THE RELATIONSHIP BETWEEN THE REAL AND
THE MONETARY SECTORS: A CASE STUDY
OF THE ECONOMETRIC MODEL FOR PAKISTAN

by

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The question of the effect of changes in money supply on the real sector of the economy is rather controversial. Contrary to the Keynesian argument that money is more or less neutral to the real variables of the economy, the monetarists believe that money has a significant effect on employment, income, investment, etc. This controversy continues both at the theoretical and the empirical levels. In this paper, an attempt is made to analyse the role of the monetary policy within the institutional setting of Pakistan.

In Pakistan the research on the problems of monetary theory has been confined primarily to money demand. There are a few exceptions like Porter [18], Imam [7] and Masih [13] which have attempted to analyse the impact of money on the real variables within a macro-context. Porter's study [18] is interesting and comprehensive in the sense that it is a survey of the portfolio behaviour of scheduled banks in Pakistan. However, no attempt has been made in the study to establish formal empirical relationships between different monetary variables e.g. excess reserves, commercial banks borrowings, money supply etc. Moreover, the study is oriented more towards the supply side of money market. Masih [13] has estimated an econometric model consisting of eight behavioural relations and four identities to analyse the role of financial institutions in financing private investment in Pakistan. He concluded that the rate of interest on time deposits affects private investment significantly. Even though Masih's model has dealt with the

money market and its linkages with the real sector, it can
hardly be classified as a comprehensive model of Pakistan's
monetary sector primarily because it is confined to the credit
side of the money market only. Moreover, only the effect of
money supply on private investment has been explored. Imam [7]
in 1970 estimated an econometric model comprising of ten iden-
tities and twelve behavioural equations for Pakistan's money
market with the aim of analysing the effect of various policy
changes. The model, however, suffers from a high degree of
aggregation.

Moreover, the three studies mentioned above cover the
time period up to 1969-70 only. As such their empirical rele-
vance is questionable because of the significant structural
changes in the economy that occured since this time. Secondly,
the studies concentrate on just one aspect of the money market
which greatly limits their utility for an overall analysis of
the market. To overcome these drawbacks a complete model of
the money market is presented in this study with the aim of
analysing the impact of changes in the money supply on the real
variables.

The methodological framework of this study is drawn
primarily from Mammen's [12] study on the Indian Money Market.
However, a number of modifications have been introduced to
incorporate specific features of Pakistan's economy which have
led to marked changes in the final specification of the model.
Mammen has linked the real and monetary sectors through the

price equation under the hypothesis that money is the sole determinant of the changes in prices. This, however, may not be true especially in cases when markets are not only distorted but also underdeveloped. To overcome this problem, the monetary and the real sectors are linked in this study through credit to the private sector and the commercial banks loan rate which affects investment.

The plan of the paper is as follows: The specification of the model is presented in Section I. The availability of data is discussed in Section II. The estimates of the model are reported in Section III. The policy implications are highlighted in Section IV and Section V concludes the paper.

I. SPECIFICATION OF THE MODEL

The model consists of nineteen behavioural relations. There are fifty-nine variables of which thirty are endogenous and twenty-nine are pre-determined. The first seven equations of the model relate to the real sector and the last twelve relate to the monetary sector. The two sectors are linked through loans and investment of commercial banks, specialized credit institutions of the private sector and the commercial bank loan rate. All the variables are at constant prices in the real sector, and are in nominal terms in the monetary sector of the model.

The aggregate private consumption depends on the disposable income. However, since it is generally argued that foreign

capital inflow has a significant impact on the consumption, it
is also included in the set of explanatory variables. Assuming
a partial adjustment in the private consumption expenditure,
lagged private consumption is also included in this set. A
dummy variable which assumes a value of one for the years from
1971-72 onwards has been introduced to incorporate the effect
of any possible change.

The total investment in the economy has been estimated
by specifying private investment and public investment functions
separately. While private investment depends on the profitabi-
lity of investable funds, public investment depends on political
considerations and sometimes on considerations to supplement
private investment. Private investment also depends on the
changes in the gross domestic product, inflow of foreign capital,
commercial bank loan rate, loans and investment of commercial
banks and specialized credit institutions to the private sector
deflated by investment price index. While all these factors
have been incorporated in specifying the function for private
investment, a dummy variable has also been introduced to account
for structural change. The increase in the GNP is included in
the specification to reflect the working of the acceleration
principle. Foreign capital inflow by easing the resource con-
straint leads to an increase in the investment while the
commercial bank loan rate reflects the opportunity cost of capi-
tal. Following Mammen's [12] methodology, it has been hypothe-
sised that public investment is influenced by the long term

objectives of planning and as such is related to the difference between the realized and the targeted income....

In this study separate functions for the excise duties, custom duties and the direct taxes have been specified. Equations 4 and 5 explain the indirect and direct tax revenue behaviour respectively in which revenues from indrect taxes, i.e. excise and custom duties are related to value added in manufacturing sector, level of import duty. Direct taxes are related to lagged Gross National Product and the time trend.

The imports are regressed on the following factors: unit value index of imports, lagged Gross National Product, Foreign Exchange Reserves, a Dummy for a possible structural change of 1971-72 and time trend. While the exports are regressed on unit value index of exports, value added in commodity producing sector, composition of output, a Dummy variable for structural change of 1971-72 and time trend.

Income and interest rates are the main arguments in the demand functions for currency in circulation, demand deposits and time deposits. An aggregate money demand function would conceal the information about demand for different components of money. Therefore, the money demand function has been estimated in a disaggregated form because the demand for currency in circulation, demand deposits and time deposits are determined by different factors.

Equations 8-10 explain the behaviour of the components of money demand. The currency in circulation is a function of income and interest rate on short term time deposits. The demand deposits are a function of non-agricultural income and interest rate on short term time deposits and the time deposits a function of level of income, ratio of time deposits rate to government bond rate and time trend.

Equations 11-14 explain the interest rate behaviour in Pakistan's money market. The interest rates on government bonds, and the bank rate are assumed to be fixed by the state authorities. It is postulated that the interest rate on short term time deposits is determined by the bank rate and the lagged interest rate on short-term time deposits. The interest rate on long-term time deposits is determined by the bank rate, government bond rate and call money rate. Since a commercial bank has the option of borrowing either from other commercial banks or from the State Bank, to what extent they will borrow from each other or from the State Bank depends on their portfolio and the bank rate. The call money rate is, therefore, specified as a function of credit to deposit ratio and bank rate, while the commercial bank loan rate is postulated to be determined by the level of excess reserves, the bank rate, level of investment and a dummy variable to capture the effect of possible structural changes during 1971-72.

Equations 15-18 explain the behaviour of commercial banks in Pakistan which in Pakistan are required to maintain legal reserve ratio and also to fulfil the liquid asset ratio in their portfolio. They are also supposed to buy government bonds whenever desired by the State Bank. In return the State Bank accepts these bonds as collateral [18].

The last equation explains the money supply. It is postulated that the money supply in Pakistan depends on the budget deficit, the level of loans and the investment by commercial banks to the private sector.

Endogenous Variables

1. C_p = Total private consumption expenditure at constant prices.

2. CB = Commercial banks borrowings from the State Bank of Pakistan.

3. CC = Currency in circulation at current prices.

4. CPI = Commercial banks loans and investment to the private sector.

5. DD = Demand deposits at current prices.

6. $DGDP_2$ = Gross domestic product less direct taxes at constant prices.

7. E = Total exports at constant prices.

8. ER = Level of excess reserves.

9. GDP = Gross Domestic Product at constant prices.

10. ΔGDP = Gross in gross domestic product.

11. GNP = Gross National Product at constant prices.

12. HS = Commercial banks holdings of government securities.

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13. I   = Total investment at constant prices.

14. I_p = Total private investment at constant prices.

15. I_g = Total public investment at constant prices.

16. IF   = Total loans and investments of commercial banks and specialized credit institutions to the private sector.

17. IFK = Inflow of foreign capital at constant prices.

18. L_R = Commercial bank loan rate.

19. M   = Total imports at constant prices.

20. M^D = Money demand at current prices.

21. M^S = Total money supply at current prices.

22. ΔM^S = Changes in money supply.

23. r_c = Interbank call money rate.

24. r_L^T = Interest rate on long term time deposits.

25. r_S^T = Interest rate on short term time deposits (0-6 months)

26. r^T = Average interest rate on time deposits.

27. T   = Total tax revenue at constant prices.

28. T_1 = Total indirect tax revenue at constant prices.

29. T_2 = Total direct tax revenue at constant prices.

30. TD   = Total time deposits at current prices.

31. Y'   = Gross National Product at current prices.

Exogenous Variables

1. BD   = Budget deficit.

2. C_g = Total public consumption expenditure at constant prices.

3. C_p^{t-1} = Lagged private consumption expenditure at constant prices.

4. CR/DT= Credit to Deposit ratio.

5. D   = Dummy = 0 for 1959/60 - 1970/71
                    1 for 1971/72 - 1979/80

6. ELA_{-1} = Lagged excess liquid assets.

7. FER = Foreign exchange reserves at constant prices.

8. GDP_{t-1} = Lagged Gross Domestic Product at constant prices.

9. IC = Loan by specialized credit institution to private sector (IDBP, ADBP, PICIC, HBFC)

10. I_g^{t-1} = Lagged public investment at constant prices.

11. M_{t-1}^S = Lagged money supply at current prices.

12. NFI = Net factor income from rest of the world.

13. OS = Total outstanding government securities with State Bank.

14. P = GNP deflator.

15. P_e = Unit value index of exports.

16. P_I = Investment price index.

17. P_m = Unit value index of exports.

18. r_b = Bank rate or rediscount rate.

19. r_g = Interest rate on government bonds.

20. r_s^{t-1} = Lagged interest rate on short term time deposits (0-6 months)

21. t = Time trend.

22. Y_{t-1} = Lagged Gross National Product at constant prices.

23. Y^M = Value added in manufacturing sector at constant prices

24. Y_{na} = Non-agricultural income at current prices.

25. Y^{AM} = Value added in commodity producing sector at constant prices.

26. Y^M/Y^{AM} = Composition of output.

27. $\dot{Y}$ = Growth rate of GNP.

28. Y^* = $Y_0(1+g)^t$ is the target level of GNP and g is the planned growth rate during different plan periods.

MODEL

1) $C_P = \alpha_1 + \beta_1 DGDP_2 + \gamma_1 IFK + \delta_1 C_P^{t-1} + \Phi_1 D + U$

$DGDP_2 = GDP - T_2$

$GDP = GNP - NFI$

$IFK = M - E$

2) $I_P = \alpha_2 + \beta_2 \Delta GDP + \gamma_2 IFK + \delta_2 L_2 + \Phi_2 (IF/P_r) + \theta_2 D + U$

$\Delta GDP = GDP_t - GDP_{t-1}$

$IF/P_I = CPI/P_I + IC/P_I$

3) $I_g = \alpha_3 + \beta_3 (Y^* - Y) + \gamma_3 I_a^{t-1} + \delta_3 IFK + \Phi_3 D + U$

$I = I_P + I_g$

4) $T_I = \alpha_4 + \beta_4 Y^M + \gamma_4 M + \delta_4 D + U$

5) $T_2 = \alpha_5 + \beta_5 Y_{-1} + \gamma_5 t + U$

$T = T_1 + T_2$

6) $M = \alpha_6 + \beta_6 Y_{-1} + \gamma_6 P_m + \delta_6 FER + \Phi_6 D + \theta_6 t + U$

7) $E = \alpha_7 + \beta_7 P_e + \gamma_7 Y^{AM} + \delta_7 (Y^M / Y^{AM}) + \Phi_7 D + \theta_7 t + U$

$Y = C_P + C_g + I + (x - M) - T_1$

$Y' = P. Y.$

8) $CC = \alpha_8 + \beta_8 Y' + \gamma_8 r_S^T + \delta_8 t + U$

9) $DD = \alpha_9 + \beta_9 Y_{na} + \gamma_9 r_S^T + U$

10) $TD = \alpha_{10} + \beta_{10} Y' + \gamma_{10} r_g / r^T + \delta_{10} t + U$

$M^D = CC + DD + TD = M^S$

11) $r_S^T = \alpha_{11} + \beta_{11}r_b + \gamma_{11}r_s^{t-1} + \delta_{11}t + U$

12) $r_L^T = \alpha_{12} + \beta_{12}r_b + {}_{12}r_g + {}_{12}r_c + {}_{12}t + U$

$r^T = \lambda r_S^T + (1-\lambda)r_L^T, \quad \lambda = 0.5$

13) $r_c = \alpha_{13} + \beta_{13}(DR/DT) + \gamma_{13}r_b + \delta_{13}D + \phi_{13}t + U$

14) $L_R = \alpha_{14} + \beta_{14}ER + \gamma_{14}r_b + \delta_{14}t + \delta_{14}D + U$

15) $ER = \alpha_{15} + \beta_{15}(CR/DT) + \gamma_{15}M^S + \delta_{15}HS + \phi_{15}Y + \theta_{15}r_b + U$

$M^S = M_t^S - M_{t-1}^S$

16) $HS = \alpha_{16} + \beta_{16}HSA_{-1} + \gamma_{16}OS + \delta_{16}D + U$

17) $CB = \alpha_{17} + \beta_{17}(L_R - r_b) + \gamma_{17}r_c + \delta_{17}(CR/DT) + U$

18) $CPI = \alpha_{18} + \beta_{18}CPA_{-1} + \gamma_{18}CB + \delta_{18}L_R + \phi_{18}D + \theta_{18}t + U$

19) $M^S = \alpha_{19} + \beta_{19}PD + \gamma_{19}CPI + \delta_{19}D + \phi_{19}t + U$

II. DATA AVAILABILITY

The data used in the estimation of the model are annual observations of the variables for the period 1959/60 - 1979/80 for West Pakistan. All the variables belonging to the real sector are at constant prices of 1959/60. The data on private consumption, public consumption, private investment, public investment, imports, exports, direct taxes, indirect taxes, net factor income from abroad, value added in manufacturing sector, value added in agricultural sector and gross national product have been obtained from the Pakistan Economic Survey [14] and

Fatima [4]. For the years 1959/60 - 1968/69 the data on private and public investment have been obtained from the Mid-Plan Review Evaluation of Progress during the first three years of the Second Five Year Plan (1965-70) [17] and the Preliminary Evaluation of the Third Five Year Plan (1965-70) [16]. Prior to the year 1969/70 the data on private and public consumption have been taken from Fatima [4]. The series on exports and imports was adjusted for interwing trade for the year 1959/60 - 1970/71 using Radhu's estimates [19]. The data on direct and indirect taxes, from 1959/60 - 1968/69, on West Pakistan basis are from the Budget in Brief [15]. The unit value indices of exports and imports were taken from the International Financial Statistics [9].

The data on Monetary variables have been obtained from various State Bank Publications, Annual Report [2], Bulletin State Bank of Pakistan [22], Banking Statistics in Pakistan [23] and Report on Currency and Finance [24]. For the years 1959/60 - 1970/71, the data on various components of money demand, viz. currency in circulation, demand deposits and time deposits, on West Pakistan basis have been taken from Kemal, Bilquees and Khan [11]. There was no source which yielded data on the following variables: Excess Reserves (ER), Commercial Banks Holding of Government Securities (HS), Commercial Banks' Borrowings from the State Bank (CB), Commercial Banks' Loans and Investment to the private sector, lagged excess liquid assets and total outstanding government securities with the

State Bank for West Pakistan for the years 1959/60 - 1973-74.
Thus to obtain an adjusted series for these variables, the
proportion of money demand for West Pakistan in total money
demand was calculated under the assumption that the money supp-
ly was directly proportional to the money demand. The data on
institutional credit, which includes loans by the Agricultural
Development Bank, the Industrial Development Bank, the House
Building Finance Corporation and the Pakistan Industrial Credit
and Investment Corporation (on West Pakistan basis) have been
obtained from various Annual Reports [21]. The series on
Budget Deficit has been taken from [4].

III. RESULTS

To estimate the equations the principal components method
of Two Stage Least Squares was used. This was necessitated by
the fact that the predetermined variables exceeded the number
of observations.

The estimated equations are presented below. The figures
in the parenthesis are t-ratios of the coefficients. The
method of estimation of each equation has been indicated.

1) C_p = -42.63 + 0.469DGDP$_2$ + 0.531IFK + 0.399 C_p^{t-1} + 1660.7 D
   (OLS)
   $\quad\quad\quad$ (4.018) $\quad\quad$ (3.642) $\quad$ (2.58) $\quad\quad$ (2.215)

   R^2 = 0.995, F = 762.56, D.W. = 2.15, D.F. = 16

2) I_p = 368.48 + 0.001GDP - 0.057IFK + 85.54 L_R + 0.268(IF/P_I) - 1246.5 D
   (2SLS)
   $\quad\quad\quad$ (0.232) $\quad$ (0.657) $\quad$ (0.689) $\quad$ (4.481) $\quad\quad$ (2.746)

   R^2 = 0.817, F = 13.394, D.W. = 1.934, D.F. = 15

3) $I_g = 320.22 + 0.4(Y^*-Y) + 0.759 I_g^{t-1} + 0.285 IFK + 1048.7\ D$
   (2SLS)   (0.612)   (6.61)   (2.527)   (2.5)

$$R^2 = 0.933, \quad F = 55.73, \quad D.W. = 1.68, \quad D.F. = 16$$

4) $T_1 = -1.120 + 0.633\ Y^M + 0.294\ M + 861.48\ D$
   (2SLS)   (3.853)   (1.052)   (1.988)

$$R^2 = 0.98, \quad F = 281.96, \quad D.W. = 1.689, \quad D.F. = 17$$

5) $T_2 = -835.34 + 0.069 Y_{-1} - 103.2\ t$
   (OLS)   (3.41)   (2.77)

$$R^2 = 0.639, \quad F = 15.95, \quad D.W. = 2.076, \quad D.F. = 18$$

6) $M = 347.38 + 0.077\ Y_{-1} + 0.277\ P_m - 0.029 FER - 1372.4 D + 104.7\ t$
   (OLS)   (2.36)   (0.215)   (0.4)   (0.343)

$$R^2 = 0.432, \quad F = 2.279, \quad D.W. = 1.847, \quad D.F. = 15$$

7) $E = -123.8 - 11.348\ P_e + 0.288\ Y^{AM} + 220.6(Y^M/Y^{AM}) + 3296.3 D + 70.2\ t$
   (OLS)   (9.286)   (3.17)   (0.025)   (7.298) (0.324)

8) $CC = -4419.6 + 0.036\ Y' - 2242.6\ r_s^T - 82.94\ t$
   (2SLS)   (2.61)   (1.62)   (0.217)

$$R^2 = 0.906, \quad F = 54.37, \quad D.W. = 0.656, \quad D.F. = 17$$

9) $DD = -1613.3 + 0.201\ Y_{n\ast} + 393.46\ r_s^T$
   (2SLS)   (10.516)   (1.045)

$$R^2 = 0.991, \quad F = 933.61, \quad D.W. = 1.221, \quad D.F. = 18$$

10) $TD = 3812.3 + 0.069\ Y' - 10917 r_g/r^T + 902.1\ t$
    (2SLS)   (5.19)   (2.223)   (5.09)

$$R^2 = 0.947, \quad F = 101.66, \quad D.W. = 1.019, \quad D.F. = 16$$

11) $r_s^T = -0.321 + 0.364\ r_b + 0.522\ r_s^{t-1} + 0.054\ t$
               (5.403)   (6.163)   (2.611)
    (OLS)

$$R^2 = 0.995, \quad F = 1123.37, \quad D.W. = 1.916, \quad D.F. = 17$$

12) $r_L^T = -0.769 + 0.249\ r_g + 0.577\ r_b + 0.266\ r_c$
    (2SLS)   (1.917) (3.62)   (3.62)   (2.559)

$$R^2 = 0.974, \quad F = 209.31, \quad D.W.\ 0.956, \quad D.F. = 17$$

13) r_c = $-6.861 + 0.078(CR/DT) + 0.97r_b - 1.508D + 0.176$ t
(OLS) $\quad\quad (3.985) \quad\quad\quad (3.647) \quad (1.716) \quad (1.794)$

$\quad\quad R^2 = 0.919, \quad F = 45.628, \quad D.W. = 2.198, \quad D.F. = 16$

14) L_R = $1.55 - 0.002ER + 0.716r_b + 0.0004I + 0.956$ D
(2SLS) $\quad\quad (2.594) \quad (3.883) \quad (2.734) \quad (1.792)$

$\quad\quad R^2 = 0.963, \quad F = 105.056, \quad D.W. = 1.348, \quad D.F. = 16$

15) ER = $616.192 + 0.112$ HS $+ 0.07$ $M^S + 10.98$ Y $- 132.29$ $r_b - 3.467$ (CR)
(2SLS) $\quad\quad (3.41) \quad\quad (1.631) \quad\quad (0.858) \quad (1.675) \quad\quad (0.81)$ $(\overline{DT})$

$\quad\quad R^2 = 0.897, \quad F = 26.156, \quad D.W. = 1.821, \quad D.F. = 15$

16) HS = $-510.15 + 0.011ER_{-1} + 0.545(OS) + 1846.01$ D
(OLS) $\quad\quad (0.021) \quad\quad (3.453) \quad\quad (2.034)$

$\quad\quad R^2 = 0.863, \quad F = 35.785, \quad D.W. = 2.029, \quad D.F. = 17$

17) CB = $4652.1 + 63.02(L_R - r_b) + 967.68r_c - 108.44(CR/DT)$
(2SLS) $\quad\quad (0.11) \quad\quad\quad (17.264) \quad (4.27)$

$\quad\quad R^2 = 0.948, \quad F = 103.38, \quad D.W. = 2.122, \quad D.F. = 17$

18) CPI = $-9774.28 + 2.98ER_{-1} + 1.89CB + 1672.47$ $L_R + 2383.07$ D
(2SLS) $\quad\quad (3.536) \quad\quad (1.913) \quad (1.171) \quad\quad (0.78)$

$\quad\quad R^2 = 0.962, \quad F = 101.41, \quad D.W. = 2.245, \quad D.F. = 16$

19) M^S = $3040.9 - 0.229BD + 2.579CPI - 4446.8$ D $- 717.3$ t
(2SLS) $\quad\quad (-0.633) \quad (25.367) \quad (-2.553) \quad (-3.735)$

$\quad\quad R^2 = 0.996, \quad F = 1142.73, \quad D.W. = 2.14, \quad D.F. = 16$

It may be noted from equation (1) that while the short run marginal propensity to consume is only 0.46, the long run marginal propensity to consume is 0.78. The marginal propensity to consume estimated in this study, though higher than the one reported in Imam [7] compares favourably with Mammen's estimate for India [12], Morishima-Saito's estimate for USA (1902-1955) [8] and Monguchi's estimate for Japan [8].

The results also imply that while the gross domestic
product and the inflow of foreign capital does not affect pri-
vate investment significantly, nationalisation has led to a
decline in the level of private investment. However, the most
important result is that private investment is not affected by
the commercial bank loan rate but is most sensitive to the
availability of funds.

The hypothesis that public investment is influenced by the
long term objectives of planning has not been substantiated as
the coefficient of the difference between actual and target
income level is small and insignificant. The coefficient of
lagged public investment is significantly less than unity which
implies that the actual level of public investment takes more
than one time period to adjust to its desired level.

The value added in the manufacturing sector and the level
of imports in any year together with the dummy variable which
incorporates the effects of any possible structural changes
during 1971-72 account for 98% of the variation in the indirect
tax revenues. However, surprisingly, the level of the imports
does not have any significant effect on indirect taxes. They
are most sensitive to the value added in the manufacturing
sector. The elasticity of the indirect tax revenues with res-
pect to value added in manufacturing is approximately equal to
unity. The direct tax revenue function estimated with lagged
income level and time trend explains only 65 percent of the

variation in direct tax revenues. The estimates show that over time the direct tax revenues in real term are declining. The marginal tax rate is 6.9 percent.

The aggregate import function estimated shows that the level of imports is neither affected by the import price index nor by the level of foreign exchange reserves. The separation of East Pakistan in 1971/72 has significantly affected the level of import. Marginal propensity to import is found to be 0.077.

The export function estimated explains approximately 90 percent of the variation in the level of exports. All the variables included have correct signs. Unit value index of exports and value added in commodity producing sector are found to be significant. The elasticity of exports with respect to unit value index of exports, value added in commodity producing sector and composition of output has been found to be 1.085, 1.723 and .023 respectively.

The demand for currency in circulation estimated in nominal terms, shows that the coefficient of the interest rate on short term time deposit has a positive sign and is significant which is surprising. The coefficient of scale variable i.e. GNP has the right sign and is significantly different from zero.

The estimates of demand deposits function show that non-agricultural income is highly significant whereas the interest

rate on the short-term time deposit has a wrong sign but is
insignificant. This implies that with an increase in the inter-
est rate on short-term time deposits over time the demand for
demand deposits has been increasing instead of decreasing. This
may be due to the fact that the demand deposits are mostly held
by the business community who are not willing to put their
money for longer periods in time deposits (this implies that
the short term time deposit rate can be the only relevant
opportunity cost variable) and that the increase in interest
rate on short-term time deposit has not been sufficient to tempt
the business community in putting their money even in short
term time deposits.

The estimates of demand for the time deposits have the
anticipated sign and are significant. The estimates show that
in order to maximize their returns, people are apt to make
changes in their portfolio. Whenever the government bond rate
is greater than the interest rate on time deposits people start
shifting their assets from time deposits to government bonds
and vice versa. This tends to substantitiate the postulated
hypothesis that time deposits and government bonds are close
substitutes in Pakistan.

Since the level of investment and commercial bank loan
rate is determined simultaneously, one of them cannot be ex-
plained properly without taking into consideration the other.
The commercial bank loan rate does not seem to have any signi-

ficant effect on the level of private investment. This result is hardly surprising since the rate of profit in Pakistan has always significantly exceeded the interest rate and the binding constraint has been the volume of credit. However, the demand for loans do have a positive effect on the cost of borrowing the loans.

Equations 15 to 18 show the formal empirical relationships between the different variables which explain the behaviour of the commercial banks. All the explanatory variables in these four equations have the anticipated signs and are also significant. All the equations taken together explain the basic characteristics of Pakistan's money market.

Since in Pakistan a certain percentage of the government securities held by the commercial banks is accepted as collateral by State Bank, and the banks are required to maintain the reserve requirements as well as the liquidity requirement, the total reserves of the commercial banks at any point of time consist of government securities and the deposits. Whenever desired by the authorities the money supply can be increased not only through market operations but the commercial banks can be requested to buy the securities from the State Bank instead of floating them in the market. The amount of securities each bank is asked to buy depends on how much they already have. The State Bank, in turn, accepts these securities as reserves.

Besides these two variables the estimated coefficient of rediscount rate has the anticipated sign and is significantly different from zero. The overall growth rate of the economy does not seem to have any significant effect on the level of excess reserves. The amount of government securities held by the commercial banks is affected neither by the yield on government securities nor by the availability of liquid assets but by the total outstanding government securities with the State Bank. The result again points to the peculiar nature of the Pakistani money market. The estimated coefficients of commercial banks' borrowings from the State Bank shows that the call money rate which is the cost of borrowing from the other scheduled banks and the credit to deposit ratio, which shows the overall asset/liability position of the commercial banks, significantly affects the borrowings of the commercial banks from the State Bank. This shows that the commercial banks borrow from the State Bank only if the cost of borrowing from other banks is higher. Moreover, the amount they can borrow from the State Bank is constrained by the relative position of their portfolio. The coefficient of the difference between commercial bank loan rate and the bank rate has the right sign but is insignificant. The latter is explained by the fact that throughout the period under study the commercial bank loan rate was always greater than bank rate. This implies that even though it is always profitable to borrow from the State Bank, the actual amount borrowed depends, firstly, on the cost of borrowing from the other banks and, secondly, it is constrained by their portfolio.

The commercial banks credit to the private sector, which
includes their investment in the private sector plus loans by
specialized credit institutions, is significantly affected by
the following factors: (i) the amount of liquid assets with the
commercial banks; (ii) the extent the commercial banks can
borrow from the State Bank; (iii) by the commercial bank loan
rate. The estimated coefficients of all these factors have the
anticipated signs.

Besides the structural shifts and the trend, the money sup-
ply in Pakistan is most significantly affected by the credit to
the private sector while the deficit in the government budget
is of little significance only.

Equation 2, 14 and 18 together with the identity relating
to investment are crucial in explaining the link between the
real and the monetary sectors. The estimated coefficient, as
stated earlier, shows that private investment is determined by
the availability of funds and not by the cost of those funds,
whereas the cost itself is determined by the demand factors.
Contrary to the theoretical argument, the commercial bank loan
rate does not have any negative effect on the level of private
investment. A possible explanation of this could be that there
is always an excess demand for loans and that returns on invest-
ment are high which implies that people are always willing to
pay whatever price is demanded. These estimates imply that any
increase in the commercial bank loan rate will lead to an
increase in both the commercial bank's credit to the private

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sector and in the level of private investment. It is clear from the specification that there is a simultaneity between the loan rate and investment. The estimates further show that the causation is not from interest rate to investment but from investment to loan rate. The estimates of money supply obtained show that the money supply in Pakistan is determined most significantly by the credit to the private sector. This has an adverse effect on the level of investment because whenever the authorities desire to control the money supply a constraint is put on the commercial banks ability to lend funds which has a direct impact on the level of investment and output.

Porter [18] has argued that of the various options at its disposal the State Bank can control the money supply effectively by raising the liquidity ratio or by selective credit control measures. Moreover, it was found that during the period under study the liquidity ratio was changed two or three times only while the State Bank resorted more often to selective control measures. Porter's conclusion about the irrelevance of the bank rate can be evaluated from the estimated equation of commercial banks' borrowing from the State Bank. The bank rate affects the other interest rate measures in a straight forward manner. The difference between commercial bank loan rate does not affect the commercial bank borrowing from the State Bank which implies that borrowing, which has a significant effect on supply of funds, is not affected by bank rate. This further

implies that the money supply is not affected by the variations in the bank rate.

IV. POLICY IMPLICATIONS

The analysis presented in this paper clearly brings out the effect of State Bank's intervention in the money market on the interest rates. The State Bank of Pakistan determines the bank rate, which affects all other interest rates, viz. call money rate, interest rate on time deposits of various maturities, bond rates etc. However, this does not necessarily mean that the changes in the bank rate can also influence the money supply. In the disaggregated analysis of the demand for money, it was found that neither the currency in circulation nor the demand deposits are significantly affected by the interest rate on short term time deposits which is the relevant opportunity cost variable. The only component of money demand which is affected by the changes in the interest rate are the time deposits. Therefore, the monetary authorities have to take into consideration the fact that raising the interest rates would leave the demand for currency in circulation and demand deposits almost unaltered.

As regards the effect of changes in the interest rate on money supply, it may be noted that the bank rate, open market operations and certain other indirect measures do not have any significant impact on the money supply in Pakistan. This can be effectively controlled by imposing a ceiling on credit expansion.

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It may be noted that private investment responds more changes in the ceiling on credit rather than to changes in the loan rate. This further implies that there is a considerable scope for increasing the interest rate within the reasonable limits, without adversely affecting the level of investment.

The primary message of the analysis is that monetary policy can work effectively only through selected credit control which on the one hand tightens the money supply but only at the expense of reducing investment which has far reaching repercussions for the whole economy.

V. CONCLUSIONS

In this paper, the relationship between the monetary variables and the real sector of the economy was investigated. The main link between the two sub-models i.e. the monetary and real models, is the credit to private sector which takes place in the monetary sector but directly affects private investment. However, both the investment in the real sector and the process of credit creation in the monetary sector have repercussions within each sub-model.

Instead of estimating an aggregate demand function for money, the demand for currency in circulation for the demand deposits and for time deposits are estimated separately. It was found that the currency in circulation and the demand deposits are not affected by changes in interest rates though the demand

for time deposits is significantly affected by changes in the interest rates. This points to the limited role that interest rates can play in the demand for money in Pakistan.

Another question which has been posed in this study is whether the interest rates are exogenous to the system or are determined within the system itself. It was found that the interest rates respond to the bank rate fixed by the monetary authorities which implies that the State Bank of Pakistan has a significant influence on the structure of interest rates.

As noted above, interest rates have only a limited role to play not only in influencing the demand for money but also the real sector of the economy, since they have no effect on the level of investment. Only the changes of selective credit ceilings can influence the level of investment.

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REFERENCES

Agarwala R. *An Econometric Model of India*. Frank Cass & Co. Ltd. 1970.

Association of Development Research and Training, Institute of Asia and Pacific. *Econometric Models of Asian Countries*. December 1, 1979.

Christ, Carl F. *Econometric Models and Methods*. New York: Johns Wiley and Sons Ltd., 1968.

Fatima, Asmat. Estimates of Private and Public Savings and Consumption for West Pakistan. *Statistical Paper Series No. 3*, (in press). Islamabad: Pakistan Institute of Development Economics. 1981.

Friedman, Milton. *A Theoretical Framework for Monetary Analysis*. Occasional Paper No. 112. National Bureau of Economic Research, New York.

Gurley I. C. & Shaw E. W. *Money in a Theory of Finance*. Brooking Institutions. 1964.

Imam, K. H. "A Structural Model of Pakistan's Monetary Sector". *Pakistan Development Review*. Vol. X, No. 3. Autumn 1970.

Institute of Economics, Academia Sinica Proceedings of the Seminar on *Econometric Modelling in Taiwan*. July 5, 1978.

International Monetary Fund. *International Financial Statistics*. Vol. XXXI, No. 5. May 1978.

Islam, N. *A Short Term Model for Pakistan Economy*. Karachi: Oxford University Press. 1965.

Kemal, A. R., Faiz Bilquees & Ashfaque H. Khan. Estimates of Money Supply in Pakistan 1959/60 to 1978/79. *Statistical Paper Series No. 1*. Islamabad: Pakistan Institute of Development Economics. 1980.

Mammen, T. "Indian Money Market: An Econometric Study" *International Economic Review*. Vol. 14, No. 1. February 1973.

Masih, Abdul M. M. "An Econometric Model of the Role of Financial Institutions in Financing Private Investment in Pakistan". *Pakistan Development Review*. Vol. XVIII, No. 3. Autumn 1979.

14. Pakistan. Finance Division. *Pakistan Economic Survey*
     1978/79, 1979/80. Islamabad: Economic Advisers Wing.
     1979, 1980.

15. Pakistan. Ministry of Finance. *The Budget-in-Brief*
     1970/71. (Final). Islamabad. June 1970.

16. Pakistan. Planning Commission. *Preliminary Evaluation*
     of the Third Five Year Plan (1965-70). Islamabad.
     August 1970.

17. Pakistan. Planning Commission. *Mid Plan Review. Evalua-*
     tion of Progress During the First Three Years of the
     Second Five Year Plan (1965-70). Karachi. May 1964.

18. Porter, R. C. *Liquidity and Lending: The Volume of Bank*
     Credit in Pakistan. Monograph No. 10. Karachi:
     Pakistan Institute of Development Economics. March
     1963.

19. Radhu, G. M. "Trade Between East and West Pakistan at
     World Prices 1960/61 - 1969/70". *Pakistan Development*
     Review. Vol. VII, No. 2. Summer 1973.

20. Shaw, E. S. *Financial Deepening in Economic Development.*
     Karachi: Oxford University Press. 1973.

21. State Bank of Pakistan. *Annual Report.* (Various years).
     Karachi.

22. _____. *Bulletin State Bank of Pakistan.*
     (Various years). Karachi.

23. _____. *Banking Statistics of Pakistan.*
     (Various years). Karachi.

24. _____. *Report on Currency and Finance.*
     (Various years). Karachi.