditure will bring about a decrease in demand for importables and exportables since $\hat{D}_M = \alpha_Z \hat{Z}$ and

$$\hat{D}_X = \gamma_Z \hat{Z} \cdot \alpha_Z = \frac{\partial D_M}{\partial Z} \cdot \frac{Z}{D_M}, \quad \text{the expenditure}$$

elasticity of demand for importables, and $\gamma_Z = \frac{\partial D_X}{\partial Z} \cdot \frac{Z}{D_X}$,

the expenditure elasticity of demand for exportables, are both assumed to be positive. The demand for importables and

exportables are also functions of the relative price between them,

R_T , but since this does not change with a devaluation, there is no shift in expenditure between importables and exportables.

The composition of output will also remain unchanged.

The change in the trade balance is given by:

$$dTB = (Y_X \hat{Y}_X - D_X \hat{D}_X) - (D_M \hat{D}_M - Y_M \hat{Y}_M)$$

or simply by $dTB = -(D_X \hat{D}_X + D_M \hat{D}_M)$ since $\hat{Y}_X = \hat{Y}_M = 0$.

A devaluation can be expected to improve the trade balance because a devaluation reduces expenditure through its real balance effect, $\hat{Z} < 0$, and, therefore, $\hat{D}_X < 0$ and $\hat{D}_M < 0$.

In summary, since the relative price of exportables to importables is assumed to remain constant after a devaluation, there is no substitution between the two kinds of goods in either domestic production or consumption. The devaluation will improve the trade balance only through its effect on real balances, which will lower expenditure and demand for both importables and exportables, according to their expenditure elasticities. This will lower the volume of actual imports and increase the amount of domestically produced goods made available for export.

B. Flexible Prices with Non-traded Goods (Model II)

The small open economy in which non-traded goods are produced in addition to exportables and importables, and consumed along with these, will have the following real expenditure and real income functions:

$$Z = R_M D_M (R_M, R_T, Z) + R_X D_X (R_X, R_T, Z) + D_N (R_M, R_X, Z)$$

$$Y = Y_P = R_M Y_M (R_M, R_T) + R_X Y_X (R_X, R_T) + Y_N (R_M, R_X),$$

where D_N^* and Y_N are domestic spending on and production of non-traded goods.

Since prices are assumed to be perfectly flexible, the full-employment level of output, Y_p , will always be maintained but its composition will depend on the relative prices R_M , R_X and R_T . $R_M = P_M/P_N$ is the price of importables in terms of non-tradables, $R_X = P_X/P_N$, the price of exportables in terms of non-tradables and $R_T = P_X/P_M$, the relative price between exportables and importables. A devaluation is expected to increase the domestic price of importables and exportables automatically while the price of non-tradables may rise or fall depending on net demand for the good. If the devaluation succeeds in raising the price of importables and exportables relative to non-tradables, productive resources will shift from the non-traded goods sector to the traded goods sector. Less non-tradables and more importables and exportables will then be produced. Since the prices of exportables and importables will change proportionately with the exchange rate, their relative price will not change and there will be no shift of resources between the importables and exportables sectors.

The composition of domestic expenditure, Z , also depends on the relative prices between importables, exportables and non-tradables. The level of demand for these goods will also vary with the level of expenditure, Z . $\hat{Z} = -\hat{P}/((1/\beta) - k) V + 1$

as derived for the first model. The change in the domestic price level, \hat{P} , is the weighted average of the changes in the price of the three classes of goods, with the weights determined by their relative shares in domestic consumption. Thus,

$$\hat{P} = \lambda_1 \hat{P}_M + \lambda_2 \hat{P}_X + (1 - \lambda_1 - \lambda_2) \hat{P}_N.$$

Since $\hat{P}_M = \hat{P}_X = \hat{E}$, the change in the domestic price level can be written as:

$$\hat{P} = (\lambda_1 + \lambda_2) \hat{E} + (1 - \lambda_1 - \lambda_2) \hat{P}_N$$

and the change in the level of real expenditure as:

$$\hat{Z} = \frac{-(\lambda_1 + \lambda_2) \hat{E} - (1 - \lambda_1 - \lambda_2) \hat{P}_N}{\left(\frac{1}{\beta} - k\right) V + 1}$$

Both the general price level and the level of real expenditure are therefore functions of the exchange rate and the price of non-traded goods. The latter will be determined endogenously so as to maintain internal balance. If initially, there was internal balance, then internal balance after devaluation will be ensured by the condition that the percentage change in the demand for non-traded goods, \hat{D}_N , equals the percentage change in its supply, \hat{Y}_N .

Since D_N is a function of relative prices and expenditure level,

$$\hat{D}_N = \epsilon_{R_M} \hat{R}_M + \epsilon_{R_X} \hat{R}_X + \epsilon_Z \hat{Z}$$

$$\epsilon_{R_M} = \frac{\partial D_N}{\partial R_M} \cdot \frac{R_M}{D_N}, \text{ the relative-price elasticity of}$$

demand for non-traded goods with respect to importables, and

$$\epsilon_{RX} = \frac{\partial D_N}{\partial R_X} \cdot \frac{R_X}{D_N}, \text{ the relative-price elasticity of demand}$$

for non-traded goods with respect to exportables, are both positive because when the relative prices of importables and exportables rise as a result of a devaluation, the consumption of non-traded goods is encouraged.

$$\epsilon_Z = \frac{\partial D_N}{\partial Z} \cdot \frac{Z}{D_N}, \text{ the expenditure elasticity of demand}$$

for non-traded goods is positive if they are normal goods.

When the devaluation reduces real balances and real expenditure, the demand for non-traded goods falls.

A rise in relative prices and a fall in real balances therefore move demand for non-traded goods in opposite directions. The change in demand for non-traded goods after a devaluation is ambiguous if they are normal goods and if their price rises less than proportionately with the exchange rate. The latter will ensure that the relative prices of importables and exportables will indeed rise after a devaluation since their percentage changes can be written as:

$$\hat{R}_M = \hat{P}_M - \hat{P}_N = \hat{E} - \hat{P}_N \quad \text{and} \quad \hat{R}_X = \hat{P}_X - \hat{P}_N = \hat{E} - \hat{P}_N.$$

When $\hat{R}_M > 0$ and $\hat{R}_X > 0$, the net change in demand for non-traded goods will depend on the relative strengths of the relative-price and real-balance effects of devaluation.

If the price of non-traded goods rises more than proportionately with the exchange rate, and $\hat{R}_M < 0$ and $\hat{R}_X < 0$, the devaluation will reduce the demand for non-traded goods through both its relative-price and real-balance effects. This is likely to happen if there is a large decrease in the supply of non-traded goods, Y_N . Since Y_N is a function of the relative prices of importables and exportables,

$$\hat{Y}_N = \eta_{FM} \hat{R}_M + \eta_{FX} \hat{R}_X,$$

$\eta_{FM} = \frac{\partial Y_N}{\partial R_M} \cdot \frac{R_M}{Y_N} < 0$ is the relative-price elasticity of the

supply of non-traded goods with respect to importables and η_{FX}

$= \frac{\partial Y_N}{\partial R_X} \cdot \frac{R_X}{Y_N} < 0$ is the relative-price elasticity with respect

to exportables. When a devaluation raises the relative prices of importables and exportables, productive sources will move toward these sectors from the non-traded goods sector.

The equilibrium condition for the non-traded goods market,

$D_N = Y_N$ yields:

$$\hat{P}_N = \hat{E} + \frac{\epsilon_Z}{\phi_{FM} + \phi_{FX}} \hat{Z},$$

where $\phi_{FM} = \epsilon_{FM} - \eta_{FM} > 0$, $\phi_{FX} = \epsilon_{FX} - \eta_{FX} > 0$ and $\hat{Z} < 0$

after a devaluation. The percentage change in the price of non-traded goods, \hat{P}_N , is a function of the exchange rate directly as well as indirectly through domestic expenditure. \hat{P}_N is a direct

positive function of the exchange rate adjustment because a devaluation shifts domestic consumption towards and production away from the non-traded goods sector by automatically raising the domestic prices of importables and exportables. \hat{P}_N is an indirect negative function of the exchange rate change because a devaluation reduces real balances, real expenditure and consequently, demand for non-traded goods. The net increase in \hat{P}_N will be smaller the more the negative expenditure effect is able to offset the positive relative-price effect of a devaluation. The price of non-traded goods may actually fall if there is an excess supply of it.

This is more likely to happen if the demand for non-traded goods is very responsive to changes in the level of expenditure (big $\epsilon_Z > 0$) but not so responsive to changes in relative prices (small $\epsilon_{Rm} > 0$ and $\epsilon_{Rx} > 0$) and if their supply does not change very much with relative prices (small $\eta_{Rm} < 0$ and $\eta_{Rx} < 0$).

When the price of non-traded goods falls or rises less than proportionately with the exchange rate, the relative prices of importables and of exportables will rise after a devaluation or $\hat{R}_M = \hat{R}_X = \hat{E} - \hat{P}_N > 0$. The devaluation can thus help to improve the trade balance through its relative-price effect.

The change in the trade balance after a devaluation,

$$dTB = (Y_X \hat{Y}_X - D_X \hat{D}_X) - (D_M \hat{D}_M - Y_M \hat{Y}_M),$$

depends on the percentage changes in the domestic demand for importables and exportables, \hat{D}_M and \hat{D}_X , and in their domestic

supply, \hat{Y}_M and \hat{Y}_X . \hat{D}_M is a function of the level of expenditure, the price of importables in terms of non-tradables and the relative price of exportables to importables. But since a devaluation does not change the latter, the change in domestic demand for importables is simply

$$\hat{D}_M = \alpha_{R_M} \hat{R}_M + \alpha_Z \hat{Z},$$

where $\alpha_{R_M} = \frac{\partial D_M}{\partial R_M} \cdot \frac{R_M}{D_M} < 0$ is the relative-price elasticity of the demand for importables with respect to non-traded goods and

$\alpha_Z = \frac{\partial D_M}{\partial Z} \cdot \frac{Z}{D_M} > 0$ is the expenditure elasticity of demand for importables.

Similarly, the change in demand for exportables can be written as:

$$\hat{D}_X = \gamma_{R_X} \hat{R}_X + \gamma_Z \hat{Z},$$

where $\gamma_{R_X} = \frac{\partial D_X}{\partial R_X} \cdot \frac{R_X}{D_X} < 0$ is the relative-price elasticity of the demand for exportables with respect to non-traded goods

and $\gamma_Z = \frac{\partial D_X}{\partial Z} \cdot \frac{Z}{D_X} > 0$ is the expenditure elasticity of the demand for exportables.

The domestic production of importables and exportables depends on their relative prices with respect to non-traded goods and to each other but since a devaluation does not change the latter,

$$\hat{Y}_M = \omega_{R_M} \hat{R}_M$$

$$\hat{Y}_X = \omega_{R_X} \hat{R}_X,$$

$$\text{where } \omega_{Rm} = \frac{\partial Y_M}{\partial R_M} \cdot \frac{R_M}{Y_M} > 0 \text{ and } \mu_{Rx} = \frac{\partial Y_X}{\partial R_X} \cdot \frac{R_X}{Y_X} > 0$$

are the relative-price elasticities of the supply of importables and exportables with respect to non-traded goods.

Substituting for \hat{D}_M , \hat{D}_X , \hat{Y}_M and \hat{Y}_X in the equation for the change in trade balance, we obtain:

$$\begin{aligned} dTB = & (Y_X \mu_{Rx} - D_X \gamma_{Rx}) \hat{R}_X + (Y_M \omega_{Rm} - D_M \alpha_{Rm}) \hat{R}_M - \\ & (D_X \gamma_Z + D_M \alpha_Z) \hat{Z}, \end{aligned}$$

where $Y_X \mu_{Rx} - D_X \gamma_{Rx} > 0$, $Y_M \omega_{Rm} - D_M \alpha_{Rm} > 0$

and $(D_X \gamma_Z + D_M \alpha_Z) \hat{Z} > 0$.

The trade balance will improve if $\hat{R}_X > 0$ and $\hat{R}_M > 0$ or if the price of non-traded goods falls or rises less than proportionately with the exchange rate. The condition under which this is likely to happen had been discussed earlier. The improvement in the trade balance will be bigger the more responsive the demand and supply of importables and exportables are to relative prices (big $\alpha_{Rm} < 0$ and $\gamma_{Rx} < 0$, big $\omega_{Rm} > 0$ and $\mu_{Rx} > 0$) and to changes in the level of expenditure (big $\alpha_Z > 0$ and $\gamma_Z > 0$).

If, on the other hand, the price of non-traded goods rises more than proportionately with the exchange rate, the trade balance can still improve after a devaluation if the decrease in real expenditure, \hat{Z} , more than offsets the substitution effects of the decrease in the relative prices of importables and exportables.

In summary, devaluation can help to improve the trade balance through its effects on both real balances and relative prices. Devaluation is likely to increase the general price level and thus lower real expenditure by lowering real balances. Devaluation will also change the relative prices of importables and exportables in relation to non-tradables. Devaluation will increase the prices of the tradable goods relative to the non-traded goods if the demand for the latter falls substantially with the level of real expenditure and is not increased greatly by the substitution effect of relative-price changes, and if the supply of non-traded goods does not fall significantly with the drop in its relative price. The increase in the relative prices of importables and exportables induces greater production and less domestic consumption of these goods, both of which help to improve the trade balance. The fall in real expenditures also discourages the consumption of importables and exportables, thus improving the trade balance further.

C. Sticky Non-Traded Goods Prices (Model III)

A small open economy which produces and consumes non-traded goods may not have perfectly flexible prices in the short-run. The price index of non-traded goods may be constant in the short-run because the shifts in production and consumption which are induced by a devaluation and which produce changes in the price of non-traded goods may not take place until after a considerable amount of time has elapsed. In the long-run, however, all prices including the price of non-traded goods can be expected to be flexible.

If the prices of non-traded goods are sticky in the short-run, the real expenditure and real income functions will be:

$$Z = (1 - Bk) Y + B(M/P) = R_M D_M(R_M, R_T, Z) + R_X D_X(R_X, R_T, Z) \\ + D_N(R_M, R_X, Z)$$

$$Y = R_M Y_M(P_M, R_T) + R_X Y_X(P_X, R_T) + Y_N \quad Y = D_N$$

Since not all prices are perfectly flexible, the full-employment level of income will not always be maintained. The production of importables and exportables will increase in response to the increase in their domestic prices after a devaluation. Since the relative price of exportables and importables, R_T , will not be

changed by a devaluation, production in the two sectors will be equally encouraged. The production of the tradable goods will not depend on their relative price to non-traded goods because they do not have to draw resources away from the non-traded goods sector in order to be increased. The output level of non-traded goods, Y_N , will have to equal the demand for them since their price will not adjust to clear the market. Total domestic production, Y , will therefore be determined endogenously.

As in the first two models, when a devaluation takes place, the domestic prices of importables and exportables will rise proportionately with the exchange rate, $\hat{P}_M = \hat{P}_X = \hat{E}$. Since the price of non-traded goods is fixed in the short-run, $\hat{P}_N = 0$, the changes in the relative prices between importables and non-tradables, $\hat{R}_M = \hat{P}_M - \hat{P}_N$, and between exportables and non-tradables, $\hat{R}_X = \hat{P}_X - \hat{P}_N$, are just equal to the change in the exchange rate, \hat{E} . The change in the domestic price level, \hat{P} , is a proportion of the change in the price of traded goods or the change in the exchange rate or

$$\hat{P} = \lambda \hat{P}_T = \lambda \hat{E},$$

where λ is the sum of the weights of importables and exportables in domestic consumption or production.

The change in domestic output is the weighted average of the changes in the output of importables, exportables and non-tradables: $\hat{Y} = (Y_M/Y) \hat{Y}_M + (Y_X/Y) \hat{Y}_X + (Y_N/Y) \hat{Y}_N$. Since the production of importables depends only on its own price which

moves with the exchange rate, $\hat{Y}_M = \omega \hat{E}$, where $\omega = \frac{\partial Y_M}{\partial P_M} \cdot \frac{P_M}{Y_M} > 0$

is the own-price elasticity of importables.

Similarly, $\hat{Y}_X = \mu \hat{E}$, where $\mu = \frac{\partial Y_X}{\partial P_M} \cdot \frac{P_M}{Y_X} > 0$ is the own-price elasticity of exportables.

The change in the output of non-traded goods is just the change in the demand for them: $\hat{Y}_N = \hat{D}_N = \epsilon_{Rm} \hat{R}_M + \epsilon_{Rx} \hat{R}_X + \epsilon_Z \hat{Z}$, as derived for the second model. Since $\hat{R}_M = \hat{R}_X = \hat{E}$, $\hat{D}_N = (\epsilon_{Rm} + \epsilon_{Rx}) \hat{E} + \epsilon_Z \hat{Z}$, the effect of a devaluation on output in the non-traded goods sector is ambiguous just like the effect on its price was in the previous model. A devaluation will tend to increase the demand for non-traded goods by making importables and exportables relatively more expensive but will also dampen it by reducing real balances and real expenditure, Z . Non-traded goods are assumed to be normal goods so that $\epsilon_Z > 0$. Only the parameters affecting the demand for non-traded goods are important in this case since the output of non-traded goods is completely demand-determined. Y_N is likely to increase if the demand for non-traded goods is very responsive to relative prices (big $\epsilon_{Rm} > 0$ and $\epsilon_{Rx} > 0$) but not very responsive to the level of expenditure (small $\epsilon_Z > 0$).

From the above equations, the change in income can be expressed as:

$$\hat{Y} = \left[\frac{(\epsilon_{Rm} + \epsilon_{Rx} - \frac{\epsilon_Z}{\Delta}) (Y - Y_M - Y_X) + \omega Y_M + \mu Y_X}{Y - \frac{\epsilon_Z}{\Delta} (Y - Y_M - Y_X)} \right] \hat{E}$$

where $\Delta = (1/\beta - k) V + 1$ and $\square = 1 + \frac{\beta}{(1 - \beta k) V}$.

The change in total output is a function of the expenditure and relative-price elasticities of the demand for non-traded goods as well as the own-price elasticities of the supply of importables and exportables. Total production is more likely to increase after a devaluation if the production of importables and of exportables are very responsive to increases in their prices (big $\omega > 0$ and $\mu > 0$ and if the substitution of non-tradables for importables and exportables in domestic consumption is greatly encouraged by an increase in the prices of the tradables relative to the non-tradables (big $\epsilon_{Rm} > 0$ and $\epsilon_{Rx} > 0$).

The change in the trade balance will depend on the changes in the domestic demand for importables and exportables, \hat{D}_M and \hat{D}_X , and in their domestic production, \hat{Y}_M and \hat{Y}_X . Since $\hat{D}_M = \alpha_{Rm} \hat{R}_M + \alpha_{Rt} \hat{R}_T + \alpha_Z \hat{Z}$, $\hat{R}_M = \hat{E}$ and $\hat{R}_T = 0$, $\hat{D}_M = \alpha_{Rm} \hat{E} + \alpha_Z \hat{Z}$, where

α_{Rm} is the relative-price elasticity and α_Z is the expenditure elasticity of the demand for importables. Similarly, since $\hat{D}_X = \gamma_{Rx} \hat{R}_X + \gamma_{Rt} \hat{R}_T + \gamma_Z \hat{Z}$, $\hat{R}_X = \hat{E}$ and $\hat{R}_T = 0$, $\hat{D}_X = \gamma_{Rx} \hat{E} + \gamma_Z \hat{Z}$,

where γ_{Rx} is the relative-price elasticity and γ_Z is the expenditure elasticity of the demand for exportables.

Recalling that $\hat{Y}_M = \omega \hat{E}$ and $\hat{Y}_X = \mu \hat{E}$ and substituting for \hat{D}_M , \hat{D}_X , \hat{Y}_M and \hat{Y}_X in the equation for the change in the trade balance, dTB , yields:

$$dTB = (Y_M^\omega + Y_X^\mu - D_M \alpha_{Rm} - D_X Y_{Rx}) \hat{E} - (D_M \alpha_Z + D_X Y_Z) \hat{Z},$$

where $(Y_M^\omega + Y_X^\mu - D_M \alpha_{Rm} - D_X Y_{Rx}) > 0$ and $(D_M \alpha_Z + D_X Y_Z) > 0$.

A devaluation can improve the trade balance directly by changing the relative prices of non-tradables and tradables as well as indirectly through real expenditure. The improvement in the trade balance through the relative-price effect will be bigger the greater the price elasticities of supply (big $\omega > 0$ and $\mu > 0$) and the higher the relative-price elasticities of demand (big $\alpha_{Rm} < 0$ and $\alpha_{Rx} < 0$). The effect of real expenditure on the trade balance will depend on how it is changed by a devaluation.

The level of expenditure, Z , is affected by a devaluation in two ways. Expenditure is a function of income and since income is now variable with respect to the exchange rate, any change in income will be positively reflected in the level of domestic spending. The rise in prices after the devaluation will still lower expenditure through the real-balance effect. The change in the level of expenditure can be written as:

$$\hat{Z} = \frac{\hat{Y}}{1 + \frac{\beta}{(1-\beta k) V}} - \frac{\hat{E}}{\left[\frac{1}{\lambda}\right] \left[\left(\frac{1}{\beta} - k\right) V + 1\right]}.$$

If income falls after the devaluation, expenditure will fall too and the trade balance will improve. If income rises, then the change in expenditure will depend on the relative weights of the changes in income and the exchange rate. If the real-balance

effect of the devaluation outweighs the effect of the rise in income, the level of expenditure will decrease and the trade balance will still improve.

In summary, a devaluation will definitely raise the general price level by increasing the domestic prices of importables and exportables. Devaluation will surely increase the production of importables and exportables but total output may rise or fall depending on the change in the demand and supply of non-tradables. The production of non-traded goods will rise if the demand for them is greatly encouraged by the fall in their price relative to importables and exportables and only weakly affected by any fall in real expenditure. The trade balance may or may not improve after a devaluation. It will improve only if the real-balance effects of devaluation on real expenditure outweighs the positive effect of income so that real expenditure falls and domestic demand for importables and exportables decline as a consequence.

CONCLUSION

The three models presented above are all based on the assumption that the economy undertaking a currency devaluation is a small open economy. An open economy is one which engages in international trade. An open economy is said to be small if it is a price-taker in the world markets for the goods that it imports or exports. It faces a perfectly elastic supply curve for its imports as well as a perfectly elastic demand curve for its exports. The devaluation of the domestic currency of a small country will not lower the foreign-currency prices of its exports since these are determined in the world markets in which the small country plays an insignificant role. Thus, the trade balance would not improve in the manner suggested by the traditional elasticities approach. This approach asserts that a devaluation will improve a country's trade balance by increasing the domestic price of its imports and therefore dampening demand for them and by decreasing the foreign-currency price of its exports thereby increasing foreign demand for them. While the first effect will still take place within a small open economy, the second will not.

A devaluation however could still improve the trade balance in the manner suggested by the models presented above. The devaluation will encourage the supply of exports by making their domestic-currency price higher. This would discourage their

domestic consumption and encourage their production. Since the same thing will be happening to imports, in an economy whose resources are fully employed, the shifts in production and consumption will have to take place in relation to a third class of goods, the non-tradable goods whose prices do not rise proportionately with the exchange rate, at least in the short-run.

The Philippines can be quite accurately called a small open economy. It is considered small not because of the size of its domestic market but because it is unable to influence the world prices for its exportables like sugar, coconut oil, copper, semi-conductors and garments and its importables like wheat, chemicals, oil and machinery. Its lack of influence is due to its small share in the international trade of these commodities except perhaps in the case of coconut oil. The Philippines supplies more than 90 percent of the world's demand for coconut oil but the country is still basically a price-taker in this market because coconut oil has many close substitutes in the vegetable-oil market.

An analysis of the effects of devaluation in a small open economy like the Philippines which would be based on the models presented earlier would therefore be more appropriate than one based on the traditional elasticities approach.

ANNEX I

DEFINITION AND RELATIVE
IMPORTANCE OF NON-TRADED GOODS

A. Definition of Non-traded goods

Model I differs from Model II and III because of the absence of non-traded goods in it. Model I considers a perfectly open economy in which all goods are either imported or exported. Models II and III introduce a third class of goods which do not enter into international trade and are therefore called non-traded goods.

Non-traded goods have been defined in a number of theoretical works on international trade, optimum currency areas and balance of payments management. Each of the definitions brings out a characteristic of this class of goods and are all helpful in clarifying the meaning of the term.

Non-traded goods are goods which do not enter into international trade either because their transportation is not feasible (Harrod, 1958 and McKinnon, 1963), transportation costs are too high (Jones, 1974) or tariffs are too high (Lombusch, et.al., 1977). Because they do not enter into international trade, non-traded commodities must have their markets cleared locally and in this respect, differ fundamentally from traded commodities, for which local excess demands or supplies can be accommodated in world markets (Jones, 1974). In addition, the

price level of non-traded goods moves differently from the price of internationally traded goods (McDougall, 1970). While the domestic price of traded goods will move with their world prices and the exchange rate, the price level of non-traded goods will be subject to domestic monetary policy (Blejer, 1977) and domestic demand and supply conditions (Dornbusch, 1974).

The above theoretical definitions give rise to two alternative operational definitions of non-traded goods. One is based on the quantity criterion and the other on the price criterion. Theoretically, the application of the quantity criterion would classify as non-tradables all those goods which have zero imports and zero exports. Exportables would be those goods produced domestically and exported while importables would be produced domestically as well as imported. Non-tradables would therefore be goods produced domestically and entirely for domestic consumption and whose domestic supply would not be supplemented by imports.

The price criterion, on the other hand, would classify as tradables all those goods whose domestic prices increase automatically and proportionately with their world prices or the exchange rate. Non-tradables would consist of goods whose prices do not automatically increase with the exchange rate but adjust to the changes in domestic demand and supply conditions which may be brought about by a devaluation.

The application of the two criteria may not always put a commodity into the same category. For instance, a portion of the available supply of a good or service may be imported but if this portion is small, the domestic price of the good may be determined more by domestic market conditions than world market prices and the exchange rate. On the other hand, even if the actual imported or exported amounts of a good may be small or even zero, the potential of trade may keep domestic prices in line with world prices.

In dividing the Philippine economy into the traded and non-traded goods sectors, a combination of the quantity and price criteria will be used. If the actual import and export values of a good or service add up to less than 10 per cent of its total domestic production value, that commodity is considered a non-tradable according to the quantity criterion. An allowance of 10 percent is made because of the high level of aggregation of the sectors included in the national input-output tables which were utilized in this exercise. After price indices for the tradable and non-tradable sectors have been constructed, these would be tested against the exchange rate to make sure that the price index of non-traded goods does not change or changes less than proportionately with the exchange rate in the very short-run. The price of non-traded goods may be expected to increase immediately after a devaluation if a significant amount of imported inputs is used in their production but their price

change should still be less than the change in the exchange rate or the prices of importables and exportables.

Applying the above quantity criterion to data on sectoral production, imports and exports contained in the 1969, 1974 and 1979 Input-Output Transactions Tables, one can divide the Philippine production structure into the non-tradable, exportable and importable goods sectors. The sectoral classification was made to conform with the system followed in the National Income Accounts which present Gross National Product by Industrial Origin. The sub-sectors which comprise the non-tradable, exportable and importable sectors are listed in Table 2.

It can be observed that many of the non-traded sub-sectors are involved in the production of food. Among the food-oriented agricultural sub-sectors are agricultural crops like "palay" (rough rice) and corn as well as livestock, poultry and fishing. Food manufacturing which is an aggregate of the processing of food for domestic consumption as well as major exports like refined sugar and coconut oil is included in the non-traded goods sector because more than 80 percent of its output can be attributed to non-tradable sub-sectors if data from the Input-Output Tables are to be used. In addition, a substantial proportion of the exportable goods are also consumed domestically.

The manufacturing activities which produce consumer goods are, for the most part, classified either in the non-tradable or exportable sectors. Those which fall under the former category

include beverages and tobacco while footwear, garments, wood and leather products are in the latter category. On the other hand, light and heavy producer goods like paper and rubber products, chemicals, metal and mineral products and machinery and equipment are all classified as importables.

Construction, utilities, storage, communication and commerce are considered as domestic activities. So were government and most private services except for hotels and restaurants which are considered exporters because they generate foreign exchange earnings. Water transportation services are also exported to a large extent while air transportation is mostly provided by foreign companies, Land transportation alone can be considered a non-traded service in the transportation industry.

Table 2

COMPOSITION OF NON-TRADABLE, EXPORTABLE AND IMPORTABLE
SECTORS OF THE PHILIPPINE ECONOMY, 1967-1983

	NON-TRADABLES	EXPORTABLES	IMPORTABLES
AGRICULTURE			
Agricultural crops	Palay Corn	Coconut Sugarcane Banana	Other crops
Other agriculture	Livestock Poultry Fishery	Forestry	
INDUSTRY			
Mining		Metallic mining	Non-metallic mining
Manufacturing	Food manufacturing Beverages Tobacco manufac- turing Publishing & printing	Footwear & wear- ing apparel Wood & cork pro- ducts Furniture & fixtures Leather and leather products	Textiles Paper & paper products Rubber products Chemicals & che- mical products Non-metallic mineral products Basic metal industries Metal products Non-electrical machinery Electrical machinery Transport equip- ment Miscellaneous manufactures

	NON-TRADABLES	EXPORTABLES	IMPORTABLES
Construction	Construction		
Electricity, gas	Electricity and gas		
Water	Water		
SERVICES			
Transportation, communication and storage	Land transportation Storage and other services Communication	Water trans- portation	Air trans- portation
Commerce	Wholesale & retail- trade Banks Non-banks Insurance Real Estate Ownership of dwellings		
Other Services			
Government service	Government service		
Private services	Educational Medical & health Business Recreational Personal Other private services	Hotels & res- taurants	

B. Relative Importance of Non-Traded Goods

The theoretical models presented above are suitable for an economy which is open to international trade but not completely so. A completely open economy is one where all goods are either exportable or importable. Theoretical literature on the effects of devaluation have developed numerous two-good models for such an economy. The economy which the models presented above can help to analyze would be one which produces importables and exportables as well as non-traded goods. The presence of this third class of goods will allow for substitution in production and consumption in response to a devaluation.

One measure of the relative importance of non-traded goods in the Philippine production structure is their percentage share in real and nominal gross domestic product as estimated in the National Income Accounts. The relative shares of non-tradables, exportables and importables in gross domestic product during the period 1967-1982 are presented in Table 3.

Table 3

PERCENT DISTRIBUTION OF REAL AND NOMINAL
GROSS DOMESTIC PRODUCT, BY SECTOR, 1967-1982

YEAR	NON-TRADABLES		EXPORTABLES		IMPORTABLES	
	Real	Nominal	Real	Nominal	Real	Nominal
1967	70.3	72.2	15.4	15.6	14.3	12.2
1970	70.0	68.0	15.4	17.1	14.6	14.9
1973	67.7	65.8	15.1	16.8	17.2	17.4
1976	69.7	67.3	14.3	13.4	16.0	19.3
1979	70.1	66.5	13.7	14.7	16.2	18.9
1982	71.0	71.4	12.3	11.1	16.7	17.5

Source: National Income Accounts, Various Years.

Table 3 shows that the Philippines has a relatively large non-traded goods sector. It accounted for around 70 percent of real and nominal gross output during the period 1967-1982. The relative shares of the exportables and importables sectors show greater variation than that of the non-tradables sector. Exportables which contributed 15 percent of total output in 1967, in both real and nominal terms, accounted for only 11 to 12 percent of output in 1982. The importables sector, on the other hand, has been increasing its share in total production, overtaking the exportables sector in 1973. From only 12 percent

in 1967, the share of importables went up to as high as 19 percent in 1976 and was 17 percent in 1982.

Another measure of the relative importance of non-traded goods in domestic production is its percentage share in nominal output for intermediate and final use as measured by the Input-Output Tables for various years. Table 4 presents the estimates from the 1969, 1974 and 1979 Input-Output Tables.

Table 4

PERCENT DISTRIBUTION OF NOMINAL OUTPUT AND
PERSONAL CONSUMPTION EXPENDITURE, BY SECTOR, 1969-1979

YEAR	NON-TRADABLES		EXPORTABLES		IMPORTABLES	
	<u>Output</u>	<u>PCE</u>	<u>Output</u>	<u>PCE</u>	<u>Output</u>	<u>PCE</u>
1969	69.7	77.3	16.6	14.9	13.7	7.8
1974	69.0	75.9	20.4	3.5	10.6	20.6
1979	64.4	73.0	12.8	9.0	22.8	18.0

Source: Input-Output Tables for 1969, 1974 and 1979.

The data presented above show that the non-traded goods sector is much bigger than the exportables and importables sector, although a little less so than what the data presented earlier would indicate. The share of non-traded goods in total output is only around 65 percent. The share of exportables is

around 13 percent as indicated earlier. The share of imports in total output as measured by the Input-Output Tables is slightly bigger than that estimated from the National Income Accounts but the ranking of the three sectors is the same.

The Input-Output Tables also make possible an estimate of the relative importance of non-traded goods in personal consumption expenditure (PCE). The percent distribution of consumption expenditure into non-tradables, exportables and importables is also presented in Table 4. It appears that the pattern of consumption expenditure is basically the same as that of domestic production. A little over 70 percent of consumption spending can be traced to the non-tradables sector for the period 1969-1979. The share of exportables in domestic consumption fell from 15 percent in 1969 to less than 10 percent in 1979. Importables, on the other hand, accounted for an increasing share of consumption spending, from 8 percent in 1969 to 18 percent in 1979.

The data presented above indicate that non-tradables constitute the bulk of domestic production and consumption. On the production side, this indicates that an increase in the price of exportables and importables relative to non-tradables may actually lead to a shift in productive resources from the non-tradables sector to the tradables sector since the former is so much bigger than the latter. On the consumption side, such a relative price change may not shift consumption from tradables to

non-tradables since tradables already constitute a small proportion of the consumption bundle. Whether or not such shifts actually take place in response to currency devaluations will be studied in greater detail.

ANNEX II

THE EFFECTS OF DEVALUATION IN THE PHILIPPINES:
A SURVEY OF THE LITERATURE AND DIRECTIONS
FOR FUTURE RESEARCHA. Studies on the Devaluation of the Peso

On the eve of the exchange and import decontrol program, Golay (1961) asserted that the most useful purpose which a devaluation could serve at that time was to stimulate export production and thus increase foreign exchange earnings. He emphasized that devaluation should not aim to reduce the level of imports which are required to expand domestic production and accelerate economic growth. Rather, the increased foreign exchange earnings should be used to finance imports. He noted that there are good prospects for export expansion since export producers can be expected to respond rationally to higher peso prices for their exports and since the resources required for expansion-land, labor and mineral resources - were readily available.

Legarda (1962) predicted that the devaluation would increase the economic incentives for export-oriented production but added that the import-substituting industries would be discouraged by a profits squeeze brought about by rising costs of imported inputs and labor which would not be fully compensated for by a rise in retail prices. Treadgold and Hooley (1967), in an attempt to verify Legarda's predictions, observed that there was a shift in relative profitability from the import-

substituting manufacturing industries to the export-oriented agricultural sector. The manufacturing sector experienced a decline in profitability and a slowdown in growth in 1960 and 1962. On the other hand, the output of commercial crops expanded in 1962-63 in response to the improved rate of return inherent in the new exchange rate. This helped to improve the trade balance which became much more favorable during these two years. However, the increased production of commercial crops was attained by shifting resources from food production for home consumption. The resulting increase in food prices contributed to the mild inflation of the post-devaluation period as did the increases in the peso price of imported and exported goods. The burden of adjustment thus fell largely on the wage-earning consumer whose nominal wages did not rise proportionately with the general price level.

Another economic analysis of the 1962 devaluation was made by Dowling (1973). He sought to explain the impact of devaluation on the trade balance in terms of the price elasticity of demand and supply of the country's imports and exports. He assumed that the world demand for Philippine exportables and world supply of Philippine importables were perfectly elastic. He estimated the Philippines' import demand and export supply price elasticities on an ex ante commodity basis and on an ex post aggregate level. Both methods yielded estimates of less than unitary value (with the ex post values being a little higher) but with

the sum being greater than one. Thus, the trade balance was expected to improve after the devaluation and it did, but by considerably less than expected. The improvement in the trade balance did not last long, however. By 1967, the trade balance had deteriorated once again. This was attributed to the domestic inflation which had eroded the relative-price advantage enjoyed by exports immediately after the 1962 devaluation.

The exchange rate and foreign trade regimes in the Philippines from 1946 to 1971 are described and analyzed by Baldwin (1975). The focus of his study were the effects of exchange control and liberalization attempts on resource allocation, industrial growth and income distribution. In addition to the effects of the 1962 devaluation noted earlier by Treadgold and Hooley (1967), Baldwin observed that export-oriented manufacturing industries grew considerably but were not able to offset the stagnation among the import-substituting manufacturing industries.

The probable impact of the 1970 devaluation on the country's trade balance, balance of payments and the growth and structure of domestic industries was first explored by Sicat (1972). He asserted that industries with export potential and more intensive use of abundant domestic resources like land, labor and minerals could grow faster than import-dependent import-substituting manufacturing industries. Together with the foreign exchange retention scheme (later replaced by an export tax) for the leading

traditional primary exports, the devaluation was expected to stimulate the export of more processed versions of the traditional exports as well as non-traditional primary and even manufactured goods. Baldwin (1975) noted that both traditional and non-traditional exports increased in volume terms, posting an overall increase of 13 percent over the 1969 level.

In addition to the above studies which discussed or measured the effects of devaluations of the Philippine peso alone, there are several cross-country studies which have analyzed Philippine devaluations together with exchange-rate adjustments in other less-developed countries. Cooper (1973) included the 1962 Philippine devaluation in his 24-devaluation, 19-country survey of the consequences of a devaluation for the balance of payments, terms of trade, aggregate demand, money supply, price and even the political future of the governments which undertook the devaluation. Miles (1978) included data on the 1962 and 1970 devaluations in his 26-devaluation, 18-country study of the effects of devaluation on the trade balance and the balance of payments. He regressed the dependent variables on changes in domestic output, monetary base and ratio of government consumption to total output, with and without changes in the exchange rate, to estimate the importance of the exchange rate in explaining the trade balance and balance of payments. Krueger (1978) wrote a synthesis volume for the ten-country project of the National Bureau of Economic Research on Foreign Trade Regimes

and Economic Development, for which Baldwin (1975) wrote about the Philippines. In addition to information drawn from the individual country studies, Krueger presented econometric results which utilized cross-section data.

B. Studies on Philippine Inflation

The effects of the 1962 and 1970 devaluations on the general price level have been noted in several studies of Philippine inflation. Ranis (1974) and Bautista (1974, 1976) traced inflationary pressures to the inability of the agricultural sector to generate a food surplus which would not only feed the non-agricultural sector but also generate the foreign exchange needed to finance imports. This shortfall in food production fuels inflation directly through high food prices and indirectly through payments deficits and the resultant currency devaluations. Devaluation, in turn, increases not only the domestic prices of imported consumer goods but also those of domestically produced goods which use imported inputs.

Ross (1966) suggested that devaluation also contributes to inflation by increasing general purchasing power and the aggregate demand for goods. He asserted that the higher peso income of those employed in the export-oriented industries would have a multiplier effect on national income. This would bring about an increase in per capita demand for goods at given prices. Apparently, this increase in demand stimulated an increase in the

supply of non-agricultural goods but an increase in the price of agricultural goods, probably because of bottlenecks in production.

Alano (1978), writing about the double-digit inflation of the early 1970s, hypothesized that this was due to the de facto devaluation in 1970 and world-wide inflation in 1972-74. It was, on the other hand, slowed down by the global recession of late 1974 and 1975. He used a simulation model to estimate how much of the deviation from the time path of domestic prices was induced by the various factors. A comparison of simulated and actual prices largely supported his hypothesis. Similarly, Bautista (1983) found that increases in the foreign price of imports, particularly oil, and the 1970 devaluation have been responsible for the upward movement of prices since 1965.

A study of Philippine inflation using the monetary approach to the balance of payments was made by Nguyen (1979). He investigated the dynamic effects of devaluation as well as of monetary policy and foreign prices on the general price level. He found that both the consumer price index (CPI) and the wholesale price index (WPI) rose significantly after a devaluation but that the WPI responded more quickly and strongly than the CPI.

C. Studies on Sectoral Growth

The influence of exchange-rate adjustments on the rate and pattern of growth of agriculture and industry has been highlighted in several studies. In her paper on economic policies and Philippine agriculture, David (1983) discussed the crucial role of the exchange rate in determining the domestic terms of trade between agriculture and industry. Since a devaluation raises the domestic price of traded goods more than non-traded goods, and the agricultural sector produces more exportable goods than import-substituting manufacturing industries, a devaluation tends to improve the agricultural terms of trade. Since the tariff structure generally favors the manufacturing sector, a devaluation serves to correct the distortions in the system of economic incentives, even if it may not be intended to do so.

Several studies on industrial-promotion policies have also given considerable attention to the impact of devaluation on various types of industries. Sicat (1972) described how import-dependent import-substituting manufacturing industries were adversely affected by the 1962 devaluation and the replacement of import controls with protective tariffs. On the other hand, these same developments encouraged the growth of export-oriented manufacturing activities. While traditional manufactured exports like refined sugar and coconut oil grew faster, the growth in the variety and volume of the non-traditional manufactured exports was more impressive. These goods included plywood, canned pineapple, iron

ore, rattan furniture, beer and various chemical and refined petroleum products, according to Power and Sicat (1971). However, the share of these exporting industries in total manufacturing output remained quite small, indicating that the manufacturing industries were still largely oriented towards the domestic market. This also explains why the rapid growth of manufactured exports failed to substantially raise the growth rates of the manufacturing sector as a whole.

The effects of the 1970 devaluation on the pattern of industrial growth were similar in direction but greater in magnitude than those of the 1962 devaluation. According to Power and Bautista (1979), there was a reallocation of resources from import-substituting industries to export-oriented ones. Non-traditional manufactured exports again posted a higher growth rate than traditional products, with the former quadrupling their 1969 levels by 1973. These non-traditional manufactured exports now included cement, garments and paper products. The impressive growth of these exports were however not attributed solely to the 1970 devaluation. These industries also benefitted from the Export Incentives Act of 1970 and other policy measures aimed directly at stimulating exports. The overall impact of these policies can be measured by the exports' effective exchange rate which increased sharply in 1970 to 57 percent for non-traditional exports and 32 percent for traditional exports. Both of these rates increased by another 11 percent in 1971.

D. Directions for Future Research

The above-mentioned studies have all contributed substantially to the existing body of knowledge about the repercussions of the 1960-62 and 1970 devaluations on the Philippine economy. Some of them have been written on the basis of theoretical models advanced by professional economists. Others have presented mainly empirical evidence obtained through econometric testing of available data. Still others have embodied primarily their authors' personal insight and firsthand knowledge of the workings of the economy. An integration of these major elements-- model-building, empirical evidence and personal insight-- in a study of the effects of devaluation, or any study for that matter, seems to be highly desirable.

The building of a theoretical and empirical framework which could be used to study the first two periods of devaluation in the Philippines, as well as the succeeding ones, would be of significant value. It would allow a comparison of the different ways in which the economy responds to an exchange-rate adjustment. The framework should be able to identify the key economic parameters which would help to determine the kind and degree of response made by the economy to a devaluation.

Among the various effects of a devaluation on the Philippine economy, some have not been analyzed in sufficient detail by the studies made so far. The first of these is the effect on the domestic price level. Both the 1962 and 1970 devaluation produced an increase in the inflation rate but the increase was much

greater for the 1970 devaluation than the 1962 one. Differences in the general policy setting in which these devaluations took place could conceivably explain the difference. One area which immediately comes to mind is monetary policy but this was expansionary in the years preceding both devaluations, presumably because they were election years. One other possibility is that the structure of the economy in 1970 was quite different from that in 1960. Thus, while the inflationary effect of devaluation is quite well-known, the mechanism through which a devaluation raises the price level needs further study.

There are two alternative ways in which the short-run effect of a devaluation on domestic prices could be estimated. The first method estimates a domestic price change equation in which the exchange rate is one of the explanatory variables. The estimated coefficient of this variable is a measure of the responsiveness of the price level to a change in the exchange rate, all other variables being assumed to be constant. This method is useful in segregating the effects of a devaluation from that of other policy variables like government expenditure or domestic credit and that of exogenous or structural variables like world inflation or excess demand for food. The second way of tracing the effects of a devaluation on the general price level is with the use of the input-output table. Assuming that the domestic price of imports will rise proportionately with the exchange rate, the overall change in the domestic price index can be estimated by

multiplying the exchange rate change with the direct and indirect import coefficients of the various industries. The method will give a good estimate of the inflation rate if most of the imports are intermediate and capital goods used in domestic production. If a substantial number of the goods in the consumption basket are imported in their final form, the increase in the price of the goods will have to be combined with the increase in the price of domestically produced goods, according to their relative weights in the consumption basket.

An offshoot of the general increase in prices after a devaluation is the fall in real wages if nominal wages do not rise by as much as the inflation rate. This fall in real wages was mentioned in some of the studies mentioned earlier but its repercussions on the pattern of consumption, aggregate demand and import demand have not been fully explored. The fall in real wages is one of the negative effects of devaluation from the point of view of consumer welfare but it may well be a necessity if the devaluation is to improve the trade balance. This is the view advanced in the income-absorption approach to the balance of payments. It asserts that trade deficits arise from the excess of domestic absorption or expenditure over domestic income. Thus, a decrease in real expenditure may have to be effected to correct the trade imbalance, and decreasing real wages is one way of doing this. A fall in real income may, however, not be necessary if consumers could be induced to shift their consumption from imported goods to domestic goods

and thus stimulate domestic production. Or if producers could substitute locally produced materials for their imported inputs. These are likely to occur only if the relative price of imported goods to domestic goods change substantially after a devaluation and domestic goods are good substitutes for imported goods.

Under certain conditions, the fall in real wages may not be experienced by workers in all sectors of the economy. Some sectors, like the export-oriented industries, may increase their income either through the expansion of output or windfall gains from the devaluation. In effect, a devaluation may bring about a redistribution of income. If the pattern of consumption of people in different sectors or classes of society are different, the redistribution of income will influence the overall impact of the devaluation on the trade balance and domestic output. If, for example, as Legarda (1962) asserted, the rural elite who benefit from an expansion of agricultural exports consume a lot of imported goods, then the devaluation might worsen the trade balance instead of improving it. If, however, they consume mostly domestically produced goods, the domestic output can be expected to increase and the trade balance to improve.

The effect of devaluation on the growth rate of gross domestic product is also in need of further consideration. The studies mentioned earlier focused on the reallocation of resources according to changes in the economic incentives for producers. The net effect

of these shifts in production on total output has not been measured or analyzed. This could not have been done in any case since the previous studies did not consider all the various sub-sectors into which the economy could be divided. These sub-sectors would be the following: import-substituting manufacturing industries, export-oriented manufacturing industries, agricultural exports, food crops and services. An analysis of the shifts in production among these sectors and the reasons for these shifts could lead to an estimate of the overall effect of devaluation on total output. If the import-substituting industries were not so import-dependent, their output could be expected to increase together with the export-oriented manufacturing and agricultural sectors. Thus, only the changes in the production of food crops and basic services would have to be studied in greater detail. But with the import-substituting industries being so import-dependent, the possible decline in their output also has to be considered and measured against the expansion of output in the export-oriented sectors.

The final area of study which should be given more attention would be the dynamic effects of devaluation on the trade balance. While the impact effects of the two devaluations on the trade balance have been noted already, and the long-run effect of the 1962 devaluation was studied in detail by Dowling (1973), a comprehensive study of the responsiveness of the trade balance to devaluation encompassing the two periods of devaluation and the

elasticities which underline it, would still contribute greatly to a better understanding of the use of devaluation as a policy tool in achieving both internal and external balance.

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