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Measuring Money Demand Function in Pakistan

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Abstract

This study investigates the factors such as interest rate, GDP per capita, exchange rate, fiscal deficit, urban and rural population to determine money demand function for Pakistan over the period from 1972-2013. We use ARDL Bound Testing approach in order to test long run relation between money demand and its factors whereas both long and short run coefficients will be found using similar approach. The results show that real interest rate exerts significant and negative effect upon money demand in both long and short run in Pakistan. The results also disclose that exchange rate and rural population are leaving significant but negative effect on the demand for money. These findings are robust to different diagnostic tests.

1. INTRODUCTION

The basic element in conducting monetary policy is demand for money. It makes possible for monetary authorities to effect expected changes in besieged macroeconomic variables such as interest rate and income by correct changes in monetary aggregates. The demand function is an imperative mean to meet the liquidity needs of economic agent (Handa, 2009). Because of its significance, the money demand has been the object of attention by researchers. Initially, research was limited to only developed modern countries but now work on developing countries gained great momentum since mid 1980's. The vector error correction model (VECM) and other estimation techniques gave greater momentum to the work on money demand. The Autoregressive distributed lag modeling (ARDL) approach has given unique results to work on demand for money. In this study we use ARDL approach to investigate the long run relationship between money demand and other macroeconomics variables used in this study. This approach will investigate the co-integrating property of demand for money in Pakistan using the method of vector error correction model (VECM). We use M2 monetary aggregate to measure money demand as dependent variable. The independent variables include per capita GDP, real interest rate, exchange rate, fiscal deficit and rural and urban population. Another issue in the determination of money demand function is its stability which has been investigated by many other researchers. Due to difference in estimation techniques, the results had been mixed and researchers could not come to the same conclusion. The other reason of dissimilar results is different data time spans. Fisher (1911) initially presented the Quantity theory of money demand which is also known as transaction demand for money. In his theory, the income was the only determinant of money demand and interest rate was ignored. The general form of money demand function is stated as:

$$MV=PT \dots\dots\dots (1)$$

Another classical approach of money demand was presented by Marshall (1923) and Pigou (1917). This approach is labeled as Cambridge cash balance approach and it concentrates on individual income which they want to hold. The individuals do not undergo from institutional limitations i.e. credit card. Keynes (1936) presented money demand theory comprises of three

motives in his famous book. These are transaction demand for money, speculative demand for money and precautionary demand for money. Keynes theory is also labeled as *liquidity preference theory*. Keynes added another variable affecting money demand i.e. interest rate. Portfolio theories emphasized that the prime function of money is store of value. Friedman (1956) and Tobin (1958) initiated the portfolio theories of demand for money. They argued that the money which people hold is necessarily a part of their portfolio assets.

Inventory theories of money demand primarily focused on money as used for the purpose of transaction. Baumol (1952) and Tobin (1956) provided foundation to inventory theoretical approach or transaction theories of money demand. Caporale and Gil-Alana (2005) described the significance of stable money demand function. According to him, the policy makers lose major pre-requisite for conducting an effective anti-inflationary monetary policy if money demand is not stable. Monetary policy plays ineffective role without a proper and stable functioning of money demand. Bahmani – Oskooee and Rehman (2005) investigated the function of money demand for seven Asian countries. The results exposed that the money demand (M1) was stable in case of India, Indonesia, and Singapore while in Malaysia, Pakistan, the Philippines and Thailand, stability of money demand (M2) was scrutinized. An efficient monetary policy is needed to identify money market characteristics. Particularly, in implementing effective monetary policy, the money demand function plays very significant role. Eventually the formulation of an optimal monetary policy is not practicable without the reliable estimate of money demand function.

In developing and developed countries, researchers are much concerned to investigate the relationship between money demand and its main determinants. In conventional theories, the main determinants are income and interest rate. Currently the efforts have been carried out to find other determinants of money demand. In Pakistan many studies have been carried out to estimate the function of money demand by various techniques of co-integration see (Akhtar, 1974; Qayyum, 2005; Azim et al., 2010; Faridi and Akhtar, 2013). Conclusively, the money demand is an important variable used to determine the level of aggregate economic activity in any economy. Examination of the money demand function for Pakistan is sole purpose of our study and to search those main factors like per capita income, real interest rate, exchange rate,

fiscal deficit and rural and urban population; determine economic activity perilously. For analysis, this study employs time series data for the period ranges from 1972 to 2013.

1.1. Problem Statement:

The empirical analysis of demand for money is most disputed issue in developing countries and stable money demand function is a necessary condition in implementing monetary policy. When any economy deals with depression/recession, the interest rate rises in this situation. At this stage monetary policy, especially, money demand plays important role effectively. Can money be used as a tool to boost growth empirically in developing countries? The above question requires appropriate working of monetary policy, mainly the money demand function. The quantity of money decides that how much this quantity can be used to stimulate economic growth in developing countries.

1.2. Objectives:

The main objectives of our study are given below:

1. To identify factors affecting money demand function in Pakistan for the period from 1972 to 2013.
2. To identify possible recommendations that would facilitate policy advisors to manage money demand function in Pakistan.

1.3. Significance of the Study:

The quantity of money demanded is vital and crucial variable to determine economic activity in any economy. Whenever the issue of monetary policy is discussed then the estimation of money demand can't be ignored. In other words, the stable money demand function is needed to attain macroeconomic objectives by monetary authorities. This is informed by the fact that monetary policy works with economic policy to influence better on level of employment and national income.

When the money demand function is specified properly, it makes the desired quantity of money to be supplied that may guarantee the stability in the economy. For this purpose monetary policy is formulated and implemented with measured precautions, this target is fulfilled by the Central Bank. Inflation and interest rate can be handled by applying the monetary policy as effective tool. This study will also cast a considerable impact in tracking the interest rates, exchange rate and other macroeconomic variables. Furthermore this research would give considerable knowledge to those researchers who take interest to explore the main determinants of money demand function in Pakistan.

1.4. Theoretical Foundation of the Study:

In this study, income, interest rate, exchange rate, fiscal deficit and population have been considered as explanatory variables which may affect money demand function in Pakistan.

The positive impact of income on money was found by the studies like Bhatta (2008); Dritsakis (2011); Arize and Nam (2012); and Sarwar et al. (2013). Therefore, we have used income as an independent variable to determine money demand function in Pakistan. Some other studies like Khan and Sajjid (2005); Tang (2007) and Arize and Nam (2012) explored negative impact of interest rate on money demand function whereas, interest rate exerted positive impact on money demand as suggested by Narayan et al. (2009); Abdullah et al. (2010) and Abdulkheir (2013). Therefore, in this study interest rate has been taken as one of the factors which could affect money demand function in Pakistan.

Afterwards, exchange rate is also considered as one of the important factors of money demand function and according to Khan and Sajjid (2005); Sahadudheen (2011) and Arize and Nam (2012), exchange rate leaves positive effects on money demand function whereas Azim et al. (2010); Dharmadasa et al. (2013); Anwar and Asghar (2012) and Okonkwo et al. (2014) found opposite results. Moreover, it is also evident that fiscal deficit has positive effect on money demand [Vamvoukas (2010) and Khrawish et al. (2012) whereas Al-Qudair and Al-Towaijri (2006) witnessed negative effect of fiscal deficit on money demand function and Faridi and Akhtar (2013) also captured the impact of population growth on money demand function in

their study. Considering the significance of exchange rate, fiscal deficit and population, in the present study, all these factors have been taken as explanatory factors of money demand function for a country like Pakistan.

1.5. Organization of the study:

Each section is separately defined in this study. Chapter 1 shows the background and significance of money demand function. Chapter 2 shows relevant literature. Chapter 3 highlights theoretical framework which shows the relationship of variables used in this study. Chapter 4 presents an overview of economic outlook of Pakistan. Chapter 5 shows the estimation of econometric methodology. Chapter 6 presents the interpretation of estimated results. Finally chapter 7 presents conclusion and policy recommendations of the study.

2. REVIEW OF LITERATURE

The previous studies concluded the long run relationship between money demand and other macroeconomic factors. Some literature is discussed here.

Khan and Sajjid (2005) analyzed the money demand function empirically using ARDL approach for Pakistan. The real income, inflation and real effective exchange rate were taken as important determinants for money demand. Time series data is used for analysis during 1982 to 2002. In long run, the independent variables were proved to be strong determinants of money demand but in short run, no relation was found between real effective exchange rate, interest rate and money demand. Hye et al. (2009) estimated money demand function using Johansen and Juselius maximum likelihood approach and fully modified ordinary least square (FMOLS) technique to estimate money demand function in the presence of real income, inflation, exchange rate and stock price. They tested this relationship empirically using time series data over the period 1971-2006 for Pakistan. The findings revealed that the stock price affects significantly and positively money demand but exchange rate does not affect significantly money demand. In short run inflation exerts negative and significant effect on money demand. Azim et al. (2010) investigated money demand function using Auto-Regressive Distributed Lag (ARDL) approach for the economy of Pakistan. The time series data were used for the period ranges from 1973-2007. The income, inflation and exchange rate were proved to be strong determinants of money demand. The income and inflation affect positively but exchange rate affects money demand negatively and money demand remained stable during 1973 and 2007.

Anwar and Asghar (2012) did analysis of money demand function using ARDL approach over the period from 1975-2009 for Pakistan. The variables like real income, exchange rate and inflation rate were used as explanatory variables. The empirical results showed co-integration between dependent and independent variables. The money demand function remained stable over time. Sarwer et al. (2013) estimated the money demand function and its stability over the period from 1972-2007 for Pakistan. In this study, three monetary aggregates were used but M2 money demand was found to be more appropriate in the formulation of monetary policy. The GDP depends positively while opportunity cost depends negatively on money demand. The findings

also investigated the importance of financial innovation in formulating the monetary policy. Abdullah et al. (2013) used disaggregated expenditure approach to find out the factors affecting money demand in Pakistan. Johansen co-integration approach is utilized to evaluate the co-integration among the variables in this study. Co-integration was observed in the variables. The findings revealed that investment expenditures, consumption expenditures and government expenditures respond positively towards money demand. Money demand is less elastic to expenditures on exports and price level. Faridi and Akhtar (2013) investigated money demand function for long run in Pakistan. The annual time series data was used over the period 1972-2011. The technique, which employed to find co-integration among variables, was Auto-Regressive Distributed Lag (ARDL). The variables proved important determinants of money demand in Pakistan. Income affects money demand positively while deposit rate negatively). While population affects money demand positively, and findings revealed that exchange rate affects money demand negatively.

Malawi (2001) explored the factors affecting money demand function using OLS estimation technique for Jordan over the period 1969-1997. The results illustrated the positive impact of income and negative impact of inflation rate on money demand. The inflation rate is used as a measure of the opportunity cost of holding money. Hwang (2002) explored the major determinants affecting money demand in the long run for the economy of Korea. For analytical purpose, the Johansen Juselius maximum likelihood method of co-integration was used. He observed that M1 has not significant relationship with its determinants i.e. real income and real rate of interest. For the measurement of opportunity cost of holding money, he chose long term interest rate instead of short term interest rate. The findings showed that M2 is better monetary aggregate to see the impact of monetary policy on economic growth rather than M1. Mohsen and Sungwon (2002) investigated money demand function in Korea. They employed ARDL approach to examine the co-integration among variables used in the study. The empirical findings showed co-integration between money demand and income, interest rate, exchange rate but money demand function remained unstable due to the external shocks, observed in 1997.

Haghighat (2011) analyzed the function of money demand empirically for Iran during 1968-2009. He selected variables like, income, inflation and exchange rate to see the impact of these

variables on money demand in the long run. The Johnson and Jusilius co-integration test was employed to observe co-integration in variables. The results showed stability of money demand function and its relationship with income, inflation and exchange rate in the long run. In the study, positive link was found between real income and money demand function that is also consistent with macroeconomic theory. Dritsakis (2011) made another attempt to determine money demand function for Hungary. In this study, ARDL approach was utilized to estimate the demand for money for the period ranges from 1995-2010. This approach is used to co-integrate analysis in any analysis. The empirical findings revealed co-integration in variables. After applying CUSUM and CUSUMSQ tests, and the monetary aggregate M1 is found to be stable. The independent variables i.e. real income, inflation and nominal exchange rate determine money demand in the long run. Inflation and nominal exchange rate effects negatively while income affects money demand positively.

Bashier and Dahlan (2011) explored the determinants of money demand for Jordan over the period 1975-2009. They employed CUSUM and CUSUMSQ tests to estimate the stability of money demand function and Johansen-Jusilius maximum likelihood technique to find the co-integration among variables. The findings showed the existence of co-integration among variables used in this study. Positive relationship was found between real income and money aggregate (M2) while the negative relationship was observed between interest rate and money demand. By incorporating CUSUM and CUSUMSQ stability test, the money demand (M2) remained stable over time. Bhatta (2013) did analysis of money demand function for Nepal using ARDL approach in long run to find co-integration among demand for real money balance, real income and interest rate. Annual data were used for analytical purpose over the period 1975-2009. The findings showed that GDP growth and interest rate determined money demand in long run. The money demand function is stable and central bank can rely on monetary aggregates to achieve economic objectives.

Alauddin and Valadkhani (2003) explored some determining factors of money demand for eight developing countries like Malaysia, Chile, Thailand, Papua New Guinea, Bangladesh, Sri Lanka, Sierra Leone and Philippines. The annual time series data were employed for the period ranges from 1979- to 1999. The seemingly unrelated regression (SUR) estimation technique was used to

estimate money demand function in studies. The findings showed the positive link between income and money demand, while negative link was observed between inflation, interest rate, US long-term interest rate and money demand. Harb (2004) investigated the function of money demand in the long run employing FMOLS technique for estimation. The panel data were used for the period ranges from 1979-2000. This study was conducted for six gulf cooperation countries (GCC). For money demand both M1 and M2 measures were adopted and GDP was used as a scale variable. The co-integration was observed among all variables used in the study. The findings suggested that the interest rate and exchange rate affect money demand negatively while income affects positively. Bahmani-oskooee and Rehman (2005) examined the money demand function using ARDL bounds testing approach for seven Asian countries. The stability of money demand function was investigated using CUSUM and CUSUMSQ tests. In India, Indonesia and Singapore, co-integration was observed between money demand (M1) and its determinants and it remained stable over time. In Pakistan, Malaysia, Philippines and Thailand, money demand (M2) was found to be co-integrated with its determinants used in this study and it remained stable over time.

2.7 Identification of gap:

There are various macroeconomic factors which effect money demand function. These factors are exchange rate, interest rate, real income, fiscal deficit, inflation, external and internal debt, tax revenue, energy crises, oil shocks etc. The relationship between money demand and above mentioned variables has ever been of vital importance for the researchers. Mundell (1963) argued that exchange rate could affect money demand. He further said that exchange rate is a major determinant of money demand along with income and interest rate. Another variable like fiscal deficit can also affect money demand. The two major approaches like Keynesian proposition and Ricardian equivalence provide explanation to investigate the relationship between money demand and fiscal deficit. These approaches were tested empirically. Vamvoukas (2010) also tested the relationship between fiscal deficit and money demand empirically. In our study, we incorporate fiscal deficit as an independent variable along with income, interest rate and exchange rate. Faridi and Akhtar (2013) investigated the link between population growth and money demand and concluded that population growth affects money

demand positively. Here we would also include the population factor in our model. We incorporate urban and rural population as independent variables to get some interesting results using ARDL bound testing approach. We take real income, interest rate, exchange rate, fiscal deficit urban and rural population as independent variables and money demand as dependent variable for our model. We apply ARDL bound testing approach to test the relationship between dependent and independent variables empirically for Pakistan. This would be a new addition in the previous literature of money demand function.

3. METHOD AND PROCEDURE OF THE STUDY

3.1. Model Specification:

The functional relationship of variables is given under.

$$LMON_t = f(LFISCDEF_t, LGDPPC_t, LEXCR_t, LINT_t, LURB_t, LRUR_t)$$

Whereas

LMON	=	log (Money demand (as a percentage of GDP))
LEXCR	=	log (Official exchange rate (LCU per US\$))
LGDPPC	=	log (Per Capita GDP)
INT	=	Real Interest Rate
LFISCDEF	=	log (Fiscal deficit as a percentage of GDP)
LURB	=	log (Urban population as (% of total population))
LRUR	=	log (Rural population as (% of total population))

3.2. Data Source:

The data on official exchange rate, GDP per capita, urban population, rural population and money demand (M2) is obtained from World Development Indicators (2015), World Bank. However, the data on fiscal deficit is collected from Pakistan Economic Survey (Various

Volumes and Issues) and data on real interest rate is collected from International Financial Statistics (2015), International Monetary Fund. The sample ranges from 1972 – 2013.

3.3. Estimation Techniques:

3.3.1. Ng-Perron for Unit Root Problem:

Ng Perron (2001) unit root test will be used to test unit root problem. The null hypothesis of the test suggests series is stationary whereas this hypothesis will be accepted or rejected on the basis of the calculated value of MZa. If it lies in critical region then we will reject null hypothesis otherwise we will accept it.

3.3.2. Estimating Co-integration using Autoregressive Distributed Lag Model (ARDL):

The autoregressive distributed lag (ARDL) model will be applied in this study. This model was developed by Pesaran et al. (2001). This approach is single equation model. This is applied in case when data series follows mixed order of integration. If the calculated value of F test turns larger than its upper critical value then cointegration between dependent and independent variable will be confirmed otherwise cointegration will not exist between dependent and independent variables. The equation of ARDL for the proposed model is crafted as below:

$$\begin{aligned} \Delta LMON_t &= m_{10} + m_{11} LMON_{t-1} + m_{12} LFISCDEF_{t-1} + m_{13} LGDPPC_{t-1} \\ &+ m_{14} LEXCR_{t-1} + m_{15} INT_{t-1} + m_{16} LURB_{t-1} + m_{17} LRUR_{t-1} + \\ &n_{11} \sum_{i=1}^p \Delta LMON_{t-i} + n_{12} \sum_{i=0}^p \Delta LFISCDEF_{t-i} + n_{13} \sum_{i=0}^p \Delta LGDPPC_{t-i} \\ &+ n_{14} \sum_{i=0}^p \Delta LEXCR_{t-i} + n_{14} \sum_{i=0}^p \Delta INT_{t-i} + n_{15} \sum_{i=0}^p \Delta LURB_{t-i} \\ &+ n_{16} \sum_{i=0}^p \Delta LRUR_{t-i} + \gamma_{11} \end{aligned}$$

The equation will guide to find long run relation between dependent and independent variables and this equation will also provide long run coefficients. Furthermore, after modifying this equation we will be able to find short run coefficients for this study. The modified equation for short run is given as below:

$$\begin{aligned} \Delta LMON_t = & n_{10} + n_{11} \sum_{i=1}^p \Delta LMON_{t-1} + n_{12} \sum_{i=0}^p \Delta LFISCDEF_{t-1} + \\ & n_{13} \sum_{i=0}^p \Delta LGDPPC_{t-1} + n_{14} \sum_{i=0}^p \Delta LEXCR_{t-1} + n_{14} \sum_{i=0}^p \Delta INT_{t-1} \\ & + n_{15} \sum_{i=0}^p \Delta LURB_{t-1} + n_{16} \sum_{i=0}^p \Delta LRUR_{t-1} + \omega_{11} ecm_{t-1} + \delta_{11} \end{aligned}$$

The coefficient of first period lagged error term will confirm whether the proposed model in this study follows convergence hypothesis or not. If the coefficient is negative and significant then it will provide evidence of convergence hypothesis and vice versa otherwise.

4. DATA ANALYSIS AND INTERPRETATIONS

In descriptive statistics, the probability of Jarque – Bera test will guide whether all the variables follow normal distribution or not? As the probability values for all the variables except fiscal deficit are insignificant for Jarque – Bera test therefore, all the selected variables other than fiscal deficit of this study follow normal distribution. The results are given in the Table – 4.1 which is given as below:

Table: 4.1 Descriptive Statistics

Series	LMON	LRUR	LURB	INT	LGDPPC	LFISCDEF	LEXCR
Mean	3.7453	4.2278	3.4389	8.7730	10.5221	0.4280	3.3063
Standard Deviation	0.0918	0.0513	0.1122	2.4208	0.2683	0.3046	0.8100
Jarque-Bera	0.3195	1.8644	1.7494	3.4548	2.2907	1015.2320	3.7663
Probability	0.8524	0.3937	0.4170	0.1777	0.3181	0.0000	0.1521

In the Table – 4.2 the results of Ng – Perron unit root test are presented. The results show that at level specification per capita GDP, fiscal deficit, exchange rate, interest rate and rural population

are witnessed as stationary but all other variables are witnessed as nonstationary variables. However, all the variables at first difference specification are found as stationary variables. The results are given as below:

Table – 4.2: Ng – Perron Unit Root Test

Ng- Perron Test Statistics				
Variable	At Level			
	MZa	MZt	MSB	MPT
LMON	-4.59671	-1.42883	0.31084	5.49788
LFISCDEF	-18.1398	-2.93544	0.16182	1.62387
LGDPPC	-11.3219	-2.19931	0.19425	2.84360
LEXCR	-20.5386	-3.06263	0.14912	1.68150
INT	-6.90629	-1.76603	0.25571	3.86559
LURB	1.46534	1.19933	0.81846	53.0730
LRUR	-14.3149	-2.45888	0.17177	2.50677
Variable	At First Difference			
	MZa	MZt	MSB	MPT
Δ LMON	-18.3008	-3.01511	0.16475	1.37444
Δ LFISCDEF	-15.1034	-2.74629	0.18183	1.62876
Δ LGDPPC	-17.0622	-2.90616	0.17033	1.48986
Δ LEXCR	-15.1630	-2.75279	0.18155	1.61829
Δ INT	-19.7926	-3.14538	0.15892	1.23947
Δ LURB	-10.6406	-2.30293	0.21643	2.31681
Δ LRUR	-21.5759	-3.06180	0.14191	1.88145
Asymptotic Critical Values				
Level of Significance		1 Percent	-13.8000	
		5 Percent	-8.10000	
		10 Percent	-5.70000	

As the unit root test confirms presence of mixed order of integration therefore, ARDL test is applied for finding long run relationship between money demand and its determinants. The estimates of cointegration method are shared in the Table – 4.3 which provides evidence of long run cointegration between money demand and its determinants in Pakistan on the basis of the value of F – test which is 3.87 and it exceeds the value of upper critical bound at 10 percent level of significance which is 3.5833. Moreover, the results are robust to the diagnostics such as serial correlation, functional form, normality and heteroscedasticity tests. The results are presented as below:

Table: 4.3 Autoregressive Distributed Lag Estimates

Estimated Model		$LMON_t = f(LFISCDEF_t, LGDPPC_t, LEXCR_t, INT_t, LURB_t, LRUR_t)$		
Optimal lags		(1,0,0,1,1,0,0)		
F – Test		3.8700		
W – Test		27.0903		
Level of Significance	Lower Critical Bound	Upper Critical Bound	Lower Critical Bound	Upper Critical Bound
At 5 %	2.7790	4.2045	19.4530	29.4318
At 10 %	2.3208	3.5833	16.2455	25.0834
Diagnostic Tests				
R-Bar-Squared	0.4673	Serial Correlation	0.5022 [0.479]	
F – Stat F (9,31)	4.8985[0.000]	Functional Form	0.5384 [0.463]	
Akaike Info. Criterion	50.2653	Normality	2.8351 [0.242]	
Schwarz Bayesian Criterion	41.6974	Heteroscedasticity	0.0806 [0.776]	

The long run coefficients are reported in Table – 4.4 which demonstrate that interest rate has negative and significant effect on money demand in long run in Pakistan. This finding is consistent with Sarwar et al. (2013) and Azim et al. (2010) who concluded the same result. Moreover; the real GDP has negative but insignificant effect on money demand in long run in Pakistan. Abdullah et al. (2010) found the similar results for Malaysia, Indonesia, Philippines and Thailand. The following Table – 4.4 contains long run coefficients:

Table – 4.4: Long Run Coefficients using ARDL Approach

Dependent variable is LMON				
Variables	Coefficients	Standard Errors	t - Statistics	Prob. Value
LFISCDEF	0.28823	0.29602	0.97367	0.338
LGDPPC	-0.9094	0.8059	-1.1285	0.268
LEXCR	-0.9663	0.4337	-2.2283	0.033
INT	-0.0014	0.0008	-1.8513	0.074
LURB	-0.1140	0.1129	-1.0096	0.320
LRUR	-0.7903	0.4406	-1.7937	0.083
C	391.5035	227.9075	1.7178	0.096

The results further expose that both exchange rate and rural population have negative and significant effect on money demand. The negative effect of exchange rate is aligned with Azim et al. (2010). This study also shows that money demand increases if budget deficit increases however, the coefficient is insignificant. The positive coefficient of budget deficit is supported by Khrawish et al. (2012). The coefficient of urban population insignificant reduces money demand in long run in Pakistan. After discussing long run coefficients, the results of short run coefficients are estimated using error correction representation for the selected ARDL model and results are shared in below Table – 4.5:

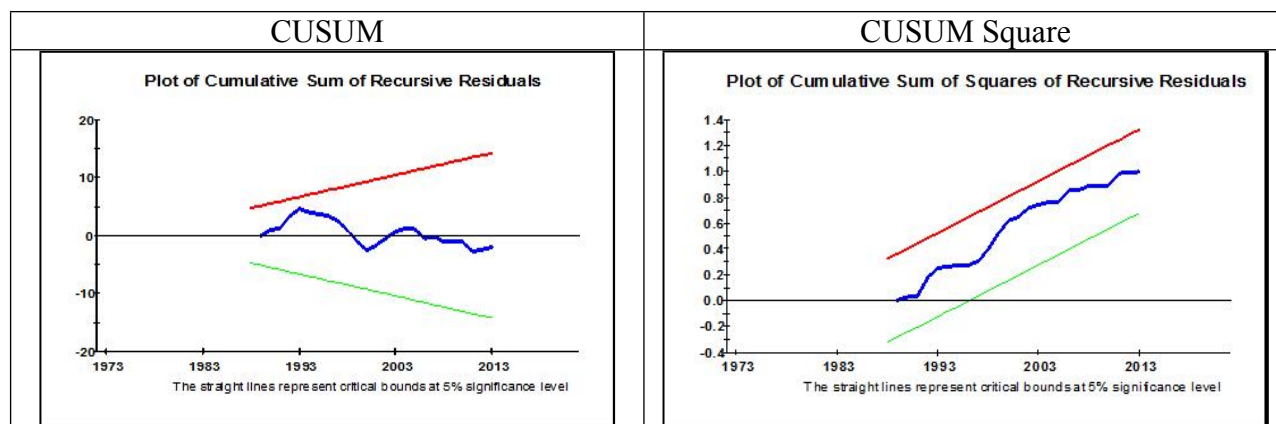
Table – 4.5: Error Correction Representations for the selected ARDL Model

Dependent variable is $\Delta LMON$				
Variables	Coefficients	Standard Errors	t – Statistics	Prob. Value
$\Delta LFISCDEF$	0.1830	0.1930	0.9483	0.350
$\Delta LGDPPC$	-0.5774	0.4947	-1.1673	0.251
$\Delta LEXCR$	-0.6135	0.3043	-2.0161	0.052
ΔINT	-0.0009	0.0005	-1.9063	0.065
$\Delta LURB$	5.009	2.4933	2.0089	0.053
$\Delta LRUR$	13.0657	6.5845	1.9843	0.056
ecm_{t-1}	-0.6349	0.1482	-4.2847	0.000
R-Squared		0.4876	R-Bar-Squared	0.3388
S.E. of Regression		0.064	F-Stat. F(7,33)	4.2139[.002]
Mean of Dependent Variable		-0.006	Residual Sum of Squares	0.12694
S.D. of Dependent Variable		0.078695	Akaike Info. Criterion	50.2653
Equation Log-likelihood		60.2653	DW-statistic	1.7939
Schwarz Bayesian Criterion		41.6974		

The results of error correction model disclose that both interest rate and exchange rate significantly reduce money demand whereas both rural and urban population shares significantly increase money demand in Pakistan. Whereas, both fiscal deficit and real GDP per capita are found as insignificant factors for short run which affect money demand. The negative and significant coefficient of one period lagged error term provides evidence of convergence of money demand function from short run disequilibrium to long run equilibrium. After discussing short run coefficients, now the stability of money demand function is tested during the period from 1972 to 2013. For this purpose both CUSUM and CUSUM square graphs are used. The Figure – 4.1 shows that both mean and variance of the error term are with critical bounds

therefore, both mean and variance of error term are stable therefore, the estimated long and short run coefficients are also stable during the period from 1972 to 2013. The Figure – 4.1 is presented as below:

Figure – 4.1: Stability Test



5. CONCLUSION AND POLICY RECOMMENDATIONS

5.1. Conclusion:

The main purpose of our study is to investigate those factors affecting money demand function for Pakistan over the period from 1972 to 2013. We select money demand (M2) as dependent variable and real income, interest rate, exchange rate, fiscal deficit and urban and rural population as independent variables. The data for all variables are taken from World Development Indicators (WDI) except fiscal deficit. The data of fiscal deficit is taken from Pakistan Economic Survey.

The process of estimation initiates from applying unit root tests i.e. Ng-Perron test and KPSS test. These two tests are useful for estimating small sample size and the above both unit root tests give superior estimations. After applying unit root tests, we are able to observe stationary at level or at first difference. If some of our data is stationary at level and first difference then it will be necessary to apply ARDL test. The ARDL bound testing approach is employed to observe the co-integration in variables. The results revealed that all variables are co-integrated and have stable long run relationship with money demand except fiscal deficit, real income and urban

population. The interest rate, exchange rate and rural population exert negative and significant effect on money demand in the long run. In case of short run, all variables exert significant effect on money demand except fiscal deficit and per capita GDP. The urban and rural population affects positively money demand in short run. The money demand function is found stable over time in Pakistan.

5.2. Recommendations:

The policy implications emerging from our study can be summarized as follows.

First, our estimations suggest that monetary authorities should use monetary targeting (M2) in implementing monetary policy. We found a stable money demand function for Pakistan. In our model, we incorporate exchange rate, fiscal deficit and urban and rural population in addition to interest rate and income in our model. It distinguishes our model from previous conventional models having interest rate and real income only. Conclusively, this model provides wide range of variables used as determinants of money demand. Policy makers are able to understand three things: depreciation of exchange rate leads to currency substitution or not; change in income and interest rate make any change in money demand or not; whether fiscal deficit affects significantly money demand or not. The stable money demand function needs in the execution of monetary policy for our economy. In Pakistan, there is need to control inflation and high interest rate. In this regard, monetary policy plays vital role especially stable money demand function. This will promote economic activities and real sector of the economy.

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