ABSTRACT

INFLATION AND THE CRAWLING PEG: THE PERUVIAN CASE

by

INES MARYLIN CHOY

It is suggested that in cases of frequent changes in the exchange rate, like in the Crawling Peg system, a vicious circle might develop: depreciation of the exchange rate may lead to increased domestic inflationary pressures and further rounds of changes in the exchange rate.

This mechanism may be present in the Peruvian economy. A system of Crawling Peg has been adopted and although the deficit in the balance of payments was eliminated, the domestic rate of inflation is still very high.

However, in the strict econometric sense, it is difficult to affirm that inflation causes changes in the exchange rate or vice versa because both variables are determined by factors such as the underlying monetary and fiscal policies.

In order to examine the relationship between inflation and changes in the exchange rate a model is tested for the Peruvian case. In this model the exchange rate, international reserves and the rate of inflation are jointly determined.

Although there is not a direct causality, in the econometric sense, there is a relationship between both variables. As long as the domestic rate of inflation is higher than the world rate of inflation there will be feedback between inflation and changes in the exchange rate.
ACKNOWLEDGEMENT

I gratefully acknowledge the guidance of Professor Herminio Blanco that made this study possible.

Special thanks are also given to Andrea Ballou for reading and editing parts of the thesis and to Vera Wallis for skillfully typing it.
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>II. CHAPTER I</td>
<td>3</td>
</tr>
<tr>
<td>1.1. Disequilibrium in the Balance of Payments and Devaluation</td>
<td>3</td>
</tr>
<tr>
<td>1.2. Summary of the Theory of Devaluation</td>
<td>5</td>
</tr>
<tr>
<td>1.3. Exchange Rate Systems and the Crawling Peg</td>
<td>7</td>
</tr>
<tr>
<td>1.3.1. The Crawling Peg</td>
<td>9</td>
</tr>
<tr>
<td>1.3.2. Exchange Rate Systems and Monetary and Real Disturbances</td>
<td>10</td>
</tr>
<tr>
<td>1.4. Rules for a Crawling Peg System</td>
<td>15</td>
</tr>
<tr>
<td>1.5. Inflation and the Crawling Peg</td>
<td>19</td>
</tr>
<tr>
<td>III. CHAPTER II</td>
<td>24</td>
</tr>
<tr>
<td>2.1. The Peruvian Economy During 1970-75</td>
<td>25</td>
</tr>
<tr>
<td>2.1.1. Principal Macroeconomic Indicators</td>
<td>25</td>
</tr>
<tr>
<td>2.1.2. Monetary and Fiscal Policy</td>
<td>27</td>
</tr>
<tr>
<td>2.1.3. The Balance of Payments</td>
<td>29</td>
</tr>
<tr>
<td>2.2. The Peruvian Economy During 1976-80</td>
<td>30</td>
</tr>
<tr>
<td>2.2.1. Principal Macroeconomic Indicators</td>
<td>30</td>
</tr>
<tr>
<td>2.2.2. Monetary and Fiscal Policy</td>
<td>31</td>
</tr>
<tr>
<td>2.2.3. The Balance of Payments</td>
<td>33</td>
</tr>
<tr>
<td>2.3. The Inflationary Process</td>
<td>35</td>
</tr>
<tr>
<td>2.4. The Exchange Rate and the System of Crawling Peg</td>
<td>37</td>
</tr>
<tr>
<td>IV. CHAPTER III</td>
<td>42</td>
</tr>
<tr>
<td>3.1. Causality Between Inflation and Exchange Rate Changes</td>
<td>42</td>
</tr>
<tr>
<td>3.2. The Model</td>
<td>45</td>
</tr>
<tr>
<td>3.3. Estimation Procedures</td>
<td>49</td>
</tr>
<tr>
<td>3.4. The Case of Peru</td>
<td>52</td>
</tr>
<tr>
<td>V. CONCLUDING REMARKS</td>
<td>66</td>
</tr>
<tr>
<td>VI. STATISTICAL APPENDIX</td>
<td>69</td>
</tr>
<tr>
<td>VII. BIBLIOGRAPHY</td>
<td>77</td>
</tr>
<tr>
<td>TABLE</td>
<td>Description</td>
</tr>
<tr>
<td>---------</td>
<td>----------------------------------------------------------</td>
</tr>
<tr>
<td>1</td>
<td>Principal Macroeconomic Indicators 1970-74</td>
</tr>
<tr>
<td>2</td>
<td>Principal Macroeconomic Indicators 1975-80</td>
</tr>
<tr>
<td>3</td>
<td>Aggregate Demand and Supply</td>
</tr>
<tr>
<td>4</td>
<td>Coefficient of Public External Debt - GDP</td>
</tr>
<tr>
<td>5</td>
<td>Coefficient Estimates</td>
</tr>
</tbody>
</table>
INTRODUCTION

In cases of persistent balance of payments deficit, adjustment policies are necessary. These policies are oriented to get either an increase in receipts relative to payments or a relative reduction of payments.

Devaluation is one of the adjustment policies. The mechanism whereby a devaluation effects the balance of payments has been extensively discussed. Some countries have adopted a system of flexible exchange rates, others have pegged or adjustable exchange rates and others, like Peru, have a system of crawling peg, where the exchange rate is periodically adjusted through continuous and small changes.

An important issue that has been raised is the inflationary effects of a system of frequent exchange rate changes, like the crawling peg.

It is well known that a change in the foreign exchange rate is likely to have an immediate effect on the price of tradable goods. Import costs would immediately increase with repercussions over the price of the other goods and the aggregate price level. This in turn might cause further depreciation of the exchange rate because relative prices between countries would be altered. A vicious circle would develop.

It is also argued that repetitive devaluations can influence price expectations increasing inflationary pressures.

The Peruvian economy could be reflecting the effects of these mechanisms. A system of crawling peg has been adopted and inflation has reached high levels.
However, a long run increase in prices would not be possible without an expansion in the money supply. As a matter of fact, high rates of growth in the money supply have also been present in the Peruvian economy.

The purpose of this thesis is to investigate the relation between the changes in the exchange rate and the inflation for the Peruvian case. The first chapter of the thesis includes a summary of the theory of devaluation, the different systems of exchange rate, specially the crawling peg, and theoretical considerations of the relation between depreciation of the exchange rate and inflation. The second chapter is an analytical description of the economic situation of Peru during the period 1970-80. The third chapter explains the model to be applied and the empirical results. The last part of the thesis contains the concluding remarks.
CHAPTER ONE

1.1 Disequilibrium in the Balance of Payments and Devaluation.

The balance of payments is a "summary statement of all economic transactions between the residents of one country and the rest of the world, covering some period of time." (Stern)\(^{1/}\)

The disequilibrium in the balance of payments is related to the difference between the foreign receipts and foreign payments of residents of the country. This difference will be reflected in changes in the official international reserves. When the disequilibrium is transitory, that is, when the events causing such a disequilibrium are reversible, the country can use its international monetary reserves as buffer to absorb the deficits or surpluses. If the buffer stock of reserves is not sufficient, other policies such as import restrictions or international borrowing may be necessary.

When a country has persistent balance of payments deficit, financing policies are not enough and adjustment policies are required.

One way to reduce the deficit is by decreasing payments. This can be achieved through reductions in domestic expenditures by means of "expending reducing" policies, such as contractionary monetary and fiscal policies. The reduction in expenditure will come by a decrease in income.

"Expenditure switching" policies are another alternative to the solution of a deficit in the balance of payments. These kinds of policies work through price mechanism. A decrease in the price of
domestic goods relative to foreign goods encourages both foreigners and residents to buy home goods lowering imports and raising exports.

Devaluation may produce expenditure switching and expenditure reducing effects, at least in the very short run.

Devaluation means an increase in the price of foreign currency in terms of domestic currency or, in other words, a decrease in the number of units of foreign currency that can be purchased for one unit of domestic currency.

An increase in the exchange rate reduces the value of real cash balances because of its effect on prices. In order to restore their real cash balances people would reduce expenditures (the expenditure reducing effect). The expenditure in tradable goods would decrease, thus improving the trade balance.

The impact of devaluation on the price of tradable goods will change the relative prices of traded and nontraded goods. This causes the switching of expenditures from traded goods to nontraded goods which should also improve the trade balance.

The increase in the price level would reduce the real money supply and the interest rate would tend to increase encouraging an inflow of capital which would improve the capital account.

Thus, devaluation should improve the overall balance of payments. Nevertheless, although devaluation may be an alternative to correct deficits in the balance of payments, it is generally a measure of last resource because of its unpopular consequences. In many cases governments prefer to use other tools such as tariffs and other trade restrictions.
1.2 SUMMARY OF THE THEORY OF DEVALUATION.

To explain the mechanism whereby a devaluation effects the deficit in the balance of payments, three approaches have been developed: the elasticities approach, the absorption approach and the monetary approach.

According to the elasticities approach, the effect of a devaluation on the balance of trade depends upon the home and foreign elasticities of the demand and supply of imports and exports.

Devaluation will have an effect on relative prices between traded and nontraded goods. Prices of traded goods will tend to rise, in terms of domestic currency, shifting purchases from these goods towards nontraded goods, thereby reducing the demand for import and export goods. The balance of trade will improve due to the reduction in imports and the increase in exports. The latter is originated by the decrease in the consumption of export goods and the increase in their production encouraged by price effects.

The success of the devaluation will depend on the responsiveness to the price changes. This is known as the Marshall-Lerner condition: the elasticity of demand for imports plus the foreign elasticity of demand for the country's exports must exceed unity.

On the other hand, the absorption approach developed by Alexander focuses on the income effects that may occur after a devaluation.

The starting point of this approach is the identity that sets the foreign trade balance equal to the difference between the total
output produced by the country and the total domestic expenditure. The amount of goods and services taken off by the market domestically is known as absorption.

It follows that an improvement in the trade balance will require an increase in output or a reduction in absorption.

According to Alexander, a devaluation could affect the trade balance in two ways:

1) Through the change in income and the income-induced change in absorption that would result from the increase in exports, and
2) Through a direct impact on absorption with any given level of real income, resulting from the increase in prices in domestic currency.

The monetary approach draws attention to the demand for money balances and its argument is based on the fact that surpluses or deficits in the balance of payments are essentially the result of disequilibria between the money supply and the money demand. Any excess in the money supply will be reflected in an excess demand for goods, services and securities resulting in a deficit in the balance of payments.3/

In order to restore equilibrium the monetary imbalance has to be eliminated. One way is by reducing the real money supply. According to this approach devaluation is equivalent to a decrease in the money supply because of its effects on prices. The domestic price level will increase and therefore the real value of cash balances will decline. In order to restore their real cash
balances people would reduce their spendings or sell some of their assets with the consequent increase in the interest rates which might attract foreign investment.

Thus, devaluation would operate directly through a reduction of expenditures and indirectly through increases in the interest rates improving the trade balance and the capital account.

1.3 EXCHANGE RATE SYSTEMS AND THE CRAWLING PEG.

When adjustments in the exchange rate are necessary to restore equilibrium in the balance of payments, a decision to be made is the way in which such adjustments will be carried out. Factors like the source of the disturbances in the balance of payments, the domestic rate of inflation compared to the external one, the response of key domestic variables (such as production), to exchange rate changes and the level of international reserves must be considered.

In a system of flexible exchange rates, the adjustment needed in the exchange rate is determined by the supply and demand forces in the foreign exchange market. The balance of payments would always be maintained in equilibrium through changes in exports and imports in response to variation in prices due to the exchange rate changes. Inflow and outflows of short-term capital due to domestic and foreign interest rate differential for example would also work to restore equilibrium.

Under this system, although the problem in the balance of payments would be solved, instability in the underlying economic and financial conditions would immediately be felt in fluctuations in
the exchange rate. This might be a source of additional risk for international business.

Another problem that is generally related to this system is that it can lead to overshooting effects: the immediate effect of a monetary expansion on the exchange rate is greater than the ultimate effect.

An alternative is a system of pegged or adjustable exchange rates, where the government tries to keep the exchange rate between certain margins by selling or buying foreign currency, and determines the adjustments in the exchange rate.

The problem with this system is that, because politically devaluation is not a popular measure, the adjustment in the exchange rate is often delayed and the result is massive and discontinuous changes in the exchange rate.

These delays in the adjustment of the exchange rate causes variations in the relative price of traded and nontraded goods with its consequences on exports and imports.

All this brings about problems of confidence and allows speculation when a devaluation is likely to occur. This might increase the balance of payments deficit making necessary a stronger devaluation.

In an attempt to overcome the problems related with a flexible or a pegged exchange rate, some countries have adopted a system known as crawling peg or a system of minidevaluations.
1.3.1 The Crawling Peg.

The crawling peg is a system in which the exchange rate is adjusted slowly and continuously. The essential feature of the crawling peg is that the exchange rate is pegged temporarily and changed periodically. Thus, delays in the adjustments are much shorter than in the adjustable system and therefore these adjustments are in smaller accounts.

In countries where inflation has reached very high levels, the need for frequent adjustments in the exchange rate is greater. The negative effects of postponed devaluations may accumulate and, in general, distortions in the whole economy appear.

As a matter of fact, most of the countries that have adopted the system of crawling peg or minidevaluations, are those with very high inflation rates, like Argentina, Brazil and Peru.

The fact that the exchange rate is adjusted continuously eliminates the problem derived from abrupt and long delayed adjustments characteristic of a system of pegged exchange rates.

However, as in the case of the other systems of exchange rates, uncertainty and speculation will not be eliminated if there exist unstable economic conditions that might come from incoherent monetary and fiscal policies.

Uncertainty may be diminished by the anticipated announcement of a feasible and, therefore, credible rate of crawl.

In order to prevent speculative flows of capital, it would be necessary to maintain the domestic foreign interest rate, differential according to the relation between the spot and forward exchange
rate in such a way that the interest rate parity theory holds.

The advantage of the crawling peg is that the rate of crawl can be managed preventing the exchange rate from deviating significantly from the equilibrium path. Thus, the problem of overshooting associated to flexible exchange rates is avoided.

The adjustments in the exchange rate make the "export" of inflation to other countries, under this system, more restricted than in the case of adjustable peg, where the fixed exchange rate allows the balance of payments act as a leakage of inflationary pressures, as long as there are enough international reserves.

1.3.2 Exchange Rate Systems and Monetary and Real Disturbances.

Although the crawling peg system may have some advantages over other systems like the flexible and adjustable exchange rate systems, an important aspect to be considered in adopting one system or another is the sort of the disturbances that affect the exchange rate.

The crawling peg, and the other systems, will have different results according to whether the disturbances are monetary or real. Black\(^5\) illustrates this point. The following diagram shows the results under the different systems when monetary disturbances take place:
The curve AA represents the asset market equilibrium. It is downward sloping because given a monetary policy, a lower price \( p \) raises the real money stock and lowers the domestic interest rate, making foreign assets more attractive. The increased demand for foreign assets will influence the foreign exchange market raising the exchange rate \( e \) and also the domestic price of foreign assets. Either, greater exchange rate intervention or lower capital mobility, steepens the slope of the AA curve.

The 45° line corresponds to points where the price of exportable \( p \) is equal to the price of importables \( e \) (assuming the foreign price \( p^* = 1 \)). The domestic price of exportables is assumed to be determined in the domestic goods market. Thus, the 45° line represents the purchasing power parity equilibrium. Points below this line mean undervaluation of the domestic currency.

The curve EE represents the equilibrium in the supply and demand of exportables. Its slope tells us that the price of exportables rises less than the price of importables which is a condition
to have the supply of exportables equal to demand. If both prices rise proportionally, the supply of exportables would increase encouraged by the increase in prices, while demand would decrease. The smaller increase in price of exportables would shift demand from importables towards exportables, making demand equal to supply.

It is assumed that the price of exportables cannot fall below its existing price level $\bar{p}$. A domestic monetary expansion causes AA and EE curves to shift outwards because the increase in real money stock will increase the demand in the asset market and the goods market. To restore equilibrium it will be necessary to increase either $p$ or $e$.

The AA curve shifts out more due to monetary expansion if capital mobility is high, while the EE curve shifts out less if it is relatively flat, since a smaller price rise will equilibrate the goods market.

Assuming significant capital mobility, the outward shift of both curves leaves the pegged exchange rate overvalued and intervention is required to support the disequilibrium peg with the domestic consequences that this means.

The monetary expansion would decrease the interest rates causing capital outflow.

Under the assumption of significant capital mobility, with a floating rate the exchange rate would depreciate to $B$ and prices in the domestic goods market would rise to the new level $p^*$. The exchange rate depreciates more than the monetary expansion producing
"overshooting". This depreciation will lead to an improvement in the current balance that will make the exchange rate appreciate towards point C.

But because price of exportables can not fall below the new level $p'$, the appreciation of the exchange rate would reduce the demand for exportables and cause unemployment at least in the very short run.

In the case of the crawling peg, the exchange rate is prevented from deviating significantly from domestic inflation, moving the exchange rate directly from A to D avoiding "overshooting".

In this case the crawling peg has advantages over the fixed and floating exchange rate systems.

In the case of real disturbances like a permanent decline in the foreign demand for exportables, the results are different.

The decline in the foreign demand for exportables will shift the EE curve downward. To have the same demand at the same price for exportable goods it would be necessary to depreciate the domestic currency. This means that terms of trade deteriorate, shown by the shift in the 45° line as in the following figure:
Rigidity in prices will prevent prices of exportables from falling despite the reduction in foreign demand. So, there would be no change in domestic prices and therefore the pegged and crawling peg systems, in this case, would not allow a depreciation of the exchange rate. The consequence is unemployment at point A causing a deficit in current account.

With floating exchange rates, the deficit in the current account caused by the decline in exports would induce the necessary depreciation of the exchange rate.

In this case the floating exchange rate system has advantages over the other two systems.

The effect of these disturbances on the exchange rate will depend largely upon the degree of capital mobility. Monetary disturbances should be expected to have larger short-run effects on exchange rates (and smaller effects on domestic interest rates) when capital mobility is high. The inverse happens with real disturbances.

In LDCs it seems that monetary disturbances are more important
and capital mobility is relatively low in comparison with developed countries. This would suggest that for these countries some type of peg system would be preferable.

1.4 RULES FOR A CRAWLING PEG SYSTEM.

There are several possible versions of the crawling peg exchange regime. Some of them rely in fully discretionary adjustments of the exchange rate as part of a country's general economic policy. Others follow a formula according to which the adjustments are made automatically.

These formulae are based on: some indicators of the balance of payments performance, averages of past exchange rates or accordant to the purchasing power parity.

Independently of the rule followed, the government can have as a policy the previous announcement of the rate of crawl, in order to avoid speculative capital movements.

Rules based on some indicators of the balance of payments performance are for instance those policies set as a function of international reserves. The rate of crawl is determined according to a reserve change target or to achieve a target level in international reserves. The exchange rate would be changed at a speed dependent on the discrepancy between actual and desired rates of change of international reserves and on the discrepancy between the country's actual reserves and a moving reserve target.

Sometimes forward exchange rates are also taken as indicators of the balance of payments performance, but there is the danger that
forward exchange rates can be at premium or discount as a consequence of speculative expectations developed, for example, by a temporary increase in the money supply. In this case forward exchange rates can be misleading.

Thus, the problem with this sort of indicators is that the exchange rate would respond to speculative capital flows as well as the other components of the balance of payments.

Alternative formulae can be settled based on some average of the spot rate in the past. These formulae can use a geometric mean or moving-arithmetic-mean of exchange rates over a past period, say one year.

One version of this formula is the following:

$$\ln R_t = \frac{1}{n} \sum_{i=1}^{n} \ln R_{t-i} + \epsilon_t$$

where $R_t$ is the parity rate and $\epsilon_t$ is a random term. $n$ is the number of days selected for the averaging period. The change of parity rate could be calculated as:

$$\ln R_{t+1} - \ln R_t = \frac{1}{n}(\ln R_t - \ln R_{t-n}) + \epsilon_t.$$

The problem is that this rule could carry disequilibriums from the past exchange rates.

Perhaps the most popular rule is that based on the purchasing power parity (PPP). The equilibrium exchange rate between currencies is determined according to relative price levels and changes over
time in this rate are determined by the relative inflation rates.

The PPP theory can be expressed in its relative or absolute version. In its absolute form it establishes that the rate of exchange between two countries will be determined by the quotient of their general price levels:

$$R_t = \frac{P^*_t}{P_t}$$

- $R_t$ = exchange rate at period $t$
- $P^*_t$ = foreign price level in period $t$
- $P_t$ = domestic price level in period $t$

According to the relative version the equilibrium exchange rate is calculated based on an old rate when equilibrium exchange rates are assumed, multiplied by the relative inflation rates.

$$R_t = \left(\frac{P^*_t}{P_t} \div \frac{P^*_o}{P_o}\right) R_o$$

- $P^*_o$ = foreign price level in period $o$
- $P_o$ = domestic price level in period $o$
- $R_o$ = equilibrium exchange rate at period $o$

Nevertheless, there are some technical problems with these formulae. The absolute version requires a common basket of goods with a standard system of weighting for the individual countries. However, even if prices are the same in all the countries, weights may vary because they depend on the consumption pattern of each country.

Another problem arises in reference to the index price to be
chosen for the calculation. The use of the Consumer Price Index has the problem that it includes nontraded goods such as services whose prices can vary in relation to the level of income. Countries with higher levels of productivity will have higher wages and the price of services will tend to be higher. This would create a bias in the PPP.

An alternative would be the use of the Wholesale Price Index that includes only internationally traded goods. However, arbitrage conditions tend to equate the price of these goods in the respective trading countries, therefore this index will not induce changes in the exchange rate according to PPP.

The relative version of the PPP has the potential danger of disequilibrium in the base period which will be carried on in the following periods.

In some cases, the government adds to the chosen rule a policy of previous announcements of the rate of crawl, which can help to avoid speculation. Expectations about higher crawl of the exchange rate because of a positive discrepancy between the expected equilibrium exchange rate and its current level could generate capital movements. A current acceleration of the exchange rate can also develop speculative capital flows that could induce higher variations in the exchange rate, specially when the crawling peg system is based on a reserve target, as it has been mentioned before. 6/

A credible announced exchange rate may reduce uncertainty for both importers and exporters. "Hedging" costs can be eliminated and
so would be the effect of these costs over prices.

If expectations of different rates of crawl from the actual one are eliminated in this way, stabilizing monetary and fiscal policy could be more effective since destabilizing speculation is avoided.

This implicitly assumes that interest rates move in order to maintain interest parity.

1.5 INFLATION AND THE CRAWLING PEG.

One popular argument against depreciation of the exchange rate has been that it could bring about an inflationary process in the depreciating country.

This argument involves the effect that a devaluation has over import prices. These prices would increase due to devaluation, because the domestic price of imports, not taking into account transport costs, would equal their foreign prices multiplied by the exchange rate.

The increase in import prices will have effects over the general price level because of the links between tradable and domestic goods. These links operate, for instance, through substitutabilities among the different goods and through the use of some of them as inputs in the production of others.

Thus, the price level would increase rising the cost of living and creating pressures for higher wages. This in turn would push up costs and prices would rise again.

The increment in prices will offset the initial effect of the change in the exchange rate on relative prices and a further depre-
cipation in the exchange rate would be necessary which might generate an upward wage-price spiral. As a result, a situation of "cost-push" inflation would develop.

Thus, in the absence of stable monetary and fiscal policy, there might be a vicious circle: depreciation of the exchange rate increases the aggregate price index which in turn cause further depreciation of the exchange rate and the circle starts all over again.

Expectations seem to have an important role in this process. People's anticipation of the increase in prices can influence important macroeconomic variables in a way that induces further price increases.

Expectations of depreciation in the exchange rate can influence price expectations and therefore support inflationary pressures.

The expectation-formation mechanism in the foreign exchange market has important implications for the vicious circle. Different hypotheses on expectations imply different time lags at which devaluation and the effects over domestic prices occur.

For existance, rational expectations will have different effects from extrapolative expectations. The latter could exaggerate the actual depreciation and lead to band wagon effects that could result in greater depreciations and higher rate of inflation.

Based on the effects over import prices and expectations, some economists argue that a system of devaluation like the crawling peg would lead to inflationary process and further devaluation.7/

According to the monetary approach, however, the vicious circle
is not possible without an expansion in the money supply. An exchange rate depreciation by itself could not set off all this process.

The reason behind this statement is that the real value of money supply will be reduced due to the initial increase in the price level caused by the change in the exchange rate. Real cash balances will decline, and in order to restore their real balances people will reduce their spendings. An excess of supply of real goods would appear which would increase exports avoiding new depreciation in the exchange rate.

Devaluation effects the level of prices but it does not necessarily mean that it produces inflation.

The rise in the price level during the adjustment period after a depreciation might tend to generate an increase in unemployment because of the reduction in aggregate demand. The authorities may react by following accommodation policy increasing the money supply and aggregate demand so as to prevent any increase in unemployment.

If the authorities persist in implementing such a policy, inflationary pressures might develop and domestic price increases and exchange rate depreciation would be unavoidable.

However, in this process, both the exchange rate and inflation come out as dependent variables of the process. Although both of them are related, it is difficult to assure that one causes the other or vice versa. The existence of both of them does not necessarily mean causality but only correlation between both variables.

As Willet\(^8\) says: "strictly speaking it is not correct to speak of causation running from inflation to exchange rate or vice versa."
Both exchange rates and prices are endogenous variables, determined by underlying factors such as monetary and fiscal policies, productivity growth, etc. Where causation is said to run primarily from prices to exchange rates, what is really said is that the underlying macrovariables that determine prices are also the main determinants of the exchange rate. Likewise, the statement that causation runs from exchange rates to inflation implies that the exchange rate change is exogenous to the domestic inflationary process."
FOOTNOTES


4 See Rudiger Dornbusch, "Exchange Rate Expectation and Monetary Policy," Journal of International Economics, 6 (1976), pp. 231-244. McKinnon affirms that overshooting explains the instability in the major convertible currencies during 1973-78. However, many other factors could have been present like expectations developed because of past inflation or the effects of the beginning of the floating when foreign exchange rates were out of line. See Ronald I. McKinnon, Money in International Exchange: The Convertible Currency System, (New York: Oxford University Press, 1979), Ch. 8.


According to some economic indicators, during the first five years of the seventies the Peruvian economy apparently had a good performance. The average rate of growth in the GDP was about 6% per year, there was a surplus in the balance of payments with the exception of 1971, and the level of inflation was relatively low before 1974. This can be seen in Table 1.

Table 1
Principal Macroeconomic Indicators 1970-74

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Rate of growth in the GDP</td>
<td>7.5</td>
<td>5.1</td>
<td>5.8</td>
<td>6.2</td>
<td>6.9</td>
</tr>
<tr>
<td>Inflation (Dec/Dec)</td>
<td>5.7</td>
<td>5.6</td>
<td>7.7</td>
<td>4.3</td>
<td>19.1</td>
</tr>
<tr>
<td>Balance of payments (US$ million)</td>
<td>257.4</td>
<td>-76.2</td>
<td>50.4</td>
<td>13.2</td>
<td>281.9</td>
</tr>
</tbody>
</table>

SOURCES: Central Reserve Bank of Peru
National Institute of Statistics

Following 1974 signs of an evident economic crisis began to appear. There was a remarkable decrease in the rate of growth of the GDP, reaching negative rates of growth. At the same time there was a deficit in the balance of payments for three consecutive years and inflation reached very high levels. The following table shows these developments:

Table 2
Principal Macroeconomic Indicators 1975-80

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Rate of growth in the GDP</td>
<td>-3.3</td>
<td>3.0</td>
<td>-1.2</td>
<td>-1.8</td>
<td>3.8</td>
<td>3.1</td>
</tr>
<tr>
<td>Inflation (Dec/Dec)</td>
<td>24.0</td>
<td>44.7</td>
<td>32.4</td>
<td>73.7</td>
<td>66.7</td>
<td>60.8</td>
</tr>
<tr>
<td>Balance of payments (US$ million)</td>
<td>-546.7</td>
<td>-867.5</td>
<td>-349.1</td>
<td>75.9</td>
<td>1578.9</td>
<td>722.3</td>
</tr>
</tbody>
</table>

SOURCES: Central Reserve Bank of Peru
National Institute of Statistics
Thus, it can be seen that the second half of the decade of the seventies was a critical period for the Peruvian economy. However, despite the fact that these economic problems have been manifest since 1975 their roots can be found in the year prior to 1975.

2.1 THE PERUVIAN ECONOMY DURING 1970-75.

2.1.1 Principal Macroeconomic Indicators

The military government, which had come to power in 1968, began an expansionary policy at the beginning of the seventies. The intention was to strengthen the economic role of the state.

With this purpose many expropriations were made, giving the government control over different sectors of the economy: productive, financial and commercial. During this period the production of goods and services increased at a higher rate than those in the past years.

On the supply side the growth in the GDP was due mainly to the increase in production in the secondary sector: manufacturing, construction, electricity. (See table 1 and 2 of the statistical appendix.)

This was the consequence of the implementation of investment projects by the government and the incentives given to the manufacturing sector that responded to a model based on import substitutions.

On the other hand, there were two main shocks affecting the primary sector: adverse climatological conditions and strikes that contracted the production in the fishing and mining sector respectively.

Parallel to this, the demand side of the economy was also growing at rates even higher than that of the production. Internal
consumption and investment increased relatively faster than output as we can see in Table 3:

Table 3
Aggregate Demand and Supply

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Consumption</td>
<td>4.2</td>
<td>5.0</td>
<td>10.4</td>
<td>9.0</td>
<td>4.8</td>
</tr>
<tr>
<td>2. Investment</td>
<td>25.0</td>
<td>0.0</td>
<td>17.2</td>
<td>30.4</td>
<td>10.0</td>
</tr>
<tr>
<td>3. Exports</td>
<td>-4.9</td>
<td>9.0</td>
<td>-18.3</td>
<td>-5.8</td>
<td>-3.8</td>
</tr>
<tr>
<td>(1+2+3) Total Demand</td>
<td>5.0</td>
<td>5.0</td>
<td>6.6</td>
<td>10.1</td>
<td>4.7</td>
</tr>
<tr>
<td>4. Imports</td>
<td>4.4</td>
<td>-0.4</td>
<td>9.7</td>
<td>31.9</td>
<td>12.2</td>
</tr>
<tr>
<td>5. GDP</td>
<td>5.1</td>
<td>5.8</td>
<td>6.2</td>
<td>6.9</td>
<td>3.3</td>
</tr>
</tbody>
</table>

SOURCE: Central Reserve Bank of Peru

Thus, there was a tendency towards an internal disequilibrium in the goods and services market. While the internal demand grew at an average rate of 8.1% per year, the internal supply increased at an average rate of only 5.5% per year.

A gap between internal demand and supply of goods and services followed from these developments that was filled by the increase in imports.

The increase in consumption was the result of a policy that included subsidies to basic foodstuffs and price control on other essential goods and services. An additional factor that also contributed to the expansion of consumption was the increase in the disposable income at the beginning of this period, due to higher nominal wages and the slow increment in prices.

Although private investment was encouraged by tax exemptions,
tariff protections and real negative interest rates, the main cause of the increase in this component of the demand was the expansion of public investment due to the implementation of different projects, especially long run maturity projects.

As a consequence of this situation a gap between internal savings and investment developed, reaching 11.8% of GDP in 1975.

2.1.2 Monetary and Fiscal Policies.

There was, in general, an expansionary policy, reflected in the high rates of growth of the government expenditures in current account compared to that of revenues.

During these years there was a continuous deterioration of the public finances. The logic consequence was the increasing deficits in the government budget that in 1975 was 5.5% of the GDP. (See Table 5 in the statistical appendix.) These deficits were financed in part through credits from the Central Bank with the consequent increase in the money supply. However, given the magnitude of the deficits in the government budget, it was necessary to obtain additional credits from abroad. These credits created a high external indebtedness. The external debt reached 22.3% of the GDP in 1975, as we can see in the following table:
Table 4

Coefficient of Public External Debt — GDP (million of dollars)

<table>
<thead>
<tr>
<th>Year</th>
<th>Public External Debt</th>
<th>GDP</th>
<th>Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>1970</td>
<td>945.4</td>
<td>6,139.4</td>
<td>15.4</td>
</tr>
<tr>
<td>1971</td>
<td>997.2</td>
<td>6,745.8</td>
<td>14.8</td>
</tr>
<tr>
<td>1972</td>
<td>1,121.2</td>
<td>7,517.4</td>
<td>14.9</td>
</tr>
<tr>
<td>1973</td>
<td>1,490.6</td>
<td>9,163.4</td>
<td>16.3</td>
</tr>
<tr>
<td>1974</td>
<td>2,182.3</td>
<td>11,415.9</td>
<td>19.1</td>
</tr>
<tr>
<td>1975</td>
<td>3,065.9</td>
<td>13,751.2</td>
<td>22.3</td>
</tr>
</tbody>
</table>

SOURCE: Central Reserve Bank of Peru.

In 1975 the government adopted some measures in order to alleviate the deficit. Taxes were increased along with the price of goods and services produced by the public sector, while subsidies were reduced. These measures, however, were insufficient to balance the budget.

In the meantime, in order to finance the government expenditures, the monetary authorities made use of the reserve requirements of the Commercial Bank System. They demanded that part of these reserves had to be held in Public Investment Bonds (bonds issued by the government).

Through the increase of credit to the private sector the monetary policy also contributed to the increase in the internal demand for goods and services. In nominal terms this variable expanded at an average rate of more than 20% per year.

Due to these facts, the total domestic credit of the Banking
System increased at a higher rate than the average rate of inflation of the period. This was reflected in a strong expansion of the money supply, despite the reduction in international reserves, the foreign source of the money supply. (See Table 6 in the statistical appendix).

2.1.3. The Balance of Payments.

The external and the internal sectors of the economy are not independent of each other. Problems in one will immediately be felt in the other. This was portrayed by the Peruvian economy, where the expansion of the internal demand brought about the necessity of greater imports, especially of food and inputs, putting pressures on the balance of payments.

This was the consequence, on the one hand, of the lower domestic production of foodstuff, and on the other of the dependent nature of the Peruvian manufacturing sector on imported inputs and capital goods. An increase in production demanded an increase in imports.

One important source of the increase in imports in this period was the government investment in big mining projects and the purchase of defense equipment. At the beginning of the seventies, the problem of bigger imports was lessened by the favorable trend in the international price of the Peruvian export products. This allowed increasing imports despite the volume of exports decline.

However, this favorable scenario ended in 1974 when problems in the supply of imports showed up. There was an increase in the price of imported products such as oil and wheat. At the same time
there was also a decrease in the price of Peru's principle exports (copper and fishing products mainly).

The consequences of these developments can be seen in the result of the Trade Balance. After having been registering a continuous surplus, this balance became negative in 1974. There was a deficit of $405.6 million, and in 1975 it grew to $1,099.3 million.

Even though the inflow of capital increased in the last years of this period due to the increased indebtedness, the magnitude of the deficit in the trade balance was the main cause of the $576.7 million deficit in the overall balance of payments in 1975. (See Table 7 in the statistical appendix.) Thus, a temporary palliative to the deficit in the trade balance was the external financing which caused a huge external debt. However when the problems in the external sector worsened, the loss of international reserves was inevitable.

2.2. THE PERUVIAN ECONOMY DURING 1976-80.

2.2.1. Principal Macroeconomic Indicators.

During this period there is a change in the behavior of many economic variables. The GDP showed rates of growth much lower than in the first half of the decade, having even contracted in 1977 and 1978 to have a slow recuperation in 1979 and 1980. (See Table 1 and 2 in the statistical appendix.)

The supply side of the economy had different characteristics. In contrast to the former period, the secondary sector experienced
a contraction, especially the construction sector. The manufacturing sector also had periods of negative rates of growth primarily due to the reduction of available dollars and domestic credit.

There were other important factors that affected the aggregate supply of the economy such as the improvement in the price of minerals. This improvement contributed to the recuperation of the mining sector which, as a matter of fact, was the sector with the highest rate of growth with the exception of 1980.

The policy of price control played an important role in the stagnation of the agricultural production. In addition, there was a period of drought and the price of fertilizers increased while the international price of export products, like sugar, decreased.

The aggregate demand was affected by the reduction in real wages and salaries, due to the inflationary process, and the conclusion of the investment projects that had been carried out by the government. For these reasons, after 1976 there was a contraction in the internal consumption and investment and consequently in the total aggregate demand.

2.2.2. Monetary and Fiscal Policies.

The economic deficit in the government budget continued to be a problem, reaching in 1977 the 7.5% of the GDP (see Table 5 in the statistical appendix).

An important factor contributing to the increasing government deficit was the rise in nominal wages.

However, it was only in June 1976 that the government adopted
contractionary fiscal policy, reducing public expenditures and increasing taxes. During the last years, subsidies, transfers and the purchase of goods and services were strongly reduced.

The taxes on imports and gasoline were the main contributors to the increase in the government receipts.

With respect to the monetary policy, at the beginning of this second period, the domestic credit expanded remarkably. The money supply, however, did not increase at the same rhythm due to the fact that much of the credit went out through the loss of international reserves. Due to the high levels of inflation, the domestic credit decreased in real terms affecting the level of production.

In November 1976, in order to get more control over the money multiplier, the reserve requirement system was modified. The reserves had to be kept in cash and deposits in the Central Bank, "freezing" funds that before had been used to finance the government expenditures.

Although after 1976 there were attempts to follow a contractionary monetary policy, during the last years the money supply had the highest rates of growth. This time, the cause was an extraordinary gain of international reserves, due to the increase in exports. This expansion in the money supply exerted pressure on prices.

In order to counteract this effect, domestic credit had to be controlled. With this purpose, additional measures were adopted such as the sale of bonds issued by the Central Bank and the gradual liberalization of imports.
2.2.3. The Balance of Payments.

At the beginning of 1976, prices of Peruvian exports fell in the international market. The inflow of long-term capital decreased, partly as a consequence of the critical situation of the Peruvian economy. There was also a significant outflow of short-term capital.

All these factors contributed to a larger deficit in the balance of payments, which initiated an intensive borrowing effort. The Central Bank made "swaps" operations with local banks and Central Banks of Venezuela and Colombia. At the same time, resources were received from the IMF and European banks.

As part of the stabilization program, measures were adopted in order to prevent imports from increasing. Foreign exchange and domestic credit for import purposes were curtailed. The domestic currency was devaluated by 44% in June and in September of 1976 a system of minidevaluations was introduced.

In 1977 exports increased by 27% principally due to an increase in the volume of exported copper, the high price of coffee and the substantial increase in non-traditional exports encouraged by a more realistic exchange rate and tax incentives.

Despite the fact that the government established quotas of foreign exchange for imports, they remained at the same level as that of the year before.

Consequently, the deficit in the trade balance was substantially reduced but it still was a $438 million deficit. The same tendency was observed in the current account balance whose deficit was re-
duced to $926 million. Long-term capital inflows remained at the same level as the previous year although official loans increased and foreign direct investment decline.

Short term capital outflows were only one third of that in 1976 due to the legal requirement of financing imports for a minimum term of 180 days. The deficit in the overall balance of payments was $349 million, much less than in 1976, but it still represented an additional loss of international reserves which remained in negative levels since February 1976. These circumstances obligated the Central Bank to look for external financing, and in October of that year, a stand-by agreement with the IMF was signed.

After a devaluation of 15% in May 1978, the system of mini-devaluations was reinstated after 10 months of interruption. A new stabilization program and a new stand-by agreement were set out. The financing required for imports was going to be gradually reduced and the external debt was restructured. Partly because of the country's recession, the devaluation, and sufficient production of oil, imports decreased. At the same time exports increased thanks to the bigger production of petroleum and more exports of nontraditional products. The external sector began to show signals of recovery. The current account deficit was reduced to US$190 million and the overall balance of payments registered a surplus after three consecutive years of deficits.

In 1979 there was an extraordinary inflow of foreign exchange from the increase in exports. There was also a repatriation of
capital through the foreign exchange certificates in the banking system that were implemented in 1977.

The monetization of the inflow of foreign exchange began to put pressure on the level of prices. In order to avoid this pressure, a percentage of the foreign exchange coming from exports of some traditional products and external financing was retained by the Central Bank.

Likewise, a liberalization of imports was initiated, reflected in the increase of imports in 1980 to the highest level of the decade: $3,062 million with the consequent reduction of the surplus in the trade balance by more than half in comparison with the previous year. This was the main factor that determined the same result in the overall balance of payments. The $1,579 million surplus in 1979 was reduced to $722 million.

2.3. THE INFLATIONARY PROCESS.

Up to 1973 the Consumer Price Index did not increase substantially. Even in 1973 the rate of inflation measured December to December, was the lowest in the decade: 4.30%.

Despite the increase in wages and salaries the increase in the general price index was not very significant, in part, due to the fact that the production of goods and services had been growing in much the same way as the internal aggregate demand. In addition, behind these price levels, there was a price control policy that delayed further increases in prices.
After this period of relative price stability, there was an increase of more than 19% in the price level in 1974 and 24% in 1975. The inflationary process began to be evident.

Although it is difficult to determine the specific causes of an inflationary process, in the case of Peru, the importance of the government budget deficit and the increase in the money supply can be cited. Both of them were the result of an expansionary policy that increased the demand over the supply of goods and services. The money supply had been increasing at an average rate of 19% per year, in nominal terms, while the production had a rate of growth of less than 7% per year.

As we have already seen, a great part of the increase in the money supply was to finance the increasing deficits in the government budget, pushing up the aggregate demand.

In the following years as the deficit in the government budget worsened, subsidies were reduced and prices of goods and services produced by the public enterprises were increased, with the consequent impact over the general price level.

The money supply continued increasing even at higher rates, reaching in 1978 more than 40% in nominal terms.

All these factors added up to inflationary expectations, contributed to the inflationary spiral and in 1978 the price level increased in 73.7%. It was already explained that during the three years before 1978 the expansion in the money supply could have been larger if part of the domestic credit had not gone out through a loss
of international reserves. However, after 1978 the increase in the international reserves turned to be the principal cause of the increase in the money supply.

Thus, although a contractionary policy was implemented, the government budget deficit continued and the money supply kept growing at high rates, so that, the principal causes of the inflationary process still remained until the end of the decade as did the increase in the price level, which in 1980 was 60.8%.

2.4. THE EXCHANGE RATE AND THE SYSTEM OF CRAWLING PEG.

Prior to 1975 the exchange rate was fixed in nominal terms during many years. This fact combined with the inflationary process that had already begun, made the domestic currency overvalued.1/

The overvaluation resulted in a penalty for exports while at the same time imports were encouraged, including import of luxury goods.

This situation was reflected in the relation of exports and imports with the GDP. The ratio exports/GDP decreased from 17.7% in 1970 to 10.8% in 1975, while imports/GDP increased from 14% to 19.5% in the same period. Expectations of devaluations were formed originating speculative activities and insecurity for the entrepreneurs.

One of the consequences of this situation was the reduction of the international reserves.

Under these circumstances a devaluation of the exchange rate
was unavoidable and in September 1975 the domestic currency was devaluated by 16% at the same time modifications in the exchange rate system were implemented like the elimination of the double exchange rate system (for commercial and tourism purpose) establishing a unique exchange rate.

After the September devaluation the exchange rate was again fixed in nominal terms. On the other hand, the deficit in the balance of payments had not yet been solved and the increase in the price level was becoming higher.

Again a new devaluation was necessary, and in June 1976 the domestic currency was devaluated by 44%, as part of a stabilization program. Nevertheless, this devaluation was not a solution for the critical situation of the external sector. The losses in the international reserves continued in larger magnitudes, which determined the decision to adopt a system of minidevaluation in September 1976.

The system of programmed minidevaluations or crawling peg, was established to reach realistic levels of valuation for the domestic currency. The "sol" was to be devaluated according to relative price changes between Peru and its main trading partners.

However, coinciding with a change of Economy Minister, this system was interrupted in July 1977 when the exchange rate was fixed at 80.88 soles/dollar.

Official sources said that the system of minidevaluations created strong inflationary expectations which encouraged the specu-
lative demand for foreign exchange pressuring the foreign exchange market and the international reserves.\(^2\)

In October of the same year, the "Mercado Unico de Cambios" was created. The purpose was to have an exchange rate determined by the supply and demand forces. A reduction of control of imports and the penalty amnesty for capital repatriation accompanied this measure.

However, this reform did not mean a complete liberalization of the foreign exchange operations. The Central Bank would intervene to smooth the fluctuations of the exchange rate.

In December commercial banks were authorized to open deposits in foreign currencies with funds that came from the repatriation. Bank certificates of foreign exchange were created with a minimum value of $1000 and valid up to 360 days. These certificates could be freely negotiated which was made at higher exchange rates than the official one. For example, when the official exchange rate was at 130 soles/dollar during the first years of 1978, these certificates were negotiated at about 170 soles/dollar, and sometimes the difference was even bigger.

After a few weeks of the implementation of the "Mercado Unico de Cambios", the domestic currency had been devaluated by 75% and the loss of international reserves continued.

The result was the end of this system fixing the exchange rate at 130.32 soles/dollar in February 1978.
The fixed exchange rate prevailed until May 1978 where after a devaluation of 15% the system of minidevaluations was reinstated. It was a system of programming small adjustments, three or four times a week, according to a target for the end of the year of the sol-dollar relation. This target was publicly known although informally.

During the months following May, the rate of crawl was above 4% per month. The minidevaluations were disaccelerated in 1979 and since then the average rate of crawl has been less than 2.5% each month.

In February 1979 the Central Bank began to make public the exchange rate for the following month. In March of the same year this announcement began to be made for the following two months and in June the period was extended to three months. The announcement of the exchange rate was interrupted in the middle of 1980.
FOOTNOTES

1 Official estimates based on the PPP affirm that the overvaluation, at August 1975, was more than 50%. These estimates were made assuming June 1976 as the base period. See: Deficits en la cuenta corriente de la balanza de pagos y su financiamiento: el caso del Peru 1970–80, (Lima: Banco Central de Reserva del Peru, April 1980).

Estimates made by Schuldt, taking 1960 as the base year, show that in 1975 the "sol" was overvalued by 43%. See: Jürgen Schuldt L., Cuesta demasiado el dolar?, (Lima: Universidad del Pacifico, 1978).

3.1. CAUSALITY BETWEEN INFLATION AND EXCHANGE RATE CHANGES

The coexistence of a system of minidevaluations or crawling peg with an inflationary process in the Peruvian economy may reflect a relation between frequent changes in the exchange rate and inflation.

As an initial exploration of this relation an econometric criterion has been applied in order to determine the direction of the causality between these two variables.

According to Granger's definition of causality, a variable $Y_t$ does not cause $X_t$ if and only if the probability distribution of the $X$s is independent of the probability distribution of the $Y$s. That is:

$$Y_t \not\rightarrow X_t \iff P(X_t/X_{t-1}, \ldots, X_{t-n}, Y_{t-1}, \ldots, Y_{t-n}) = P(X_t/X_{t-1}, \ldots, X_{t-n})$$

The above is an ad hoc definition of causality based entirely on the predictability of a variable.

In applied work, a more restrictive notion of causality is used. Here only one of the parameters of the distribution of $Y_t$ and $X_t$, the variance ($\sigma^2$), is considered:

$$Y_t \not\rightarrow X_t \iff \sigma^2(X_t/X_{t-1}, \ldots, X_{t-n}, Y_{t-1}, \ldots, Y_{t-n}) = \sigma^2(X_t/X_{t-1}, \ldots, X_{t-n})$$

If $Y_t$ does not help predict $X_t$, then it is said that $Y_t$ does not cause $X_t$. 
The following regressions were estimated in order to investigate the causality relations between changes in the exchange rate \((\rho^*_t)\) and inflation \((P^*_t)\).

**RESTRICTED (R):**

\[
P^*_t = 7.942 - 0.092 P^*_{t-1} - 0.053 P^*_{t-2} - 0.261 P^*_{t-3} - 0.127 P^*_{t-4} - 0.211 P^*_{t-5} - 0.038 T
\]
\[
= 7.942 - 0.092 \times (2.157) - 0.053 \times (0.200) - 0.261 \times (0.201) - 0.127 \times (0.121) - 0.211 \times (0.116) - 0.038 \times (0.200)
\]

\[
R^2 = 0.208 \quad F = 0.874 \quad \text{s.e.} = 1.521 \quad Q = 6.885
\]

**UNRESTRICTED (UR):**

\[
P^*_t = 9.941 - 0.152 P^*_{t-1} - 0.001 P^*_{t-2} - 0.409 P^*_{t-3} - 0.177 P^*_{t-4} - 0.322 P^*_{t-5} + 0.418 \rho^*_{t-1} - 0.917 \rho^*_{t-2} + 1.721
\]
\[
= 9.941 - 0.152 \times (4.902) - 0.001 \times (0.307) - 0.409 \times (0.281) - 0.177 \times (0.275) - 0.322 \times (0.116) + 0.418 \times (0.200) - 0.917 \times (1.927) + 1.721 \times (1.638)
\]

\[
R^2 = 0.270 \quad F = 0.504 \quad \text{s.e.} = 1.686 \quad Q(13) = 3.939
\]

Where \(T\) is a trend variable, the numbers in parentheses are the standard error of the regression coefficients, \(F\) is the \(F\) test for the joint hypothesis that all the parameters are zero, \(s.e.\) is the standard error of the regression, and \(Q\) is the test for the joint hypothesis that all the autocorrelation coefficients are zero.

The null hypothesis that all the coefficients of \(\rho^*_t\) are jointly zero was tested with the following \(F\) test:

\[
\frac{(\text{SSE}_R - \text{SSE}_{UR})/q}{\text{SSE}_{UR}/(n-k)} \sim F_{q',n-k}
\]
Where \( q \) is the number of added variables in the unrestricted regression, \( n \) is the number of observations, \( K \) = number of variables in the unrestricted regression. The calculated \( F \) is 0.254 which is less than the critical value \( F_{5,15} = 2.90 \) with 95% confidence, failing to reject the null hypothesis. This means that past values of changes in the exchange rate do not help predict the rate of inflation. Thus, changes in the exchange rate do not cause inflation.

To see whether causality exists in the opposite direction the regressions were the following:

RESTRICTED (R): 
\[
\begin{align*}
p_t^* &= -0.423 + 0.621 p_{t-1}^* + 0.020 p_{t-2}^* - 0.252 p_{t-3}^* \\
&\quad + 0.228 p_{t-4}^* + 0.160 p_{t-5}^* + 0.044 T \\
&\quad (0.445)(0.246)(0.284)(0.230)(0.145)(0.073)(0.019)
\end{align*}
\]

\[R^2 = 0.849 \quad F = 18.729 \quad \text{s.e.} = 0.300 \quad Q(13) = 7.057\]

UNRESTRICTED (UR): 
\[
\begin{align*}
p_t^* &= -0.222 + 0.825 p_{t-1}^* - 0.338 p_{t-2}^* - 0.070 p_{t-3}^* \\
&\quad + 0.185 p_{t-4}^* + 0.181 p_{t-5}^* - 0.040 p_{t-6}^* + 0.066 T \\
&\quad (0.922)(0.362)(0.395)(0.308)(0.211)(0.114)(0.058)(0.053)
\end{align*}
\]

\[R^2 = 0.874 \quad F = 9.425 \quad \text{s.e.} = 0.100 \quad Q(13) = 12.527\]

The \( F \) test for the null hypothesis that all the coefficients of \( p_t^* \) are jointly zero gave a value of 0.586. This value is less than the \( F_{5,15} \) critical value of 2.90 with 95% confidence. Thus, the
null hypothesis is not rejected, therefore inflation rates do not cause changes in the exchange rate.

In interpreting these results it is necessary to have in mind that these tests are designed for large samples. In addition, they do not test contemporaneous causality between the two variables.

Despite the results it is not possible to say that there is no relation between inflation and changes in the exchange rate.

Since both variables are determined by factors such as the expansion in the money supply in relation to money demand, world inflation, and so on, the next section deals with a model that was designed to analyze the feedback mechanism between inflation and changes in the exchange rate in a context where both are endogenous variables.

3.2 THE MODEL

The following model has been developed by Blejer and Leiderman\(^2\). The framework is an extension of the monetary approach for the analysis of the simultaneous determination of the rate of inflation, the exchange rate and the balance of payments under a crawling peg system.

The model is developed for a small country whose international price of traded goods is exogenously determined. The price of nontraded goods responds to domestic monetary variables.

It is also assumed that the rate of growth of real income is not affected by monetary variables.
The relationships of the monetary sector are:

1. \( M_s = a(R+D) \)
2. \( M_d = P m_d \)
3. \( m_d = f(y, \pi_e) \)

Where \( M_s \) is the nominal supply of domestic money; \( a \) is the money multiplier; \( R \) is the foreign exchange reserves held by the Central Bank; \( D \) is the domestic credit component of the monetary base; \( M_d \) is the demand for nominal cash balances; \( P \) is a price index that includes traded and nontraded goods; \( m_d \) is the real demand for money, assumed to be a function of real income \( y \) and the expected rate of inflation \( \pi_e \) taken as a proxy of the alternative cost of holding money.

Assuming that the market clears in each period\(^{3/2} \), so that the stock of money supply is equal to money demand, ex post. Therefore there is a flow equilibrium:

4. \( M^*_s = M^*_d \)

Where the asterisk indicates the percentage rate of change of the variable. Differentiating equations (1) and (2) logarithmically, the flow equilibrium condition can be expressed as:

5. \( a^* + (1-\gamma)R^* + \gamma D^* = P^* + m^*_d \)

Where \( \gamma = D/(R+D) \) and \( P^* \) is the domestic rate of inflation.

The domestic rate of inflation is a weighted average of the
rate of change of the price of traded and nontraded goods:

\[ P^* = \lambda P^*_T + (1-\lambda) P^*_NT \]

Where \( P_T \) and \( P_{NT} \) is the price in domestic currency of traded, non-traded goods, respectively, and \( \lambda \) is the share of traded goods in total expenditure. \( P^* \) will be determined by the world rate of inflation \( (P^*_W) \) and the variations in the exchange rate \( (p^*) \).

\[ (7) \quad P^*_T = P^*_W + p^* \]

The price of nontraded goods may be affected, at least in the short run, by the ex ante excess supply of money which implies an excess demand in the goods market. The price of nontraded goods relative to that of traded goods will be, therefore, a function of imbalances in the money market.

\[ (8) \quad P^*_NT = P^*_T + \Omega \]

Where \( \Omega \) is a measure of monetary imbalance and \( \theta \) is the elasticity of the relative price with respect to the monetary variable.

\( \Omega \) is defined as the gap (in percentage terms) between the ex ante change in the money supply (given by the change in the domestic credit component of the base and in the money multiplier) and changes in demand.

The change in international reserves is taken as an endogenous reaction through which money supply and demand become equal ex post.
Therefore, equation (8) can be written as:

(10) \[ P^*_{NT} = P^* + \theta (YD^* + a^* - M^*_d) \]

Substituting (7) into (10) and then (7) and (10) into (6) and assuming \( a^* = 0 \), we obtain:

(11) \[ P^* = \varepsilon (P^*_W + \rho^*) + (1-\varepsilon) (YD^* - m^*_d) \]

where \( \varepsilon = [1+\theta(1-\lambda)]^{-1} \).

Changes in international reserves of the Central Bank to restore equilibrium may be obtained by substituting \( P^* \) in equation (5) for its value in (11):

(12) \[ (1-Y)R^* = \varepsilon (P^*_W + \rho^* + m^*_d - YD^*) \]

In equation (11) and (12) the domestic rate of inflation and the balance of payments are functions of world inflation exchange rate policy and the rate of ex-ante excess flow supply of money.

Although under the crawling peg the exchange rate might be changed according to different rules, this model assumes that the nominal rate (\( \rho \)) is altered to maintain purchasing power parity.

The reaction function implied by the policy rule is:

(13) \[ \rho^*_t = \beta \sum_{i=0}^{m} (1-\beta)^i L^i (P^*_{NT} - P^*_W) \]

Where \( t \) is a time subscript, \( \beta \) is the portion of the current differential rate of inflation transmitted to the exchange rate in the current period, and \( L \) is the lag operator (\( L^i X_t = X_{t-i} \)).
Equation (13) assumes that, in addition to the current period adjustment, the exchange rate will continue to change in each subsequent period by a fraction $\beta$ of the still unadjusted differential, until the whole differential has been transmitted to the exchange rate. The greater the $\beta$, the faster the rate will adjust.

3.3. ESTIMATION PROCEDURES

For estimation purposes the econometric form of the model is the following system:

\begin{align}
(3') \quad \log m_t &= \alpha_0 + \alpha_1 \log y_t - \alpha_2 \pi^e_t + \alpha_3 \log m_{t-1} + u_{1t} \\
(11') \quad P^*_t &= \Gamma_0 + \Gamma(P^*_w^*+\pi^*_t) + \Gamma_2(a*+\gamma D^*_w-m^*_d) + u_{2t} \\
(12') \quad (1-\gamma)R^*_t &= \delta_0 + \delta_1 (P^*_w + \rho^* + m^*_d - \gamma D^*_w - a^*_t) + u_{3t} \\
(13') \quad \rho^*_t &= \beta_0 + \beta_1 (P^*_w-P^*_t) + \beta_2 (P^*_w-P^*_t)_{t-1} + \beta (P^*_w-P^*_t)_{t-2} + u_{4t}
\end{align}

The theoretical model imposes the following restrictions upon the parameters of the model:

I: $\Gamma_1 = \delta_1$

II: $\Gamma_2 = (1-\Gamma_1)$

III: $\beta_2 = \beta_1 (1-\beta_1)$

IV: $\beta_3 = \beta_1 (1-\beta_1)^2$

Equation (3') is the empirical counterpart of the model's demand for real balances. The specification is semilogarithmic, where the log of real money balances depends on the log of real income and expected inflation.
In equilibrium, the demand for money $m_t$ is given by:

$$\log m_t = \theta_1 \log y_t - \theta_2 \pi^e$$

Assuming a partial adjustment mechanism towards equilibrium of the form:

$$(\log m_t - \log m_{t-1}) = \lambda(\log m_t^e - \log m_{t-1}) \quad 0<\lambda<1$$

After substituting $m_t^e$ and rearranging the terms:

$$\log m_t = \log m_{t-1} + \lambda(\theta_1 \log y_t - \theta_2 \pi^e) - \lambda \log m_{t-1}$$

$$\log m_t = \lambda \theta_1 \log y_t - \lambda \theta_2 \pi^e + (1-\lambda) \log m_{t-1}$$

$$\log m_t = \alpha_1 \log y_t - \alpha_2 \pi^e + \alpha_3 \log m_{t-1}$$

$$\alpha_1 = \lambda \theta_1 \quad \alpha_2 = \lambda \theta_2 \quad \alpha_3 = (1-\lambda)$$

Because it is a similogarithmic function, the long run income elasticity is $\theta_1$, and the elasticity with respect to $\pi^e$ is $\theta_2 \pi^e$, where $\pi^e$ is the average $\pi$ of the period.

In order to get $m_{dt}^*$, the rate of change of real money demand, the first differences of the fitted values of the estimated money demand equation are taken.

The estimation of money demand also requires a proxy for $\pi^e$. Blejer and Leiderman assumed a version of the rational expectation hypothesis for the Brazilian case. $\pi^e$ was constructed from the fitted values of a regression of the rate of inflation on lagged
values of itself, foreign inflation, domestic credit growth, exchange rate changes and real income growth. Two lags for each variable were included.

Equations (11), (12') and (13') constitute a simultaneous equation system, which, imposing the restrictions, is linear in the variables but nonlinear in some of the parameters.

The results obtained by Blejer and Leiderman for the Brazilian case, using a full-information maximum-likelihood estimator, are the following:

\[
\log m_t = 0.873 + 0.162 \log y_t - 1.700 \pi^e + 0.876 \log m_{t-1} \\
(0.873) (0.049) (0.229) (0.045)
\]

\[
\begin{align*}
\tau^* & = 0.002 + 0.958 (P^*+p^*) + 0.042 (a^*+y^D*-m^*d^*)_t \\
& (0.001) (0.018) (0.018)
\end{align*}
\]

\[
(l-Y)R^* = -0.038 + 0.958(P^*+p^*+m^*_d^*-y^D^*-a^*)_t \\
(0.039) (0.018)
\]

\[
\begin{align*}
p^* & = -0.008 + 0.526 (P^*-P^*_W) + 0.249 (P^*-P^*_W)_{t-1} + \\
& + 0.118 (P^*-P^*_W)_{t-2} \\
& (0.003) (0.106) (0.005) (0.029)
\end{align*}
\]

Numbers in parentheses are asymptotic standard errors of regression coefficients. Their sample period was III/1968 through IV/1977 with 38 observations. The coefficient of \((a^*+y^D^*-m^*d^*)_t\) in equation (11') indicates that an increase in the rate of domestic credit creation above the rate of growth in money demand will increase
domestic inflation and, according to equation (12'), will reduce international reserves.

Equation (13') assumes that the government follows the Purchasing Power Parity rule. This implies that $p_t^*$ is an endogenous variable that depends on the divergence of domestic inflation from world inflation. This divergence will depreciate the exchange rate, which in turn will further increase the rate of domestic inflation and reduce the rate at which international reserves decrease, according to equation (11') and (12').

The exchange rate reaction function embodies a restriction of geometrically decaying parameters of the current and lagged values of the domestic and foreign inflation differential on the exchange rate. The results indicate that more than 50 percent of this differential is transmitted to the exchange rate in the current quarter and an additional 25 percent in the next. The full adjustment is reached after three quarters.

Although the authors estimated the model with all the restrictions, they report to have tested only restrictions III and IV. The sample information failed to reject these restrictions, according to the $\chi^2$ likelihood ratio test.

3.4. THE CASE OF PERU

The crawling peg in Peru was adopted for the first time in September 1976. It was interrupted in July 1977 and reinstated in May 1978. The exchange rate began to be adjusted three or four times a week.
This fact makes it possible to evaluate the system only since 1978. Thus the sample period is from May 1978 to December 1980. Given the short length of the period, it was necessary to work with monthly data. The sample contains 32 observations.

For P, R, and M the following series were utilized: consumer price index, international reserves of the Central Bank and the money supply. D was generated by subtracting R from the monetary base, and ρ is the exchange rate at the end of the month. Since there is not available monthly data for GNP, y is represented by the index of manufactured production.

The world inflation was calculated based on a weighted average of the inflation of the main trading countries of the Peruvian economy. In order to get a proxy for the \( \pi^e \) it was assumed that agents forecast inflation with the information that is available. The set of information was composed of past values of the rate of inflation, exchange rate changes, money supply, domestic credit, real income, world inflation. Many combinations of these variables, including the Blejer and Leiderman's version, were used to estimate a regression to forecast the rate of inflation.

The criteria in choosing the "best" equation were the \( R^2 \) as a measure of the influence of the explanatory variables on the \( \pi^e \), and the test of the statistical significance of the parameters. The t test was used for the null hypothesis that each parameter individually was equal to zero, and the F test was used for the
hypothesis that all the parameters are jointly equal to zero.

According to these criteria the "best" equation is the following:

\[ P* = 1.294 + 0.808 (p* + P^*)t-1 \]
\[ (0.127) (0.599) \]

\[ R^2 = 0.567 \quad D.W. = 1.702 \quad s.e. = 1.787 \quad F = 40.198 \]

D.W. is the Durbin-Watson statistic.

This equation indicates that values of exchange rate changes and world inflation from the past period significantly affect the rate of inflation in Peru. This result may be related to the fact that the share of the tradable good sector in Peru is relatively high, as indicated by the traded goods/GDP relation. (Exports were more than 20% of the GDP during the three years under analysis, and imports were about 18% in average). \( \pi^e \) was constructed from the fitted value of this regression.

The following step was the estimation of the demand for money. This equation was estimated at a first stage because the system is block recursive. Thus, even if the disturbances are contemporaneously correlated this equation can be consistently estimated separately:

\[ (3') \quad \log m_t = 0.041 + 0.305 \log y_t - 0.010 \pi^e_t + 0.824 \log m_{t-1} \]
\[ (0.723) (0.130) \quad (0.004) (0.086) \]

\[ R^2 = 0.829 \quad h = -0.528 \quad s.e. = 0.040 \quad F = 49.519 \]

h is the Durbin's serial-correlation statistic for autoregressive models.

The parameter estimates imply the following long run income
elasticity:

\[ \hat{\theta}_1 = \frac{0.305}{1-0.824} = 1.733 \]

The estimated long run elasticity with respect to \( \pi^e \), evaluated at the sample mean:

\[ \hat{\theta}_2 \frac{\pi^e}{\pi} = \frac{-0.010}{1-0.824} \times 0.045 = -0.003 \]

All the coefficients in the estimated money demand equation have the expected signs and are significantly different from zero.

Because the data are monthly it could be argued that economic agents look not only at the last month's money stock but also at past values of \( m_t \) to adjust their demand for money. Thus, more lagged values of \( m_t \) should be included in the estimation of money demand.

However, tests were made including two more lags of \( m_t \) in the equation and the results were that the estimated coefficients for \( m_{t-2} \) and \( m_{t-3} \) were not significantly different from zero according to the \( t \) statistic. The null hypothesis that these parameters are jointly equal to zero was not rejected either, according to the \( F \) test applied with 95% confidence. Given these results, the estimations were made including only one lag for \( m_t \). \( m^\ast_{dt} \) was constructed by taking the first difference of the fitted values of the estimated money demand equation.

The model assumes that \( y_t \) is exogenous. If this assumption were not fulfilled the estimators of the parameters would be inconsistent.
During the analyzed period, imports were restricted and the restrictions were, in a way, related to the state of the international reserves.

Since the Peruvian industrial sector depends on imported inputs it might be an argument against the exogenity of $y_t$ with respect to monetary variables. In order to test the exogenity of $y_t$, a regression of this variable against lag values of itself and international reserves was estimated.

The null hypothesis that all the coefficients of the lag values of international reserves were zero was tested. The $F$ test did not reject the null hypothesis. This means that the addition of past values of international reserves to the regression does not help to explain $y_t$. Therefore, we can say that $y_t$ is econometrically exogenous to international reserves.

Regarding the reaction function of the exchange rate it is unlikely that the complete adjustment to the inflation differential is reached in only three months. Therefore, the reaction function includes a larger number of lags of the difference between the Peruvian and the world inflation. After correcting autocorrelation of second order by Durbin's Method\(^6\), the $F$ test gave as a result that two more lags of the domestic-foreign inflation differential should be included. The reaction function is the following:

$$ p_t^* = \beta_0 + \beta_1(P^*_t - P^*_w) + \beta_2(P^*_t - P^*_w)_{t-1} + \beta_3(P^*_t - P^*_w)_{t-2} + \beta_4(P^*_t - P^*_w)_{t-3} + \beta_5(P^*_t - P^*_w)_{t-4} + u_t $$
The number of lags of the inflation differential to be included in the reaction function was also tested estimating this equation simultaneously with the rest of the model.

The likelihood function test failed to reject the null hypothesis that the parameters of the three additional lags are jointly zero. However, the size and the signs of these parameters were economically meaningless, therefore the reaction function includes only two more lags.

During this period the rate of crawl was not always announced. In addition, at the beginning, the announcement of the crawl was for the following month but after some months such announcements were made for the following two and then three months. In 1980 these announcements were discontinued. This lack of continuity in the policy could have been a source of instability in the exchange rate function.

Tests of stability were carried out for February 1979, when the announcement began, and for July 1980 when they were eliminated. Fisher test was applied for the null hypothesis that the coefficients are the same during the whole period, in other words, that the coefficients did not change over time:

\[
\frac{(SSE_R - SSE_{UR})/(n-m)}{SSE_{UR}/(m-k)} \sim F(n-m, m-k)
\]
Where $SSE_R$ and $SSE_{UR}$ are the sum of square errors of the restricted and unrestricted regressions respectively, $n =$ number of observations in the restricted regression, $m =$ number of observations of the unrestricted regression, $k =$ number of independent variables.

The Fisher test failed to reject the null hypothesis for both cases. Thus, the reaction function of the exchange rate is stable. Thus, equations (11), (12) and (13) for the Peruvian case were the following:

\[
(11) \quad P_t^* = \gamma_0 + \gamma_1 (P^*_W \times P^*_t) + \gamma_2 (a^* + \gamma D^* - m^*_d) t + u_2 t
\]

\[
(12) \quad (1-\gamma)R_t^* = \delta_0 + \delta_1 (P^*_W \times P^*_t - \gamma D^* - a^*) t + u_3 t
\]

\[
(13) \quad P_t^* = \beta_0 + \beta_1 (P^*_W \times P^*_t) + \beta_2 (P^*_W \times P^*_t-1) + \beta_3 (P^*_W \times P^*_t-2)
\]

\[+ \beta_4 (P^*_W \times P^*_t-3) + \beta_5 (P^*_W \times P^*_t-4) + u_4 t\]

These equations were estimated simultaneously using two methods: three stage least squares (3SLS) and maximum likelihood procedure (FIML). The results can be observed in the following table, where ordinary least square estimators (OLS) are presented for comparison purposes:
### Table 5

<table>
<thead>
<tr>
<th>EQUATION</th>
<th>COEFFICIENT</th>
<th>OLS</th>
<th>3 SLS UNRESTRICTED</th>
<th>3 SLS RESTRICTED</th>
<th>FIML UNRESTRICTED</th>
<th>FIML RESTRICTED</th>
</tr>
</thead>
<tbody>
<tr>
<td>(11)</td>
<td>$\Gamma_0$</td>
<td>3.130</td>
<td>0.808</td>
<td>0.829</td>
<td>0.033</td>
<td>0.644</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(1.441)</td>
<td>(1.497)</td>
<td>(0.291)</td>
<td>(1.066)</td>
<td>(0.290)</td>
</tr>
<tr>
<td></td>
<td>$\Gamma_1$</td>
<td>0.290</td>
<td>0.947</td>
<td>0.939</td>
<td>1.236</td>
<td>1.001</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.421)</td>
<td>(0.570)</td>
<td>(0.038)</td>
<td>(0.401)</td>
<td>(0.024)</td>
</tr>
<tr>
<td></td>
<td>$\Gamma_2$</td>
<td>0.069</td>
<td>0.062</td>
<td>0.061</td>
<td>-0.013</td>
<td>-0.001</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.041)</td>
<td>(0.040)</td>
<td>(0.038)</td>
<td>(0.024)</td>
<td>(0.024)</td>
</tr>
<tr>
<td>(12)</td>
<td>$\delta_0$</td>
<td>5.008</td>
<td>5.421</td>
<td>6.068</td>
<td>6.203</td>
<td>5.832</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(4.949)</td>
<td>(5.117)</td>
<td>(4.485)</td>
<td>(4.999)</td>
<td>(4.447)</td>
</tr>
<tr>
<td></td>
<td>$\delta_1$</td>
<td>1.072</td>
<td>1.108</td>
<td>0.939</td>
<td>0.904</td>
<td>1.001</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.644)</td>
<td>(0.651)</td>
<td>(0.038)</td>
<td>(0.685)</td>
<td>(0.024)</td>
</tr>
<tr>
<td>(13)</td>
<td>$\beta_0$</td>
<td>0.981</td>
<td>0.088</td>
<td>0.087</td>
<td>-0.166</td>
<td>-0.073</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.535)</td>
<td>(0.082)</td>
<td>(0.082)</td>
<td>(0.162)</td>
<td>(0.095)</td>
</tr>
<tr>
<td></td>
<td>$\beta_1$</td>
<td>0.106</td>
<td>0.129</td>
<td>0.130</td>
<td>0.348</td>
<td>0.342</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.033)</td>
<td>(0.030)</td>
<td>(0.030)</td>
<td>(0.098)</td>
<td>(0.046)</td>
</tr>
<tr>
<td></td>
<td>$\beta_2$</td>
<td>0.079</td>
<td>0.097</td>
<td>0.097</td>
<td>0.262</td>
<td>0.225</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.042)</td>
<td>(0.039)</td>
<td>(0.039)</td>
<td>(0.077)</td>
<td>(0.015)</td>
</tr>
<tr>
<td></td>
<td>$\beta_3$</td>
<td>0.124</td>
<td>0.141</td>
<td>0.141</td>
<td>0.239</td>
<td>0.168</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.040)</td>
<td>(0.041)</td>
<td>(0.041)</td>
<td>(0.061)</td>
<td>(0.001)</td>
</tr>
<tr>
<td></td>
<td>$\beta_4$</td>
<td>0.102</td>
<td>0.110</td>
<td>0.110</td>
<td>0.138</td>
<td>0.097</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.030)</td>
<td>(0.039)</td>
<td>(0.039)</td>
<td>(0.044)</td>
<td>(0.007)</td>
</tr>
<tr>
<td></td>
<td>$\beta_5$</td>
<td>0.053</td>
<td>0.042</td>
<td>0.042</td>
<td>0.051</td>
<td>0.064</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.019)</td>
<td>(0.018)</td>
<td>(0.018)</td>
<td>(0.018)</td>
<td>(0.009)</td>
</tr>
</tbody>
</table>

Log likelihood function: -161.100 -161.120 -157.694 -163.628

Numbers in parentheses are the standard error of the regression coefficients.
Using 3SLS the following linear restrictions were tested:

\[ H_0 : \begin{align*}
\text{I)} & \quad \Gamma_1 = \delta_1 \\
\text{II)} & \quad \Gamma_2 = (1 - \Gamma_1)
\end{align*} \]

The likelihood ratio calculated for this test was:

\[ 2(\hat{L}^{UR} - \hat{L}^R) \sim \chi^2 \\
2(-161.100 + 161.120) = 0.04 \]

The \( \chi^2 \) critical value with 2 degrees of freedom is 5.99 with 95% confidence, which is higher than the calculated \( \chi^2 \), that is, the sample information fails to reject the restrictions imposed.

The inclusion of the restrictions gives more efficient parameter estimators, as indicated by the reduction in the standard error of the coefficients. All the parameter estimates have the proper sign.

According to the results in equations (11) and (12) the exchange rate changes will significantly effect the domestic rate of inflation and also the international reserves. The world inflation will effect these variables in the same way, that is, an increase in the exchange rate change and the world inflation will be felt in the domestic rate of inflation and the international reserves in almost the same magnitude. (See Table 5)

The excess money supply will also have an effect on the domestic rate of inflation in the same direction although in much less proportion than the effect of the exchange rate and world inflation.

A large percentage of the monetary imbalances will be eliminated through deficits in the balance of payments as indicated by the
results in equation (12).

As long as the increase in the domestic rate of inflation is larger than that of the world inflation, it will induce a further depreciation of the exchange rate. The exchange rate reaction function (13) indicates that only about 50% of the domestic and foreign inflation differential will be transmitted to the exchange rate during five months.

With the FIML method, it is possible to impose a pattern of geometrically decaying weights in the effects of the domestic-foreign inflation differential on the exchange rate. Thus, the null hypothesis $H_0$ includes the following restrictions:

\[
\begin{align*}
H_0: \quad & I) \quad \Gamma_1 = \delta_1 \\
& II) \quad \Gamma_2 = (1-\Gamma_1) \\
& III) \quad \beta_2 = \beta_1(1-\beta_1) \\
& IV) \quad \beta_3 = \beta_1(1-\beta_1)^2 \\
& V) \quad \beta_4 = \beta_1(1-\beta_1)^3 \\
& VI) \quad \beta_5 = \beta_1(1-\beta_1)^4
\end{align*}
\]

The chi-square likelihood ratio to test $H_0$ is the following:

\[
2(L^UR - L^R) \sim \chi^2_6
\]

\[
2(-157.694 + 163.628) = 11.868
\]

The critical value of $\chi^2$ with 6 degrees of freedom is 12.59 with
95% confidence, which means that the restrictions are not rejected.

Some of the results are quite similar to those obtained by the 3SLS, although there are also some differences. The efficiency of the parameter estimators is improved with the inclusion of the restrictions.

As in the 3SLS method, the exchange rate changes and the world inflation will have a direct effect over the domestic rate of inflation and international reserves. The parameters of equations (11) and (12) indicate that these last two variables will fully absorb any increase in the exchange rate depreciation and the world inflation.

The coefficient of the excess money supply, however, has the sign opposite that which theoretically should be expected. Nevertheless, this coefficient is not significantly different from zero.

An explanation would be that within the current month the excess money supply does not affect domestic prices and the monetary imbalances are eliminated through a depletion of the international reserves.

There will be feedback from the increase in domestic inflation over the exchange rate. The reaction function indicates that 34% of the differential between domestic and world inflation is transmitted to the exchange rate within the current month. 23% of this difference will be reflected in the exchange rate in the following month and almost a complete adjustment will be reached after four months.
Although, in general, the results obtained are quite similar to those for the Brazilian case, there are some aspects of the model that should be pointed out. The model embodies some important restrictions in the parameters that have not been tested by the authors.

For example, the parameter of $P^*_W$ and $\rho^*$ in equation (11) are restricted to be equal.

Equation (11) unrestricted would be:

\begin{equation}
(11) \frac{P^*_t}{P^*_t} = \gamma_0 + \gamma_1 \frac{P^*_t}{P^*_t} + \gamma_2 \rho^*_t + \gamma_3 (a^* + \gamma D^* - m^*_d)_t
\end{equation}

Applying 3SLS to the model with the unrestricted equation (11) the results are the following:

\begin{equation}
(11') \frac{P^*_t}{P^*_t} = 0.725 + 2.504 \frac{P^*_t}{P^*_t} + 0.461 \frac{P^*_t}{P^*_t} + 0.076 \frac{P^*_t}{P^*_t} + 0.076
\end{equation}

\begin{equation}
(1.487) (1.080) (0.548) (0.038)
\end{equation}

\begin{equation}
(a^* + \gamma D^* - m^*_d)_t
\end{equation}

\begin{equation}
(12') (1-\gamma) R^* = 5.257 + 1.151 (\frac{P^*_t}{P^*_t} + \frac{P^*_t}{P^*_t} + \frac{P^*_t}{P^*_t} - \gamma D^* - a^*)_t
\end{equation}

\begin{equation}
(5.119) (0.652)
\end{equation}

\begin{equation}
(13') \frac{\rho^*_t}{\rho^*_t} = 0.487 + 0.094 (\frac{P^*-P^*_t}{P^*_t}) + 0.037 (\frac{P^*-P^*_t}{P^*_t}) + 0.044
\end{equation}

\begin{equation}
(0.185) (0.032) (0.044)
\end{equation}

\begin{equation}
+ 0.066 (\frac{P^*-P^*_t}{P^*_t}) + 0.019 (\frac{P^*-P^*_t}{P^*_t}) + 0.047
\end{equation}

\begin{equation}
(0.047) (0.048)
\end{equation}

\begin{equation}
+ 0.078 (\frac{P^*-P^*_t}{P^*_t}) - 4
\end{equation}

\begin{equation}
(0.045)
\end{equation}

Likelihood function = -159.17 System $R^2 = 0.556$

The null hypothesis to be tested is: $H_0: \gamma_1 = \gamma_2$

The chi-square likelihood ratio is the following:

\begin{equation}
2 (L^R R - L^R) \sim \chi^2_1
\end{equation}
The critical value of $\chi^2$ with one degree of freedom is 3.84 with 95% confidence. Thus, the sample rejects the null hypothesis.

The rejection of this restriction seems to indicate that the empirical evidence does not support some important points of the theoretical framework of the model. This fact might alter the conclusions about the functioning of the model. The inclusion of restrictions that are not valid would affect the bias and consistency of the parameter estimators.

Another fact that must be considered in interpreting the results for the Peruvian case is the short length of the analyzed period. The size of the sample might affect the power of the tests. In addition the estimators properties are those for large samples (they are asymptotically consistent). This would explain the differences in the results obtained by both of the applied estimation procedures.

The monthly data could have been a source of problems in finding a better equation for $\pi^2$. It might also affect the results obtained with respect to the influence of the excess money supply on prices.
FOOTNOTES


3 This assumption is made for simplicity purposes. The empirical section is done with a mechanism of lagged adjustment in the money market.

4 Changes in 'a' are considered in the empirical section.

5 The sources of data are the International Financial Statistics published by the IMF, Memoirs and bulletins of the Central Reserve Bank of Peru and the National Institute of Statistics.


7 This test is explained later.

CONCLUDING REMARKS

The expansionary monetary and fiscal policies followed by the Peruvian government during most of the seventies, ended in balance of payments problems and an inflationary process.

The deficits in the trade balance reinforced by the outflow of short term capital were the main cause of the balance of payments deficits. Financial policies were not enough to solve the problem in the balance of payments and the loss of international reserves continued. The Peruvian authorities faced the necessity of devaluation of the exchange rate.

Thus, inflation and devaluation were the reflection of the underlying expansion in the aggregate demand.

The crawling peg system was adopted and maintained since 1978, after a period of many changes in the exchange rate policy. The exchange rate is adjusted according to the relative price changes between Peru and its main trading partners.

The implementation of the crawling peg was followed by the elimination of the deficit in the trade balance and in the overall balance of payments. However, the inflationary process is still an unsolved problem. The years after the adoption of the crawling peg experienced the highest rate of inflation.

Nevertheless, in the strict econometric sense, it is not possible to affirm that there is a direct causality running from the exchange rate changes towards inflation or vice versa, for the
Peruvian case. However, this does not deny the existence of a relationship between these two variables.

Since both inflation and changes in the exchange rate are dependent variables in this process, a model that accounts for the joint determination of the exchange rate, the rate of inflation, and the balance of payments in a crawling peg system has been applied. According to the results, a higher rate of world inflation will reduce the rate of devaluation of the exchange rate and will have a positive effect on the rate of accumulation of international reserves. It will, however, significantly raise the domestic rate of inflation. As long as the domestic rate of inflation is greater than the world rate of inflation a further depreciation of the exchange rate will be necessary, which in turn will affect prices.

The depreciation of the exchange rate will reduce the rate at which international reserves are depleted.

The effect of an increase in the money supply above the growth in money demand on prices is not significantly different from zero. This would indicate that the relative price between nontraded and traded goods is inelastic with respect to monetary imbalances, at least in the current month.

The excess money supply will be felt in the balance of payments through a reduction of the international reserves.

However, when interpreting these results, it is necessary to have in mind the limitations of this analysis. The short length of the period under analysis may affect the bias of the
parameter estimators and the power of the tests. The monthly data may be the cause of the results obtained with respect to the effects of the excess money supply on prices. The model itself has some weaknesses. It embodies some restrictions in the parameters that, at least for the Peruvian case, do not seem to be valid. This would affect the bias and consistency of the parameter estimators.

Nevertheless, what should be clear is that the feedback between inflation and exchange rate changes will exist as long as the causes of the inflationary process are not eliminated and the domestic rate of inflation is higher than the world rate of inflation.
<table>
<thead>
<tr>
<th>TABLE 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gross Domestic Product Sectorial Origin</td>
</tr>
<tr>
<td>(millions of soles of 1970)</td>
</tr>
<tr>
<td>-----------------</td>
</tr>
<tr>
<td>Agriculture and Forestry</td>
</tr>
<tr>
<td>Fishing</td>
</tr>
<tr>
<td>Mining</td>
</tr>
<tr>
<td>Manufacturing</td>
</tr>
<tr>
<td>Construction</td>
</tr>
<tr>
<td>Government</td>
</tr>
<tr>
<td>Others</td>
</tr>
<tr>
<td>GDP</td>
</tr>
</tbody>
</table>

**SOURCE:** Central Reserve Bank of Peru

\(^1\) Preliminars
### TABLE 2
Gross Domestic Product Sectorial Origin
(Percentage variations at 1970 prices)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture and Forestry</td>
<td>3.0</td>
<td>0.8</td>
<td>2.4</td>
<td>2.3</td>
<td>1.0</td>
<td>3.3</td>
<td>0.0</td>
<td>-3.0</td>
<td>3.1</td>
<td>-5.5</td>
</tr>
<tr>
<td><em>Fishing</em></td>
<td>-13.6</td>
<td>-47.9</td>
<td>-23.1</td>
<td>35.9</td>
<td>-15.2</td>
<td>19.9</td>
<td>-5.5</td>
<td>30.1</td>
<td>7.7</td>
<td>-5.1</td>
</tr>
<tr>
<td>Mining</td>
<td>-4.0</td>
<td>7.1</td>
<td>-0.6</td>
<td>3.7</td>
<td>-10.9</td>
<td>8.9</td>
<td>27.2</td>
<td>13.5</td>
<td>11.7</td>
<td>-2.8</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>8.6</td>
<td>7.3</td>
<td>7.4</td>
<td>7.5</td>
<td>4.7</td>
<td>4.2</td>
<td>-6.5</td>
<td>-2.1</td>
<td>4.0</td>
<td>6.0</td>
</tr>
<tr>
<td>Construction</td>
<td>10.5</td>
<td>12.4</td>
<td>5.0</td>
<td>22.0</td>
<td>16.8</td>
<td>-2.8</td>
<td>-7.7</td>
<td>-16.1</td>
<td>3.7</td>
<td>18.1</td>
</tr>
<tr>
<td>Government</td>
<td>6.5</td>
<td>7.0</td>
<td>2.2</td>
<td>2.3</td>
<td>4.5</td>
<td>2.0</td>
<td>2.8</td>
<td>-0.5</td>
<td>-0.5</td>
<td>1.5</td>
</tr>
<tr>
<td>Others</td>
<td>6.3</td>
<td>8.8</td>
<td>9.9</td>
<td>7.1</td>
<td>4.2</td>
<td>2.1</td>
<td>-2.3</td>
<td>-3.4</td>
<td>2.7</td>
<td>4.4</td>
</tr>
<tr>
<td>GDP</td>
<td>5.1</td>
<td>5.8</td>
<td>6.2</td>
<td>6.9</td>
<td>3.3</td>
<td>3.0</td>
<td>-1.2</td>
<td>-1.8</td>
<td>3.8</td>
<td>3.1</td>
</tr>
</tbody>
</table>

SOURCE: Central Reserve Bank of Peru.
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Private Consumption</td>
<td>170,813</td>
<td>177,488</td>
<td>185,357</td>
<td>206,033</td>
<td>226,820</td>
<td>234,456</td>
<td>238,786</td>
<td>234,629</td>
<td>221,634</td>
<td>223,077</td>
<td>230,626</td>
</tr>
<tr>
<td>Public Consumption</td>
<td>28,979</td>
<td>30,880</td>
<td>33,509</td>
<td>34,784</td>
<td>36,497</td>
<td>41,423</td>
<td>42,838</td>
<td>47,036</td>
<td>39,651</td>
<td>35,448</td>
<td>43,069</td>
</tr>
<tr>
<td>Gross Domestic</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Investment</td>
<td>31,049</td>
<td>38,812</td>
<td>38,824</td>
<td>45,497</td>
<td>59,333</td>
<td>65,254</td>
<td>57,942</td>
<td>44,980</td>
<td>39,226</td>
<td>43,961</td>
<td>57,041</td>
</tr>
<tr>
<td>Gross Fixed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Investment</td>
<td>29,896</td>
<td>32,874</td>
<td>35,142</td>
<td>37,042</td>
<td>48,457</td>
<td>58,254</td>
<td>53,942</td>
<td>43,480</td>
<td>37,726</td>
<td>43,261</td>
<td>54,741</td>
</tr>
<tr>
<td>- Public Sector</td>
<td>10,897</td>
<td>12,581</td>
<td>13,674</td>
<td>16,130</td>
<td>25,329</td>
<td>28,355</td>
<td>26,740</td>
<td>19,597</td>
<td>16,231</td>
<td>18,520</td>
<td>24,681</td>
</tr>
<tr>
<td>- Private Sector</td>
<td>18,999</td>
<td>20,293</td>
<td>21,468</td>
<td>20,912</td>
<td>23,128</td>
<td>29,899</td>
<td>27,202</td>
<td>23,883</td>
<td>21,495</td>
<td>24,741</td>
<td>30,060</td>
</tr>
<tr>
<td>Variation of Stocks</td>
<td>1,153</td>
<td>5,938</td>
<td>3,682</td>
<td>8,455</td>
<td>10,876</td>
<td>7,000</td>
<td>4,000</td>
<td>1,500</td>
<td>1,500</td>
<td>700</td>
<td>2,300</td>
</tr>
<tr>
<td>Exports</td>
<td>47,522</td>
<td>45,175</td>
<td>49,263</td>
<td>40,250</td>
<td>37,910</td>
<td>36,483</td>
<td>37,116</td>
<td>42,152</td>
<td>48,838</td>
<td>60,985</td>
<td>57,580</td>
</tr>
<tr>
<td>Imports</td>
<td>37,697</td>
<td>39,341</td>
<td>39,171</td>
<td>42,980</td>
<td>56,681</td>
<td>63,587</td>
<td>53,123</td>
<td>49,068</td>
<td>35,366</td>
<td>37,633</td>
<td>52,463</td>
</tr>
<tr>
<td>GDP</td>
<td>240,666</td>
<td>253,014</td>
<td>267,782</td>
<td>284,384</td>
<td>303,879</td>
<td>314,029</td>
<td>323,559</td>
<td>319,729</td>
<td>313,983</td>
<td>325,838</td>
<td>335,853</td>
</tr>
</tbody>
</table>

**SOURCE:** Central Reserve Bank of Peru

<sup>1/</sup>Preliminary
### Table 4

Gross Domestic Product by Expenditure
(percentage variation at 1970 prices)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Private Consumption</td>
<td>3.9</td>
<td>4.4</td>
<td>11.6</td>
<td>9.7</td>
<td>3.4</td>
<td>1.8</td>
<td>-1.7</td>
<td>-5.5</td>
<td>0.7</td>
<td>3.4</td>
</tr>
<tr>
<td>Public Consumption</td>
<td>6.6</td>
<td>8.5</td>
<td>3.8</td>
<td>4.9</td>
<td>13.5</td>
<td>3.4</td>
<td>9.8</td>
<td>-15.7</td>
<td>-10.6</td>
<td>21.5</td>
</tr>
<tr>
<td>Gross Domestic Investment</td>
<td>25.0</td>
<td>0.0</td>
<td>17.2</td>
<td>30.4</td>
<td>10.0</td>
<td>-11.2</td>
<td>-22.4</td>
<td>-12.7</td>
<td>12.1</td>
<td>29.7</td>
</tr>
<tr>
<td>Gross Fixed Investment</td>
<td>10.0</td>
<td>6.9</td>
<td>5.4</td>
<td>30.8</td>
<td>20.2</td>
<td>-7.4</td>
<td>-19.4</td>
<td>-13.2</td>
<td>14.7</td>
<td>26.5</td>
</tr>
<tr>
<td>- Public Sector</td>
<td>15.5</td>
<td>8.7</td>
<td>18.0</td>
<td>57.0</td>
<td>11.9</td>
<td>-5.7</td>
<td>-26.7</td>
<td>-17.2</td>
<td>14.1</td>
<td>33.3</td>
</tr>
<tr>
<td>- Private Sector</td>
<td>6.8</td>
<td>5.8</td>
<td>-2.6</td>
<td>10.6</td>
<td>29.3</td>
<td>-9.0</td>
<td>-12.2</td>
<td>-10.0</td>
<td>15.1</td>
<td>21.5</td>
</tr>
<tr>
<td>Variation of Stock</td>
<td>15.0</td>
<td>-38.0</td>
<td>129.6</td>
<td>28.6</td>
<td>-35.6</td>
<td>-42.9</td>
<td>-62.5</td>
<td>0.0</td>
<td>53.3</td>
<td>192.9</td>
</tr>
<tr>
<td>Exports</td>
<td>-4.9</td>
<td>9.0</td>
<td>-18.3</td>
<td>-5.8</td>
<td>-3.8</td>
<td>1.7</td>
<td>13.6</td>
<td>15.9</td>
<td>24.9</td>
<td>-5.6</td>
</tr>
<tr>
<td>Imports</td>
<td>4.4</td>
<td>-0.4</td>
<td>9.7</td>
<td>31.9</td>
<td>12.2</td>
<td>-16.5</td>
<td>-7.6</td>
<td>-27.9</td>
<td>6.4</td>
<td>39.4</td>
</tr>
<tr>
<td>GDP</td>
<td>5.1</td>
<td>5.8</td>
<td>6.2</td>
<td>6.9</td>
<td>3.3</td>
<td>3.0</td>
<td>-1.2</td>
<td>-1.8</td>
<td>3.8</td>
<td>3.1</td>
</tr>
</tbody>
</table>

Source: Central Reserve Bank of Peru.
Table 5
(millions of current soles)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Current Revenue</td>
<td>38,842</td>
<td>41,382</td>
<td>45,636</td>
<td>53,363</td>
<td>68,500</td>
<td>87,896</td>
<td>111,397</td>
<td>154,052</td>
<td>263,743</td>
<td>552,230</td>
<td>1,019,262</td>
</tr>
<tr>
<td>Current Expenditure</td>
<td>32,194</td>
<td>37,017</td>
<td>42,333</td>
<td>51,995</td>
<td>62,444</td>
<td>90,507</td>
<td>122,718</td>
<td>193,092</td>
<td>291,032</td>
<td>442,041</td>
<td>897,940</td>
</tr>
<tr>
<td>Current Account</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surplus</td>
<td>6,648</td>
<td>4,365</td>
<td>3,303</td>
<td>1,368</td>
<td>6,116</td>
<td>-2,611</td>
<td>-11,321</td>
<td>-39,040</td>
<td>-27,289</td>
<td>110,189</td>
<td>121,322</td>
</tr>
<tr>
<td>Capital Expenditures</td>
<td>9,930</td>
<td>12,468</td>
<td>14,134</td>
<td>15,416</td>
<td>20,206</td>
<td>27,980</td>
<td>37,111</td>
<td>40,103</td>
<td>57,650</td>
<td>128,556</td>
<td>262,282</td>
</tr>
<tr>
<td>Econ. Surp. or Def.</td>
<td>-3,282</td>
<td>-8,103</td>
<td>-10,831</td>
<td>-14,048</td>
<td>-14,090</td>
<td>-30,591</td>
<td>-48,432</td>
<td>-79,143</td>
<td>-84,939</td>
<td>-18,367</td>
<td>-140,960</td>
</tr>
<tr>
<td>Financing</td>
<td>3,282</td>
<td>8,103</td>
<td>10,831</td>
<td>14,048</td>
<td>14,090</td>
<td>30,591</td>
<td>48,432</td>
<td>79,143</td>
<td>84,939</td>
<td>18,367</td>
<td>140,960</td>
</tr>
<tr>
<td>1. External (net)</td>
<td>1,461</td>
<td>-967</td>
<td>1,932</td>
<td>6,956</td>
<td>11,030</td>
<td>16,013</td>
<td>15,803</td>
<td>34,789</td>
<td>7,885</td>
<td>24,629</td>
<td>15,300</td>
</tr>
<tr>
<td>a) Disbursements</td>
<td>4,622</td>
<td>4,483</td>
<td>7,060</td>
<td>18,188</td>
<td>20,895</td>
<td>22,802</td>
<td>24,092</td>
<td>57,805</td>
<td>74,500</td>
<td>95,607</td>
<td>197,290</td>
</tr>
<tr>
<td>2. Internal (net)</td>
<td>1,821</td>
<td>9,070</td>
<td>8,899</td>
<td>7,092</td>
<td>3,060</td>
<td>13,778</td>
<td>32,629</td>
<td>44,654</td>
<td>77,054</td>
<td>42,996</td>
<td>125,660</td>
</tr>
<tr>
<td>Econ. Defic/GDP</td>
<td>-1.4</td>
<td>-3.1</td>
<td>-3.7</td>
<td>-3.9</td>
<td>-3.1</td>
<td>-5.5</td>
<td>-6.3</td>
<td>-7.5</td>
<td>-5.1</td>
<td>-0.6</td>
<td>-3.1</td>
</tr>
<tr>
<td>Internal Fin/GDP</td>
<td>0.8</td>
<td>3.4</td>
<td>3.0</td>
<td>2.0</td>
<td>0.7</td>
<td>2.5</td>
<td>4.2</td>
<td>4.2</td>
<td>4.6</td>
<td>1.4</td>
<td>2.8</td>
</tr>
<tr>
<td>Current GDP</td>
<td>240.7</td>
<td>264.4</td>
<td>294.7</td>
<td>359.2</td>
<td>447.5</td>
<td>555.5</td>
<td>769.1</td>
<td>1,052.1</td>
<td>1,670.9</td>
<td>3,057.7</td>
<td>4,556.1</td>
</tr>
</tbody>
</table>

Source: Central Reserve Bank of Peru.
Table 6
Monetary Accounts of the Banking System
(millions of soles)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>I. Net International Reserves</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>A. Gold</strong></td>
<td>1,557.1</td>
<td>1,550.0</td>
<td>1,625.4</td>
<td>1,648.9</td>
<td>1,648.9</td>
<td>1,917.3</td>
<td>2,982.6</td>
<td>4,668.8</td>
<td>8,077.7</td>
<td>26,621.3</td>
<td>92,734.5</td>
</tr>
<tr>
<td><strong>B. Gold Subscription in the IMF</strong></td>
<td>1,190.0</td>
<td>1,190.0</td>
<td>1,320.0</td>
<td>1,435.6</td>
<td>1,435.6</td>
<td>1,669.3</td>
<td>2,596.7</td>
<td>4,080.5</td>
<td>6,235.2</td>
<td>17,256.3</td>
<td>49,825.2</td>
</tr>
<tr>
<td><strong>C. Other Foreign Exchange Assets</strong></td>
<td>16,434.2</td>
<td>16,733.8</td>
<td>17,298.5</td>
<td>19,022.4</td>
<td>34,312.7</td>
<td>17,467.0</td>
<td>20,164.6</td>
<td>41,545.5</td>
<td>98,236.0</td>
<td>420,679.8</td>
<td>699,825.4</td>
</tr>
<tr>
<td><strong>D. Liabilities</strong></td>
<td>2,804.7</td>
<td>4,046.4</td>
<td>4,838.2</td>
<td>6,216.4</td>
<td>10,597.5</td>
<td>15,842.0</td>
<td>78,366.0</td>
<td>171,409.8</td>
<td>307,299.0</td>
<td>326,070.4</td>
<td>421,229.6</td>
</tr>
<tr>
<td><strong>II. Other External Operations</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>A. Other Credits</strong></td>
<td>2,560.2</td>
<td>2,613.5</td>
<td>4,030.6</td>
<td>4,046.5</td>
<td>4,338.6</td>
<td>5,356.4</td>
<td>7,614.8</td>
<td>9,538.1</td>
<td>24,840.0</td>
<td>40,395.4</td>
<td>91,502.6</td>
</tr>
<tr>
<td><strong>B. Other Liabilities</strong></td>
<td>4,730.3</td>
<td>5,097.7</td>
<td>7,051.9</td>
<td>10,752.6</td>
<td>13,966.1</td>
<td>20,119.2</td>
<td>30,815.4</td>
<td>41,267.5</td>
<td>74,433.3</td>
<td>99,752.7</td>
<td>165,820.9</td>
</tr>
<tr>
<td><strong>III. Domestic Credit</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>A. Public Sector (net)</strong></td>
<td>40,410.4</td>
<td>52,171.3</td>
<td>62,816.5</td>
<td>81,422.4</td>
<td>92,925.8</td>
<td>130,551.3</td>
<td>237,017.5</td>
<td>248,822.2</td>
<td>562,892.0</td>
<td>552,816.2</td>
<td>890,304.1</td>
</tr>
<tr>
<td><strong>1. Credits</strong></td>
<td>27,739.8</td>
<td>33,817.7</td>
<td>41,391.0</td>
<td>58,843.9</td>
<td>78,456.4</td>
<td>113,590.8</td>
<td>179,601.5</td>
<td>247,928.2</td>
<td>402,592.3</td>
<td>412,265.2</td>
<td>543,822.3</td>
</tr>
<tr>
<td>a. Central Govt.</td>
<td>23,875.0</td>
<td>28,413.8</td>
<td>35,352.3</td>
<td>43,886.9</td>
<td>47,034.3</td>
<td>67,435.8</td>
<td>105,317.5</td>
<td>134,361.1</td>
<td>250,988.3</td>
<td>262,318.7</td>
<td>402,160.4</td>
</tr>
<tr>
<td>b. Public Sub-sector</td>
<td>3,575.1</td>
<td>4,342.9</td>
<td>4,987.0</td>
<td>10,413.0</td>
<td>27,616.5</td>
<td>15,884.8</td>
<td>90,154.0</td>
<td>235,039.0</td>
<td>176,473.0</td>
<td>182,763.0</td>
<td>140,297.7</td>
</tr>
<tr>
<td>c. Local Govt.</td>
<td>289.7</td>
<td>673.0</td>
<td>1,051.7</td>
<td>1,407.9</td>
<td>1,286.3</td>
<td>1,421.2</td>
<td>1,084.0</td>
<td>1,009.8</td>
<td>1,003.8</td>
<td>1,239.0</td>
<td>1,390.2</td>
</tr>
<tr>
<td><strong>2. Deposits</strong></td>
<td>18,593.1</td>
<td>18,394.9</td>
<td>24,352.4</td>
<td>31,617.4</td>
<td>51,525.4</td>
<td>61,366.2</td>
<td>74,726.3</td>
<td>87,130.6</td>
<td>121,259.2</td>
<td>203,160.7</td>
<td>197,612.7</td>
</tr>
<tr>
<td>a. Central Govt.</td>
<td>12,271.8</td>
<td>9,135.1</td>
<td>9,756.2</td>
<td>10,985.0</td>
<td>15,103.1</td>
<td>19,561.9</td>
<td>19,539.7</td>
<td>16,086.0</td>
<td>25,460.3</td>
<td>75,446.2</td>
<td>63,339.6</td>
</tr>
<tr>
<td>b. Public Sub-sector</td>
<td>6,042.3</td>
<td>9,050.9</td>
<td>14,214.7</td>
<td>20,322.6</td>
<td>35,031.2</td>
<td>41,423.8</td>
<td>57,587.6</td>
<td>65,247.7</td>
<td>95,161.4</td>
<td>146,272.5</td>
<td>111,305.1</td>
</tr>
<tr>
<td>c. Local Govt.</td>
<td>279.0</td>
<td>353.9</td>
<td>379.5</td>
<td>309.8</td>
<td>359.1</td>
<td>380.5</td>
<td>599.0</td>
<td>796.9</td>
<td>614.5</td>
<td>1,442.0</td>
<td>2,388.0</td>
</tr>
<tr>
<td><strong>B. Private Sector</strong></td>
<td>39,604.1</td>
<td>48,017.4</td>
<td>59,041.1</td>
<td>73,013.5</td>
<td>84,479.1</td>
<td>108,644.4</td>
<td>134,950.1</td>
<td>169,810.9</td>
<td>237,737.3</td>
<td>391,876.7</td>
<td>765,860.4</td>
</tr>
<tr>
<td><strong>C. DOM and Other</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>D. COFIDE</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>E. Interbank Operations</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>F. Capital, Reserves, and Provisions</strong></td>
<td>13,283.4</td>
<td>15,207.8</td>
<td>16,495.2</td>
<td>19,825.3</td>
<td>24,226.3</td>
<td>29,698.2</td>
<td>38,723.0</td>
<td>53,852.5</td>
<td>86,283.0</td>
<td>166,289.8</td>
<td>261,851.0</td>
</tr>
<tr>
<td><strong>1. Capital</strong></td>
<td>6,313.3</td>
<td>7,310.3</td>
<td>7,520.9</td>
<td>8,569.8</td>
<td>9,376.8</td>
<td>10,851.5</td>
<td>13,857.3</td>
<td>17,226.9</td>
<td>24,535.5</td>
<td>40,595.5</td>
<td>76,038.4</td>
</tr>
<tr>
<td>a. Official</td>
<td>4,558.8</td>
<td>4,972.3</td>
<td>5,284.3</td>
<td>6,415.2</td>
<td>7,157.6</td>
<td>8,568.0</td>
<td>11,256.9</td>
<td>13,443.6</td>
<td>19,826.4</td>
<td>32,362.2</td>
<td>59,646.8</td>
</tr>
<tr>
<td>b. Private</td>
<td>1,754.5</td>
<td>2,398.0</td>
<td>2,536.6</td>
<td>2,145.4</td>
<td>2,919.2</td>
<td>2,393.5</td>
<td>2,500.4</td>
<td>3,703.3</td>
<td>4,091.1</td>
<td>8,293.3</td>
<td>10,391.6</td>
</tr>
</tbody>
</table>
### Table 6 (continued)

Monetary Accounts of the Banking System  
(millions of soles)

<table>
<thead>
<tr>
<th></th>
<th>38.70</th>
<th>38.70</th>
<th>38.70</th>
<th>38.70</th>
<th>38.70</th>
<th>38.70</th>
<th>38.70</th>
<th>38.70</th>
<th>38.70</th>
<th>38.70</th>
<th>38.70</th>
<th>38.70</th>
<th>38.70</th>
<th>38.70</th>
<th>38.70</th>
<th>38.70</th>
<th>38.70</th>
<th>38.70</th>
<th>38.70</th>
<th>38.70</th>
<th>38.70</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Reserves</td>
<td>1,143.4</td>
<td>1,722.4</td>
<td>1,890.8</td>
<td>2,468.6</td>
<td>2,981.5</td>
<td>2,916.7</td>
<td>4,316.7</td>
<td>6,783.4</td>
<td>8,197.8</td>
<td>70,293.7</td>
<td>63,078.4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Provisions</td>
<td>4,873.3</td>
<td>5,396.3</td>
<td>5,765.7</td>
<td>7,108.2</td>
<td>8,868.0</td>
<td>11,831.3</td>
<td>17,647.7</td>
<td>23,259.8</td>
<td>35,687.5</td>
<td>64,193.7</td>
<td>94,659.3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Results</td>
<td>953.7</td>
<td>878.7</td>
<td>1,217.8</td>
<td>1,698.7</td>
<td>3,000.0</td>
<td>4,098.7</td>
<td>2,901.8</td>
<td>6,582.4</td>
<td>16,862.2</td>
<td>31,206.9</td>
<td>28,076.9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G. Other Assets and Liabilities</td>
<td>5,107.0</td>
<td>6,298.9</td>
<td>3,336.0</td>
<td>273.7</td>
<td>3,762.1</td>
<td>2,767.3</td>
<td>10,609.7</td>
<td>15,208.8</td>
<td>6,103.3</td>
<td>-17,671.5</td>
<td>-75,608.4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Exchanges</td>
<td>1,323.0</td>
<td>1,562.7</td>
<td>1,593.2</td>
<td>2,077.6</td>
<td>4,322.4</td>
<td>4,391.7</td>
<td>4,602.3</td>
<td>7,799.0</td>
<td>10,570.9</td>
<td>21,035.0</td>
<td>54,988.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Real Investments</td>
<td>1,928.9</td>
<td>2,954.1</td>
<td>3,087.7</td>
<td>3,465.0</td>
<td>3,733.8</td>
<td>5,291.9</td>
<td>7,379.3</td>
<td>12,265.0</td>
<td>20,432.4</td>
<td>47,161.4</td>
<td>87,844.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Other</td>
<td>1,653.1</td>
<td>-217.9</td>
<td>-1,346.9</td>
<td>-4,784.9</td>
<td>-2,314.1</td>
<td>-2,216.3</td>
<td>-1,390.5</td>
<td>-4,855.2</td>
<td>-26,900.0</td>
<td>-85,868.7</td>
<td>-218,480.8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H. Credito Cambiario</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Adjustment for Appraisal Increase</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>5,778.5</td>
<td>36,499.8</td>
<td>106,528.1</td>
<td>110,931.6</td>
<td>88,569.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I+II+III = IV</td>
<td>54,816.9</td>
<td>63,115.8</td>
<td>75,274.9</td>
<td>90,356.8</td>
<td>110,298.1</td>
<td>129,803.7</td>
<td>151,194.8</td>
<td>195,866.8</td>
<td>318,639.1</td>
<td>640,965.9</td>
<td>1,237,141.3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IV. Money Supply</td>
<td>54,816.9</td>
<td>63,115.8</td>
<td>75,274.9</td>
<td>90,356.8</td>
<td>110,298.1</td>
<td>129,803.7</td>
<td>151,194.8</td>
<td>195,866.8</td>
<td>318,639.1</td>
<td>640,965.9</td>
<td>1,237,141.3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A. Money</td>
<td>42,505.3</td>
<td>56,381.9</td>
<td>64,253.9</td>
<td>73,058.3</td>
<td>67,395.0</td>
<td>75,868.9</td>
<td>98,080.0</td>
<td>121,015.2</td>
<td>137,050.3</td>
<td>131,227.4</td>
<td>368,184.9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Rates and Coin in Circulation</td>
<td>16,251.7</td>
<td>18,944.1</td>
<td>21,946.8</td>
<td>27,212.4</td>
<td>33,477.8</td>
<td>42,603.4</td>
<td>49,505.0</td>
<td>60,795.0</td>
<td>90,972.5</td>
<td>162,004.7</td>
<td>273,393.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Demand Deposits in Domestic Currency</td>
<td>16,653.6</td>
<td>17,437.8</td>
<td>21,998.7</td>
<td>25,882.9</td>
<td>33,917.2</td>
<td>37,244.9</td>
<td>47,414.5</td>
<td>60,220.2</td>
<td>86,078.0</td>
<td>154,222.7</td>
<td>274,791.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B. Quasi money</td>
<td>20,569.2</td>
<td>25,006.2</td>
<td>29,188.7</td>
<td>36,410.2</td>
<td>39,616.9</td>
<td>46,419.6</td>
<td>50,590.6</td>
<td>71,149.1</td>
<td>137,980.5</td>
<td>234,718.5</td>
<td>688,957.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Time Deposits in Domestic Currency</td>
<td>5,787.3</td>
<td>7,293.5</td>
<td>7,392.3</td>
<td>8,642.6</td>
<td>9,098.0</td>
<td>9,573.8</td>
<td>9,964.8</td>
<td>16,626.3</td>
<td>24,326.5</td>
<td>39,472.2</td>
<td>60,767.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Savings Accounts</td>
<td>7,953.8</td>
<td>8,905.7</td>
<td>9,966.8</td>
<td>11,296.5</td>
<td>12,777.7</td>
<td>14,960.6</td>
<td>17,096.3</td>
<td>21,609.8</td>
<td>30,265.5</td>
<td>67,048.2</td>
<td>137,804.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Foreign Exchange Deposits</td>
<td>425.3</td>
<td>225.9</td>
<td>259.3</td>
<td>375.3</td>
<td>792.6</td>
<td>553.0</td>
<td>1,450.4</td>
<td>6,193.5</td>
<td>49,005.0</td>
<td>144,552.3</td>
<td>365,306.9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Foreign Exchange Certificates</td>
<td>147.8</td>
<td>125.6</td>
<td>110.8</td>
<td>1.5</td>
<td>34.9</td>
<td>117.6</td>
<td>0.9</td>
<td>52.9</td>
<td>233.3</td>
<td>5,262.7</td>
<td>8,450.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Mortgage Certificates</td>
<td>5,052.4</td>
<td>7,120.3</td>
<td>9,526.7</td>
<td>12,089.3</td>
<td>14,606.8</td>
<td>18,235.1</td>
<td>19,733.0</td>
<td>23,821.4</td>
<td>30,740.9</td>
<td>59,128.3</td>
<td>107,088.8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Other Values</td>
<td>1,182.4</td>
<td>1,333.2</td>
<td>1,738.8</td>
<td>2,005.0</td>
<td>2,306.9</td>
<td>2,977.5</td>
<td>2,345.2</td>
<td>3,045.2</td>
<td>3,409.2</td>
<td>3,733.0</td>
<td>6,084.8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C. Other Mortgage Certificates</td>
<td>1,362.4</td>
<td>1,727.7</td>
<td>2,140.7</td>
<td>2,851.3</td>
<td>3,286.2</td>
<td>3,535.8</td>
<td>3,684.2</td>
<td>3,802.5</td>
<td>3,608.1</td>
<td>3,521.8</td>
<td>3,455.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**SOURCE:** Central Reserve Bank of Peru.
### Table 7

**Balance of Payments**

(millions of US Dollars)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>I. Goods and Services</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exports FOB</td>
<td>1,034.2</td>
<td>889.4</td>
<td>945.0</td>
<td>1,111.8</td>
<td>1,503.3</td>
<td>1,290.9</td>
<td>1,359.5</td>
<td>1,725.6</td>
<td>1,940.7</td>
<td>3,490.9</td>
<td>3,898.3</td>
</tr>
<tr>
<td>Imports FOB</td>
<td>-699.6</td>
<td>-730.0</td>
<td>-812.0</td>
<td>-1,033.0</td>
<td>-1,908.9</td>
<td>-2,390.2</td>
<td>-2,100.0</td>
<td>-2,164.0</td>
<td>-1,600.5</td>
<td>-1,951.3</td>
<td>-3,061.7</td>
</tr>
<tr>
<td>A. Trade Balance</td>
<td>344.6</td>
<td>159.4</td>
<td>133.0</td>
<td>78.8</td>
<td>-405.6</td>
<td>-1,099.3</td>
<td>-740.5</td>
<td>-438.4</td>
<td>340.2</td>
<td>1,539.6</td>
<td>836.6</td>
</tr>
<tr>
<td>Freight</td>
<td>38.6</td>
<td>37.3</td>
<td>37.6</td>
<td>35.2</td>
<td>59.2</td>
<td>-102.5</td>
<td>-60.7</td>
<td>-56.4</td>
<td>-6.7</td>
<td>3.9</td>
<td>-50.5</td>
</tr>
<tr>
<td>Insurance</td>
<td>-14.3</td>
<td>-15.6</td>
<td>-17.6</td>
<td>-12.6</td>
<td>-1.1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Investment Income</td>
<td>-148.5</td>
<td>-125.4</td>
<td>-120.9</td>
<td>-180.9</td>
<td>-218.5</td>
<td>-240.3</td>
<td>-366.4</td>
<td>-426.4</td>
<td>-577.7</td>
<td>-966.5</td>
<td>-834.7</td>
</tr>
<tr>
<td>(Public)</td>
<td>(-31.4)</td>
<td>(-47.7)</td>
<td>(-50.6)</td>
<td>(-65.6)</td>
<td>(-104.4)</td>
<td>(-193.4)</td>
<td>(-275.4)</td>
<td>(-299.6)</td>
<td>(-420.2)</td>
<td>(-683.7)</td>
<td>(-478.2)</td>
</tr>
<tr>
<td>(Private)</td>
<td>(-117.1)</td>
<td>(-77.7)</td>
<td>(-70.3)</td>
<td>(-115.3)</td>
<td>(-114.1)</td>
<td>(-46.9)</td>
<td>(-91.0)</td>
<td>(-126.8)</td>
<td>(-157.5)</td>
<td>(-882.8)</td>
<td>(-356.5)</td>
</tr>
<tr>
<td>Government</td>
<td>-15.0</td>
<td>14.0</td>
<td>13.4</td>
<td>14.2</td>
<td>-14.2</td>
<td>16.5</td>
<td>-12.2</td>
<td>-23.4</td>
<td>22.0</td>
<td>-25.6</td>
<td>-27.5</td>
</tr>
<tr>
<td>Other Transportation</td>
<td>-2.1</td>
<td>31.9</td>
<td>42.2</td>
<td>56.1</td>
<td>-112.2</td>
<td>-94.3</td>
<td>-93.4</td>
<td>-88.4</td>
<td>-76.0</td>
<td>-76.1</td>
<td>-99.2</td>
</tr>
<tr>
<td>Travel</td>
<td>-9.7</td>
<td>8.4</td>
<td>15.8</td>
<td>15.0</td>
<td>18.5</td>
<td>8.0</td>
<td>44.7</td>
<td>75.6</td>
<td>107.8</td>
<td>143.6</td>
<td>185.3</td>
</tr>
<tr>
<td>Other Services</td>
<td>-3.2</td>
<td>16.9</td>
<td>12.0</td>
<td>28.6</td>
<td>60.0</td>
<td>42.9</td>
<td>21.3</td>
<td>25.6</td>
<td>-13.4</td>
<td>-14.0</td>
<td>-81.9</td>
</tr>
<tr>
<td><strong>II. Service Balance</strong></td>
<td>-231.4</td>
<td>-232.7</td>
<td>-203.9</td>
<td>-312.6</td>
<td>-446.7</td>
<td>-488.5</td>
<td>-509.3</td>
<td>-544.6</td>
<td>-568.0</td>
<td>-932.7</td>
<td>-908.5</td>
</tr>
<tr>
<td><strong>C. Transfer Payments</strong></td>
<td>81.6</td>
<td>39.4</td>
<td>39.2</td>
<td>42.2</td>
<td>45.1</td>
<td>49.4</td>
<td>57.8</td>
<td>56.8</td>
<td>56.0</td>
<td>122.0</td>
<td>134.3</td>
</tr>
<tr>
<td><strong>D. Balance on Current Accnt</strong></td>
<td>184.8</td>
<td>-33.9</td>
<td>-31.7</td>
<td>-191.6</td>
<td>-807.2</td>
<td>-1,538.4</td>
<td>-1,192.0</td>
<td>-926.2</td>
<td>-191.8</td>
<td>728.9</td>
<td>62.4</td>
</tr>
</tbody>
</table>

**SOURCE:** Central Reserve Bank of Peru.
VII.

BIBLIOGRAPHY
BIBLIOGRAPHY


**COMPUTER PROGRAMS:**


**STATISTICS**

1. Banco Central De Reserva Del Peru: Memorias and Boletines.
2. Instituto National De Estadistica: Boletines.