

Niaz Hussain Ghumro*
Mohd Zaini Abd Karim**

THE ROLE OF REMITTANCES IN THE STABILITY OF MONEY DEMAND IN PAKISTAN: A COINTEGRATION ANALYSIS

.....

ABSTRACT: *The paper examines the dynamic relationship between the series of monetary aggregates M1 and M2 for the period 1972–2014. M1 and M2 are the dependent variables, while the explanatory variables are real income, discount rate, inflation rate, real exchange rate, and remittances. The ARDL bounds testing approach to cointegration is used to investigate the existence of long-run and short-run effects of remittances on monetary aggregates. The results show that remittances exert only positive effects on real narrow money*

demand in the end, suggesting that in Pakistan remittances are used for the purpose of consumption. Both money demand functions are stable in Pakistan, but the long-run effect of M1 remittances is a faster speed of adjustment to equilibrium (26.2%) than M2 remittances (21.3%). It is recommended that M1 be used as a monetary tool in Pakistan.

KEY WORDS: *Remittances, Money Demand, Stability, ADF, ARDL, Error Correction Model.*

JEL CLASSIFICATION: E4, E5, E52, F41, G, G2

* Ph.D Scholar at Universiti of Utara Malaysia, Assistant Professor Sukkur IBA, University Sindh Pakistan, Email: niaz_ghumro@iba-suk.edu.pk

** Professor, Othman Yeop Abdullah Graduate School of Business, Universiti Utara Malaysia. Email: zaini500@uum.edu.my

1. INTRODUCTION

According to the World Bank, workers' remittances are the sum of compensation and personal transfers in the balance of payments. Along with other factors, they impact on the development and welfare of countries with an open economy. Remittances are one of the sources of financial inflow and a substitute for foreign aid in developing countries such as Pakistan, and may affect money demand. Since the 1980s policymakers and economic development experts in Pakistan and other developing economies have focused on the role of remittances in economic development. Remittances have been gaining importance as a source of development finance. Many developing economies depend on remittances to cover scarce domestic resources, inadequate private capital inflow, and scarce official development assistance (Adenutsi & Ahoritor 2008).

Almost all research is agreed on the economic impact of remittances in the economies of developing countries where large portions of the labour force work abroad. Remittance transfers bring households nearer to a country's available financial services. Levine and Zervos (1996) confirm the satisfactory and active role of financial institutions in enhancing a country's growth, which may affect monetary transactions in the economy.

Intuitively, a rise in remittances (generally from income) should encourage households to increase their money holdings for transaction motives. Households in Pakistan that receive remittances can see them as a macroeconomic phenomenon, which may encourage them to use the US dollar as the medium of exchange, thus enabling them to buy more goods and services. Thus, remittances lead to the substitution of the Pakistani Rupee (PKR) with US dollars (USD) and affect money demand. Therefore, when estimating money demand in an open economy like Pakistan's, it is necessary to include remittances as a variable. If USD are used more than the domestic currency, i.e., there is significant currency substitution, money demand in the domestic currency decreases. However, inflows of foreign money increase foreign reserves and money supply, if they are not sterilized by the State Bank of Pakistan.

To the best of our knowledge, there are only two studies, namely Adenutsi and Ahoritor (2008) for Ghana and Vergas-Silva (2009) for Mexico, that have focused on remittances in the estimation of money demand, and there is no study on Pakistan that includes remittances as an independent variable.

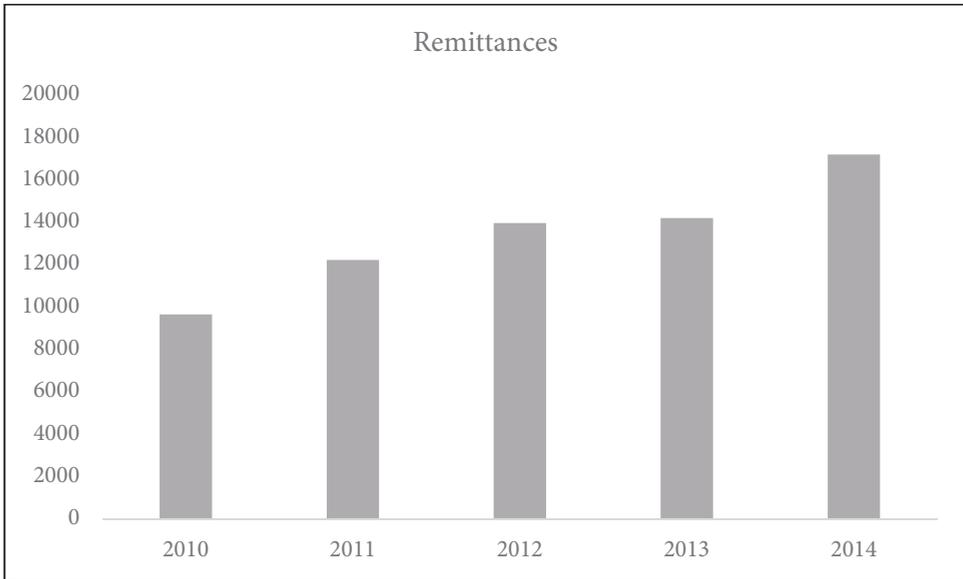
Pakistan is a labour-intensive country like Ghana and Mexico, and is very dependent on remittances from emigrants working abroad. Therefore, this study adds remittances as an exogenous variable in the money demand function for Pakistan. However, Pakistan differs from Ghana and Mexico in many aspects such as population (182.1 million, 27.41 million, 127 million), GDP (24.9 billion, 82.4 billion, 1298 billion), unemployment rate (11.2%, 11%, 4.14%), and inflation rate (4.8%, 4.1%, 4.27%) respectively, so the role of remittances in money demand in Pakistan is not going to be similar to that found for Ghana and Mexico.

Thus, this paper contributes to the literature by including remittances as an independent variable along with other variables in the estimation of money demand in Pakistan. The rest of the paper is organized as follows. Section two gives a brief history of remittances in Pakistan. Section three briefly summarizes the empirical literature on money demand. Section four explains the methodology and data sources. Section five presents and discusses the empirical results. Finally, section six concludes the paper.

2. A BRIEF HISTORY OF REMITTANCES IN PAKISTAN

Remittances are an important contributing source of foreign exchange inflow in developing economies. Five of the world's top ten recipients of remittances are in Asia: China, India, Bangladesh, the Philippines, and Pakistan. In 2006, 2007, and 2008, developing economies received remittances amounting to \$235 billion, \$289 billion, and \$338 billion, respectively. According to a World Bank report (2014), Pakistan ranked twelfth in remittance inflows in 2009 and seventh in 2014. The historical upward trend of remittances in Pakistan is shown in Figure 1.

Figure 1: Historical Remittances in Pakistan (USD Million)



Source: State Bank of Pakistan

Remittances are the second most important source of foreign exchange earnings in Pakistan after exports. During the last four decades, millions of Pakistanis working abroad have sent significant amounts of remittances to the country. Historically, remittances have remained more stable than portfolio inflows, foreign direct investment, and aid inflows. The steadily growing remittances improve Pakistan's balance of payments and reduce dependence on external borrowing. Remittances have also helped the country to recover from the adverse effects of oil shocks, helped redress unemployment and improved the living standards of recipient households.

Since 9/11, remittance inflows have increased sharply every year except 2004. Between 2000 (\$1 billion) and 2002 (\$3.55 billion) remittances more than doubled. In 2003 remittances totalled \$4.8 billion, to fall 8.7% in 2004 to \$3.8 billion, but rose again to \$6 billion in 2007. With the advent of democratic government in 2008, remittance inflows rose to \$6.5 billion. According to a World Bank Report (2011), the Pakistani diaspora of seven million workers contributed more than US\$11.2 billion in the fiscal year 2011. In 2012 Pakistan received more than \$13 billion in remittances, in 2013 \$14 billion, and in 2014 \$15 billion. This massive rise in remittances inflows has contributed to reducing

THE ROLE OF REMITTANCES IN THE STABILITY OF MONEY DEMAND IN PAKISTAN

poverty and the current account deficit, increasing foreign reserves and economic growth, and stabilizing the currency exchange rate. North America and Western Europe are the main source of remittances to Pakistan. Since 1973, billions of dollars have also come from oil-rich Arab countries.

A State Bank of Pakistan report of February 2015 documented the inflow of remittances to Pakistan. The major remittance-contributing countries were Saudi Arabia (KSA), the UAE, Qatar, Bahrain, Oman, and Kuwait (Gulf Cooperation Council countries, or GCC) the USA, and EU countries. Between 2011 and 2014 the amount of remittances rose exponentially, as shown in Table 1. The largest increase, of 1,181.4%, was from the UK. According to the Governor of the State Bank of Pakistan, the diaspora of Pakistani workers has grown to 10 million and in the coming years remittances are expected to amount to around 16 billion dollars.

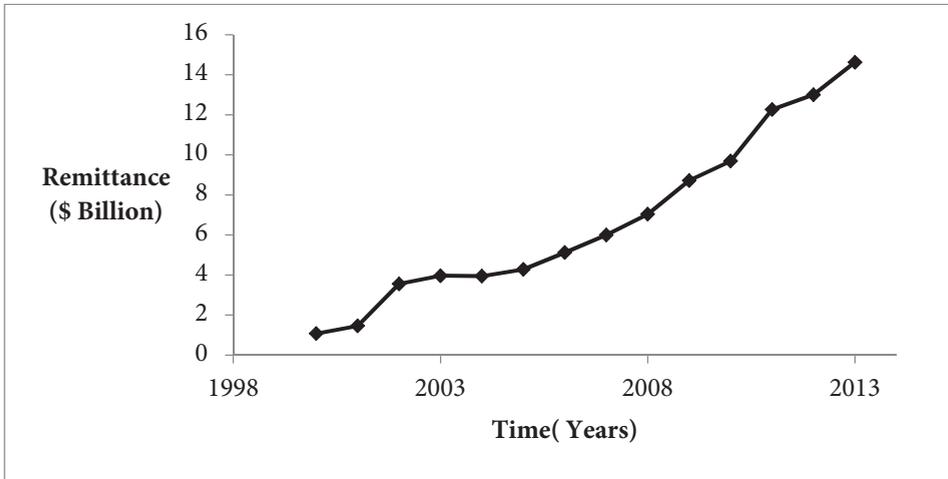
Table 1: Remittances to Pakistan in 2011 & 2014 in US Million Dollars

Country	2011	2014	Change	% change
KSA	291.2	2,965.8	2,674.6	918.47
UAE	216.5	2,027	1,810.5	836.26
USA	167.6	1,626.9	1,459.3	870.69
UK	117.56	1,506.5	1,388.9	1,181.4
GCC	131.54	1,193.7	1,062.2	807.48
EU	28.08	284.06	255.98	911.61

Source: State Bank of Pakistan

Figure 2 shows the upward trend in remittance inflows to Pakistan from 2000 to 2014. The global economic recession in 2008 did not affect the inflows, and remittances increased after 2010 due to an increased number of Pakistanis working abroad. The economic history of Pakistan has shown remittance inflows to be stable and countercyclical. Workers from abroad remit more money to assist their families during natural calamities and crises.

Figure 2. Trend of Remittances to Pakistan Post-9/11



Source: State Bank of Pakistan

3. LITERATURE REVIEW

Almost all studies of remittances are related to developing countries. Muco, Sanfey, and Taci (2004) argue that remittance inflows largely facilitated the stability between inflation and exchange rate during the early transition years (1993-1996) in Albania. The increased remittance inflows and the underground economic activity of smuggling and contraband goods and services raised foreign currency circulation while lowering the demand for domestic currency. Muco, Marta, Papapanagos, and Sanfey (1999) and Haderi, Papapanagos, Sanfey, and Talka (1999) provide empirical evidence that in developing countries, remittances explain more variation in inflation than money supply.

Researchers, policymakers, and academics have debated remittances in developing countries because of their impact on economic development and growth. Many studies have also shown that labour surplus, innovative technologies, foreign aid, Foreign Direct Investment (FDI), and the opportunity cost of investment are also sources of economic growth (for instance, Lewis 1954; Solow 1956; Denison 1967; Romer 1986; Barro 1991).

Remittances contribute in various ways to economic growth and development. In developing countries they play an important role in boosting income and stable investment (Ratha 2007). Because they are less volatile, remittances are

more valuable than foreign direct investment and private capital flows (Buch, Kuckulenz, & Manchec 2002). For developing and underdeveloped economies like Pakistan, remittances can reduce the impact of external shocks on the balance of payments. When households' income increases due to remittances inflows, consumption grows and money demand increases.

Remittances impact exchange rate regimes. Ball, Lopez, and Reyes (2013) show that under a fixed exchange regime, growing remittances increase money supply and inflation, while under a flexible exchange rate regime they temporarily do not affect money supply, reduce the amount of inflation, and increase the real exchange rate. Reinhart and Rogoff (2004) propose that an increase in remittances causes a rise in prices by shifting resources from the tradable to the non-tradable sector. Under a fixed exchange rate regime a negative shock in the tradable sector cannot adjust price levels in the international market. Thus, nominal depreciation is prevented. This reduces the rise in the price level and output of the tradable sector. Alternatively, under a flexible exchange rate regime an international price level can be set, remittances inflow causes the exchange rate to appreciate and raises prices, and money demand may also fluctuate.

Remittances can improve the macroeconomic conditions of either the worker's host or home country, or both of them. Verga-Silvas and Haug (2006) argue that remittances trigger improvement in macroeconomic conditions in the host country as compared to the home country. In the home country the economy receives various effects from remittances: they are a reliable source of foreign exchange, a viable tool to alleviate poverty, a mechanism to share risk, a secure investment source, and a way to augment future consumption (Ratha 2005).

There are many studies related to remittances in the literature, including Shahbaz and Amir (2009), Amjad et al. (2013), and Mughal (2013) for Pakistan; Abiad et al. (2010) for 91 economies of the world; Bang et al. (2013) and Keshri and Bhagat (2013) for India; Akkoyunlu and Siliverstovs (2013) for Turkey; and Imai et al. (2014) for Asian economies. However, none of the studies investigates the impact of remittances on money demand. To the best of our knowledge, as noted above, the only studies that do consider remittances as a determinant of money demand are Adentusi and Ahortor (2008) and Vergas-Silva (2009). Adentusi and Ahortor (2008) examine the relation between remittances and narrow money demand for Ghana employing the VAR technique and find that remittances have no effect on money demand. Vergas-

Silva (2009) studies money demand, remittances, and the exchange rate in Mexico, using variance decomposition, impulse response function, and vector error correction models to address the issue of endogeneity in remittances and exchange rate. They find that remittances negatively impact US dollar money demand with statistical significance. They empirically observe that remittances Granger-cause money demand and suggest incorporating remittances in other studies.

Remittances may affect money demand through other variables such as exchange rate, income, and interest rate. Thus, the impact of remittances on money demand is ambiguous: if a country's imports become cheaper and pressure is put on a country's current account, economic agents (traders and households) will demand more money.

By examining the impact of remittances on money demand in Pakistan, this study aims to fill a gap in the literature.

4. METHODOLOGY AND DATA

In this paper, following Bahmani and Bahmani-Oskooee (2012) and Bahmani (2013), the model of money demand for the Pakistani economy takes the following form:

$$\ln M_t = b_0 + b_1 \ln Y_t + b_2 \ln i_t + b_3 \pi_t + b_4 \ln RER_t + b_5 \ln RM_t + e_t \quad (1)$$

where the dependent variable M_t is money demand, consisting of narrow money demand (M1) and broad money demand (M2). Since the data on money demand is unobservable in the market the data for money supply has been used. Y is real income and its coefficient has the expected positive sign, i is discount rate and the coefficient has a negative sign, and π is inflation rate with a negative coefficient sign. The explanatory variables are RER or real exchange rate and RM or remittances, and both of them have coefficients with an unclear sign.

Generally, compared to real monetary balances as an endogenous variable, nominal monetary aggregates in the model create severe econometric caveats (Sriram 1999). Thus, in this model the money demand function deals with real balances. M1 (narrow nominal monetary aggregates) consists of currency in circulation and demand deposits. It is transformed into real terms as $\ln M1$ by deflating with the GDP deflator for the year 2006. In the same way, M2 (broad

money), consisting of M1 and quasi-money, is converted into real terms ($LnM2$) by deflating with the GDP deflator for the base year 2006.

Real income (LnY), expressed in million Pakistani Rupees at the price of the base year 2006, is measured through real GDP. Since there is a positive relationship between real income and money demand, the expected coefficient of real income $b_1 > 0$, interpreting an increase in money demand in the economy as an increase in real income.

The domestic interest rate is an opportunity-cost-holding monetary aggregate. The bank discount rate $Ln i$ is used as a proxy for domestic interest rate. Most of the rates depend on it because the State Bank of Pakistan issues it for other banks. Since there is a negative relationship between discount rate and money demand the sign of the coefficient discount rate is expected to be negative. Specifically, $b_2 < 0$ interprets an increase in the opportunity cost of holding money as an increase in the discount rate, lowering the quantity of money stocks (James 1998). On the other hand, inflation rate is also an opportunity cost of holding money, which is a continuous change in the price level in the economy. Inflation rate uses the proxy of a GDP deflator and is defined as follows:

$$\pi_t = \frac{p(t) - p(t-1)}{p(t-1)}$$

where $P(t)$ and $P(t-1)$ are the current and previous year's GDP deflators. Since there is a negative relationship between money demand and inflation rate the expected sign of the coefficient of inflation rate is negative. Specifically, $b_3 < 0$ interprets the opportunity cost of holding money as the inflation rate rises and lowers the quantity of money in the economy.

The exchange rate reckons the number of units of domestic currency in terms of foreign currency. In Pakistan it is number of Pakistani Rupees to one US dollar, which further explains that an increase in the Pakistani Rupee results in depreciation of the US dollar, and vice versa. The nominal exchange rate can be converted into the real exchange rate by the following formula:

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

where EX is the exchange rate of the Pakistani Rupee and P^d and P^* are the price levels in Pakistan and the US. However, the sign of the coefficient of the exchange rate is still undecided in terms of positive and negative. A negative sign, interpreted as an appreciation in the exchange rate, results in a decrease in the money demand and favours the currency substitution hypothesis, while a positive sign favours the wealth effect hypothesis.

Remittances ($LnRM$), expressed in million PKR, are converted into real terms by deflating the base year 2006. Pakistanis working abroad remit money to help their families and friends in US dollars through the proper channels. It depends on households whether they convert the amount into PKR in order to consume and invest, thus raising the money demand for domestic currency. However, households may not convert all the remittances into PKR: households in developing countries may mitigate risk of depreciation by holding foreign currency. The presence of dollarization in the economy facilitates households holding both currencies. Therefore, the sign of remittances with money demand is still dubious and its impact on money demand may be negative or positive.

The ARDL Bound Testing Approach

To achieve our objective of examining the effect of remittances on money demand we use the Autoregressive Distributed Lag (ARDL) Bound Testing approach, which is a modern cointegration technique for examining long-run and short-run relationships between dependent and independent variables. This approach is appropriate for a small sample size and is statistically significant when examining cointegration relationships in the samples, whereas the Johansen cointegration approach needs a large sample size for valid findings (Ghatak and Siddiki 2001). All cointegration approaches except ARDL need all independent variables to be of the same order. Unlike standard cointegration tests, ARDL does not necessitate pretesting (Pesaran, Shin and Smith 2001). Moreover, ARDL is possible for the same number of optimal lags, which is not possible with traditional techniques.

In this paper, we use the ARDL model suggested by Pesaran and Shin (1999) and Pesaran et al. (2001), which for this paper takes the form:

$$\Delta LNM_t = \alpha_0 + \sum_{i=1}^{q_1} b_i \Delta LNM_{t-i} + \sum_{i=1}^{q_2} c_i \Delta LNY_{t-i} + \sum_{i=1}^{q_3} d_i \Delta LNI_{t-i} + \sum_{i=1}^{q_4} e_i \Delta \pi_{t-i} + \sum_{i=1}^{q_5} f_i \Delta LNRER_{t-i} + \sum_{i=1}^{q_6} g_i \Delta LNRM_{t-i} + \gamma_0 LNM_{t-1} + \gamma_1 LnY_{t-1} + \gamma_2 LNI_{t-1} + \gamma_3 \pi_{t-1} + \gamma_4 LnRER_{t-1} + \gamma_5 LnRM_{t-1} + \mu_{1t} \quad (2)$$

The parameter where γ_j $j=1, 2, 3, 4, 5$ portrays long-run effects for corresponding variables normalized by γ_0 . Meanwhile, the $b_i, c_i, d_i, e_i, f_i,$ and g_i indicators of money demand in Pakistan depict short-run effects for the ARDL model. In the ARDL model, the null hypothesis is stated as ($\gamma_1 = \gamma_2 = \gamma_3 = \gamma_4 = \gamma_5 = 0$). It describes no co-integration among the dependent variables and a set of independent variables jointly. The bound testing approach suggested by Pesaran et al. (2001) has to be used, comparing both the calculated F-value and the tabulated value. If the calculated F-value is above the upper bound, there is a long-run relationship; if it is below the lower bound, no cointegration is confirmed. Finally, the result becomes inconclusive if the calculated value of the F-statistics falls between the lower bound and the upper bound.

An error correction term can be included in the ARDL model to analyse the long-run relationship and is another way to confirm cointegration. Equation (3) carries the ECM terms as follows:

$$\Delta LNM_t = \alpha_0 + \sum_{i=1}^{q_1} b_i \Delta LNM_{t-i} + \sum_{i=1}^{q_2} c_i \Delta LNY_{t-i} + \sum_{i=1}^{q_3} d_i \Delta LNI_{t-i} + \sum_{i=1}^{q_4} e_i \Delta \pi_{t-i} + \sum_{i=1}^{q_5} f_i \Delta LNRER_{t-i} + \sum_{i=1}^{q_6} g_i \Delta LNRM_{t-i} + \lambda ECM_{t-1} \mu_{1t} \quad (3)$$

This ARDL model provides better results for a small dataset and is more dynamic than traditional techniques.

Data

This paper analyses an annual data set covering the period 1972–2014. The data has been sourced domestically from annual reports of the State Bank of Pakistan (SBP), the Pakistan Statistical Bureau (PSB), and the Pakistan Economic Survey (PES), and internationally 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 units of the data are local currency (PKR), international currency (USD), and percentages that are unit-less. Logarithmic transformation has been used for all the variables except inflation rate. The dependent variables in the model include LnM1 and LnM2 and the explanatory variables are real income, discount rate, inflation, real exchange rate, and remittances.

5. EMPIRICAL RESULTS

The ARDL model does not need the order of integration but it confirms the non-availability of stationary at second order i.e I(2) in the model. In order to confirm it, the Augmented Dickey Fuller (1969) stationarity test was conducted for all the variables. The results are reported in Table 2. The results reveal that LnM1, LnI, π , and LnRM are stationary at zero order of integration with constant term in the model.(at level with constant), while LnM2, LnY, and LnRER are not stationary at the level but at the first difference with constant term in the model. All the variables in the model are I(0) or I(1) and none are I(2). The ARDL bounds testing approach can be applied when the variables are I(0), I(1), or a mixture of I(0) and I(1). In this paper, all variables are I(0) and I(1) so the results reported in Table 2 mean that the ARDL bounds testing approach can be applied.

Table 2: Augmented Dickey Fuller (ADF) Test Statistics

	Level		First Difference	
	C	C+T	C	C+T
LnM1	0.15	-3.57**	-5.42***	-5.38***
LnM2	-0.35	-2.25	-5.05***	-4.99***
LnY	-0.37	-1.17	-6.56***	-6.81***
LnI	-3.12**	-3.24*	-4.54***	-4.44***
π	-4.62***	-4.58***	-7.49***	-7.38***
LnRER	-1.05	-0.45	-4.81***	-4.79***
LnRM	-3.08**	-3.79**	-6.50***	-5.96***

Note: 1. *, **, and *** show the results' significance at the level of 10%, 5%, and 1% respectively.

Source: Authors' Calculation

The first step in the ARDL method is to select a lag order based on the contemporaneous criterion in the literature, because the F-statistic is sensitive to lag length. The Hannan-Quinn Criterion (HQC) is preferred for model specification as it defines parsimonious specification clearly (Pesaran and Smith 1998). Thus, this paper uses the HQC, selects the optimal three lags, and reports the results of the optimal model for M1 and M2 in Pakistan in Table 3 and Table 4.

Since the computed values of F for M1 and M2 are 27.348 and 31.891 respectively, they fall above the upper bounds at 5% and 1% levels respectively.

Using the asymptotic critical values tabulated by Pesaran et al. (2001) and Narayan (2005), both test statistics are also found to be significant for M1 and M2 at the 1% and 5% levels respectively. The results reject the null hypothesis of no cointegration. Therefore, the existence of a valid long-run relationship between monetary aggregates M1 and M2 and the set of explanatory variables are shown for the case of Pakistan.

After establishment of cointegration in the model, short-run and long-run effects are computed and the results are reported in panels A and B of Table 3 and Table 4 for M1 and M2 respectively. The results show that the coefficient of remittances (LnRM) is positively related to the M1 and M2 monetary aggregates in both the short run and long run. M1 is statistically significant at the 1% significance level in the long run and insignificant in the short run. However, it is positively related to M2 and remains statistically insignificant even at 5% level of significance in the long run and the short run. Further results for the positive coefficient of remittances suggest that households in Pakistan use remittances for the purpose of consumption. The inelastic coefficient of remittances provides evidence of inefficient remittance channels.

Panels A and B of Table 3 and Table 4 report the long-run coefficients for M1 and M2. The coefficient of real income (LnYt) is positive and statistically significant in the long run at the 1% level but not significant in the short run. However, the coefficient of real income (LnYt) with M2 is also positive and statistically significant at the 1% level, which explains that a 1% in real income results in an increase of five basis points in real broad money demand. Further, income does not follow the quantity theory of money in the long run. It is also not significant in the short run.

In Table 3 and Table 4 the coefficient of discount rate (LnI) has a negative relation with both M1 and M2 and is not statistically significant in either the long run or the short run with either monetary aggregate. The coefficient of inflation rate (π) has the expected sign with both monetary aggregates and is statistically significant with M1 and M2 at the 10% level in the short run. However, it is statistically insignificant with both M1 and M2 even at the 10% significance level. The results reveal that exchange rate (LnRER) is positively related to the M1 and M2 monetary aggregates in the long run and the short run. However, it is statistically significant with both monetary aggregates at the 1% level in the long run, supporting the wealth hypothesis in Pakistan, and is not statistically significant in the short run with either monetary aggregate.

Table 3: ARDL (1, 2, 0, 0, 3, 1) Model for Narrow Money Demand (M1) in Pakistan

Panel A: Short-Run Effects

	Lag Order			
	0	1	2	3
		1.082		
ΔLnM1		(7.571)		
	0.009	-0.018		
ΔLnY	(1.345)	(2.506)		
	-0.017			
ΔLnI	(0.262)			
	-0.010			
$\Delta \pi$	(2.437)			
	-0.155	0.303	-0.759	
ΔLnRER	(0.655)	(0.962)	(3.614)	
	0.033			
ΔLnRM	(1.006)			

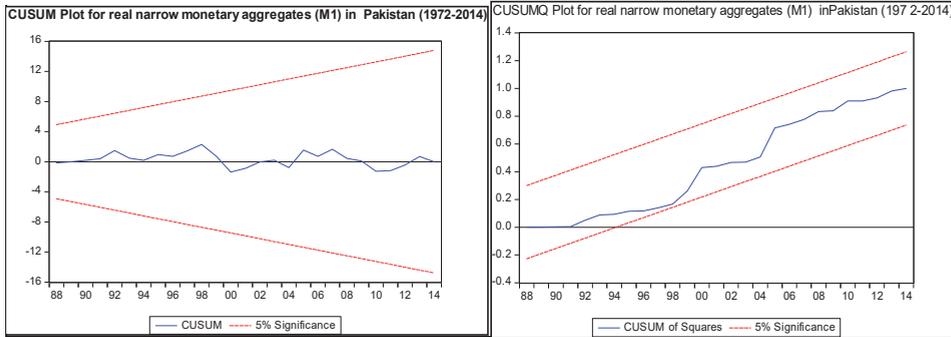
Panel B: Long-Run Effects

Constant	LnY	LnI	π	LnRER	LnRM	ECM(-1)
10.260	0.038	-0.063	-0.036	2.292	0.443	-0.262
(6.899)	(2.227)	(0.253)	(1.656)	(10.335)	(4.048)	(2.975)

Panel C: Battery of Diagnostic Tests

Bounds Test		RESET		ARCH-Test		LM	
F	Prob	χ^2	Prob	χ^2	Prob	χ^2	Prob
27.348	(0.000)	0.197	(0.846)	0.114	(0.736)	4.540	(0.103)

Panel D: CUSUM and CUSUMQ Plots for M1



- Note:** a. The values in parentheses are absolute t-values in Panel A and B and p-values in Panel C.
- b. The upper bound critical value is 3.5 for the F-statistics in Pesaran et al. (2001, Table CI-Case III, p. 300) at 5%.
- c. RESET is Ramsey's specification test. It follows χ^2 distribution with one degree of freedom. 3.84 is the critical value at 5%.
- d. ARCH test is for heteroskedasticity of residuals. It follows χ^2 distribution with one degree of freedom. 3.84 is the critical value at 5%.
- e. LM is the Lagrange multiplier test for serial correlation. It follows χ^2 distribution with four degrees of freedom. 9.48 is the critical value at the level of significance 5%.

Table 4: ARDL (2, 2, 3, 0, 3, 0) Model for Broad Money Demand (M2) in Pakistan

Panel A: Short-Run Effects

	Lag Order			
	0	1	2	3
		0.295		
ΔLnM2		(1.999)		
	0.008	-0.014		
ΔLnY	(1.248)	(2.518)		
	-0.082	-0.156	0.238	
ΔLnI	(0.743)	(1.114)	(2.286)	
	-0.007			
$\Delta \pi$	(2.086)			
	0.194	0.265	-0.407	
ΔLnRER	(0.956)	(1.073)	(2.448)	
	0.026			
ΔLnRM	(0.864)			

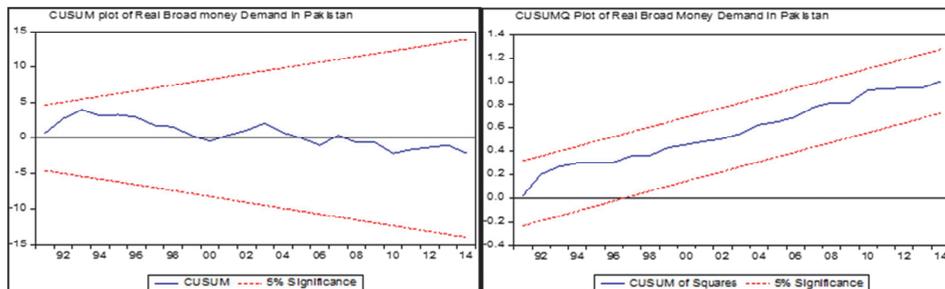
Panel-B: Long-Run Effects

Constant	LnY	LnI	π	LnRER	LnRM	ECM(-1)
14.608	0.049	-0.299	-0.033	1.839	0.124	-0.213
(6.604)	(1.872)	(0.692)	(1.449)	(7.463)	(1.004)	(2.548)

Panel C: Battery of Diagnostic Tests

Bounds Test		RESET		ARCH-Test		LM	
F	Prob	χ^2	Prob	χ^2	Prob	χ^2	Prob
31.891	(0.000)	1.251	(0.275)	0.023	(0.879)	1.095	(0.578)

Panel D: CUSUM and CUSUMQ Plots for M2



Note: a. The values in parentheses are absolute t-values in Exhibit A and B and p-values in Exhibit C.

- b. The upper bound critical value is 3.5 for the F-statistics in Pesaran et al. (2001, Table CI, Case III, p. 300) at 5%.
- c. RESET is Ramsey's specification test. It follows χ^2 distribution with one degree of freedom. 3.84 is the critical value at 5%.
- d. ARCH test is for heteroskedasticity of residuals. It follows χ^2 distribution with one degree of freedom. 3.84 is the critical value at 5%.
- e. LM is the Lagrange multiplier test for serial correlation. It follows χ^2 distribution with four degrees of freedom. 9.48 is the critical value at 5% level of significance.

Economic policies are more concerned with long-run effects than short-run effects when estimating the coefficients. Only establishing cointegration in the ARDL model through lagged explanatory variables makes the long-run effects meaningful (Ericsson and McKinnon 2002). The Error Correction Model (ECM) portrays the speed adjusting from short- to long-run equilibrium in the dynamic ARDL model. The ECM coefficient shows how quickly variables return from short- to long-run equilibrium and it should be highly significant with a negative sign, which is further proof of a stable long-run relationship in the model (Banerjee et al. 1998). The values of the ECM for M1 and M2 are reported in panel D of Table 3 and Table 4. The coefficient of the ECM (-1) for real narrow money demand (M1) is -0.262 and statistically significant, which describes every year long-run equilibrium is corrected at the speed of 26.2% of short-run equilibrium. Real broad money demand (M2) is -0.213 and statistically significant at the 1% level, so equilibrium is corrected every year at the speed of 21.3% for M2 through the explanatory variables, which is a slower speed of adjustment to the long-run equilibrium than for real narrow money demand (M1). Hence, equilibrium for the M1 model takes four years to be fully corrected, whereas for M2 it takes five years, because M1 is composed of fewer components than M2.

The ARDL model was checked for goodness of fit. The battery of diagnostic tests and the stability test for parameters were checked. Panels C and D of Table 3 and Table 4 show that all the diagnostic tests, including the Ramsey RESET test for model misspecification, the ARCH Test for autocorrelation, and the Breusch-Godfrey LM test for serial correlation, passed for both M1 and M2, showing correctly specified models with no indication of autocorrelation. Finally, to check the stability of parameters, Panels D of Table 3 and Table 4 provide evidence that both M1 and M2 have a stable money demand function in Pakistan because they stay within the lines at the 5% level of significance in the CUSUM and CUSUMQ plots.

6. CONCLUSION

The paper examines the dynamic relationship between the series of monetary aggregates M1 and M2 for the period 1972-2014, with M1 and M2 as dependent variables and real income, discount rate, inflation rate, real exchange rate, and, particularly, remittances, as explanatory variables. It implements the ARDL bounds-testing approach to cointegration to investigate the existence of long-run and short-run effects of remittances for both M1 and M2. Both money demand functions are stable in Pakistan but the remittances have long-run effects, with M1 adjusting quicker to equilibrium (26.2%) than M2 (21.3%). Remittances exert effects on M1 only in the long run, showing that households used remittances for consumption purposes only. Therefore, the authorities should use narrow money supply rather than broad money supply as a tool for controlling monetary policy in Pakistan. To stabilize M1, thus improving consumption and enhancing economic growth, the Pakistani authorities should take viable measures to make remittances through proper channels in Pakistan easier, in order to avoid money coming in through illegal channels.

REFERENCES

- Abiad, A., Detragiache, E., & Tressel, T. (2010). A new database of financial reforms. *IMF Staff Papers*, 57(2), pp.281-302. Doi:10.1057/imfsp.2009.23
- Acosta, P. A., Lartey, E. K., & Mandelman, F. S. (2009). Remittances and the Dutch Disease. *Journal of International Economics*, 79(1), pp.102-116. DOI:10.1016/j.jinteco.2009.06.007

THE ROLE OF REMITTANCES IN THE STABILITY OF MONEY DEMAND IN PAKISTAN

Adenutsi, D. E., & Ahortor, C. R. (2008). Remittances, Exchange Rate, and Monetary Policy in Ghana. *West African Journal of Monetary and Economic Integration*, 8(2), pp.1-42.

Amjad, R., & Ahmed, M. A. (1986). Impact of Workers' Remittances from the Middle East on Pakistan's Economy: Some Selected Issues. *The Pakistan Development Review*, 25(4), pp.757-785.

Amjad, R., Irfan, M. and Arif, G. (2013). *How to Increase Formal Inflows of Remittances: An Analysis of the Remittance Market in Pakistan*. Working Paper, A joint publication of Lahore School of Economics (LSE), International Growth Center (IGC) and the Pakistan Institute of Development Economics (PIDE).

Bahmani, S. (2013). Exchange rate volatility and demand for money in less-developed countries. *Journal of Economics and Finance*, 37(3), pp.442-452. DOI: 10.1007/s12197-011-9190-y

Bahmani, S., & Bahmani-Oskooee, M. (2012). Exchange rate volatility and demand for money in Iran. *International Journal of Monetary Economics and Finance*, 5(3), pp.268-276 DOI: 10.1504/IJMEF.2012.049048

Ball, C., Lopez, C., & Reyes, J. (2013). Remittances, inflation and exchange rate regimes in small open economies. *The World Economy*. Retrieved from <http://onlinelibrary.wiley.com/doi/10.1111/twec.12042/full>

Banerjee, A., Dolado, J., & Mestre, R. (1998). Error-correction mechanism tests for cointegration in a single-equation framework. *Journal of Time Series Analysis*, 19(3), pp.267-283. DOI: 10.1111/1467-9892.00091

Bang, J. T., Mitra, A., & Wunnava, P. V. (2013). Financial Liberalization and Remittances: Recent Longitudinal Evidence (No. 7497). IZA Discussion Paper.

Barro, R. J. (1991). Economic growth in a cross section of countries. *The Quarterly Journal of Economics*, 106(2), pp.407-443. DOI: 10.3386/w3120

Buch, C. M., Kuckulenz, A., & Le Manchec, M. H. (2002). *Worker remittances and capital flows*. (KA Working Paper WP/1130). Kieler Arbeitspapiere: Kiel Institute for the World Economy: Germany.

Chami, R., Jahjah, S., & Fullenkamp, C. (2005). Are immigrant remittance flows a source of capital for development? *IMF Staff Papers* 52(1), pp.55-81.

Denison, E. F. (1967). *European economic growth and the US postwar record: Highlights of why growth rates differ: Postwar experience in nine Western countries*. J. P. Poullier (Ed.). Brookings Institution.

Dickey, D. A., & Fuller, W. A. (1979). Distribution of the estimators for autoregressive time series with a unit root. *Journal of the American Statistical Association*, 74(366a), pp.427-431. DOI: 10.1080/01621459.1979.10482531

- Ericsson, N. R., & MacKinnon, J. G. (2002). Distributions of error correction tests for cointegration. *The Econometrics Journal*, 5(2), pp.285-318. DOI: 10.1111/1368-423X.00085
- Ghatak, S., & Siddiki, J. U. (2001). The use of the ARDL approach in estimating virtual exchange rates in India. *Journal of Applied Statistics*, 28(5), 573-583. DOI: 10.1080/02664760120047906.
- Haderi, S., Papapanagos, H., Sanfey, P., & Talka, M. (1999). Inflation and Stabilisation in Albania. *Post-Communist Economies*, 11(1), pp.127-141. DOI: 10.1080/14631379996075
- Imai, K. S., Gaiha, R., Ali, A., & Kaicker, N. (2014). Remittances, growth and poverty: New evidence from Asian countries. *Journal of Policy Modeling*, 36(3), pp.524-538.
- Keshri, K., & Bhagat, R. B. (2013). Socioeconomic determinants of temporary labour migration in India: A regional analysis. *Asian Population Studies*, 9(2), pp.175-195.
- Levine, R., & Zervos, S. (1996). *Stock markets, banks, and economic growth*. (WB Working Paper WP/1690). Washington D.C: World Bank.
- Lewis, W. A. (1954). Economic development with unlimited supplies of labour. *The Manchester School*, 22(2), pp.139-191. DOI:10.1111/j.1467-957.1954.tb00021.x
- Mughal, M. Y. (2013). Remittances as development strategy: Stepping-stones or slippery slope? *Journal of International Development*, 25(4), pp.583-595.
- Muço, M., Sanfey, P., & Taci, A. (2004). *Inflation, exchange rates and the role of monetary policy in Albania*. (EBRD Working Paper WP/88). London: European Bank for Reconstruction and Development.
- Narayan, P. K. (2005). The saving and investment nexus for China: evidence from Cointegration tests. *Applied Economics*, 37(17), pp.1979-1990. DOI: 10.1080/00036840500278103
- Orozco, M. (2010). *Worker remittances in an international scope*. (IDB Working Paper WP/8721). Washington D.C.: Inter-American Development Bank.
- Pesaran, M. H., Shin, Y., & Smith, R. P. (1999). Pooled mean group estimation of Dynamic heterogeneous panels. *Journal of the American Statistical Association*, 94(446), pp.621-634.
- Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). Bounds testing approaches to the analysis of level relationships. *Journal of Applied Econometrics*, 16(3), pp.289-326. DOI: 10.1002/jae.616
- Ratha, D. (2005). Workers' remittances: an important and stable source of external development finance. *Global Development Finance*. pp. 157-172.
- Ratha, D. (2007, February). *Leveraging remittances for development*. In Second Plenary Meeting of the Leading Group on Solidarity Levies to Fund Development, 6(7).

THE ROLE OF REMITTANCES IN THE STABILITY OF MONEY DEMAND IN PAKISTAN

Reinhart, C., & Rogoff, K. (2004). The modern history of exchange rate arrangements: A reinterpretation. *Quarterly Journal of Economics*, 119, pp.1–48. DOI: 10.3386/w8963

Romer, P. M. (1986). Increasing returns and long-run growth. *The Journal of Political Economy*, 94(5), 1002-1037.

Shahbaz, M., & Aamir, N. (2009). Determinants of workers' remittances: Implications for poor people of Pakistan. *European Journal of Scientific Research*, 25(1), pp.130-144.

Sriram, S. S. (2000). A survey of recent empirical money demand studies. *IMF Staff Papers*, 47(3), pp.334-365.

Solow, R. M. (1956). A contribution to the theory of economic growth. *The Quarterly Journal of Economics*, 70(1), pp.65-94.

Stark, O., & Bloom, D. E. (1985). The new economics of labor migration. *The American Economic Review*, 75(2) pp.173-178.

Vargas-Silva, C. (2009). The tale of three amigos: Remittances, exchange rates, and money demand in Mexico. *Review of Development Economics*, 13(1), pp.1-14. DOI: 10.1111/j.1467-9361.2008.00468.x

Vargas-Silva, C., & Huang, P. (2006). Macroeconomic determinants of workers' remittances: Host versus home country's economic conditions. *Journal of International Trade & Economic Development*, 15(1), pp.81-99. DOI: 10.1080/09638190500525779

World Bank (2006). World Development Report 2006. Washington D.C.

World Bank (2011). World Development Report 2011. Washington D.C.

World Bank (2014). World Development Report 2014. Washington D.C.

Received: August 10, 2016.

Accepted: May 29, 2017.

