



## An Econometric Study of Demand for Money in Pakistan

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**Abstract :** *The present study is confined to know the results of application of Various econometric techniques such as ECM, Unit Root Test, Co-integration test on the data of the some selected variables, money demand (M2) as dependent variable, and income, inflation, and exchange rate as independent variables. Eviews 5.0. has been applied on the data for the period 1972 to 2011 from Pakistan. The results show a relationship between M2, and income, inflation, and exchange rate variables.. Our results from CUSUM and CUSUM SQUARES show that M2 is stable between 1972 to 2011.*

**Key words :** money demand, stability, Pakistan

### INTRODUCTION

The demand for money is one of the important area of study of macroeconomics of a country. Various forms of money demand on which economists have worked include, narrow money (M1) (non-interest-bearing holdings), and broad money generally termed as M2 or M3. and described the results in the light of their applications for the policy makers of a country.

A typical money-demand function may be written as

$$\frac{M}{P} = L(y, x), \quad (1)$$

Where:

M is the demand of money

P is the price level

y is the real income level

x is the opportunity cost variable.

Economists have used various econometric techniques such as Augmented Dicky Fuller test (Dicky and Fuller, 1979) for unit root, CUSUM and CUSUM SQUARES test (Brown, Durbin and Evans, 1975) for stability of model, and likelihood ratio (Johansen, 1988) test for number of cointegrating vectors.

With reference to Pakistan, the most important studies are: Qayyum (2005), Pervaiz et al (2010), Qazi Muhammad Adnan, et al (2009) Akhtar Hossain (1994), Hussain, Zakir, et al (2006), and Sofia Anwar and Nabila Asghar (2012).

In addition some of the most important studies related to the area of present study are those of, Hiroya Akiba (1996), Mundell (1963), Suliman et al (2011), Nazar Dahmardeh et al (2011), Arango and Nadiri (1981), and Laidler, D. (1982)

The set up of research paper is as; section 1 (introduction), section 2 (literature survey), section 3 (results and discussion), section 4 (conclusion), and section 5 (references).

### SECTION 2

**LITERATURE SURVEY** Various authors have studied the money demand function using various models, such as: Qayyum (2005) applied cointegration analysis and error correction model to study demand money M2. Mohsen Bahmani-Oskooee and Yongoing Wang (2007) applied CUSUM and



CUSUMSQ tests alongwith with cointegration analysis,. ParvezAzim,et al(2010) used Autoregressive Distributed Lag approach for their study for cointegration analysis Qazi Muhammad Adnan,et al(2009) used robust time series tools for their study of money demand in Pakistan . Sofia Anwar and Nabila Asghar(2012) applied ARDL approach .. Suliman Zakaria Suliman and Hala Ahmed Dafaalla(2011) applied cointegration and error correction models for their study on money demand function in Sudan.. Akhtar Hossain(1994)observed that “ narrow money demand function in Pakistan is more stable than the broad money demand function (975)”. Hussain, Zakir,et al(2006) during their study of demand for money in Pakistan , analyzed the data through OLSQ... Nazar Dahmardeh et al(2011) applied cointegrating tests .

## INVESTIGATIVE TECHNIQUES

During the present study ,the variables considered are M(money demand) as dependent variable and Y(real income),INF(inflation rate), ER (exchange rate),and  $v$  ( stochastic disturbance term) as independent variables.

$$\ln M_t = \beta_1 + \beta_2 \ln Y_t + \beta_3 \ln INF_t + \beta_4 ER_t + v_t$$

where

$M$  is money demand (M2),  $Y$  is real income,  $INF$  is inflation rate and  $ER$  is exchange rate  $v$  is the stochastic disturbance term.

## DATA COLLECTIONS

Data of the variables has been collected for the period 1972 to 2011 from WDI, Economy Watch and various reports of State Bank of Pakistan.

## DATA ANALYSIS PLAN

The data has been analyzed using Eviews 5.0 for the following tests: Unit Root test, Co-integration test, ECM, and Stability test.

## EMPIRICAL RESULTS:

### UNIT ROOT TEST

The result of 1(1) shown in the table shows unit root in levels and stationary after first differencing.

TABLE 1

AUGMENTED DICKEY-FULLER TEST RESULTS FOR UNIT ROOTS

Variables level	ADF stats	Variable first difference	ADF stats	Results
M2	-0.667947	$\Delta M2$	-5.077877*	I(1)
YT	-2.364140	$\Delta YT$	-4.503200*	I(1)
INF	-6.325092	$\Delta INF$	-7.856991*	I(1)
ER	-0.661362	$\Delta ER$	-6.348719*	I(1)

\*shows significance at 5 %

### COINTEGRATION ANALYSIS:

The results shown in table 2. shows that each case has one cointegrating equation at 5 % level of significance .



TABLE 2

JOHANSEN TEST FOR COINTEGRATION  
MAXIMUM EIGEN VALUE TEST

Null Hypothesis	Alternative Hypothesis	Test Statistic
$r = 0$	$r = 1$	39.57537*
$r = 1$	$r = 2$	21.38834
$r = 2$	$r = 3$	3.564466
$r = 3$	$r = 4$	0.351865

TRACE TEST

Null Hypothesis	Alternative Hypothesis	Test Statistic
$r = 0$	$r \geq 1$	64.88003*
$r = 1$	$r \geq 2$	25.30467
$r = 2$	$r \geq 3$	3.916331
$r = 3$	$r \geq 4$	0.351865

\* Indicates significance at the 5 percent level

TABLE 3

NORMALIZED COEFFICIENTS OF JOHANSEN TEST ON M2

Variables	Coefficients	Standard Error	T - Value
YT	-2.238816*	0.14355	-15.596
INF	0.005336*	0.00071	7.525
ER	-0.016809*	0.00360	4.669

\*indicates significance at 5 % critical values.

The coefficients of YT, and ER are significant .while INF variable is non significant. The estimated equation indicates that M2 is mainly determined by the real income, inflation and exchange rate of the economy having elasticities of -2.24, 0.005, and -0.017 respectively.

**ERROR CORRECTION APPROACH**

After establishing the co-integration relationship ,error correction model (ECM) is established to determine the short run dynamics of the regression model.

TABLE 4

ERROR CORRECTION MODEL ESTIMATES DEPENDENT VARIABLE  $\Delta M2$

Variables	Coefficients	Standard Error	T-Value
$\Delta YT (-1)$	-1.184	0.591	-2.004
$\Delta YT (-2)$	-0.628	0.571	-1.098
$\Delta INF(-1)$	-0.00048	0.00022	-2.222
$\Delta INF(-2)$	-0.00021	0.00014	-1.504
$\Delta ER(-1)$	-0.00105	0.0038	-0.278
$\Delta ER(-2)$	-0.0093	0.0042	-2.21001
EC(-1)	0.08172	0.0557	1.4636
Constant	0.0266	0.0544	4.8902
R-square = 0.414082		F statistics = 2.120173	



$\Delta Y_T(-1)$  and  $Y\Delta T(-2)$  are significant at 10%. While  $\Delta INF(-1)$ ,  $\Delta INF(-2)$ ,  $\Delta ER(-1)$ ,  $\Delta ER(-2)$  are not significant at 5%.

### SINGLE EQUATION RESULTS

$$CI \text{ relation : } M2_t = -22.20 + 2.25 Y_{T-1} - 0.006 INF_t + 0.02 ER_t + U_t$$

$$ECM : \Delta M2_t = 0.054 + 0.0817 U_{t-1} - 0.16 \Delta M2_{t-1} + 0.17 \Delta M2_{t-2} + 0.59 \Delta Y_{T-1} + 0.57 \Delta Y_{T-2}$$

### FIRST EQUATION FROM VAR RESULTS

$$CI \text{ relation : } M2_t = -22.20 + 2.25 Y_{T-1} - 0.006 INF_t + 0.02 ER_t + U_t$$

$$ECM : \Delta M2_t = 0.0266 + 0.0817 U_{t-1} + 0.161 \Delta M2_{t-1} - 0.244 M2_{t-2} - 1.184 Y_{T-1} - 0.628 Y_{T-2} - 0.0005 INF_{t-1} - 0.0002 INF_{t-2} - 0.001 ER_{t-1} - 0.009 ER_{t-2}$$

### DIAGNOSTIC TEST

CUSUM and CUSUM SQUARES test are shown in figures 1, 2

FIGURE 1

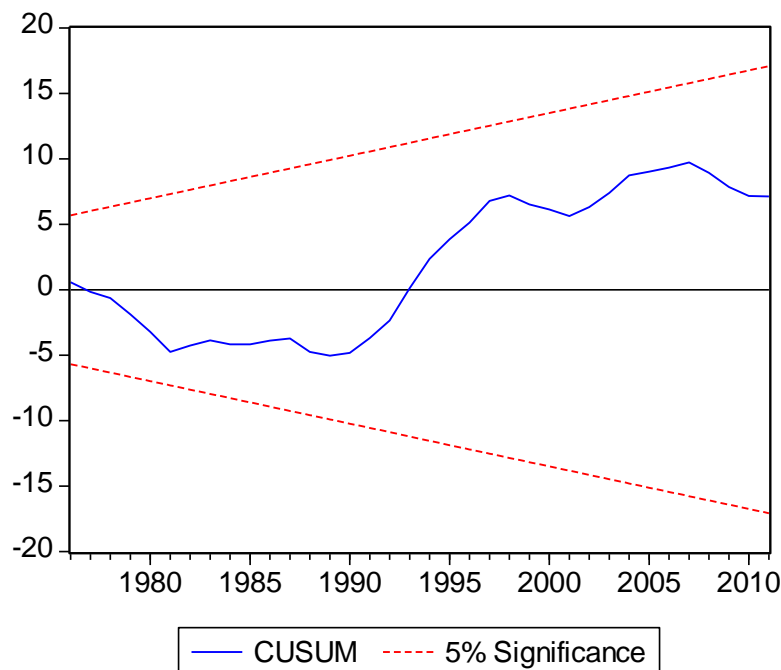
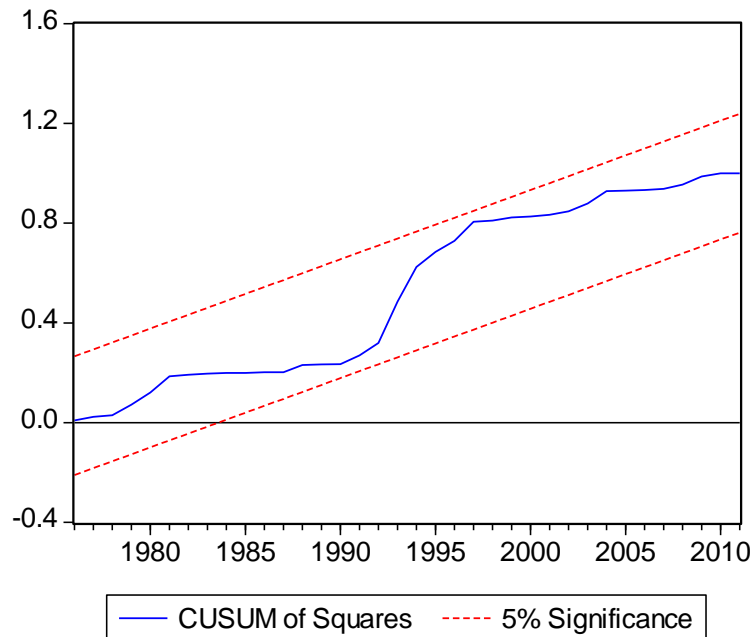


FIGURE 2  
CUSUM SQ



As the plots of these two tests are within the critical value line, it shows a stable long-run relationship between money demand (M2), real income ( $Y_t$ ), inflation rate (INF), and exchange rate. Thus the results are appropriate for policy implications.

### Conclusion:

In this paper, time series data for the period 1972 to 2011 has been used for cointegration analysis. The results show a negative relationship of inflation with money demand and a positive relationship of exchange rate and income with money demand. The plots of CUSUM and CUSUMSQ indicate a long-run relationship of real income ( $Y_t$ ), inflation rate (INF), and exchange rate with money demand M2. From the present study, we conclude that the variables, real money, income, and exchange rate are determinants of money demand M2 in Pakistan,

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