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Money Demand, Exchange Rate, and Remittances in Pakistan: A Vector Autoregressive Analysis

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Abstract

This paper analyzed the relationship between money demand, exchange rate, and remittances incase of Pakistan using annual time series data for the period 1972- 2014. The Vector autoregressive methodology has been employed to study relationship by analyzing the Granger Causality, Impulse Response Function, and the Variance Decomposition. The results reveal that there is unidirectional causality from remittances to money demand and exchange rate. Based on the impulse response function, a positive shock results in remittances increase in money demand. It shows that advent of remittances increase income of households and hence, increase in consumption on goods and services thereby increase in money demand. The negative trend between money demand and exchange rate shows that money demand decreases with the appreciation of exchange rate. It is recommended that exchange rate, remittances and management of monetary aggregates should be tracked in the right process, so that their management can lead in the direction of economic growth in the country.

I INTRODUCTION

An optimal monetary policy is essential for enhancing economic growth provided money is determined exogenously in the economy. The impact of money has been widely investigated on the basis of controversies of Keynesians and Monetarists in both developed and developing economies. According to Monetarists' view-point, money plays a crucial role that changes prices and income. Hence, there is causality from money to prices and income without any feedback. On the other hand, Keynesians' view-point describes that money has no any crucial role in the prices and income changes. Since the changes in money stocks are due to changes in income that shows the unidirectional causality from income to money while, the changes in prices are due to structural factors.

Pakistan is an open and emerging economy that trades with the rest of the world. It is one of the labor-intensive countries of the world that sends significant workers abroad to support

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their families by sending significant portion of their earnings to the home countries as remittances. Many developing economies are depending upon remittances to cover up scarce resources domestically in case of inadequate private capital inflows and dwindled official development assistance (Adenutsi & Ahortor, 2008). Moreover, remittances' transfers bring the households nearer to the available financial services in the country. All the financial institutions are committed to enhance the growth. Levine and Zervos (1996) confirmed the satisfactory and active role of the financial institutions in enhancing the growth in the country that may affect monetary transactions in the economy.

Intuitively, a rise in remittances would encourage households to increase the money holdings for transaction motives. Remittances can be seen as macroeconomic phenomenon due to receiving remittances by households in Pakistan. This trend may encourage the households to use US dollar as medium of exchange. As a result, this trend may enable households to buy more goods and services using US dollars in Pakistan. All the transactions of money balances depend upon exchange rate. Remittances also respond the changes in exchange rate (Yang, 2008). This suggests that remittances lead to substitution of Pak Rupee with US dollars hence affecting transaction of money stock.

Money demand depends on domestic variables such as income, prices or interest rates but in the context of open economy, it also relies on foreign variables such as remittances, exchange rate, and foreign interest rate (Verga-silvas. 2009). There is hardly a study conducted in Pakistan with regards to money demand, exchange rate, and remittance. Hence, there is need to examine causal relationship between money demand, exchange rate, and remittances in the case of open economy like Pakistan. Thus this paper attempts to investigate the relationship by using the Vector Autoregressive (Hereafter VAR) approach in the case of Pakistan with annual time series data for the period 1972-2014.

The remaining paper is organized in the following way. Section two discusses empirical literature review. Section three describes the data and methodology. Section four discusses the results, concluding with section five of the paper.

II LITERATURE REVIEW

Money demand function has always remained the focus of economics in both the developed and developing economies. Several exogenous variables have been considered to explain money demand function for narrow money demand and broad money demand. A large body of empirical literature review has estimated function for money demand in the developing countries including others Gupta and Moazzami (1989), Bahmani-Oskooee and Malixi (1991), and Simmons (1992). Gupta and Moazzami (1989) estimate money demand function for ten Asian countries comprise of Pakistan, India, Sri Lanka, Burma, Thailand Malaysia, Singapore, Philippines, Indonesia, and south Korea as a function of real gross national product, real total consumption, interest rate, and expected inflation rate. The empirical results show that real gross national product, real total consumption, interest rate, and expected inflation rate are significant factors in the study. Bahmani-Oskooe and Malixi (1991) estimate money demand function for 13 developing economies including Pakistan, Turkey, Egypt, India, Thailand, Philippines, Korea, Brazil, Peru, Portugal, Dominican Republic, Greece, and Mexico. The empirical results reveal that the fall in the domestic money demand is due to depreciation in the real effective exchange rate. Simmons (1992) estimate money demand function for five African developing countries including Congo, Cote d' Ivoire, Mauritius, Morocco, and Tunisia. The empirical results reveal that the

inflation along with domestic interest rate is an important factor in estimating money demand function in the economies. Agenor and Khan (1996) also estimate dynamic currency substitution model for the ten economies by incorporating rational expectations.

From the literature reviewed for money demand, there are lot of studies in both the developed and developing countries. However, no one has paid attention to the relationship of money demand, exchange rate and remittances except for Adenutsi and Ahortor (2008) for Ghanna and Verga-silvas (2009) for Mexico. Since Pakistan is lacking of such study, it is imperative to study the relationship between money demand, exchange rate and remittances in case of Pakistan by employing the VAR methodology. It is expected that results of the study may not be comparable with the existing studies in the body of literature review since Pakistan's economic conditions are different from Mexico and Ghana.

III METHODOLOGY AND DATA

Following Verga-silvas (2009), the model in the context of Pakistan economy takes the following form:

$$(LnM2)_t = f((LnREM)_t, (LnRER)_t) \quad \text{.....(1)}$$

$$(LnREM)_t = f((LnM2)_t, (LnRER)_t) \quad \text{.....(2)}$$

$$(LnRER)_t = f((LnM2)_t, (LnREM)_t) \quad \text{.....(3)}$$

Since the econometric models with nominal variables have severe caveats as compared to real variables (Sriram, 1999). To overcoming this problem, all the variables are used in real terms in this model. The broad nominal monetary aggregate (M2) consists of the total of the narrow money and quasi money. The real broad monetary balance (LnM2) is obtained by deflating nominal monetary balance by the 2006 deflator. All the variables including real monetary balances are expressed in terms of natural logarithm in this model.

Remittance (LnREM) is the variable under study and is expressed in million rupees. The real remittances are obtained by deflating the nominal remittances by 2006 deflator. Pakistan workers working abroad remit money helping their families and friends in US dollars through proper channels. The choice of decision depends upon the desire of households whether to convert the amount into Pak rupee to consume and invest, raising money demand for domestic currency. But households may not convert all the remittances in Pak rupee. It is arguably documented in developing countries that households mitigate unexpected risk of depreciation, holding foreign currency. The presence of dollarization in the economy facilitates the households to maintain their holdings in both currencies. Therefore, the sign of remittances with money demand is still puzzled and its impact on money demand may be negative and positive.

The nominal exchange rate of Pak rupee purchases the number of U.S. dollar. The real exchange rate RER is calculated by the formula as follows.

$$RER = \frac{EX * p^*}{P^d}.$$

where EX posits the nominal exchange rate in Pakistan rupee for US dollars. P^* is the foreign price level which is in US while the domestic price level (P^d) is in Pakistan. However, LnRER has unclear sign as negative or positive in the literature reviewed on the money demand. It varies from in different studies. The positive sign of the coefficient of real exchange rate indicates increase in domestic money demand and supports hypothesis of

wealth effect. The negative sign of the coefficient of real exchange rate results decrease in domestic money demand and supports hypothesis of currency substitution.

3.1 THE VAR METHODOLOGY

The VAR methodology was introduced by Sims (1980a) and has extensively been employed in macroeconomic modelling. It is a system of equations containing each variable as an endogenous is expressed it terms of own lags and other variables' lags (Hall *et al*., 1996). Following the McCarthy (2000), VAR model was applied to investigate impact of remittances and exchange rate on money demand as policy variable in Pakistan from 1972-2014. The VAR models are used only for the forecast purpose for economic variables with time series characteristics and have been found successful for the forecasting systems of interconnected variables (Hall *et al*., 1996). The VAR model is also commonly employed for system of variables to analyze the impact of different types of random instability on it such as the monetary transmission Mechanism.

The VAR model in terms of equations is expressed as follows. Consider the following three variables structural VAR, with only one lag[3]

$$(LnM2)_t = \gamma_{10} + b_{11}(LnREM)_t + b_{12}(LnRER)_t + \gamma_{11}(LnM2)_{t-1} + \gamma_{12}(LnREM)_{t-1} + \gamma_{13}(LnRER)_{t-1} + e_{(LnM2)t} \quad \ldots\ldots(4)$$

$$(LnREM)_t = \gamma_{20} + b_{21}(LnM2)_t + b_{22}(LnRER)_t + \gamma_{21}(LnM2)_{t-1} + \gamma_{22}(LnREM)_{t-1} + \gamma_{23}(LnRER)_{t-1} + e_{(LnREM)t} \quad \ldots\ldots(5)$$

$$(LnRER)_t = \gamma_{30} + b_{31}(LnM2)_t + b_{32}(LnREM)_t + \gamma_{31}(LnM2)_{t-1} + \gamma_{32}(LnREM)_{t-1} + \gamma_{33}(LnRER)_{t-1} + e_{(LnRER)t} \quad \ldots\ldots(6)$$

Transferring all the lagged value terms to the right side, system of the equations can be expressed as follows:

$$(LnM2)_t + b_{11}(LnREM)_t + b_{12}(LnRER)_t = \gamma_{10} + \gamma_{11}(LnM2)_{t-1} + \gamma_{12}(LnREM)_{t-1} + \gamma_{13}(LnRER)_{t-1} + e_{(LnM2)t} \quad \ldots\ldots(7)$$

$$(LnREM)_t + b_{21}(LnM2)_t + b_{22}(LnRER)_t = \gamma_{20} + \gamma_{21}(LnM2)_{t-1} + \gamma_{22}(LnREM)_{t-1} + \gamma_{23}(LnRER)_{t-1} + e_{(LnREM)t} \quad \ldots\ldots(8)$$

$$(LnRER)_t + b_{31}(LnM2)_t + b_{32}(LnREM)_t = \gamma_{30} + \gamma_{31}(LnM2)_{t-1} + \gamma_{32}(LnREM)_{t-1} + \gamma_{33}(LnRER)_{t-1} + e_{(LnRER)t} \quad \ldots\ldots(9)$$

$$\begin{bmatrix} 1 & b_{11} & b_{12} \\ b_{21} & 1 & b_{22} \\ b_{31} & b_{32} & 1 \end{bmatrix} \begin{bmatrix} (LnM2)_t \\ (LnREM)_t \\ (LnRER)_t \end{bmatrix} = \begin{bmatrix} \gamma_{10} \\ \gamma_{20} \\ \gamma_{30} \end{bmatrix} + \begin{bmatrix} \gamma_{11} & \gamma_{12} & \gamma_{13} \\ \gamma_{21} & \gamma_{22} & \gamma_{23} \\ \gamma_{31} & \gamma_{32} & \gamma_{33} \end{bmatrix} \begin{bmatrix} (LnM2)_{t-1} \\ (LnREM)_{t-1} \\ (LnRER)_{t-1} \end{bmatrix} + \begin{bmatrix} e_{(LnM2)t} \\ e_{(LnREM)t} \\ e_{(LnRER)t} \end{bmatrix} \quad \ldots\ldots\ldots(10)$$

Or the above form can be expressed in a compact form in following way:

$BZ_t = B_o + \Gamma Z_{t-1} + \mu$

Transferring matrix B to the right side, we get

$Z_t = B^{-1}B_o + B^{-1}\Gamma Z_{t-1} + B^{-1}\mu$

$Z_t = A_o + A_1 Z_{t-1} + et$……(11)

3 For Simplicity we have taken one lag. However for the selection of appropriate lag we have used the criterion like Likely hood Ratio (LR), Akaike Information (AIC), and Schwartz Criteria (SC).

Where $Z_t = \begin{bmatrix} (LnM2)_t \\ (LnREM)_t \\ (LnRER)_t \end{bmatrix}$, $A_0 = \begin{bmatrix} a_{10} \\ a_{20} \\ a_{30} \end{bmatrix}$, $A_{1=} \begin{bmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{bmatrix}$, and $e_t = \begin{bmatrix} e_{(LnM2)t} \\ e_{(LnREM)t} \\ e_{(LnRER)t} \end{bmatrix}$

Finally, the reduced form of VAR in terms of lagged values only to the right side as exogenous variables can be expressed as follows.

$$(LnM2)_t = a_{10} + a_{11}(LnM2)_{t-1} + a_{12}(LnREM)_{t-1} + \gamma_{13}(LnRER)_{t-1} + e_{(LnM2)t} \quad \text{.....(12)}$$

$$(LnREM)_t = a_{20} + a_{21}(LnM2)_{t-1} + a_{22}(LnREM)_{t-1} + \gamma_{23}(LnRER)_{t-1} + e_{(LnREM)t} \quad \text{.....(13)}$$

$$(LnRER)_t = a_{30} + a_{31}(LnM2)_{t-1} + a_{32}(LnREM)_{t-1} + \gamma_{33}(LnRER)_{t-1} + e_{(LnRER)t} \quad \text{.....(14)}$$

In fact, VAR methodology includes three analytical tools; impulse response function (IRF), Granger causality, and Variance Decomposition (VD). In conclusion, identification is of prime importance in VAR methodology; whether the structural shocks can be traced back from the residual error terms of the estimated VAR models. In VAR models, this identification is done either by Choleskey decomposition method or Structural VAR method and both have their own merits. But this paper used Choleskey decomposition method. It is quite legitimate to estimate the VECM when variables are found I(1), but the shocks must be identified and any kind of policy analysis must be done by the IRF, or Granger causality, or VD. Otherwise, simply estimating a VECM is of no use.

3.2 DATA

The data set from the period from 1972 to 2014has been sourced domestically from the various reports of Pakistan Economic Survey, Statistical Bureau, and State Bank of Pakistan. Internationally, it has been sourced from International financial Statistics (IFS) issued by the International Monetary Fund (IMF) and World Data Indicators (WDI) CD ROM, 2014 owned by the World Bank. The data for all the variables have been collected into Pak rupee as local currency units and converted in real terms and logarithmic (Ln) form.

VIEMPIRICAL RESULTS AND DISCUSSION

The analysis of this paper started with the stationarity test by employing the Augmented Dickey Fuller (1979) (ADF) test statistic which has null hypothesis of unit root in the time series variable. It has been observed that all the variables (LnM2, LnRER, and LnREM) used in this model are not stationary at the level but they are stationary at the first difference. Results are shown in Table1 as follows.

Table 1: Results of ADF test statistics at the level and first difference for all the variables

	Level		First Difference		Order
Variables	**Constant**	**C+Trend**	**Constant**	**C+Trend**	
LnM2	-0.35	-2.25	-5.05***	-4.99***	I(1)
LnRER	-1.05	-0.45	-4.81***	-4.79***	I(1)
LnREM	-1.23	-2.11	-5.13***	-5.69***	I(1)

Note: *** show the level of significance at 1%.
Source: Authors' own calculation

That makes way fair to employ the VAR model in this paper. The optimal number of the lags is given in the Table 2 on the basis of several criteria. Since all of the criteria in Table 2 depict the maximality or optimality of the lag length is one. So lag length one has been selected for the VAR estimation.

Table 2: Optimal Lag Length Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-37.7819	NA	0.001625	2.091379	2.219345	2.137292
1	90.73195	230.6659*	3.55e-06*	-4.037536*	-3.525671*	-3.853883*
2	97.78275	11.57054	3.96E-06	-3.93758	-3.04181	-3.61618
3	100.6148	4.211793	5.56E-06	-3.62127	-2.34161	-3.16214
4	111.9431	15.10442	5.16E-06	-3.74067	-2.07711	-3.1438

Note: * indicates lag order selected by the criterion. LR-Sequential modified LR test statistic (each at 5% level), FPE- Final Prediction Error, AIC-Akaike Information Criterion, SC-Schwartz Information Criterion, and HQ-Hannan Quinn Information Criterion.

The results of the VAR model are depicted in Table 3.The previous year values of money supply determine this year values of money demand and remittances. On the other hand, money demand lag values do not determine the real exchange rate values.

Table 3: Vector Auto-regression Results

	LnM2	LnRER	LnREM
LnM2(-1)	0.942	0.056	1.832
	(0.070)	(0.058)	(0.375)
	[13.430]	[0.975]	[4.884]
LnRER(-1)	0.051	0.879	-2.749
	(0.115)	(0.094)	(0.615)
	[0.446]	[9.318]	[-4.469]
LnREM(-1)	0.028	-0.009	0.374
	(0.019)	(0.016)	(0.104)
	[1.418]	[-0.588]	[3.596]
C	0.570	-0.510	-16.000
	(0.883)	(0.724)	(4.719)
	[0.646]	[-0.705]	[-3.391]
R^2	0.984	0.959	0.782

Note: values in the parentheses show standard deviations, and values in the square brackets show the t-values.

There is weak coordination between the previous periods of money supply and the real exchange rate as the coefficient is positive and statistically insignificant while strong coordination between the remittances and previous period's value of money demand as coefficient is positive and statistically significant. The rise in the previous period value of money supply increases the remittances in the economy.

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The results show that the previous period's real exchange rate positively affects money demand but it is statistically insignificant so there is weak coordination between the previous period's real exchange rate and money demand. On the other hand, previous period real exchange negatively affects the remittances with statistically significant coefficients. This shows the rise in the previous period's real exchange rate decreases the flow of remittances in the economy. Thus, one can conclude that there is strong coordination between the previous period's real exchange and remittances in the case of Pakistan.

Finally the results of the VAR model indicate the weak coordination of the previous period's remittances with money demand and real exchange rate because it positively affects money demand and negatively affects real exchange rate with insignificant coefficients. Previous period remittances determine its own value only in this model.

The core concept of causality is to investigate whether the previous values of one variable are useful in forecasting another variable. The results of pair wise Granger Causality test for the short-run proposed by Granger (1988) are reported in Table 4. The null hypothesis of no causality between two variables would be rejected on the basis of p values less than 5%. The reported results in the Table 4 depicts that p values are greater than 5% for LnM2 and LnRER. Hence, one cannot reject the null hypothesis of no causality indicating causality between LnM2 and LnRER. There is unidirectional causality from remittances to money demand and remittances to real exchange rate since one can reject the null hypothesis of no causality at the 5% level. On the other hand, there is absence of granger causality from money demand and real exchange rate to remittances (LnREM) in Pakistan. Thus, one can conclude that LnM2 and LnRER can be predicted with the previous values of LnREM on the basis of the significant results at the 1% level.

Table 4: Pair wise Granger Causality

Null Hypothesis:	Observation	F-Statistic	Probability
LnRER does not Granger Cause LnM2	41	0.33185	0.7198
LnM2 does not Granger Cause LnRER		1.06459	0.3555
LnREMdoes not Granger Cause LnM2	41	6.30095	0.0045
LnM2 does not Granger Cause LnREM		0.595	0.5569
LnREM does not Granger Cause LnRER	41	8.73463	0.0008
LnRER does not Granger Cause LnREM		1.67993	0.2007

Source: Authors' calculation

4.1 Impulse Response Function (IRF)

An Impulse Response Function (IRF) generalized by Peasaran and Shin (1998) describes the shocks to the system that affects the equations over time. It shows the effects of the shocks on the adjustment paths of the variables. In economics, we are interested to grasp the impact of one variable through an innovation or shock to another variable over time. It is all about the straight line within the bands in the graph. Hence, this paper attempt to calculate IRF with Cholesky method on money demand, exchange rate and remittances in Pakistan. The shocks or innovations in money supply, exchange rate and remittances are reported in the Figure 1 in the first, second, and third column respectively.

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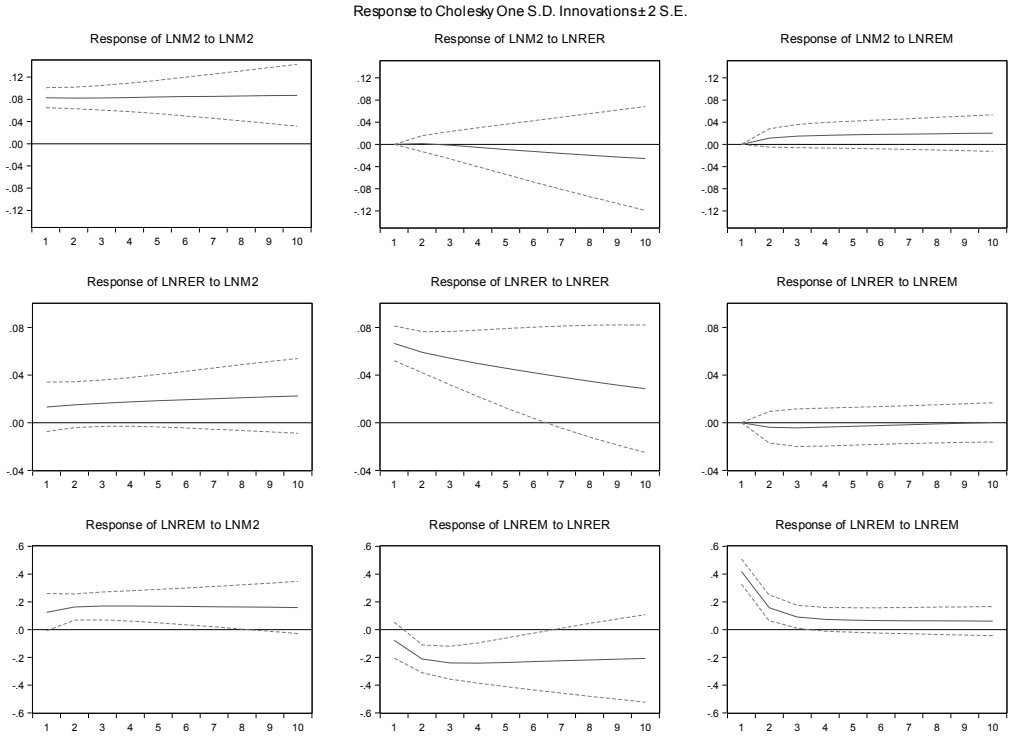

Figure1. Impulse Response Function for money demand, exchange rate, and remittances in Pakistan.

The one standard deviation shock in money demand affects positively on itself. On the other hand, a one standard deviation positive shock to money demand responds very negligible reaction to exchange rate and remittances. Real exchange rate has negative and decreasing reaction from money demand while remittances respond to real exchange rate negative and in increasing manner. On the other hand, real exchange rate responds itself positive and decreasing due to one standard deviation positive shock in itself. Finally, one positive shock in remittances respond positively and increasingly and negative with real exchange rate while positive response to itself.

4.2 Variance of Decomposition

Variance Decomposition (hereafter, VDC) partitions the variance of forecasting error of a certain variable (say, money demand) into proportions attributable to shocks in each variable in the system including its own, can provide an indication of these relativities. An optimally forecasted variable from its own lagged values will have all its variance of forecasting error accounted for by its own disturbances (Sims, 1982). VDC proposed by Tanabe and Sagae (1992) measures the contribution of each type of shock to forecast variance of errors. It is also useful to assess how shocks to the economic variables reverberate through a system like impulse response function. The results of variance decomposition for money demand, exchange rate, and remittances are quite sensitive and separately reported in Table 5.

Table 5 shows the 61.27% variation of fluctuation is accounted by remittances and money demand shows 23.08%, real exchange rate causes 15.65% in the short-run due to one

shock. In addition to this, 50.44%, 26.92%, and 22.65% variation is contributed by remittances, money demand, and exchange rate respectively due to one unit positive shock in the long-run.

Table 5 Variance of Decomposition for Money Supply, Exchange Rate, and Remittances

	LnREM				LnM2				LnRER			
Periods	S.E	LnM2	LnRER	LnREM	S.E	LnM2	LnRER	LnREM	S.E	LnM2	LnRER	LnREM
1	0.44	8.46	1.00	90.55	0.08	100.00	0.00	0.00	0.07	0.00	100.00	0.00
2	0.54	18.49	8.46	73.05	0.12	97.56	0.01	2.42	0.09	0.34	77.65	22.01
3	0.62	23.08	15.65	61.27	0.14	97.46	0.82	1.72	0.11	1.28	66.85	31.86
4	0.69	24.55	19.56	55.89	0.17	94.73	3.20	2.08	0.12	2.26	61.98	35.76
5	0.75	25.13	21.41	53.47	0.19	91.66	5.94	2.40	0.13	3.08	58.91	38.01
6	0.81	25.52	22.28	52.20	0.21	89.22	8.22	2.56	0.14	3.78	56.56	39.66
7	0.86	25.88	22.66	51.46	0.23	87.48	9.83	2.70	0.14	4.42	54.65	40.93
8	0.90	26.22	22.78	51.00	0.24	86.32	10.78	2.90	0.15	5.02	53.05	41.93
9	0.94	26.57	22.76	50.68	0.26	85.59	11.20	3.21	0.15	5.59	51.67	42.74
10	0.98	26.92	22.65	50.44	0.28	85.12	11.22	3.66	0.16	6.16	50.44	43.40

Source. Authors' own calculations

The model for money demand explains that in the short-run that is up to year 3, due to one shock in money demand can cause 97.46% variation of fluctuations in the money demand (own shock) and exchange rate and remittances contribute 0.82% and 1.72% fluctuations in the money demand due to one positive shock. On the other hand in the long-run that is up to year 10, money demand can cause 85.12% variation of fluctuations in the money demand(own shock) and exchange rate and remittances contribute 11.22% and 3.66% fluctuations in the money demand due to one positive shock.

Finally, the model for exchange rate accounts for 66.85% variation of fluctuation in itself due to one unit of positive shock and money demand and remittances cause the 23.08% and 31.86% variation of fluctuation in exchange rate due to positive shock in the short-run. Besides this, the exchange rate, remittances, and money demand contribute 50.44%, 43.40%, and 6.16% respectively due to one standard deviation of the positive shock in the long-run. It can be concluded that in all the models in Table 5 explain more than 50% of the variation that is accounted for its own shock in the both long-run and short-run.

Since all the results of VAR system would be null and void if stability of the model is not checked and the diagnostic checks for residuals are not checked for the estimated model. It is described in the Table 6 as follows. Since all the roots of the VAR system are fallen inside the unit circle so it is the evidence about the stability of the model. Thus this model can be used for forecasting purpose for the future time range which can guide the policy makers in the future. The residuals pass all the required tests such as normality test, auto correlation test and test for homoscedastic residuals. Table 6 also depicts the results of aforementioned tests that makes model more comprehensible for forecasting purpose since residuals of the estimated cleared all the tests.

Table 6: Results for Stability Test and battery of Diagnostics for Residuals.

Stability Test	**Roots**	**Modulus**
	0.9967	0.9967
	0.9506	0.9506
	0.2477	0.2477
Normality Test	JB	P Value
	5.237	0.1564
Auto correlation Test	LM	P-Value
	15.7038	0.1243
Homoscedasticity Test	White	P-Value
	42.6417	0.2070

V CONCLUSION

The objective of this paper is to analyze the connection between money demand, exchange rate, and remittances in the case of Pakistan, using time series data from 1972 to 2014. The VAR methodology has been applied including Granger Causality, Impulse Response Function, and Variance Decomposition. The results show that there is unidirectional causality from remittances to money demand and exchange rate. According to impulse response function, there is positive relationship between remittances resulting increase in money demand with rise of remittances. It shows that advent of remittances increases income of households and they consume more on the goods and services demanding more money. The negative trend between money demand and exchange rate shows that money demand decreases with the appreciation of exchange rate. Finally, the results of variance decomposition reveals that all the variables in this paper are affected more than 50% due to its own shock. It is recommended that exchange rate, remittances and management of monetary aggregates should be tracked in the right process, so that their management can lead in the direction of economic growth in the country.

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