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Recent Developments in Balance of Payments Analysis and Applications for Asian Countries[1/]

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I. Introduction

The balance of payments statement is the record of all transactions by residents of a country with nonresidents. For analytical purposes, it is normally subdivided into various accounts, such as goods and services accounts, short and long term capital accounts, private and government transfer accounts, and official settlement account or monetary account. By virtue of the system of double-entry bookkeeping, the sum of all accounts in a balance of payments statement must add up to zero. However, by selecting an account as the "below-the-line account"--for example the official settlement account in a pegged exchange rate system--the balance of payments, i.e., the sum of the above-the-line accounts, does not necessarily add up to zero. But such a sum must always be equal to the balance in the below-the-line account.

The selection of the official settlement balance as the below-the-line account in a pegged exchange rate regime is due to the fact that this account registers the intervention of the monetary authorities in the foreign exchange market to keep the value of the currency in terms of foreign exchange within a specified range.

The analysis of the balance of payments can be made in various ways, depending in part on the purpose of the analysis. The approaches that one currently encounters frequently in the literature go under the names of elasticity--and its further developments which incorporate income and absorption effects--and monetary approaches with their recent elaborations.

The empirical relevance of the various approaches can be assessed by: a) investigating the realism of the hypothesis on which each approach rests and b) testing the approaches through systematic observation. We shall first analyze the realism of the assumptions underlying the various approaches and then we shall report on some empirical findings.

II. Theoretical Foundations

1. The Elasticity Approach

The elasticity approach is normally used to analyze one account of the balance of payments, namely, the trade account. It focuses on the role played by relative price changes--foreign versus domestic--in the process of adjustment. It starts from the premise that a relative price change brought about by a change in the value of a currency, i.e., its exchange rate, will affect the trade balance. For example, a devaluation, not accompanied by offsetting changes in the value of other currencies will make imports more expensive while the demand for the country's exports will increase. It therefore concludes that, barring special cases (see below) thought to be rather uncommon, a devaluation will improve the balance of trade while a revaluation will worsen it.

This conclusion has intuitive appeal and can be proved rigorously provided that the sum of the elasticities of the devaluing country's demand for imports and of the rest of the world's demand for its exports is larger than one in absolute value[1/] and assuming that other things remain the same. The other things that are supposed to remain the same are the effects, induced by a change in the exchange rate, on domestic and foreign incomes, on the price of exports in terms of the currencies of exporting countries, and on the monetary aggregates of the devaluing country and the rest of the world. Let us examine the conditions under which these things remain the same.

In order that the income of the devaluing country remain the same, it is necessary that any improvement in the trade balance following a devaluation be exactly offset by a reduction in domestic absorption (domestic consumption plus investment plus government expenditure) or, which is the same, by an increase in domestic savings greater than the increase in domestic investment (income less absorption) or reduction in domestic dissavings defined as the excess of domestic investment over domestic savings. A question that should be investigated is how a devaluation affects absorption or domestic savings. One transmission mechanism is via higher domestic prices of imports. Assuming that nominal income and total domestic expenditure in local currency remains unchanged after the devaluation, an increase in the price of imports in domestic currency will reduce total real expenditure both on imported and domestically produced goods. How much the real expenditure reduction will affect imported goods on the one hand and domestically produced goods on the other hand will depend on the elasticity of substitution between the two goods. The reduction in expenditure on domestically produced goods will release resources for the expansion of exports. Thus, assuming constant total domestic expenditure in nominal terms, the increase in the domestic price of imports "forces" the saving or reduces the dissaving that is necessary to produce the improvement in the trade account.

Nominal income will remain unchanged after a devaluation if the increase in real income exactly offsets the reduction in expenditure in real terms by residents on domestically produced goods. But there is nothing in the mechanism described above which insures the equality of the two effects. And, if these two effects are not offsetting each other, income will change. The change in income normally is expected to bring about a change in expenditure including expenditure on foreign-produced goods. Thus, if income changes, the Marshall-Lerner condition (see above)

1/ This is known as the Marshall-Lerner condition. It is both the necessary and sufficient condition for a successful devaluation--i.e., a devaluation improves the trade account--when a) the export value of the devaluing country does not exceed its import value--i.e., the devaluing country does not have a surplus in the trade account--and b) the elasticities of supply in the devaluing country and in the rest of the world are infinite--i.e., the price of exports in terms of the currency of the exporting country does not change in response to a change in the quantity demanded. When the elasticities of supply are less than infinite, the Marshall-Lerner condition is generally sufficient but not necessary for a successful devaluation.

becomes a necessary but not sufficient condition for a successful devaluation. It will be necessary to investigate the effect of changes in income on imports and exports.

The assumption that a devaluation in one country does not affect, or does not affect significantly, the rest of the world's income is realistic if the devaluing country is relatively small.

For export prices expressed in domestic currency to remain constant following a devaluation it is necessary to assume: a) that productive factors can be moved without cost from the production of goods, whose demand has fallen, to the production of exports, whose demand has increased; b) that the expansion of output can be carried out without increasing the unitary cost of production; and, last but not least, c) that export industries do not use, as factors of production, imported commodities. These assumptions are not quite realistic; they can be relaxed but, if we do so, the assumption that income remains constant becomes more difficult to maintain. The reason is that, if (to take an extreme case for instance) exports remain constant, i.e., are completely inelastic, to maintain the assumption of constant income, it will imply that the reduction in real expenditure will affect only imported goods. The assumption that an increase in exports can take place at constant prices is more realistic if the economy is not at the full employment level of output. But then the assumption of constant income would not be realistic.

The assumption that the price of exports from the rest of the world, expressed in the rest of the world's currencies does not change either at all or at least not significantly is realistic in the case where the devaluing country is small.

For monetary aggregates to remain constant in both the devaluing country and the rest of the world, it is necessary to assume that the balance of payments, as measured by the official settlement balance, was in equilibrium before the devaluation and has not changed because of it. Only in this case would the amount of foreign exchange assets of central banks remain constant, and, therefore, would not contribute to changes in reserve money and money supply. Since the elasticity approach does not allow for compensatory capital movements, it is contradictory to show that a devaluation improves the balance of trade, while assuming monetary aggregates unchanged.

In a pegged exchange rate system, there is no mechanism in the elasticity approach that links the trade account directly with the capital account and no requirement that the sum of the trade account plus services and the capital account add up to zero. Therefore, if one wishes to maintain money supply constant, one would have to assume central bank intervention. But, in this case, the outturn of the balance of payments would be the result of both exchange rate changes and monetary intervention.

The requirement of constant monetary aggregates also implies that the central bank's windfall profits or losses arising from the change in the valuation of foreign assets after an exchange rate change should be sterilized.

The absence of consideration of the monetary impact caused by an exchange rate change is the major criticism leveled against the elasticity approach by the supporters of the monetary approach. This is because a surplus or deficit in the balance of payments--i.e., in the official settlement account--has a monetary impact. A surplus adds money to the economy and an expansion of money is expected (see below) to increase either domestic expenditure or to cause a capital outflow so as to eliminate the surplus. All this occurs quite independently of the exchange rate change.

Besides the size of the relevant elasticities which are important for the determination of the magnitude of the effects of an exchange rate change, there is also the problem of the timing of the effects. The discussions on this problem have converged on two aspects: i) which of the two factors--prices or quantity--adjusts first and ii) what is their speed of adjustment. Some authors tend to argue that the price effect of an exchange rate change, such as in a devaluation, dominates the quantity effect in the period immediately following the devaluation, thus contributing to a further deterioration in the trade account. Later, however, the quantity effect will dominate the price effect and the balance of trade will improve. This phenomenon is known in the literature as the J-curve effect and empirical evidence has been presented to support its existence.

Other authors make a distinction between the so-called short-term and long-term elasticities. The first refer to the response of production to price changes with constant productive capacity. The latter refer to the response of production to price change in a period sufficiently long to permit changes in the productive capacity. The long-term elasticities are supposed to be larger than the short-term ones.

As mentioned before, the investigation of the effects of exchange rate changes has been almost exclusively limited to the trade account, but exchange rate changes also affect the capital account. The main argument is that, if an exchange rate changes, the value of financial assets held by investors denominated in the currency whose value has changed will change in relation to other financial assets denominated in other currencies. This may call for a re-equilibrating of the portfolio. Specifically, a devaluation of a currency may bring about a reduction in the demand for securities denominated in other currencies. Thus devaluation will stimulate capital inflow and/or restrain capital outflow, but this will be a once-and-for-all affair. It is not like the effect of the exchange rate change on the trade account, which is supposed to bring about a permanent change in the flows of imports and exports.

Another argument why a change in the exchange rate affects capital flows is that, if an exchange rate is brought close to what the market considers to be the equilibrium rate, speculative capital inflows and outflows are likely to disappear or be reversed. More specifically, if the market judges the value of the currency to be overvalued, capital outflows are likely to occur. These will stop or they may be reversed when the exchange rate is brought to what appears to be its equilibrium value. The opposite will take place when the value of a currency appears to be undervalued.

2. The Elasticity-Income Approach

The elasticity-income approach relaxes one of the assumptions of the simply elasticity approach, namely that income remains constant. This permits breaking the equality between reductions in domestic absorption and improvement in the trade balance, although the equality between improvement in the trade balance and increase in income less absorption--called by some as hoarding--remains. The balance of trade can improve and domestic absorption increase if income increases to an amount sufficient to permit both to take place.

The approach is formulated in the framework of Keynesian analysis. It assumes that imports are related to both income and change in the relative prices of imported goods; that the economies of both the devaluing country and the rest of the world are not at the full employment level of output; that the marginal propensity to save is positive both in the devaluing country and in the rest of the world; and that money supply somehow responds to accomodate any change in income, but is not affected by the balance of payments outturn.

Under these assumptions, if a country devalues, its trade balance will improve in accordance with the value of the relevant elasticities very much as in the simple elasticity approach. The elasticities here are called impact elasticities because they affect trade before other effects, such as changes in income or absorption, make themselves felt. Improvement in the trade balance without an offsetting change in absorption will cause an increase in income. And larger income will cause larger imports--which, of course, are the exports of the rest of the world--thus causing a deterioration after the original improvement in the trade balance. Parallel to this process in the devaluing country, a reverse process goes on in the rest of the world. When there is an improvement in the trade account of the devaluing country, there is a corresponding deterioration in the same accounts in the rest of the world. A worsening of the trade balance without offsetting changes in absorption will cause income to decline. A declined income will cause a reduction in imports--which again are the exports of the devaluing countries. It can be proven that this process leads to a final improvement in the balance of trade that is smaller than the original improvement caused by the impact elasticities. Assuming non-zero marginal propensity to save in the rest of the world, the final improvement in the balance of trade can be reduced considerably if: a) the marginal propensity to save in the devaluing country is small and the improvement disappears altogether if propensity is zero; and b) the marginal propensity to import in the devaluing country is large.

The adjustment of the trade account via income change need not be set in motion by an exchange rate change. Any policy that affects income will have an impact on the balance of trade if we assume, as it is realistic to assume, that income affects domestic expenditure and domestic expenditure affects imports and/or exports.

3. The Absorption Approach

The absorption approach is very much the same as the elasticity-income approach.1/ It makes use of basically the same hypothesis but it is usually presented with the assumption that the economy is at the full employment level and hence output cannot be increased in the short run. In the first article2/, Alexander, who is the originator of this approach, treats both cases of full employment and the underemployment, but, probably because of his emphasis on the fact that improvement in the trade balance means a reduction in domestic absorption relative to income, this approach is usually described in the context of a full employment situation.

It assumes, more realistically than the simple elasticity approach, that the supply elasticity of export for the devaluing country and the supply elasticity of export for the rest of the world are not infinite and therefore a devaluation in this case will increase the domestic prices of both exports and imports. The higher import price in the domestic currency will initially induce individuals and enterprises in the devaluing country to shift their demand from imports to domestic products while the higher export prices will tend to stimulate exports. The resulting increase in demand for the country's production would tend to raise domestic prices and money income by the same amount as the devaluation. Thus, relative price change brought about by a devaluation cannot be maintained indefinitely. Any permanent improvement in the trade balance--which, it is useful to repeat, under the condition of full employment, is equivalent to a reduction in absorption--brought about by a devaluation must, therefore, be caused by something different from relative price change. Alexander indicated two alternative routes for devaluation-induced reduction in absorption: one Keynesian involving redistribution of income from workers to capitalists or taxpayers to the government that may, but not necessarily, reduce total demand and the other route involving the real balance effect of inflation in reducing the purchasing power of domestic money.

In short, the absorption approach focuses on the fact that, at full employment of resources, there is no possibility of expanding production in the short run; any improvement in the current account will have to be generated by a reduction in domestic absorption. It demonstrates that a devaluation is a valid instrument to produce this result, not via the relative price changes but through other consequences which accompany a devaluation such as a reduction of real money balances and redistribution of income. It should be noted that the real balance effect, to be effective, presupposes that nominal money does not expand as much as the increase in prices likely to accompany a devaluation.

1/ Sidney S. Alexander, "Effects of a Devaluation: A Simplified Synthesis of Elasticities and Absorption Approach," American Economic Review, March 1959.
2/ Sidney S. Alexander, "Effects of a Devaluation on the Trade Balance," Staff Papers, Vol. 2 (April 1952), pp. 263-72.

4. The Basic Monetary Approach

The monetary approach to the balance of payments, whose origin dates back to David Hume and his discussion on the price species flow, is enjoying a renewed popularity and a substantial amount of research is presently being devoted to it. A significant contribution to the revival and formal refinement of this approach has been attributed to the International Monetary Fund.1/2/

The main characteristic of the monetary approach is that it analyzes the outturn of the balance of payments as measured by the official settlement balance in terms of the determinants of the demand and supply of money rather than in terms of determinants of other accounts in the balance of payments, i.e., trade and services accounts, short and long term capital accounts, and private and government transfer accounts. This is possible because the official settlement balance--in countries other than reserve currency countries--measures the rate of increase or decrease in a country's international reserves and this, together with the central bank domestic credit, determines the country's reserves or high power-money, which, in turn, is an important determinant of the country's money supply. A change in the country's international reserves, in accordance with this view, can be viewed as resulting from the consequence of disequilibrium in the demand and supply of money. Thus an increase in a country's international reserves, or, which is the same, a surplus in a country's official settlement account, is viewed as resulting from an excess demand for money, while a deficit in the country's official settlement account is viewed as an excess supply of money.

According to Johnson, who was one of the major contributors to and expositors of this approach, the monetary approach does not imply that the analysis of the official settlement account in terms of the determinants of other accounts is not valid. The two types of analysis, if made correctly, should yield the same results because a) by virtue of double entry bookkeeping, the "below-the-line account"--in this case, the official settlement account--must equal the sum of the "above-the-line accounts" and b) the above and below the line accounts are joined together by the budget constraint. More specifically, in macroeconomic terms, the two lines of investigation yield the same result if: a) the relationships between, on the one hand, the supply and demand for money and their determinants and, on the other hand, demand for imports, supply of exports, and net demand for short and long term capital and their determinants are stable; and b) the determinants of both sets of relationships are the same so that anything that affects one set of relationships also affects the other.

1/ The Monetary Approach to the Balance of Payments, J. A. Frenkel and H. G. Johnson, editors (Toronto, University of Toronto Press, 1976), p. 31.
2/ Significant articles by the Fund staff members have been collected and published under the title The Monetary Approach to the Balance of Payments (Washington, D.C., IMF, 1977).

The preference for the analysis conducted in terms of determinants of the demand for and supply of money stems, at the theoretical level, from the fact that the other analytical approach tends to neglect the role of money in the determination of the other accounts and hence in the official settlement account--which, as we have already noted, is directly connected with the supply of money--and, at an operational level, from the fact that statistical data relevant for the analysis of balance of payments in terms of demand for and supply of money are readily available for most countries.

Before proceeding in the presentation of the more technical aspects of the monetary approach, it is useful to state the following.

Firstly, the monetary approach has limited scope as it does not attempt to explain the structure of the balance of payments but only its outcome as measured by the official settlement account. The narrowness of the approach, however, is compensated by the macroeconomic nature of the demand for and supply of money, which permits analysis of the balance of payments in the macroeconomic cortext in which it belongs.

Secondly, the monetary approach is applicable not only to a country adopting a pegged exchange rate regime, but also to a country adopting a floating one. In a country adopting, for simplicity, "clean" floating--i.e., no change in official foreign exchange reserves--the monetary approach shifts the emphasis from the determination of the official settlement account to the determination of the exchange rate. An excess supply of money will cause an increase in the level of prices, including the price of foreign exchange, i.e., the rate of exchange will depreciate, while an excess demand for money will cause an appreciation of the exchange rate.

Thirdly, while according to this approach, monetary policy determines the balance of payments or exchange rate--depending on the exchange rate regime adopted by a country--balance of payments problems are not necessarily the result of monetary disturbances. Monetary authorities may have adopted a policy stance giving rise to a balance of payments problem to prevent a less desirable outcome. For instance, the increase in the price of petroleum did not by itself cause the deficits in the balance of payments that various countries have experienced. It was the monetary policy of the countries that permitted these deficits, but the alternative to the deficits would have been drastic deflation in these countries and the world.

The validity of the monetary approach rests primarily on the stability of the demand for and supply of money relationships. Specifically, the demand for money is assumed to depend on real income, rate of return on capital, and prices. Only if the demand for and supply of money are stable functions of a few variables can one draw the conclusion that a change in a factor affecting the demand (e.g., real income) will elicit either countervailing adjustments in other factors affecting the demand (e.g., interest rate and/or prices) or an adjustment in factors affecting the supply (e.g., domestic bank credit and/or international reserves). The factor or factors which will adjust are, of course, the one (ones) which offer the least resistance.

Supporters of the monetary approach to the balance of payments tend to assume, in addition to the stability of the demand function for money, the absence of money illusion, e.g., people will demand twice the amount of money originally demanded if the prices of all goods, services, and the nominal value of assets double. This assumption permits us to ignore money in the determination of real--as opposed to nominal--income, because people are not confused by absolute money prices; they are able to see the relative prices of goods and services and, therefore, their behavioral relationships are not altered by changes in absolute money prices. For example, if relative prices of labor and finished goods remain the same, the amount of labor services supplied will not be modified by a change in the nominal wage rate because the real wage rate has not changed. Real income, consequently, is determined by real factors, i.e., taste and technology.

The supporters of the monetary approach also tend to assume full employment of labor. Johnson claims that, in the context of a growing world economy, in the long run, the assumption of wage rigidity and variable employment becomes uninteresting.

The monetary approach to the balance of payments assumes that the markets for goods, services, and capital are worldwide and efficient. From this assumption, it follows that the price, for instance, of a commodity in different national submarkets tends to be the same--except for transportation costs--when expressed in a common currency unit and that any difference which may occur tends to be eliminated rather quickly by arbitrage operations between markets. This is the so-called purchasing power parity doctrine generally associated with the name of Cassel1/. It follows that, in a pegged exchange rate system, the prices of goods in the domestic markets are exogenously determined as they are equal to the world prices of the corresponding goods multiplied by the exchange rate, plus transportation costs.

The equality of prices in different national markets is not limited to traded goods alone. It extends, according to the proponents of the theory, to all goods and services. This is because the factors of production--or inputs--of the nontradable goods are generally also inputs for the tradable goods; efficient and competitive markets tend to equalize the prices of inputs used in different productive sectors while maximization of profits tends to equalize the value of the marginal outputs of an input used in different productive sectors. Therefore, the prices of nontradable goods are linked to those of tradables by common inputs, e.g., labor. Any large deviation in the stable relationship between prices of traded/nontraded goods that is not due to real factors, i.e., changes in tastes and/or technology, must be relatively short-lived.

It may be noted that the assumption of prices being given exogenously to a national economy derives from the so-called "small country assumption," i.e., a country so small that its variation in demand for imports and supply of exports does not affect world prices. In principle, this

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1/ Gustav Cassel, Post-War Monetary Stabilization (New York, 1928).

assumption is not necessary; the theory is compatible with the assumption that demand for imports by the various countries, including a country under analysis, and the supply of exports by other countries determines the world price. What is necessary for the theory is that prices for the same goods expressed in a common currency unit tend to be the same in various national markets after taking into account transportation costs.

The efficiency and competitiveness of the world capital market tend to bring the real rate of return on capital in various national economies to a common level when expressed in terms of a common currency unit. (Different real rates of return will, naturally, exist for different ventures.) The nominal rate of return on capital could differ in different countries if the rates of inflation in these countries are different. But, under a regime of pegged exchange rates, the purchasing power doctrine would make this impossible except for the short run; therefore, even the nominal rate of return would tend to be the same across countries.

Summing up the validity of the monetary approach rests on two basic assumptions: a) the existence of stable demand for and supply of money and b) the existence of efficient market for goods, services, and capital. The demand for money is assumed to be a stable function of prices, real output, and rate of return on capital. The real output is determined by real factors, i.e., full employment, while the nominal rate of return, or the interest rate, is determined by the real rate of return on capital and the expected rate of inflation, if any. The expected rate of inflation is determined by the public's perceptions of the likely future course of monetary policy, while the real rate of return on capital is determined by the marginal productivity of capital. The existence of efficient markets for goods, services, and capital implies that--except for transportation costs--the prices of goods and services and the rate of return on capital cannot be significantly different across countries when expressed in terms of a common unit; and the anticipated rate of inflation cannot differ significantly across countries in a world of pegged exchange rates. In other words, the purchasing power and the expected purchasing power of a currency tend to be the same at home and abroad except for small, temporary discrepancies across borders.

Given this scenario, it goes without saying that an excess demand for money must be met either by credit expansion or surplus in the balance of payments. Other adjustments are impossible under the hypothesis. Precisely: real income cannot be reduced because absence of money illusion makes real income a function of real factors and not of the monetary ones; prices cannot be reduced because they are exogenously determined; the nominal interest rate cannot increase because it is determined by the marginal productivity of capital, and by the expected rate of inflation, which is exogenously determined under a pegged exchange rate system. Thus, the process of adjustment which takes place after the emergence of an excess demand for money, under the assumptions made here, cannot involve the factors determining the demand for money. It can only involve the determinants of the supply of money.

In a "clean" floating exchange rate regime, the adjustment process will be different because, by definition, a surplus in the balance of

payments is ruled out. Thus, if domestic credit does not increase, the adjustment process has to take place via the determinants of the demand for money. The obvious factor susceptible of adjustment under the hypothesis is a reduction of the price level brought about via the exchange rate change. Thus all absolute money prices will be reduced, but the relative prices will not be changed and the purchasing power doctrine will not be violated because there would be a corresponding appreciation of the exchange rate.

5. Further elaboration of the monetary approach

The rather severe assumptions of the monetary approach to the balance of payments can be relaxed but by doing so we lose the simplicity of the theory and the possibility of analyzing the balance of payments in terms of purely monetary data. Relaxing the assumption of purchasing power parity means that prices are no longer exogenously given; therefore, we have to insert, in the basic monetary model, a macroeconomic relationship that explains the price formation as a function of other variables. Also, if we relax the assumption that the real rate of return is not determined exogenously, we have to add an additional relationship to explain this variable. And again, if we permit some degree of money illusion, we have to explain the level of real income and its variation. In other words, the monetary approach to the balance of payments is elegant and simple as long as the only endogenous variable is the change in foreign exchange reserves, real income, real rate of return, expected rate of inflation, and prices being exogenously given, while the domestic credit creation is a policy instrument. It loses its "elegance" and simplicity the moment we have to make more realistic assumptions which imply that at least some of the "exogenous" variables mentioned above are not truly exogenous but must be explained within the system. Once we do so, we build a macroeconomic model; if we wish to call this model "monetary" simply because it takes into account the effect of balance of payments outturns on money supply and, in turn, assume a stable demand function for money, we can do so. But I believe this is more a question of semantics than anything else. One could equally well add the monetary relations to the elasticity income approach and get the same result. What kind of label should this model carry? After all that monetary relationships play an important role in the typical Keynesian analysis of income determination is demonstrated by the well-known IS-LM analysis. One only needs to make the supply of money endogenous and make it a function of the outturn of the balance of payments, to reach the same conclusion as the monetary approach.[1/]

1/ A model utilizing these assumptions has been in use in the Institute courses since 1968 and presented under various names. At first it was called Money and Income Determination Model, then Model V, and now A Dynamic Macro Model. It was developed independently at about the same time as Victor Argy's "Monetary Variables and the Balance of Payments" (The Monetary Approach to the Balance of Payments) and assumes the same basic relationships although one was developed in a dynamic and the other in a static framework.

III. Empirical Evidence

If the elasticity approach is valid, the empirical evidence should show that a change in relative prices has an important influence on the volume of imports and exports. This should be reflected in the size of the price elasticities of imports and exports. Several estimates have been made of these elasticities by many economists for various countries, including Asian countries, and all these investigations show that changes in relative prices have important effects on the demand for imports and exports of a country.

As the estimated elasticities were not available for a number of Asian countries, a fairly standard model 1/ was used to estimate these parameters for all Asian countries for which the relevant statistical data were readily available. Thus, the exclusion of certain countries from this study was dictated by the availability of sufficiently long time series to justify statistical inferences.

The model relates the volume of import demand to real income and relative prices (prices of imported goods in domestic currency over prices of domestically produced goods) and the volume of exports to real world income and relative prices (prices of domestically produced exported goods in US dollars over prices of goods produced in the rest of the world---also in US dollars). In mathematical terms, the model can be expressed as follow:

$$(1) \quad \log M_t = \alpha_0 + \alpha_1 \log Y_t + \alpha_2 \log \frac{PM_t}{PD_t} + u_t$$

and

$$(2) \quad \log X_t = \beta_0 + \beta_1 \log W_t + \beta_2 \log \frac{PX_t}{PW_t} + v_t$$

Where M stands for the volume of imports of a country, Y the real income of the country, PM the unit value of imports in the country, PD the domestic price level, X the volume of exports, W the world real income, PX the unit value of exports in US dollars, PW the index of the world prices in US dollars, u and v error terms and the subscript t indicates time.

To eliminate two of the potential sources of bias in the estimates, two modifications have been made to the basic model as was done by Mohsin Khan. One is to assume that the actual volume of imports and exports in

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1/ H. S. Houthakker and Stephen P. Magee, "Income and Price Elasticities in World Trade," The Review of Economics and Statistics, Vol. 51 (1969), pp. 511-25; also Mohsin Khan, "Imports and Exports Demand in Developing Countries." Staff Papers Vol. XXI (1974) pp. 678-693.

one period are not the desired or equilibrium amounts but some amount between the previous period's imports and exports and the desired amounts for this period. The other is to assume that import prices and export prices are not given exogenously but are dependent on the supply of and demand for imports and exports, respectively. No attempt was made to eliminate other sources of bias such as auto-correlation nor to build more appropriate time series than the ones readily available. The standard model and its modifications were estimated for two different periods 1964-76 and 1964-73 to see if and to what extend the exceptional conditions prevailing in the world economy in 1974-76 changed the value of the estimated parameters.

The results of these investigations show that the modifications improved the results for imports but not significantly, while exports performed worse in general. Furthermore, the estimates for the period 1964-73 were better than those for the period 1964-76. This could be explained by the fact that normal relationships were seriously disturbed in the period 1974-76. We, therefore, present only the results of the standard model for the period 1964-73 in Table 1 and 2.

The estimates of the import equations relating in logarithmic linear form the volume of imports to real income and relative prices for the nine Asian countries (Table 1) for which the data are available reveal that, except for India and Sri Lanka, the basic assumption that income and relative prices determine imports is verified by the high value of the R square adjusted. The coefficients have the expected signs except for Japan. The income elasticities are significantly different from zero at either one per cent or 5 per cent probability level for seven countries, except India and Sri Lanka. The price elasticities are significantly different from zero at one per cent or 5 per cent probability level for China, Korea, the Philippines, and Thailand, while for Japan the price elasticity is not significant and has the wrong sign.

Imports

	Income Elasticity	Price Elasticity
China	1.9	-0.7
India	-0.7	0.2
Japan	1.5	0.3
Korea	1.8	-1.1
Malaysia	0.8	-0.5
Philippines	0.9	-0.6
Singapore	1.1	-0.2
Sri Lanka	-0.1	-0.6
Thailand	1.0	-1.5

The results are generally consistent with those obtained by others for developed and developing countries. Income elasticity greater than one suggests that the country permits an expansion of domestic demand to be met by a larger percentage increase of imports. The negative price elasticities are in conformity with expected behavior pattern that the demand for imports fall when import price increases relative to domestic prices.

A conclusion that we can draw from these results and assuming the price elasticities for imports of the rest of the world are at least as high as the price elasticities of most Asian countries mentioned above--a quite reasonable hypothesis on an a priori ground supported by empirical evidence[1/]--is that the Marshall Lerner condition is satisfied. The order of magnitude of the price elasticities indicate that, while a devaluation is helpful in correcting a trade account deficit, devaluation alone may not go far enough, the price elasticity being relatively small.

For what concerns exports, the simple equation relating, in logarithmic linear form, the volume of exports to world income and relative prices confirms the hypothesis that exports vary positively with world income and negatively with relative prices. The exceptions are China and Sri Lanka. The first country shows a positive relation between price elasticity and exports: the second shows a negative relation between exports and world income. The income elasticities are statistically significant at the one per cent probability level for China, Japan, Korea, Malaysia, the Philippines, and Thailand. The price elasticities for the eight Asian countries for which the data are available have the right sign, except China as already mentioned, but they are not statistically significant at the 5 per cent probability level, except for Korea and the Philippines.

Exports

	Income Elasticity	Price Elasticity
China	5.3	0.2
India	0.1	-1.2
Japan	3.2	-0.9
Korea	6.6	-0.9
Malaysia	1.5	-0.2
Philippines	1.1	-0.6
Sri Lanka	-0.7	-0.7
Thailand	1.1	-0.7

1/ H.S. Houthakker and Stephen P. Magee, "Income and Price Elasticities in World Trade," The Review of Economics and Statistics, Vol. 51 (1969), pp. 511-25; Mohsin Khan, "Import and Export Demand in Developing Countries," Staff Papers, Vol. XXI, No. 3, pp. 678-93; Morris Goldstein, Mohsin S. Khan, and Lawrence H. Officer, "Alternative Measures of Relative Prices in the Demand for Total Imports," DM/77/57 (June 30, 1977).

The results on the previous page show that Asian countries, with the exception of India and Sri Lanka, benefited from the expansion of world income as their exports increased more rapidly.

One conclusion that we can draw from the above, i.e., from both the export and import estimates, is that the world income elasticity for exports of Asian countries being generally higher than the income elasticity of the imports of Asian countries, the income of the latter can grow faster than world income without a worsening of the trade account. Specifically, China can grow at a rate 2.8 times the rate of growth of the world income, Japan 2.1, Korea 3.6, Malaysia 1.9, the Philippines 1.2 and Thailand 1.1. Another obvious conclusion we can draw from this exercise, but one still worth stating, is that the estimation of behavioral equations in countries using extensive direct controls does not yield good results.

The monetary approach was also tested on a time series basis for individual Asian countries using the same model tested by Aghevli and Khan on a cross-sectional basis using data for 39 developing countries.[1/] The model relates the rate of change in international reserves to the rates of changes in prices, real income, inflation, money multiplier, and net domestic assets of the central bank. In mathematical terms, the model can be expressed as:

$$(3) \quad \left(\frac{R}{H} \cdot \dot{\frac{R}{R}}\right) = \gamma_0 + \gamma_1 \dot{\frac{P}{P}} + \gamma_2 \dot{\frac{Y}{Y}} + \gamma_3 \dot{\frac{\Pi}{\Pi}} + \gamma_4 \dot{\frac{m}{m}} + \gamma_5 \frac{D}{H} \cdot \dot{\frac{D}{D}} + e$$

Where R denotes international reserves (net); P the domestic price level; Y the real GNP; Π the rate of inflation--i.e., $\frac{dP}{dt} \cdot \frac{1}{P}$; m the money multiplier--i.e., MO/H where MO stands for money supply and H for reserve money; and D net domestic credit. The letter e stands for the error term and the dot over a variable denotes a time derivative, i.e., $\frac{d}{dt} \cdot$

The results were not, in general, satisfactory. Most of the coefficients were insignificant. The F test (testing the entire equation) was, in most cases, also insignificant. The fact that we were working with annual percentage changes of stocks and flow variables may partly explain the unsatisfactory results. Besides, the model implies certain hypotheses which are not met in the Asian context. These are: fixed exchange rates--not just pegged with wide margins of fluctuation, full employment, capital mobility, and free trade. The test performed by Aghevli and Khan, referred to above, shows that the monetary approach was able to explain the behavior of the balance of payments in the sense that it verified certain major propositions of the monetary approach--namely that an increase in the rate of growth of income would lead to an improvement in the balance of payments; but it did not support the proposition that there was no money illusion nor the proposition that an increase in domestic credit would leak out entirely in the balance of payments.

1/ B. B. Aghevli and M. S. Khan, "The Monetary Approach to the Balance of Payments Determination: An Empirical Test," DM/74/113 (November 25, 1974).

A number of analyses that have been conducted here in the Fund have tended to relax the strict assumptions of the "pure" monetary approach by introducing equations to explain the behavior of variables that, in the purely monetary approach, were taken as exogenous. As is to be expected, these models tend to be complex; however, in those that have been applied to developing countries efforts have been made to keep them relatively simple because of data constraints.

Otani and Park, in a monetary model of the Korean economy,[1/] assumed prices, real output and imports as endogenous, while money wages, interest rate, and exports were assumed to be determined exogenously and domestic credit a policy variable. (Only the key variables are reported here). Aghevli, in "An Econometric Model of the Monetary Sector for Indonesia"[2/], assumed the price level, exports and imports as endogenous, while real income, exports and import prices, the rate of interest, and domestic credit as exogenous. Khan, in a monetary model of the Venezuelan economy,[3/] assumed as endogenous the nominal value of imports, private domestic expenditure in current prices, gross domestic output, change in foreign assets, while the exogenous variables are price indexes of imports and exports and domestic credit, the latter being the policy variable. To report in detail the results of these models would be beyond the scope of this paper. One should, however, mention that in all these models credit has an impact on the balance of payments via one channel of transmission or another but that creation of credit in excess of the increase in nominal money balance will not all leak out in the balance of payments. Part will be absorbed by variations in other variables.

If one looks at the stand-by arrangements in the upper credit tranches made by the Fund between 1969 and April 1977, one notes that, out of 90 stand-by arrangements, 83 had a ceiling on overall credit expansion. And all 18 of the stand-by arrangements in the upper credit tranches made with Asian countries had ceilings on overall credit expansion. The above obviously shows that there is an extremely large concensus here in the Fund that the credit variable is an important determinant of the balance of payments performance. And the fact that the Fund has successfully helped a large number of member countries to improve their balance of payments appears to indicate that its approach is important. However, since the ceiling on overall credit expansion was not the only performance criteria, it is evident that a comprehensive stabilization program designed to improve a country's balance of payments performance has to be broad based and include other policy variables as well.

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1/ Ichiro Otani and Yung Chul Park, "A Monetary Model of the Korean Economy," Staff Papers, Vol. XXIII (1976), pp. 164ff.
2/ Bijan B. Aghevli, "An Econometric Model of the Monetary Sector for Indonesia," DM/75/13 (February 11, 1975).
3/ Mohsin S. Khan, "Experiments with a Monetary Model for the Venezuelan Economy," Staff Papers, Vol. XXI (1974), pp. 389-413.

The view that the exchange rate change is a useful tool to correct balance of trade disequilibrium but that, unaided by other policies, may not go far enough is also expressed in the Fund's 1977 Annual Report. "The contribution of exchange rate movements to the reduction of existing imbalances is found to have been limited, and two main explanations are advanced: 1) until recently, the need for external adjustment has not been given high priority. . .; and 2) the effectiveness of exchange rate changes has often been impaired by the absence of appropriate accompanying domestic policies. The greater exchange rate flexibility of the past four years has, nevertheless, been helpful in offsetting the effects of divergent inflation rates on countries' external positions."

The Report goes on to say that "there is considerable empirical evidence that relative price changes eventually have a strong impact on foreign trade performance. Successful trade performance, however is, also strongly influenced by nonprice factors, such as reputation for quality, reliable delivery schedules, good after-sales service, and the development of new products. It is consequently unrealistic to expect that an unanticipated change in relative prices, induced by an exchange rate change, will rapidly affect patterns of production and demand that reflect such 'structural' factors. At a minimum, economic agents will have to be sure that the relative price change is going to last before they undertake the large adjustment cost involved in any change in the pattern of demand or supply."[1/]

Further, the Report says: "For the exchange rate to have the desired impact on the current account, it must be able, inter alia, to exert a sustained impact on relative costs. The high rates of inflation that have characterized the 1970s, however, have caused economic agents to focus on wages and prices in real rather than in nominal terms, and have contributed to the rapid spread of wage indexation.... In some countries where there was no formal indexation, wages nevertheless responded rapidly to price rises. These factors help to explain why many countries, and particularly those with small open economies, now accept the vicious circle hypothesis, that exchange rate changes lead to offsetting price and cost movements and further exchange rate adjustments, and why they believe that the benefits from exchange rate adjustments are limited. The factors considered above cannot be ignored, but their importance should not be exaggerated either."[2/]

In regard to the J-curve, the Report notes that: "A major consequence of the slow speed of adjustment in the goods market is that the trade balance may initially move in a perverse direction following an exchange rate change because the terms of trade effect may more than offset the slowly developing volume effect on the balance of trade.... The deterioration in the terms of trade as a result of a depreciation will be particularly marked if the country's export prices in terms of foreign exchange fall because in the short run the world demand for its

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1/ International Monetary Fund, Annual Report 1977 (IMF, Washington, D.C., 1977), pp. 28 and 32.
2/ Ibid., p. 35.

products is relatively inelastic--for example, because it exports specialized goods that account for a large share of the corresponding market--while its short-run export supply is relatively price elastic."1/

Concerning the exchange rate effect on capital flow, the Report says: "Rate flexibility has also facilitated the financing of current account imbalanced by encouraging equilibrating capital movements."2/

IV. Issues for Discussion

As the empirical relevance of a theory depends on the realism of the hypothesis on which it is based, this paper has sought to bring out explicitly, in the section on Theoretical Foundations, the assumptions on which each of the theories dealing with the balance of payments rest. The purpose of this elucidation is to permit a judgement as to what extent these assumptions are appropriate in the Asian countries context. The paper also presents the results of empirical investigations into the relationships between the variables suggested by the various approaches and balance of payments aggregates. In order to arrive at some conclusion on the validity of the various approaches, we submit to you a list of points for discussion.

1) For the validity of the elasticity approach it is fundamental that imports and exports react to relative price changes. Do you expect your country's demand for imports to be affected significantly if relative prices of imports, i.e., the ratio of the price index of your country's imports to the index of prices of domestically produced goods, changes? What do you expect would happen to the demand for your country's exports if the relative prices of exports, i.e., the ratio of the price index of your country's exports over the world price index, changes? Is there scope in your country for expanding the volume of exports in the short run if the demand for them increases?

2) According to the elasticity approach, a devaluation or revaluation of a currency affects the trade account via changes in relative prices. Do you think that an exchange rate change will bring about a variation in relative prices in your country? If it does, is the variation in relative prices expected to last for a short or a long period? What factors in the context of your country will work towards the elimination of the effects of an exchange rate change on relative prices? Will this process of elimination work fast or slow? Do you think that there are some linkages between variations in the trade account and the capital account resulting from exchange rate changes?

3) For the use of expansionary or deflationary domestic policies, specifically fiscal policy, as an instrument to eliminate current account disequilibria under the income approach, it is necessary that import or exports or both react to change in home and the rest-of-the-world incomes. To what extent are your country's imports and exports responsive to changes in domestic and foreign income?

1/ IMF, Annual Report 1977, p. 32.
2/ Ibid., p. 33.

4) The validity of what has been called here the basic monetary approach rests on the assumptions that the demand for and supply of money are stable functions of a few macro variables and that the market for goods and services are world-wide and efficient. To what extent are these two assumptions valid with reference to the various Asian countries? To what extent would other variables--for example, prices and real income--carry the major burden of adjustment besides the use of foreign exchange reserves?

Table 1

$$\log M = \alpha_0 + \alpha_1 \log Y + \alpha_2 \log \frac{PM}{PD}$$

(1964-73)

	α_0	α_1	α_2	$\bar{R}^2$	S.E.	D.W.
China	-6.0983** (-22.1540)	1.8772** (37.3600)	-0.6745* (-3.3140)	0.9948	0.4079	2.9963
India	13.7988** (9.1166)	-0.6660* (-2.5988)	0.2030 (0.5656)	0.3926	0.08056	2.3479
Japan	-7.4056 (-2.2060)	1.4510** (4.7949)	0.2828 (0.4132)	0.9858	0.4772	2.0748
Korea	-7.9681** (-4.2697)	1.8418** (7.8275)	-1.0628* (-2.5893)	0.9600	0.1451	0.9362
Malaysia 1967-73	0.7667 (0.3037)	0.7998* (2.9614)	-0.4561 (-0.8076)	0.7732	0.05303	2.8213
Philippines	5.4184** (9.7430)	0.9198** (16.1937)	-0.6049** (-4.1240)	0.8028	0.5543	2.1574
Singapore	-0.9015 (-1.2629)	1.1258** (13.7758)	-0.1931 (-0.4782)	0.9930	0.03507	1.4950
Sri Lanka	9.0415 (1.7863)	-0.1404 (-0.2608)	-0.5691 (-0.8993)	0.3785	0.1112	2.4210
Thailand	5.3712** (17.7569)	0.9800** (15.6440)	-1.5035** (-6.4619)	0.9795	0.4030	2.1499

M = Import value at 1970 prices, IFS line 71 divided by line 75.
Y = Gross national product (GNP) in real terms, IFS line 99ar.
PM = Import price index, IFS line 75.
PD = GNP deflator, IFS line 99a divided b[redacted]line 99ar.

S.E. = Standard error of estimate.
D.W. = Durbin Watson statistic.
* = Significant at 5 per cent level.
** = Significant at 1 per cent level.
Numbers in parentheses are t values.

Table 2

$$\log X = \beta_0 + \beta_1 \log W + \beta_2 \log \frac{PX}{PW}$$

(1964-73)

	β_0	β_1	β_2	$\bar{R}^2$	S.E.	D.W.
China	-38.11** (-16.24)	5.34** (17.29)	0.21 (0.45)	0.98	0.10	0.92
India	2.09 (0.64)	0.12 (0.28)	-1.19 (-1.34)	0.75	0.06	2.99
Japan	-19.13** (-13.05)	3.19** (16.51)	-0.85 (-0.61)	0.98	0.07	1.27
Korea	-48.48** (96.21)	6.62** (99.38)	-0.93** (-7.73)	1.00	0.02	2.19
Malaysia 1967-73	-8.50** (-10.57)	1.48** (13.97)	-0.16 (-1.43)	0.98	0.03	1.08
Philippines	-6.15** (-4.77)	1.11** (6.49)	-0.62* (-2.37)	0.91	0.06	1.92
Sri Lanka	6.73 (1.78)	-0.72 (1.45)	-0.71 (-1.92)	0.59	0.04	2.73
Thailand	-6.02* (-2.87)	1.06** (3.86)	-0.69 (-1.75)	0.84	0.09	0.65

X = Export value at 1970 prices, IFS line 70d divided by line 74d.
W = World real income (in US dollars) - OECD Main Economic Indicators.
PX = Export prices (in US dollars), line 74d.
PW = World price index - OECD Main Economic Indicators.

S.E. = Standard error of estimate.
D.W. = Durbin Watson statistic.
* = Significant at 5 per cent level.
** = Significant at 1 per cent level.
Numbers in parentheses are t values.