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The Monetary Approach to the Balance of Pay - ments: A Case Study of Nepal (1964-1983)

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INTRODUCTION

In a developing country like Nepal, the balance of payments plays a vital role in its development. The increasing demand for foreign assets for its developmental plan is one of the main problems of Nepal. To solve this mounting problem, it is necessary to study the balance of payments.

To study the balance of payments, there are basically three approaches; namely the elasticity, the absorption and the monetary approach. All three approaches, properly applied to study balance of payments, can be used to find the right answer to the problem. The three approaches have advantages and disadvantages. The elasticity and absorption approaches study one of the main components of balance of payments (i.e. current account), so they provide the main source of the problem but fail to include the capital account. The monetary approach studies the monetary authorities' account but does not explain the source of the problem.

Although the monetary approach cannot explain where the deficit or the surplus in the balance of payments is coming from, the application of this approach is increasing over time. There are several reasons for this. Theoretically, the balance of payments has been argued to have monetary phenomena by Johnson, Mussa and Mundell. Empirically, Guitian, studying the Spanish balance of payments, Zecher studying the Australian balance of payments, Khan studying the balance of payments of ten underdeveloped countries and Aghevli and Khan, studying the balance of payments of 39 underdeveloped countries, found that the balance of payments behaves in conformity with the theoretical proposition of the monetary theory. Genberg and Bean studied Swedish and Japanese balance of payments, respectively, and concluded that the monetary model of the balance of payments has a high predictive power and its policy variable is a useful tool to influence balance of payments. The other reason behind using the monetary approach is the lack of sufficient data to use the elasticity and absorption approaches. This is especially true in underdeveloped countries.

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The monetary approach seems to be a better tool to study balance of payments, but one cannot completely rely on it. One has to test the monetary approach before using it for developing plans and implementing policies. There is a fundamental difference between the Monetarists and the Keynesians in connection with the effect of the macro variables in the balance of payments. According to the Keynesians, an increase in income and a decrease in domestic credit creation have a negative effect on the balance of payments, whereas, from the Monetarists' point of view, an increase in income and a decrease in domestic credit creation have a positive effect on the balance of payments. In connection to policy, Keynesians rely on changing domestic prices, whereas to the Monetarists, credit creation (or destruction) is the only effective policy variable.

Taking the Monetarists' and Keynesians' points of view into consideration, the objective of this paper is to test the applicability of the monetary approach to the balance of payments in Nepal. The test will be performed assuming the fixed and flexible exchange rate systems of Nepalese currency.

To achieve the objective, the plan of the paper is as follows: Following the introductory part, in the second part the definition of the variables, the source of the data and the coverage of the study are given. In the third part, the model is presented. In the fourth part, the results are presented, and in the fifth and final part, the conclusion is put forward.

DEFINITION OF THE VARIABLES, SOURCES OF THE DATA AND COVERAGE OF THE STUDY

Definition of the Variables

M1 = Narrow definition of money, i.e. currency plus demand deposits.

M2 = M1 + time deposits.

H = High powered money (i.e. currency held by the private sector, currency held by commercial banks and deposits of the private sectors and commercial banks at the central bank).

R = Net foreign assets of the monetary authority (i.e. Foreign assets - Foreign liabilities).

D = Net domestic credit creation (i.e. D = H-R).

m1 = $\frac{M1}{H}$ = money multiplier for M1 definition of money.

m2 = $\frac{M2}{H}$ = money multiplier for M2 definition of money.

Y = Domestic income, proxied by G.D.P. of Nepal at 1964 prices (i.e. real prices).

All the variables defined up to now are taken at mid-July of the year.

I = Bank interest rate of saving and time deposits in Nepal.

P = Consumer price index of Nepal (Base year = 1964).

IP = Wholesale price index of India (Base year = 1964).

X = Exchange rate (Indian currency in terms of Nepali currency).

These variables are taken at the end of the year.

A dot over a variable signifies the change in that variable over time. A dot over a variable divided by the variable itself is the growth rate of that variable.

$\frac{\dot{R}}{H}$ = change in net foreign assets of the monetary authority divided by high powered money.

$\frac{\dot{D}}{H}$ = change in the net credit creation of the monetary authority divided by high powered money.

$\dot{R}$ = the change in net foreign assets of the monetary authority, defined as overall balance of payments.

Sources of the Data

G.D.P. of Nepal, Indian wholesale price Index and Nepali consumer price index are collected from "International Financial Statistics", I.M.F. December 1985. The rest of the data are collected from "Quarterly Economic Bulletin" Nepal Rastra Bank, mid-July, 1983.

Coverage of the Study

The study period covered in this paper is 1964 to 1983.

THE MODEL AND THE ASSUMPTION OF THE PAPER

The small country monetary model of Johnson, with minor changes and most of the changes are adopted from Aghevli and Khan will be used in this paper. The assumptions of the model are: (a) The country is small and diversified, (b) There is monetary equilibrium in the country, (c) It maintains a fixed and flexible exchange rate and is growing over time. Along with these assumptions, this paper assumes India as the rest of the world to Nepal. Even though this is a limiting assumption for Nepal, India fulfills most of the criterion of the model. This assumption can be supported by Dr. Fry's statement "... Nepalese economy is closely tied to India that inflation in Nepal, is solely a result of inflation in India. No room exists for independent policy in Nepal." Under these assumptions, the hypothesis of the study is that disequilibrium in any market of Nepal will be fully reflected in the balance of payments.

The demand for money: With the assumption of the standard homogeneity postulate of monetary theory, the demand for nominal money is a function of income and interest rate,

i.e. $Md = Pf\ (Y,I)$ ..... (1)

where Md is the nominal demand for money.

The supply of money: The supply of money is defined as the product of high powered money and the money multiplier,

i.e. $Ms = mH$ ..... (2)

where Ms = supply of money.

or $Ms = m\ (R + D)$ ..... (3)

Converting (1) in growth rate terms (1) will be

$$\frac{\dot{Md}}{Md} = \frac{\dot{P}}{P} + n_y \frac{\dot{Y}}{Y} + n_i \frac{\dot{I}}{I} \quad \text{..... (4)}$$

where n is the elasticity of the corresponding variables.

The money supply identity in growth rate terms will be

$$\frac{\dot{Ms}}{Ms} = \frac{\dot{m}}{m} + \frac{\dot{R}}{R} + \frac{\dot{D}}{D} \quad \text{..... (5)}$$

By assumption, Ms = Md so they are interchangeable. Therefore (5) can be written as

$$\frac{\dot{R}}{R} = \frac{H}{R}\left[\frac{\dot{P}}{P} + n_y \frac{\dot{Y}}{Y} + n_i \frac{\dot{I}}{I} - \frac{\dot{m}}{m}\right] - \frac{\dot{D}}{R} \quad \text{..... (6)}$$

This is the basic equation of the model, showing the relationship of the monetary approach to the balance of payments. Equation (6) can be converted in the following form to estimate and test the monetary implication of the balance of payments

$$\frac{\dot{R}}{H} = \frac{\dot{P}}{P} + n_y \frac{\dot{Y}}{Y} + n_i \frac{\dot{I}}{I} - \frac{\dot{m}}{m} - \frac{\dot{D}}{H} \quad \text{..... (7)}$$

or $$\frac{\dot{R}}{H} = \alpha + \alpha_1 \frac{\dot{P}}{P} + \alpha_2 \frac{\dot{Y}}{Y} + \alpha_3 \frac{\dot{I}}{I} + \alpha_4 \frac{\dot{m}}{m} + \alpha_5 \frac{\dot{D}}{H} + u \quad \text{..... (8)}$$

Where u is the random error term. The expected signs and magnitude of the coefficients are as follows:

α, a +ve number, α_1 and α_2, +ve fractions tending to one, α_3, a -ve fractions, α_4 and α_5, -ve fractions tending to -1.

In between 1964 to 1983, Nepal changed its exchange rate five times, so the validity of the assumption of fixed exchange rate is not that reasonable. To make the study more reasonable, it is assumed that Nepal maintains an adjustable flexible exchange rate. To include the exchange rate, the following relation is used (the derivation of the relation is given in the Appendix).

$$\frac{\dot{P}}{P} = \delta_3 g + \delta_1 \frac{\dot{IP}}{IP} + \delta_2 \frac{\dot{X}}{X} \quad \ldots\ldots\ldots (9)$$

Substituting the value of $\frac{\dot{P}}{P}$ in (8) we get

$$\frac{\dot{R}}{H} = \alpha + \alpha_1 \left(\delta_3 g + \delta_1 \frac{\dot{IP}}{IP} + \delta_2 \frac{\dot{X}}{X}\right) + \alpha_2 \frac{\dot{Y}}{Y} + \alpha_3 \frac{\dot{I}}{I} + \alpha_4 \frac{\dot{m}}{m} + \alpha_5 \frac{\dot{D}}{H} + u \quad \ldots\ldots (10)$$

If $\alpha + \alpha_1 \delta_3 g = \alpha_1'$, $\alpha_1 \delta_1 = \alpha_1''$ and $\alpha_1 \delta_2 = \alpha_1'''$

Then

$$\frac{\dot{R}}{H} = \alpha_1' + \alpha_1'' \frac{\dot{IP}}{IP} + \alpha_1''' \frac{\dot{X}}{X} + \alpha_2 \frac{\dot{Y}}{Y} + \alpha_3 \frac{\dot{I}}{I} + \alpha_4 \frac{\dot{m}}{m} + \alpha_5 \frac{\dot{D}}{H} + u \quad \ldots\ldots\ldots (11)$$

The expected sign of $\frac{\dot{X}}{X}$ (exchange rate) is positive. Model (11) is the estimating model. Model (8) and (11) can be, and will be estimated for M_1 and M_2 definition of money.

RESULTS

Using the ordinary least squares method, two groups of two equations are estimated. The first group (A) of two equations are estimated under the assumption of fixed exchange rate and the second group (B) of two equations are estimated under the assumption of flexible exchange rate and considering India as the rest of the world to Nepal. In each group, the first equation is estimated for M1 definition of money and the second equation is estimated for M2 definition of money.

No. of observations for all the equations = 19.

GROUP A

$$(1) \quad \hat{\frac{\dot{R}}{H}} = \underset{}{0.070} + \underset{(2.92)}{0.510} \frac{\dot{P}}{P} + \underset{(1.98)}{0.338} \frac{\dot{Y}}{Y} - \underset{(0.78)}{0.006} \frac{\dot{I}}{I} - \underset{(0.11)}{0.529} \frac{\dot{m1}}{m1} - \underset{(1.47)}{1.067} \frac{\dot{D}}{H}$$
$$(14.87)$$

$F = 56.00$, $R^2 = 0.96$, $\bar{R}^2 = 0.94$, D.W. Statistics = 1.7

$$(2)\quad \hat{\frac{\dot{R}}{H}} = \underset{(5.59)}{0.110} + \underset{(1.56)}{0.291}\,\frac{\dot{P}}{P} + \underset{(1.47)}{0.442}\,\frac{\dot{Y}}{Y} - \underset{(o.29)}{0.011}\,\frac{\dot{I}}{I} - \underset{(4.31)}{0.859}\,\frac{\dot{m}2}{m2} - \underset{(22.02)}{1.083}\,\frac{\dot{D}}{H}$$

$F = 121.52,\ R^2 = 0.98,\ \bar{R}^2 = 0.97,$ D.W. Statistics = 1.26

GROUP B

$$(1)\quad \hat{\frac{\dot{R}}{H}} = \underset{(3.46)}{0.075} + \underset{(2.36)}{0.383}\,\frac{\dot{IP}}{IP} - \underset{(0.50)}{0.068}\,\frac{\dot{X}}{X} + \underset{(1.45)}{0.604}\,\frac{\dot{Y}}{Y} - \underset{(1.12)}{0.061}\,\frac{\dot{I}}{I} - \underset{(2.96)}{0.997}\,\frac{\dot{m}1}{m1} - \underset{(13.38)}{1.073}\,\frac{\dot{D}}{H}$$

$F = 51.01,\ R^2 = 0.96,\ \bar{R}^2 = 0.94,$ D.W. Statistics = 1.28

$$(2)\quad \hat{\frac{\dot{R}}{H}} = \underset{(6.53}{0.121} + \underset{(1.12)}{0.140}\,\frac{\dot{IP}}{IP} - \underset{(0.06)}{0.006}\,\frac{\dot{X}}{X} + \underset{(2.01)}{0.645}\,\frac{\dot{Y}}{Y} - \underset{(0.235)}{0.010}\,\frac{\dot{I}}{I} - \underset{(4.75)}{0.944}\,\frac{\dot{m}2}{m2} - \underset{(17.36)}{1.064}\,\frac{\dot{D}}{H}$$

$F = 86.91,\ R^2 = 0.98,\ \bar{R}^2 = 0.97,$ D.W. Statistics = 1.31

Note: Numbers in the parentheses are t-ratios.

Overall, the fitness of the models is good; the F-values of all the estimated equations are significant at one percent significance level. The R^2 is not less than .95, so more than 95 percent of the variation in the dependent variable is explained by the independent variables. In each group, the model with M2 definition of money fits better than the M1 definition of money. This may be the result of not having sufficient investment opportunities in the economy. In comparison to the estimated equations in Group B, the estimated equations in Group A are slightly better in terms of fitness of the equations, for both the M1 and M2 definitions of money. In all the estimated equations $\frac{\dot{I}}{I}$ is insignificant. This may be due to the undeveloped money market of the country. That is, the bank interest rate may not be the real opportunity cost of money in Nepal.

In Group A all the variables have right signs. $\frac{\dot{P}}{P}$ is significant at 5 and 10 percent level of significance in M1 and M2 definition of money, respectively. But the coefficients are lower than expected. The interpretation of this result would be, the increase in $\frac{\dot{P}}{P}$ significantly increase $\frac{\dot{R}}{H}$ but less than that suggested by the theory. Alternatively it can be said that the demand for money is not homogeneous of degree one. The $\frac{\dot{Y}}{Y}$ is insignificant for M1 definition of money and significant at 10 percent level of significance for M2 definition of money. Money multiplier is highly significant in M2 definition of money whereas it is significant only at 10 percent level of significance in M1 definition of money. These results reflect the real economic condition of Nepal. It clearly gives the message that the Nepalese people are divided into two groups, the haves and havesnot.

The rich people who have surplus income keep their surplus income in the form of time deposits due to the lack of sufficient investment opportunities in the country. The expenditure activities of these people determine the velocity of money. If these people dishoard their money, it significantly reduces the overall balance of payments. With the help of this result we can say one percent increase in $\frac{\dot{m}2}{m2}$ will reduce $\frac{\dot{R}}{H}$ by.85 percent. The level of significance of $\frac{\dot{m}1}{m1}$ is not high but it is still significant at 10 percent. So we can say one percent increase $\frac{\dot{m}1}{m1}$ decreases $\frac{\dot{R}}{H}$ by .5 percent. In a country where, except for agricultural products, almost everything is imported from the rest of the world (mostly from India) the adverse effect of money multipliers in $\frac{\dot{R}}{H}$ seems reasonable. The $\frac{\dot{D}}{D}$ in both the equations are highly significant and the coefficients are close to minus one. This result signifies that the domestic credit creation (or destruction) has a nearly equal and opposite effect on $\frac{\dot{R}}{H}$.

The basic objective of estimating the equations of Group B is to see whether the occasional change in the exchange rate has a significant effect or not on the overall balance of payments. The result shows that the change in the exchange rate has no significant effect on overall balance of payments. Even though to interpret an insignificant explanatory variable is statistically meaningless, it is worth mentioning the wrong sign of the variable. In both the M1 and M2 definition of money the $\frac{\dot{X}}{X}$ yields -ve sign. The -ve sign of the $\frac{\dot{X}}{X}$ may be indicating the highly inelastic Nepalese demand for goods and services. Considering the 160 U. S. dollar per capita G.D.P. of the country the possibility of having inverse relationship between exchange rate and overall balance of payments is very high. That is to say devaluation as a policy variable to increase overall balance of payments can back fire the Nepalese balance of payments. In this group, the other different result other than Group A is the significance of the Indian wholesale price index in M1 definition of money. This result suggests that one percent increase in Indian wholesale price increases .38 percent overall balance of payments of Nepal.

With the help of a correlation matrix of the independent variables we can say there is no serious multicollinearity problem. The Durbin-Watson statistics of all the estimated equations are in the inconclusive region. To see whether there is a serious problem of autocorrelation or not, Cochrance-Orcutt's iterative process of correcting autocorrelation is used upto 3rd order. The results do not change significantly, so it seems there is no serious autocorrelation problem. The graphical methods, used to see the heteroscedasticity problem, suggest that there is no serious heteroscedasticity problem. Therefore, the estimated equations are considered to be reasonably efficient.

CONCLUSION

With the help of the fitting of the models and the explanatory power of the independent variables in the estimated equations, we can conclude that to study the balance of payments in Nepal, the monetary approach can be used. All the results of the estimated equations are in conformity with the monetary approach to the balance of payments. The byproduct of this study is the identification of the policy variable. The results show that the domestic credit creation can be used effectively to influence surplus or deficit in the balance of payments. The results also show that the increase in income (i.e. positive growth rate of the economy) increases the overall balance of payments. The use of the exchange rate as a policy variable will not help to correct the balance of payments problem. Finally, the result shows both the models with M1 and M2 definition of money are equally good to study balance of payments in Nepal. The choice of the model depends upon the nature of the problem under study.

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APPENDIX

The derivation of the relationship between Nepali currency and Indian currency.

IP = Indian price level.

PN = Price of non traded goods.

WN & WT = Share of non traded and traded goods in G.D.P. respectively.

X = Exchange rate (Indian rupee per Nepali rupee).

P = Domestic price level.

Then, $P = (IP\ X)\ WT + PN\ WN$

If WT & WN are assumed fixed then:

$$\dot{P} = WTXIP + WTIP\dot{X} + \dot{P}NWN$$

or $$\frac{\dot{P}}{P} = \frac{(WTXIP)}{P}\frac{\dot{IP}}{IP} + \frac{(WTIPX)}{P}\frac{\dot{X}}{X} + \frac{(WNPN)}{P}\frac{\dot{PN}}{PN}$$

or $$\frac{\dot{P}}{P} = \delta_1 \frac{\dot{IP}}{IP} + \delta_2 \frac{\dot{X}}{X} + \delta_3 \frac{\dot{PN}}{PN}$$

where, $\delta_1 + \delta_2 + \delta_3 = 1$

Assuming $\frac{\dot{PN}}{PN}$ = a constant say(g), then,

$$\frac{\dot{P}}{P} = \delta_3 g + \delta_1 \frac{\dot{IP}}{IP} + \delta_2 \frac{\dot{X}}{X}$$