

**DEMAND FOR REAL MONEY BALANCES BY BUSINESS SECTOR:
AN ECONOMETRIC INVESTIGATION**

Hina Ali^{1§}, Imran Sharif Chaudhry² and Iqra Hameed¹

¹ Department of Economics, The Women University, Multan, Pakistan

² School of Economics, Bahauddin Zakariya University, Multan, Pakistan

[§] Corresponding Author Email: hinaali@wum.edu.pk

ABSTRACT

Money Demand is a macroeconomic concept. Basically it is concerned with the application of monetary policy. The present study aimed at reckoning the impact of inflation on real money balances by business sector. The current paper estimate the demand for real money balance by business sector from 1980-2015, by using a comprehensive time series data for the developing country Pakistan. Many factors cause and effect real money balance of business sector such as, Inflation, Consumption, Exchange rate and many others. The real money balance is directly and inversely effected by such factors. The time series data contains the problem of stationarity, to resolve this problem Augmented Dickey Fuller (ADF) unit root test is employed. The mixture of I(0) and I(1) is certified by ADF test. The present scenario recommended the ARDL technique of econometrics. By employing it we conclude that there exist long run Cointegration among regressand and regressors. Here stability test shows that there is disequilibrium in short run but in long run it should be stable and in equilibrium. The result of this study proves that Inflation rate is an important determinant of demand for real money balances by business sector.

KEYWORDS

Real Money Balances, Gross Domestic Product, Consumption, Investment Real Effective Exchange Rate, Inflation Rate.

1. INTRODUCTION

As we know that classical's are the supply sidiers and they don't consider much role of money, according to them money is only a "Medium of Exchange". While Keynes presented the concept of demand for money after the great depression of 1930. He says that Demand for Money has three parts but most important are Transactive and Speculative demand for money. "Money as a store of wealth completes with other assets such as real estates and so on. It is expected that the level of increase in prices is the opportunity cost of these durable Items (Sowa 1933)."

Real money balance was literally defined as the real purchasing power of the stock of the people or the business firms. Here we mainly concerned with the monetary policies. In this regard monetary economics has a great importance in this respect. It provide a major tool which is used to solve the problems regarding macroeconomics. Money

supply and money demand are its major components. As money supply is exogenously determined while monetary policy is concerned with the money demand. Money demand is affected by many other variables. Monetary policy is defined as “as policy employing central bank’s control of the supply of money as an instrument for achieving the objectives of general economic policy”. Monetary policy is used to attain the full employment, price stability, economic growth and balance of payment.

According to Pakistan the monetary policy is conducted by the state bank of Pakistan. He controls the supply and demand for money. He also controls the exchange rate. The two major sectors domestic and commercial has importantly discussed. Domestic sector is just occupied the only country’s income or demand and supply of non-commercial sector. And commercial sector discussed the industrial sector or business sector.

Econometrically we draw our model as the real money balance is a function of CONS, ER, FI, GDP and INF are used as variables. We check the stationarity of all variables. Some of present study based variables are stationary at 1st difference while some are at level. So OLS is not used. These results suggest that ARDL is the suitable econometric technique to work further on it.

2. LITERATURE REVIEW

Qayyum (2000) estimated the demand for real money balances by business sector. This paper used annual time series data from 1960 -1991 and used partial adjustment mechanism technique. This study took variables like real money balances by business sector (RMDB), real sales (Rs), interest rate(r), rate of inflation (PE), seasonal dummies (D). The final result showed that these variables are not stationary.

Qayyum (2001) examined sectorial study of demand for real money balance. In this paper quarterly time series data is observed. In this study error correction model approach is used to observe the relationship among real money balances and its determinants. This study depends upon the following variables as income (Y), bound rate(BR) interest rate (int) and rate of inflation (INF). From cointegration approach it was clearly stated that there exist long term association among regressor and regressand. The result of this study was that any change in interest rate were more effect on personal sector, changer in inflation rate were no effect on business sector.

Khan and Z. Sajjid (2005) investigated the monetary dynamics and exchange rates through autoregressive distributed lag model. In this study we used 20 years data from 1982 -2002. In this study quarterly time series data is used. ARDL procedure was freshly designed. This paper based on logarithm of nominal money balances (MB), price (P), real income (RY), and interest rate (INT) and inflation (INF). Finally it shows that real money balance is a direct function of income, while indirect function of interest rate and inflation rate.

Kutlar and Bakirci (2007) out looked cointegration analysis of money demand in turkey. This study used time series data from period 1987-1999. This study used error correction model to specify the variables and their relations. The variables used in this study was real money balances (RMB), income (Y), inflation (INF) and exchange rate

(ER). In the above study money demand, income, money and non-money returns and their relation with inflation was dealt in detail.

Malik and Aslam (2010) investigated that how demand for money in Pakistan was affected by financial innovation. This paper used time series data from period 1957-2008 using ARDL technique. This study used money demand (MD), income per capita (GDP), call money rate (CMR), financial innovation (FI) and rate of inflation (INF) as regressand and regressor respectively. Stationarity of the variables are observed. This study concluded that in case of Pakistan definitely there be the momentous relationship among variables.

Herve and Shen (2011) examined the money demand of d'Ivoine: confirmation through cointegration analysis. This study used the data from 1980-2007 showed the long and short term associations between the explained and explanatory variables. In this study we took the variables like real money stock (RMS), real income (RY) and interest rate (INT). This paper used annual time series data of 28 years. In this paper the cointegration technique was used. In this study the stationarity of the parameters are observed. While the cointegration technique was used to explain the existed relationship among variable. This study was useful in making the policies for the country which was particularly studied.

Dahmardeh and Lzadi (2011) studied money demand function of Iran by using freshly invented technique ARDL. This study was used to estimate demand for money of Iran from 1971-2005. This paper used ARDL for long run and error correction model for short run analysis. The variables in this study were as money demand (MD), income (Y), exchange rate (ER), inflation (INF) and interest rate (INT). It was concluded that macro policies in Iran not only focused on stabilizing economy but they also focused on achieving equilibrium exchange rate and inflation rate in domestic economy.

S. Anwar and N. Asghar (2012) observed stability of money demand in Pakistan. This study analyzed the association among (RMD), income (RY), inflation (INF) and exchange rate (ER). For long run analysis ARDL was used. This study used annual time series technique from period 1975-2009. Finally the overall study showed that financial experts must focused on the lengthy time period's stability of real money balances and monetary policy.

Sarwar et al. (2013) studied the Pakistan's stable money demand function. In this paper time series data was taken and this study also used modern techniques for the estimation of variables. This study take data from 1970 to 2007. This study took real money balances (RMB), real income (RY), financial innovation (FI),inflation (INF) and interest (INT). This study used M1, M2, and M3 for the estimation of real demand for money. It helped to formulate correct information for monetary policy.

Naduka (2014) studied long run steadiness of demand for actual wide-ranging money function of Nigeria through G.H approach. This study used time series data from period 1970-2012. In this study real money balances (RMB), income (Y), interest rate (INT) and inflation (PE) are used as variables. It was concluded that response variable is directly affected by income while indirectly affected by inflation and interest rate.

Havi et al. (2014) out looked long run steadiness of Ghana through cointegration approach. In this article time series analysis was used. The study took variables such as real money demand (RMD), domestic interest rate (DI), nominal exchange rate (ER), expected inflation (PE). In this study the data was used from 1978 to 1990. The final result shows that all the variables were stationary at 1st difference. The variables of this study were stationary at 5% level of significance with constant and trend.

3. DATA AND METHODOLOGY

3.1 Data

The data in this study was collected from world development indicators. This data set contain 35 financial years. The data in this study we used was annual time series data from period 1980-2015. This data is collected from different sources like world development indicators, state bank of Pakistan etc. In this study RMB, CONS, ER, FI, GDP and INF are used as variables.

Table 1 encapsulates the dependent and independent variables of present study.

Table 1
Description of Variables

Variables	Description of the variables	Measurement Unit
<i>Dependent variable</i>		
RMB	Real Money Balance	Rupees(millions)
<i>Independent variables</i>		
CONS	Consumption	In percentage
ER	Exchange Rate	Index 2010=100
FI	Financial Innovation	In percentage
GDP	Gross Domestic Product	In percentage
INF	Inflation	In percentage

This table shows all the variables which have been used in this research. Table also shows the units of measurement of the variables. Real Money Balances (RMB) has been taken as dependent variable while Consumption rate (CONS), Exchange rate (ER), financial innovation (FI), Gross Domestic Product (GDP) and Inflation rate (INF) as independent variable.

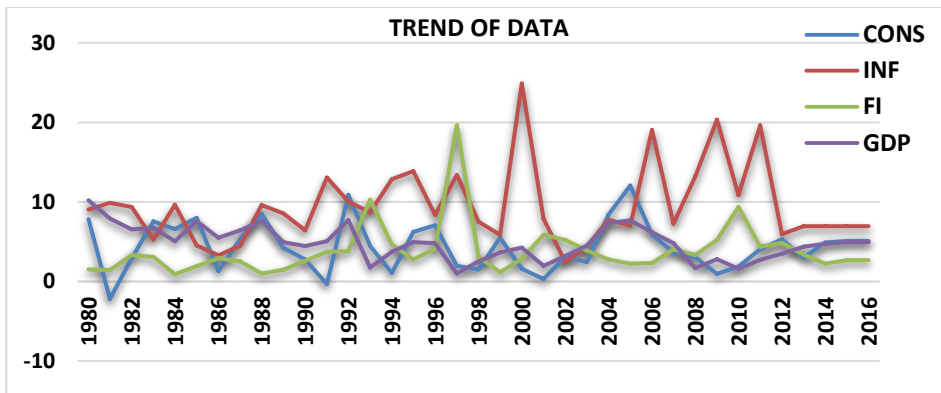


Figure 1: Trend of Demand for Real Money Balances by Business Sector

In this diagram we explain the relationship among variables from 1980 to 2015. It is quite clear that Real money balance is a Response Variable while Consumption, Exchange rate, Financial innovation, Gross domestic product and inflation rate are explanatory variables. These all effect the response variable either in increasing or decreasing trend.

3.2 Econometric Issues

In this section we deal with the problem of stationarity which presents in time series data. As our current study based on time series data so we have to use the test of stationarity. There are different test regarding it but we use Augmented Dickey Fuller (ADF) test presented by Dickey and Fuller (1981). If the given variables are time variant means their variance is changed with change in time. Such situation is called UNIT ROOT. Due to this our variables become non-stationary. To solve out this problem we apply some tests on our data to make sure that the;

- ❖ E (regressand) = always a constant value
- ❖ Var (regressand) = also a constant value

There are various types of test to check the stationarity of the variables. There are so many tests for this purpose the list of these variables are as follows:

- Dickey-Fuller test (1979)
- Augmented-Dickey-Fuller test (1981)
- Ng-Perron test
- Elliott-Rothenberg-Stock point-Optimal etc.

Consider the AR(1) model

$$Y_t = \Phi Y_{t-1} + \mu_t$$

Here,

- If $\Phi < 1$ then series are Stationary
- If $\Phi = 1$ then series Explodes
- If $\Phi > 1$ then series are Non-Stationary

Source: Authors' calculation from Eview's 9.5

Table 2
Results of ADF Test

Variables	At level			At 1 st Differences			Results
	Intercept	Trend & Intercept	None	Intercept	Trend & Intercept	None	Integration
RMB	--2.08	-3.88	-1.20	-7.96	-7.89	-7.97	I(1)***
CONS	-5.47	-5.38	-2.70	-7.41	-7.29	-7.53	I(0)*
ER	-2.07	-2.07	-2.36	-5.51	-6.49	-5.19	I(1)***
FI	-5.10	-5.12	-2.72	-6.95	-6.90	-7.07	I(0)***
INF	-5.49	-5.63	-0.85	-7.34	-7.24	-7.46	I(0)***
GDP	-3.82	-3.94	-1.79	-7.50	-7.48	-7.59	I(0)***

Authors' calculations, the (*, **, ***) shows the level of significance at 1%, 5% and 10% respectively.

This table shows that CONS, FI and INF and GDP are stationery at level i.e. I(0) while RMB and ER are at 1st difference i.e. I(1). The results of ADF unit root test recommended the ARDL the Auto Regressive Distributed Lag technique for the present research model

3.3 Model specification

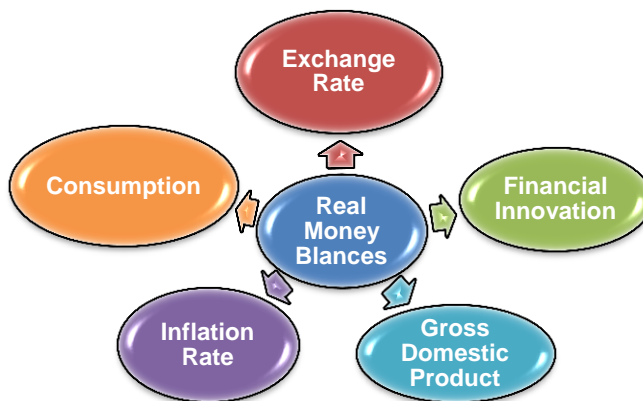
We discuss two types of models as given,

Specific Model

The econometric model is use to explain the relationship among variables as it provide best reliable results which are applicable in the real world. This model shows the impact of Consumption (CONS), Exchange rate (ER), financial innovation (FI), financial innovation (I), Gross Domestic Product (GDP) and Inflation rate (INF)

Our model is:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 \mu$$



where,

- Y = Real Money Balances (MD/P)
- X1 = Consumption (CONS)
- X2 = Exchange Rate (REER)
- X3 = Financial Innovation (M3/ GDP)
- X4 = Gross Domestic Product (GDP)
- X5 = Inflation Rate (INF)
- μ = Error term

As, is intercept and b_1, b_2, b_3, b_4 are the coefficients of the variables. We estimate the above model by using the suitable econometric technique.

This is the general ARDL Equation:

$$\begin{aligned} \Delta(RMB)_t = & \gamma_o + \sum_{i=1}^g \gamma_{1i} \Delta(RMB)_{t-i} + \sum_{i=0}^h \gamma_{2i} \Delta(CONS)_{t-i} + \sum_{i=0}^i \gamma_{3i} \Delta(ER)_{t-i} \\ & + \sum_{i=0}^g \gamma_{7i} \Delta(FI)_{t-i} + \sum_{i=0}^h \gamma_{8i} \Delta(GDP)_{t-i} + \sum_{i=0}^i \gamma_{9i} \Delta(INF)_{t-i} \\ & + \gamma_{10} (RMB)_{t-i} + \gamma_{11} (CONS)_{t-i} + \gamma_{12} (ER)_{t-i} + \gamma_{13} (FI)_{t-i} \\ & + \gamma_{14} (GDP)_{t-i} + \gamma_{15} (INF)_{t-i} + u_t \dots \dots \dots \end{aligned} \quad (1)$$

The Null Hypothesis is given as follows

$$H_o : \gamma_{10} = \gamma_{11} = \gamma_{12} = \gamma_{13} = \gamma_{14} = \gamma_{15} = \gamma_{16} = \gamma_{17} = \gamma_{18} = 0$$

(No longrun association)

$$H_1 : \gamma_{10} \neq \gamma_{11} \neq \gamma_{12} \neq \gamma_{13} \neq \gamma_{14} \neq \gamma_{15} \neq \gamma_{16} \neq \gamma_{17} \neq \gamma_{18} \neq 0$$

(Long run association happen)

Equation (1) explains the long run association among regressors and regressand.

$$\begin{aligned} \Delta(RMB)_t = & \alpha_o + \sum_{i=1}^{z_1} \alpha_{1i} (RMB)_{t-i} + \sum_{i=0}^{z_2} \alpha_{2i} (CONS)_{t-i} + \sum_{i=0}^{z_3} \alpha_{3i} (ER)_{t-i} \\ & + \sum_{i=0}^{z_4} \alpha_{4i} (FI)_{t-i} + \sum_{i=0}^{z_5} \alpha_{5i} (GDP)_{t-i} + \sum_{i=0}^{z_6} \alpha_{6i} (INF)_{t-i} + \mu t \end{aligned}$$

Equation 2 shows the adjusted value for the dependent variable poverty.

$$\begin{aligned} \Delta(RMB)_t = & \gamma_0 + \sum_{i=1}^{k_1} \gamma_{1i} \Delta(RMB)_{t-i} + \sum_{i=0}^{k_2} \gamma_{2i} \Delta(CONS)_{t-i} + \sum_{i=0}^{k_3} \gamma_{3i} \Delta(ER)_{t-i} \\ & + \sum_{i=0}^{k_4} \gamma_{4i} \Delta(FI)_{t-i} + \sum_{i=0}^{k_5} \gamma_{5i} \Delta(GDP)_{t-i} + \sum_{i=0}^{k_6} \gamma_{6i} \Delta(INF)_{t-i} + \lambda (ECM)_{t-1} \end{aligned}$$

Equation (3) shows the short run association. The term $(ECM)_{t-1}$ explains it.

Bound test of Cointegration

This test explains that either there exist a Cointegration among the variables or not. The results of bound test of Cointegration potted in Table 3.

Table 3
Results of Bound Test

Equation	F-Statistics Calculated	Upper Bound Critical Value	Result
Equation (1)	6.50	4.15	Co-integration
RMB, CONS, ER, FI	[0.00]	(99%)	
GDP, INF			Exits

Source: Authors' calculation from Eview's 9.5

Note: Calculated F-statistic: 7.47 (Significant at 1% marginal values). Critical Values at $k = 6-1=5$ is cited from Narayan (2005), the numbers in parenthesis shows the probabilities of F-statistic

The above table explains that there exist Cointegration among all variables as the value of F- statistics value is greater than the upper bound value. Here the choice of critical value based on Narayan (2005) is a traditional source of critical value of bound testing but upto maximum 7 parameters. Here we have 6 only.

Table 4
Descriptive Statistics

	RMB	CONS	ER	FI	GDP	INF
Mean	52554.8	4.368	123.966	3.9154	4.8569	9.6006
Median	21227.13	4.129	110.171	3.0833	4.8397	8.4793
Std. Dev.	63515.99	3.155	42.464	3.3513	2.1515	5.0222
Skewness	1.248	0.368	1.018	3.209	0.255	1.281
Kurtosis	3.428	2.855	3.581	14.892	2.600	4.367
Jarque-Bera	9.61	0.84	6.73	273.93	0.631	12.64
Probability	0.00	0.66	0.03	0.00	0.73	0.00

Source: Author's Calculation from Eview's 9.5

In the above table we show the analysis of the selected variables which are RMB, CONS, ER, FI, GDP, INF. We show the mean, median, maxima, minima, Skewness, j.b etc. Here it is quite clear that RMB, ER, FI & INF > 3 so they are LeptoKurtic while CONS & GDP < 3 shows MesoKurtic. Here CONS & GDP are normally distributed while others not.

4. RESULTS AND DISCUSSION

From the above discussion the result of stationarity recommends the ARDL (Auto Regressive Distributed Lag model) technique. ARDL the econometric technique was based on some particular assumptions which are:

- ❖ All variables are stationary at level i.e. I (0).
- ❖ All are stationary at 1st difference i.e. I (1).
- ❖ If there is a mixture of I (0, 1).
- ❖ But not at 2nd difference.

Here our variables full fill the 3rd assumption of applying ARDL. We estimate long run and short run coefficients. Long run estimates are presented in Table 5.

Table 5
Long Run Estimates of Coefficients

Estimated Long Run Coefficients using the ARDL Approach				
ARDL (1, 4, 4, 3, 4, 4) selected based on Schwarz Bayesian Criterion				
Dependent variable is RMB				
32 observations used for estimation from 1980 to 2015				
Regressors	Coefficients	Std. Error	T-Ratio	Prob
CONS	25276.60	8185.36	3.09	[0.02]
ER	281.596	246.08	-1.14	[0.29]
FI	5752.4	4811.14	-7.43	[0.00]
GDP	-55949.5	13852.10	-4.04	[0.00]
INF	-5232.932	4024.57	1.30	[0.24]

Source: Authors' calculations from Eview's 9.5

The above table shows the long run coefficients of the variables, this estimation shows that if one percent increase in CONS will increases 25276.60% real money balances and vice versa. One percent increase in ER will increases 281.59% real money balance and vice versa. Where one percent increase in FI will increases 5752.4% real money balances and due to one percent change in GDP 55949.5% poverty decreases. While one percent change in inflation will decreases real money balances by 5232.93% shows indirect relationship between real money balances and inflation.

Table 6
Short Run Results

ARDL (1, 4, 4, 3, 4, 4) selected based on Schwarz Bayesian Criterion				
Dependent variable is RMB				
32 observations used for estimation from 1980 to 2015				
Regressors	Coefficient	Standard Error	T-Ratio	[Prob]
dRMB	-0.851	0.143	-5.967	[0.00]
dCONS	-1798.51	1793.99	-1.003	[0.35]
dER	1326.22	295.76	4.484	[0.00]
dFI	-33833.4	1796.13	-2.134	[0.07]
dGDP	16486.4	7433.6	2.218	[0.06]
dINF	-4341.8	1061.6	-4.081	[0.00]
Coint Eq-1	-0.23	0.09	-2.38	[0.002]
Cointeq = RMB - (25276.6063 * CONS-281.5965 * ER - 35752.4738 * FI - 55949.5701 * GDP + 5238,9324 * INF + 342445.4579)				

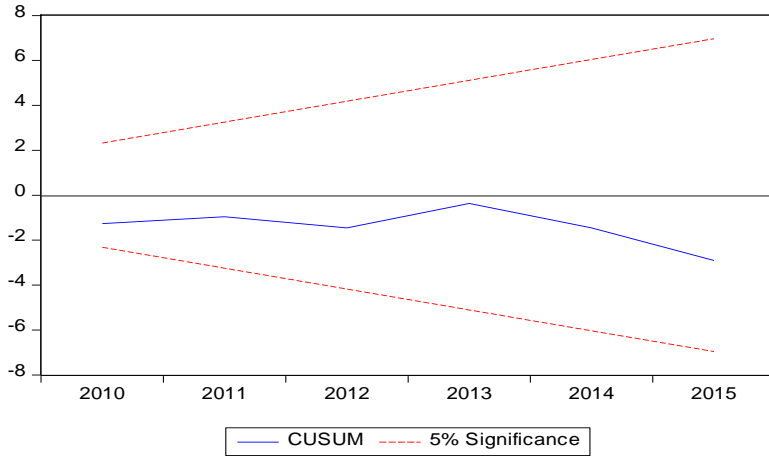
Source: Authors' calculations from Eview's 9.5

The table 6 shows the short run coefficients of selected variables. It explains that some of the variables are indirectly affect the real money balances while some directly. The ECM value shows that about 23% previous disequilibrium is adjusted in current period. There exist Cointegration and this model is stable also.

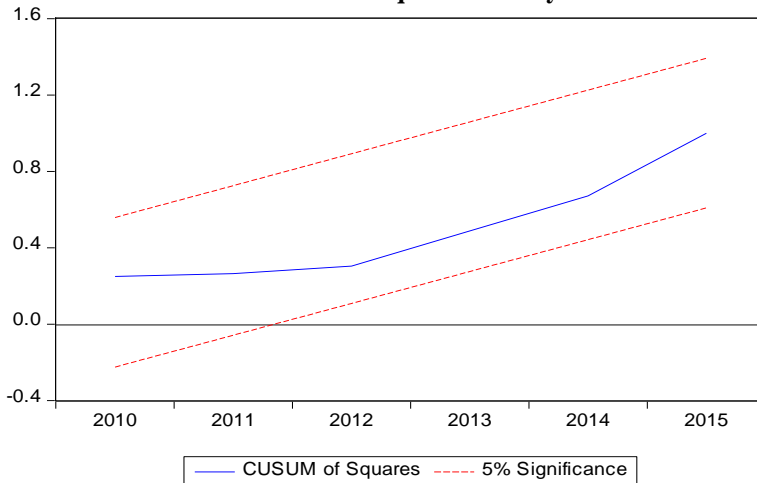
Stability Test

Stability of the model is shown by CUSUM and CUSUM of Square test. This is an important step of ARDL model through stability test we find that either our model is stable and good for economic conditions. The model is stable if its values lies within the range of 5% level of significance shown by red lines.

Stability Test of Model: [RMB|CONS, ER, FI, GDP, INF]



Plot of CUSUM of Square Stability Test



The CUSUM OF SQUARE test shows that for some time the model should not be consistent but after a patch of time it become stable as shown above.

5. CONCLUSION & POLICY IMPLICATIONS

The aim of this paper is to estimate the real money balances of the commercial sector. Here we use the annual time series data from 1980-2015. All the variables are stationary at I(0). Due to this we do not use the ordinary least square method. So we use the cointegration analysis for long and short run stability of variables. This test is used to make the adjustment which prevents the error in the long run relationship.

Here cointegration test is used to state the long run relationships and vector error correction model is used to detect the short run relationships. And this model made the 5.3% adjustments each year. In our present study we mainly discuss the effect of inflation and consumption. Both are negatively related with the real money balances.

As we know that there is disequilibrium in Pakistan's economy due to many problems but especially through political instability. As earlier we describe that monetary policy is controlled by SBP and it is control by the central authority of the country. Frequent changes in politician's policies disturb economic conditions and the monetary policy can't work properly. But the Pakistan's economic condition is progressing and I hope that in future we will become the developed one and compete with all developed nations (Inshaa Allah).

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