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STABILITY OF MONEY DEMAND IN PAKISTAN: THE IMPACT OF EXCANGE RATE, REMITTANCES, AND FINANCIAL LIBERALIZATION



DOCTOR OF PHILOSOPHY UNIVERSITI OF UTARA MALAYSIA SEPTEMBER 2016

STABILITY OF MONEY DEMAND IN PAKISTAN: THE IMPACT OF EXCHANGE RATE, REMITTANCES, AND FINANCIAL LIBERALIZATION



Thesis Submitted to Othman Yeop Abdullah Graduate School of Business, Universiti Utara Malaysia, In Fulfilment of the Requirement for the Degree of Doctor of Philosophy

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ABSTRACT

Understanding the demand for money in an economy is an important prerequisite for formulating and conducting monetary policy. Several macroeconomic variables influence the money demand. Pakistan has undergone significant changes in the macroeconomic landscape over the years such as exchange rate changes with its volatility, remittances, and financial liberalization. Such changes in the economy might have caused shifts in the parameters of the money demand function over time, making the function unreliable for policy decisions. It is therefore necessary to investigate money demand function in the Pakistan, including exchange rate with its volatility, remittances, and financial liberalization in order to capture their long-run and short-run effects. Using Autoregressive Distributed Lag (ARDL) Bounds Testing Approach, this study sought to examine the relationship between demand for money and exchange rate with its volatility, remittances and the pace of financial liberalization in Pakistan using data from 1972 to 2014. Empirical results of the study reveal that exchange rate and its volatility support the wealth effect hypothesis, and uncertainty in the exchange rate drives more holding of the domestic currency. The positive and inelastic coefficient of remittances show the increasing patterns of consumption among the households and revealing inefficiency of regular channels of remittances in Pakistan. Financial liberalization increases money demand and its small coefficient reveals that the pace of financial liberalization is still growing. Finally, this thesis examines the stability of both models for policy implementation. The results reveal that only model for real narrow money demand is stable. Thus, the policy makers should consider real narrow money demand as a policy tool in Pakistan.

Keywords: money demand, volatility, remittances, financial liberalization, ARDL

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ABSTRAK

Memahami permintaan wang dalam ekonomi adalah prasyarat penting bagi merangka dan menjalankan dasar kewangan. Permintaan wang dipengaruhi oleh beberapa pemboleh ubah makroekonomi. Selama ini, negara Pakistan telah mengalami perubahan yang ketara dalam landskap makroekonomi seperti perubahan kadar pertukaran yang tidak stabil, kiriman wang dan liberalisasi kewangan. Sebarang perubahan dalam ekonomi mungkin telah menyebabkan perubahan dalam parameter fungsi permintaan wang dari semasa ke semasa. Justeru itu, ia menjadikan fungsi itu tidak boleh dipercayai dalam membuat keputusan berkaitan dasar. Oleh itu, adalah perlu untuk mengkaji fungsi permintaan wang di Pakistan, termasuk kadar pertukaran yang tidak stabil, kiriman wang dan liberalisasi kewangan untuk melihat kesan jangka panjang dan jangka pendek. Dengan menggunakan pendekatan Autoregresif Distributed lagged (ARDL) Bounds Testing, kajian ini bertujuan untuk mengkaji hubungan antara permintaan wang dan pertukaran kadar mata wang yang tidak stabil, kiriman wang dan kadar liberalisasi kewangan di Pakistan dengan menggunakan data dari tahun 1972 hingga 2014. Keputusan empirikal mendedahkan bahawa kadar pertukaran yang tidak stabil menyokong hipotesis kesan kekayaan dan ketidaktentuan dalam pertukaran mata wang menyebabkan peningkatan dalam pegangan mata wang domestik. Pekali kiriman wang yang positif dan tidak anjal menunjukkan peningkatan dalam corak penggunaan dalam kalangan isi rumah dan mendedahkan ketidakcekapan saluran biasa kiriman wang di Pakistan. Liberalisasi kewangan meningkatkan permintaan wang dan pekalinya yang kecil mendedahkan bahawa kadar liberalisasi kewangan masih dalam proses. Akhirnya,kajian ini mengkaji kestabilan kedua-dua model untuk pelaksanaan dasar. Keputusan menunjukkan bahawa hanya model permintaan wang sempit yang sebenar adalah stabil. Maka, pembuat dasar perlu mengambil kira permintaan wang sempit yang sebenar sebagai satu alat dasar di Pakistan.

Kata Kunci : permintaan wang, volatility , kiriman wang, liberalisasi kewangan, ARDL

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LIST OF ABBREVIATIONS

- ADB Asian Development Bank
- AIC Akaike Information Criterion
- ARDL Auto-regressive Distributed lag

ASEAN Association of South Asian Nations

- BOE Bank of England
- BSC Bayesian Schwartz Criterion
- ECB European Central Bank
- EG Engle Granger
- EU European Union
- Fed Federal Reserve Board
- FSRs Financial Structural Reforms
- FY Fiscal Year

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- GCC Gulf Cooperation Council
- GDP Gross Domestic Product
- GNP Gross National Product
- HQC Hannan Quinn Criterion
- IADB Inter-American Development Bank
- IFS International financial statistics
- IMF International Monetary Fund
- JJ Johansen Julius
- KSA Kingdom of Saudi Arabia
- LDCs Less Developed Countries
- LN Natural Logarithm

- Logarithm Log
- Partial Adjustment Dynamic PAD
- PKR Pak Rupee
- SAP Structural Adjustment Program
- State Bank of Pakistan SBP
- UAE United Arab Emirates
- United Kingdom UK
- US United States
- United States of America USA
- USD United States Dollar
- VAR Vector Auto-regressive
- World Data Indicator WDI



CHAPTER ONE

INTRODUCTION

1.1 Introduction

The function for money demand has long been a fundamental block in macroeconomic modelling and remained an important framework for monetary policy in the economy. This chapter presents background of the study, problem statement, research questions, research objectives, scope of the study, and significance of the study. Further, it discusses historical review of money supply, exchange rate, and remittances in the context of Pakistan, ending the chapter with summary and organization of the study.

1.2 Background of the Study

Money demand is considered as heart of the monetary policy in the field of monetaryeconomics. It can be defined as the amount of cash balances desired to hold in one's pockets. Money demand can be further divided into combination of liquid and semiliquid assets that can be easily used as medium of exchange. It guides the policy makers in devising optimal monetary policy for the economy. Because of its importance, many studies have been conducted in both developed and developing economies in the past. There are basically two issues related to money demand world-wide. First, money demand should be in coordination with the announced objectives of monetary policy of an economy. Second, irrespective of the size of the economy, there should be specific form of money demand function which plays key role in the whole economy. Central banks depend upon money demand in order to set the targets for money supply's medium term growth. Treichel (1997) argued that the manipulation of interest rates and reserve money is done using the money demand function to control the total liquidity of the economy. Consequently, the stability of money demand is undoubtedly very important for all the prevailing economies in the world.

Money demand remains the most popular research area in monetary economics due to the issue of instability. As argued by Arrau, Gregorio, Reinhart, and Wickham (1995), both fiscal and monetary policies are meaningless without the stability of money demand function. The stable money demand significantly plays a dual role. First, it can assess the implication of policy-driven changes related to welfare for the society in an economy. Second, it has predictable and significant impact on interest rates, output, and price. However, Sloman (1997) argued that the Keynes' contention about stable money demand function was contradicted to other empirical studies. Since Keynes does not support a stable money demand function because interest rate affects the demand for cash balances in a very strange manner that its elasticity is more than unity in absolute terms. On the basis of his arguments, money follows a role as store of wealth and is very close substitute to other financial assets¹.

A stable money demand function is necessary in regulating optimal monetary policy that facilitates policy-makers to ascertain liquidity needs of the economy. Therefore, it is very essential to have a solid knowledge about the factors affecting money demand and

¹ For a further details see the portfolio Balance Theory.

the long-run relationship between them. Doing in this way, optimal monetary policy can be tracked properly in the economy.

Money demand has remained an essential component of economics since inception in the literature. However, it was unattended before 1920s. This scenario was changed by the incidence of the Great Depression in early 1930s and by the publication of The General Theory² by John Maynard Keyes in 1936. Consequently, money demand has been given special attention in the field of monetary theory.

The US Federal Reserve System suggests that the Great Depression is due to money that is plentiful and cheap due to low market interest rates. This leads to the fact that no one remains responsible and preventive for the Great Depression³ such as scarcity of money and increment of money supply. On the other hand, researchers argued that money supply decreases due to tight monetary policy and as a result prices fall significantly. An argument put forwarded by this group was that the monetary authorities could have adopted an aggressive response by increasing money supply and consequently general prices would have ended the depression (Wheelock & Wilson, 1995).

² Keynes, J. M. (1936), The General Theory of Employment, Interest and Money; Harcourt, Bruce and Co., N.Y.

³ In United States, the economic indices related to the development and welfare fluctuated during that time as real national income went down by 33 percent .General price level fell by 25 percent while unemployment took the numbers from four percent to 25 percent from 1929 to1933.

A bleak picture of the economy was presented by arguing that failure of banking sector was at the highest since about \$6.8 billion deposits, banks failed to repay during the time span of 1929 to 1933, when depositors demanded their cash back from the banks (Wheelock & Wilson, 1995). Strange and interesting questions were raised including i) Were banks merely failed due to consequence of fall in national income and money demand? ii) Were banks responsible for depression? iii) Are such incidents possible in developing world? iv) Did these financial crises create chain of crises globally including Asian developing economies?

Irvin Fisher (1932), introduced and applied a theory known as Quantity Theory of Money, advocated for change in money supply leads to cause change in general price level. He further argued that there should be increase in money supply to prevent deflation. But monetarists⁴ like Friedman and Schwartz (1963) argue that the decrease in money supply causes banking panics resulting in economic slow-down. However, Keynesian explanation does not make banks responsible for depression and thus cannot be a fruitful remedy. They further argue that low business investment and household consumption reduced the aggregate demand and as a result economic activity declines. This explanation creates a controversy and divides economists in two groups that are totally oppose to one another.

However, all economists unanimously agree that money motivates and facilitates all economic activity regarding consumption and production, and distribution and

⁴ Friedman, M. (1956), Quantity Theory of Money– A Restatement: in Readings in Macroeconomics; M. G. Mueller (ed), Holt, Rhine Hart and Winston Inc; N.Y.

exchange. It enhances the consumer's level of satisfaction, measures the intensity of desire, mobilizes the capital, assists in capital formation, and enhances the ability of entrepreneur to maximize profit by variety of production factors. Money expedites exchange and helps in trade domestically and internationally as well. It supports the price mechanism by allocating resources and fastens industrialization process. Furthermore, it is an important tool which has largely furnished the growth to wealth of nation and welfare of society.

Money demand remains an important area in economics particularly in monetary economics. The knowledge regarding factors influencing money demand is very crucial for optimal monetary policy with intermediate targets and for the selection of instruments. Empirically, policy analysis and forecasting are properly made through a well specified and stable function for money demand. Specific quantity of money can also be predicted through stability of function for money demand related to the variables that have linkage to money and to the economy's real sector (Judd & Scadding, 1982; Friedman, 1987).

Theoretically, narrow money demand was considered stable with other specified variables such as interest rate, income and prices before the oil price shock and Breton Wood System in the early 1970s'. However, money demand was empirically shifted in the industrial countries. The periods of "missing money" were first empirically documented by Goldfled (1976) who estimated the long run money demand function for United States in the literature. Whereas, conventional money demand functions were

developed by others that handle the problem of instability with parameters such as Breuer and Lippert (1996).

The relationship among money demand, prices and output, interest rate, exchange rate and so no based on the strength, direction and stability, have been gaining importance for conducting monetary policy. An indicator approach or intermediate monetary targeting framework can be well explained by the relationship among these variables. Theoretically, it possess a common theme that a money demand function bridges a relationship among variables such as money balances, transaction activity or a measure regarding real income, and opportunity cost of holding money balances such as short term interest rate. The existence of real income increases money demand in conventional function for money demand due to income effect in the response of raise in income. This is termed as a "transaction demand". Whereas the existence of a term interest rate in the money demand stands for transactions and speculative demand, through elasticity in the portfolio balanced model of James Tobin, and may demonstrate the substitutability versus bonds through the consumption and production decisions (Branson, 1989). Hoffman, Rasche, and Tieslau (1995) showed the importance of stability of money demand function as a king in the monetarist models, New Classical models, even some New Keynesian and business cycle models inculcate the inflation and general price level.

Sousa (2010) and Afonso and Sousa (2012) argued that the conduct of an optimal monetary policy cannot be separated from macroeconomic framework that further strengthens relationship between wealth dynamics and economic policy in global financial crisis. Most of the central banks such as Federal Reserve Board (Fed), European Central Bank (ECB), and Bank of England (BOE) are still busy in achieving their monetary policy for long term price stability.

State bank of Pakistan (SBP) as the central bank and the regulatory authority of monetary policy in Pakistan is a sole issuer and distributor of currency in the economy. It was mainly established for two broader goals; first, it ascertains the monetary stability in the economy and second to utilize fully productive resources of the country to maintain economic sustainability. The SBP always strives more to retain monetary stability and utilize fully productive resources with price stability through various structures. The inefficiency of fiscal authorities significantly effects economic growth in Pakistan since mostly government borrows from its State Bank. Consequently, economic stimulus mainly burdens over monetary policy set by monetary authorities. In essence, appropriate policies set by SBP that are essential for economic development needs stability of money demand. Therefore, it is essential to conduct the study on money demand function in case of Pakistan.

Pakistan, as an emerging economy, has been facing wide fluctuations in Gross Domestic Product (GDP), exchange rate, remittances, and monetary aggregates. The GDP growth rate is 2.5 percent for the period 1972- 2010 but with the lowest 2 percent and the highest of 9 percent during the 2000-2001 and 2004-2005 periods, respectively. Pakistan could not retain the significant growth momentum, as its average growth rate remains at average of 2.6 percent from 2008-2009 to 2010-2011. There are several reasons behind

the down fall of growth momentum; for instance instability due to high profile killings, security hazards, devastating floods in 2010-2011, war on terror, trade shocks and global financial crisis (Pakistan Economic Survey, 2010-2011).

The Pakistan government has persistently been borrowing to support its budget. Domestic borrowing remained at Rs. 239.5 billion, Rs. 286.4 billion, and Rs. 342.2 billion during the fiscal year 2008-2009, 2009-2010, and 2010-2011, respectively. This persistent rise in borrowing has also led to demand pressures and remained the cause of failure of monetary policy (Pakistan Economic Survey, 2010-2011). These also exert impact upon future expectations about the fluctuations of macro variables in the financial markets domestically as well as globally.

It requires proper analysis of the functionality of monetary policy and use of money to answer these questions. This is very important for developing world where problems of development and growth face out in particular nature and are compounded by rigidities, structural bottlenecks, flexible exchange rate, movement in capital market globalization, liberalization of financial markets and innovation. The economic development and growth can be stimulated more or less by quantity theory of money in the developing world including Pakistan.

A stable money demand function is a tool for concerned authorities for devising a viable and efficient monetary policy in the economy. The decisions regarding effective monetary policy are initiated by a central bank or government to influence economy, assuring availability of amount of money, and the cost of credit. There has been a debate about monetary policy in terms of effectiveness and fundamental limitations. There are some practical issues regarding monetary policy that affect its effectiveness like integration with other currencies and condition of banking sector within the concerned countries. Monetary policy mainly holds three areas such as controlling amount of money in circulation, setting interest rate for borrowing, lending, and investment purposes, and adjusting exchange rate between foreign and domestic currencies which can be achieved through stable money demand. Moreover, Boughton (1981) and Arnold (1994) classified three areas for money demand instability such as monetary policy, institutional changes, and international development.

A Stable money demand is considered as performance indicator in particular economy. The increasing status of money demand usually shows improving economic condition of a country while decreasing status posits the deteriorating economic situation (Maravic & Palic, 2005). Monetarists make government responsible for controlling the amount of money in the economy. According to their view point, the changes in money supply influence national output and price level in short-run and long-run respectively. They argue that specific objectives of an optimal monetary policy can be achieved through targeted increase in money supply.

Both money supply and inflation have remained performance yard-sticks for government's governance and economic development through monetary and fiscal policy. The concerned authorities always strive to maintain money supply and to keep the country as low inflationary for the economic development. Pakistan is a country where money supply is regulated by the central bank, the State Bank of Pakistan. Since its birth, Pakistan has stepped into two digits inflation during 1970s' but it has again returned to single digit in the late 1990s' that caused to dwindle the stability of majority of economic variables including money supply in case of Pakistan.

Pakistan as an emerging open economy has been affected by several internal as well as external factors that remained accountable for the soaring inflation rate, sluggish economic growth, depreciation of exchange rate, low investment, and hike in food and raw material prices, and increase in indirect taxes during 1990 and 1997. In addition, unexpected damage to crops due to floods and heavy rains is also accountable. The several steps have been made to track money supply near to GDP growth and manage currency depreciation. As a result, twin objectives regarding macroeconomic stability with sustainable growth and structure of interest rate determined by market forces were achieved with the coordination of monetary policy. The inflation rate fell to 7.8%, 5.5% and 3.4% in 1998, 1999, and 2000, respectively. Money supply to some extent remained helpful for lowering inflation rate through international market and suitable agricultural growth (State Bank Pakistan, 2000).

Moreover, inflation rate fell to 3.1% from 2002 to 2004 but again it rose to 4.4% and 9.3% in 2006 and 2007, respectively. The rise in inflationary trend is caused by improving income level, demand pressure, and supply shocks. Almost, all of the central banks are committed to reduce inflation (Blejer, 1979). Government with consent of

SBP took several remedies to control inflation and money supply to an adequate level. The SBP followed a tightened monetary policy from an easy to strict policy. As in results, rise in lending rates took place by 152 basis points in order to control the liquidity amount in the prevailing financial system.

It is the responsibility of SBP to stabilize the financial system in the economy. According to Gurley and Shaw (1956), financial system plays its due role in the process of economic growth and development. With the development and economic growth, financial system becomes strong and broad with structure. It facilitates both savers and investors by offering the wide variety of instruments and portfolio options in terms monetary aggregates and their substitutes. The developing economies of the world have often devised monetary and fiscal policies for macroeconomic variables including income remittances, exchange rate and exchange rate volatility and financial liberalization to cope the occurring problems in economies. The financial system has been assisting the government to overcome the budget deficit despite the fiscal policy.

Generally, the financial system comprises a wide range of financial institutions that are categorized into banking and non-banking institutions. The banking institutions deal with traditional banks, development banks and discount houses, whereas non-banking institutions relate with a wide variety of organizations, facilitators, operating as regulators, and investors such as stock exchange, stock brokers, Securities and stock Commission, finances houses, insurance houses, provident funds, and building societies so on.

The role of financial intermediaries in Pakistan welcomes both the borrowers and lenders, achieving the announced objectives. They bring savers and borrowers together through selling personal debt instruments such as deposits and securities. Thus, financial intermediaries facilitate the households with various forms of money other than the cash form. They try to reach the economic agents and help them change their circumstances in order to realize their inherent potential. Ishrat Hussain, former governor of SBP, considers that unstable and unfavorable macroeconomic conditions remained responsible in implementing reforms in terms of financial liberalization in banking sector in Pakistan.

Remittances has remained second source after exports in Pakistan. After the incidence of 9/11 in the US, the remittances-inflows have sharply increased each year except for 2004. Remittance inflows remained more than double in year 2002 (\$3.55 billion) as compared to year 2000 (\$1 billion). The workers abroad sent \$ 4.8 billion in year 2003 while \$3.8 billion in the year 2004, portraying a fall of 8.7% and \$ 6 billion in the year 2007. On the advent of democratic government, remittance inflows coupled to \$6.5 billion in 2008. Pakistan received more than \$ 13 billion in terms of remittances inflows in fiscal year 2012 while crossed the \$ 14 billion and \$ 15 billion in the years 2013 and 2014, respectively (SBP Report, 2014). This achievement is remarkable resilience in the history of remittances in Pakistan. This massive rise in remittances inflows adds contribution in reducing poverty and current account deficit, increasing foreign reserves and economic growth, affecting money supply in the economy.

According to jointly report March, 2005 by IMF-World Bank for financial sector assessment program in Pakistan, during the period 1990-2000, government has brought financial reforms into financial sector through banking system. An extensive network of banks owned by government and development finance institutions were opened but unfortunately all were found full of inefficiency, corruption, and mismanagement. Thus, liquidity mismanagement was one of the reasons in financial sector for the global upheavals too. Pakistan, being a small open economy, could not remained safe from external shocks. The recent global financial crises accompanied with political turmoil and deteriorating situations of law and order and war and terror further worsened the economic activity in Pakistan (Sarwar, Sarwar, & Waqas, 2013).

As a result, the value of Pak rupee has been worsened and weakened day by day due to deteriorating law and order situation and political instability since the early 1970s'. In addition, many other factors are also accountable for this worsening scenario that shed the foreign direct investment, international trade, remittances, and so on which leads badly depreciation of rupee in 2013 and one US. Dollar crosses 100 Pak rupee. It is expected that openness of variables in money demand function may hold an implication for optimal monetary policy in the economy. If these external shocks are ignored monetary policy may remain ineffective (Arize, 1994).

In the light of above viewpoint, it is imperative to study the stability of money demand for narrow money demand (M1) and broad money demand (M2) including open variables such as exchange rate, exchange rate volatility, remittances, and financial liberalization in case of the economy Pakistan. In doing so, we focus Laidler (1993) and Bahmani-Oskooee (2001) who argued some of the problems of instability in money demand function that could stem from inadequate modeling of the short-run dynamic, characterizing departure from long-run equilibrium.

1.3 Problem statement

The government of Pakistan mostly relies on domestic borrowings from the central bank. The central bank adopts expansionary monetary policy and it creates problem with money supply and results in instability in money demand. The central bank, the State Bank of Pakistan (SBP), is accountable in maintaining money supply in terms of different monetary measures such as M_1 , M_2 , and other standardized forms of money. It regulates monetary policy that remains in coordination with announced targets of the economy. The measurement and stability are the broad problems in establishing money demand function (Boorman, 1976). Thus stability in money demand has remained an important issue in all the economies including Pakistan.

Pakistan is an open economy that trades with several economies of the world in terms of goods and services, labor and capital, information and ideas across the borders (Siddiqui & Iqbal, 2005; Shahbaz, 2012). According to the report of World Bank (2015), Pakistan's international trade including imports and exports represents 33% of GDP from 1972 to 2015. Pakistan is a dollarized economy where majority of the

population prefers to save and accumulate US dollar, which further reveals the openness of the economy.



Figure 1.1. *Graph of the M1, M2, Remittances and Exchange Rates from 2000 to 2013* Source: State Bank of Pakistan

Figure 1.1 gives the graphs of macro variables. An empirical measure of exchange rate volatility the argument/ observations. Further from the Figure 1.1, it can be observed that there is similar trend between exchange rate and monetary aggregates. This raises question whether money demand in Pakistan is affected by exchange rate including volatility of exchange rate. Since prior to the year 2014, exchange rate crosses the PKR 100 versus US dollar.

This wide fluctuation in exchange rate affects the growth of the firms and multinational companies increasing degree of risk to the financial institutions such as banks and stock exchange markets. Hence it may be beneficial to explore the effects of exchange rate and volatility of exchange rate on money demand in case of Pakistan

The value of remittances worldwide, being a factor of income, has increased because momentary emigrants have to return ultimately to their countries of origin with accumulated savings. According to report of World Bank (2012), Pakistan received \$13,186.58 million with 17.73% growth as compared to the previous fiscal year and ranked seventh position in remittances among top ten developing countries. Saudi Arabia, UAE, USA, UK, GCC (including Qatar, Bahrain, Oman and Kuwait) and EU are the major source of remittances to Pakistan (State Bank of Pakistan, 2012). The percentage rise in the remittances in 2012 comparing 2011 in these countries are 19.34%, 35.68%, 29.82%, 67.73%, 24.20%, and 33.48% respectively (State Bank of Pakistan, 2012).

Since year 2000, remittances in Pakistan follow the similar increasing trend with both the monetary aggregates as depicted in Figure 1.1. Hence, to understand the stability in money demand, we need also to understand its relationship with remittances.

Moreover, financial reforms generally increase competition introducing additional monetary substitutes such as credit cards and electronic transfers, increasing time deposits' liquidity, and raising capital mobility which may contribute instability in the money demand. Consequently, central banks of the most of the developed countries have discarded money supply as a policy instrument because it becomes difficult to forecast money demand in the presence of a temporally unstable function. Since the early 1990s, Pakistan has been introducing several financial reforms in its financial sector. The chunk of main policies consists of interest rates liberalization, reducing control on credit, enhancing efficiency and competition in the financial sector, strengthening supervisory framework, and promoting deepening and growth of financial markets. However, whether financial liberalization may contribute to the instability of money demand in Pakistan is not satisfactorily resolved. Thus, it is essential to analyze the impact of financial liberalization on money demand in Pakistan.

The literature of money demand reveals that there are few empirical studies that considered exchange rate along with its volatility in estimating money demand. To the best of our knowledge, only Mcgibany and Nourzad (1995) for US, Bahmani (2011) for less developed countries, and Bahmani and Bahmani-Oskooee (2012) for Iran have incorporated volatility of exchange rate along with the exchange rate as a main

component. Bahmani and Bahmani-Oskooee (2012) report a significant effect of exchange rate volatility on the money demand function for Iran and propose to use it in future studies for other countries. Following their suggestion, the volatility of exchange rate with exchange rate can be considered as determinant of money demand in Pakistan. It is expected that it may resolve the problem of instability in estimating money demand function due to the openness of Pakistan economy.

There are hardly few studies that incorporated remittances in estimating money demand. To the best of our knowledge, only Adentusi and Ahortor (2008) and Vergas-silva (2009) investigated the impact of remittances on money demand in Ghana and Mexico respectively. There is a need to understand the relationship between money demand and remittances in Pakistan. Since Pakistan has one of the biggest shares in total international remittances, it is expected that remittances may also be one of the contributing factors affecting money demand in Pakistan.

In addition, there are ample researches in the body of literature analyzing impact of financial liberalization on money demand. The studies among others, Lieberman (1977), Bordo and jonung (1990), Melnick (1995), Sekine (1998), Dekle and Pradhan (1999), Maghyereh (2003), and James (2005) highlighted the role of financial liberalization in money demand along with other exogenous variables. However in the case of Pakistan, there is no satisfactory work on the effect of financial liberalization conducted on money demand except Khan (1994) and Khan and Hye (2013. Therefore,

it is essential to explore further impact of financial liberalization on money demand using new technique in Pakistan.

On the question of stability, there are only two earlier studies such as Khan (1980, 1982a) and Ahmed and Khan (1990) found stable and instable money demand function respectively in Pakistan. Hence, there has not been a consensus on the stability of money demand in terms of monetary aggregates in Pakistan. Some studies found broad money demand as stable and narrow money demand as instable (for example Khan and sajjid (2005), Azim, Ahmed, Ullah, Zaman, and Zakaria (2010), Anwar and Asghar (2012) whereas Hossain and Ali (1994), and Qayyum (2005) found the opposite.

The above discussion clearly depicts that the findings regarding the stability of money demand in various studies are not harmonized with one another. There are many reasons about this disagreement but omission of related variables such as exclusion of related variables volatility of exchange rate, financial liberalization, and remittances is one of the reasons. Therefore, it is necessary to investigate the impact of exchange rate, remittances, and financial liberalization on the stability of money demand function for Pakistan.

1.4 Research Questions

In view of the above discussion, several questions arise.

1. Do exchange rate and volatility of exchange rate affect money demand in the long-run and short-run in Pakistan?

- 2. Do remittances play contributory role in money demand in the short-run and longrun in Pakistan?
- Does financial liberalization affect money demand in the short-run and long-run in Pakistan
- 4. Is money demand function stable in Pakistan?

1.5 Research Objectives

The general objective of this study is to examine the effect of exchange rate, volatility of exchange rate, remittances, and financial liberalization on money demand in Pakistan. The specific objectives of this research are as follows

- 1. To examine the effects of exchange rate and volatility of exchange rate money demand in Pakistan in both short and long-run.
- 2. To analyze remittances effect money demand in Pakistan in both short and longrun.
- 3. To analyze financial liberalization effects money demand in Pakistan in both short and long-run.
- 4. To determine the stability of money demand in Pakistan.

1.6 The Scope of the Study

The scope of the study is to establish the function for money demand at macro level using different standard measures of monetary aggregates such as M_1 and M_2 along with set of exogenous variables including exchange rate with its volatility, remittances,

and financial liberalization in Pakistan using annual time series data from 1972 to 2014. The estimation of functions for the narrow monetary aggregates (M1) and broad monetary aggregates (M2) would be framed through well-known and reliable econometric technique to test the stability of functions for money demand throughout the selected sample with future recommendation and suggestions to authorities in Pakistan.

1.7 Significance of the Study

The optimal monetary policy can be properly implemented through stable function for money demand. It directly affects trading activity prevailing in market economy. Thus, general price level is also affected through it.

This study is expected to contribute in providing guidelines for monetary authority to maintain the level of amount of money in the economy. It provides full information that can help to track out information about the impact of exchange rate, and volatility of exchange rate, remittances, and various money stocks on monetary policy in Pakistan. It would also contribute in the literature by filling the gap by introducing exchange rate, exchange rate volatility, remittances, and financial liberalization simultaneously as factors estimating money demand function in Pakistan and helps potential scholars that intend to conduct study for money demand. The data have been collected from domestic sources including various reports of State Bank of Pakistan, Economic Survey of Pakistan, and, Statistical Year Book, while international sources consists of International Financial Statistics (IFS) and World Data Indicator (WDI).
1.8 Overview of Money Supply, Exchange Rate, and Remittances in Pakistan

Pakistan is an open developing economy. Since August, 14, 1947 (the independence day), it has been facing many serious economic problems such as high risk crisis in financial sector, weak law and order, war and terror, political instability, unsustainable fiscal and balance of payment, and subpar growth. There is a dire need to take necessary steps to initiate comprehensive economic reforms in the Pakistan so that the economy can grow faster to achieve its targeted goals as compared to world community. Money supply, Exchange rate and Remittances play important role in the economy of Pakistan. This section presents an overview of macroeconomic variables including money supply, exchange rate and remittances in the context of Pakistan.

1.8.1 Money Supply

Money supply is considered as circulation of the total stock of money in the economy. The circulation is comprised of currency coins, notes, deposit accounts holding money, and the other forms of liquid assets. Analysis and valuation of money supply facilitate the economists and policy makers to devise new or change the existing policy in order to control money supply. The valuation first affects the business cycle and then the economy. Mr Mohammad Ali Jinnah, the first governor general of Pakistan, inaugurated a central bank- known as State Bank of Pakistan on the 1st July 1948. It periodically publishes data on the money supply based on monetary aggregates regulated in the country.

Money supply plays a vital role in the economy of Pakistan. Monetary policy ascertains the available quantity of money, targets the interest rate to promote economic growth in the Pakistan. Pakistan, being an emerging economy, usually faces problems of unstable prices and unemployment. It is the responsibility of monetary policy to develop a connection between interest rate and money supply. Both the monetary and fiscal policies can be managed with different tools to influence inflation, unemployment, economic growth, interest rate, remittances and exchange rates. The monetary policy is vigilantly controlled by the State Bank of Pakistan (SBP) while the fiscal policy is by the Ministry of Finance.

Money supply is one of the economic development indicators in the economy that is used to control inflation prevailing in the economy. The monetary authority in Pakistan has always remained steadfast in maintaining low inflation rate since its birth. In the 1970s', inflation experienced double digits but reduced to single digit in the1990s'.

The State Bank of Pakistan (SBP) is accountable for creation of money supply in Pakistan. Price stability and growth ascertained are mandatory tasks to SBP. When government sets targeted inflation, SBP uses money supply as a tool to control the prevailing problem in the economy. The statistics show that growth of money supply remained in excess for the 2000-2005 period. The monetary policy stance is biased towards growth due to low inflation. After 2005, the stance of monetary policy tilted towards the prevailing inflation due to its rise (State Bank of Pakistan, 2006).

Pakistan is a country that anchors its own monetary policy through its central bank, the State Bank of Pakistan. Monetary aggregates are targeted into ranges under targeting regime. The nascent financial instruments, financial markets' structural changes, and frequently changes made in monetary balances in countries including European Union and US result in instability between macroeconomic variables and the monetary aggregates. Moreover, economists perceive slight different concept of money due to changes made in definition of monetary aggregates in the various economies.

In Pakistan, the monetary aggregates are set and issued by the SBP. Monetary aggregates are composed of M₀, M₁, M₂, and M₃. M₀ (Notes in circulation) and M₁ (M₀ plus Transferable Deposits⁵) are narrow money while M₂ (M₁ plus Other deposits⁶, Securities other than shares⁷, and Coins in circulation⁸) and M₃ (M₂ plus Deposits held with Non-Banks Financial companies⁹, National Saving Schemes¹⁰, and Post Offices¹¹) are broader aggregates. The M2 comprises currency in circulation, other deposits with SBP, demand deposits, time deposits and Resident Foreign Currency Deposits (RFCDs) of the scheduled banks. A solid glimpse of financial assets reveals that financial

⁵ All deposits that can be easily exchanged without any penalty on demand.

⁶ All the claims that provide evidence of the deposits other than transferable in domestic or foreign currencies.

⁷ These negotiable instruments are for short term and included in the liabilities of broad money.

⁸ Central Government issues them but does not includes in the liabilities of broad money and puts them outside the scope of Depository Corporation Survey..

⁹ These deposits were not included in the broad money liabilities prior to June 2008, after that they has remained pat of transferable and other deposits. These companies include Depository NBFCs, DFIs and MFBs.

¹⁰ These are basically savings made by public through government schemes including SSCs, DSCs, Prize Bonds, National Saving accounts etc

¹¹M3 is revised from Nov-13 to Mar-14 due to revision in outstanding amount of NSS by CDNS.

instruments are in wide variety like non-bank financial institutions' liabilities, National Saving Schemes (NSS) instruments. These, non-bank financial institutions' liabilities, and National Saving Schemes (NSS) instruments, possess the same characteristics as the time deposits are considered for monetary aggregates. Since the last two decades, nascent financial instruments have been introduced inviting the economists to reconsider existing aggregates and to introduce new monetary aggregates that may have higher order.

The graphical representation of trends of monetary aggregates in terms of M_1 and M_2 from Fiscal year 2000-2001 to 2013-2014 is shown in Figure 1.2. In the graph only data on M_1 and M_2 are shown for the Pakistan monetary variables. It reveals an upward trend for the both M_1 and M_2 throughout the period. The gap between the trends for the both M_1 and M_2 increases with the passage of the time.

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This rising trend in the monetary aggregates provides the evidence for the unsatisfactory role of the monetary policy in Pakistan. In the conduct of an optimal monetary policy, stability of money demand follows the significant implications. If there is relationship between prices and money, an appropriate monetary strategy can be devised with monetary aggregates.

1.8.2 Exchange Rate

Despite the limited role of exchange rate during the era of fixed exchange rate, it has significantly become important in the conduct of optimal monetary policy and macroeconomic performance with the speedy process of globalization and trade liberalization. Although exchange rate fluctuations can be good for the economy, majority of the researchers argues that its impacts become doubtful when study is linked to developing countries like Pakistan where most of the needs are fulfilled by the agriculture sector domestically and heavily depends on foreign trade particularly for exports.

The currency of Pakistan is rupee with official code PKR. The denominations of the coins are 1, 2, and 5 rupee while the currency notes consist of 10, 20, 50, 100, 500, 1000, and 5000 rupee denomination. As US is the major trading partner and trade is mostly in US dollars. The exchange rate of Pak rupee is usually measured in US dollar. Pakistan followed a fixed peg exchange rate regime for the 1947-1982 periods. After the independence in Pakistan, rupee is pegged with pound sterling, being the dominated colony under the rule of "The Great Britain" till September, 1971. After 1971, it was pegged with US dollar because of its political alliance to the US until January 1982. When the role of US in the world became more prominent and most of countries' destiny was related to US, dollar received more preference than rupee in Pakistan.

Furthermore, the manage floating exchange rate was adopted with effect from January 1982, in which the fate of rupee was decided daily in comparison to currencies of major trading partners and competitors of the Pakistan. A two-tier exchange rate system was adopted with effect from 22nd July 1998 due to first nuclear detonation by Pakistan government. However, the exchange rate system was brought together with the start of market-based floating exchange rate system, in which supply and demand determines the value of exchange rate in foreign exchange market. Presently, floating exchange rate

is maintained in Pakistan and market forces determine the exchange rate of Pak rupee versus the US dollar.

The devaluations in Pak rupee occurred in the years 1949, 1955 and 1967, respectively before the fall of Decca. In June 1955, rupee had major devaluation of 30 percent for the first time since it was introduced. It was made in comparison of pound sterling in order to bring to the level of Pakistan's other trading partners' currencies. Later on, rupee remained under the experience of fixed exchange rate more or less for the period of seventeen years with the value of PKR. 4.76/1 US dollar. According to the comments of experts, rupee remained over-valued most of the time during these last seventeen years.

Government has always remained under criticism for the times of devolution of Pak rupee. In the era of Mr. Zulifqar Ali Bhutto, the rupee was given a new value of Rs.11/1 US dollar in 1971-1972 which is the worst devaluation of almost 58 percent. It was the recorded devaluation in the Pak rupee against the US dollar. It is reasoned that government snatched the past subsidy in times of over-valuation from industrialists due to the substantial devaluation of exchange rate.

After the twice devaluation of exchange rate in 1955 and 1972, Pak rupee has remained over-valued with 10 percent against US dollar in February 1973. It reached the value of PKR. 9.9 Per US dollar and remained as an official exchange rate till January 1982. Government adopted a new pegging rupee in comparison of fixed exchange rate, recommended by IMF. The State Bank of Pakistan started to play its role in determining the exchange rate system in lieu of Pakistan government. The State Bank of Pakistan used weighted average method to determine the exchange rate for Pakistani rupee with respect to its trading partners' currencies.

After this stage, exchange rate system became independent under the authority of the State Bank of Pakistan (SBP) compared to before. The exchange rate market became relatively liberalized in 1990s as compared to the strict control in 1980s. The demand and supply began to determine the exchange rate in the foreign exchange market and differential between official exchange rate and kerb¹² differs very slightly. The Pakistani currency received devaluation of nearly 23 percent in the 1982-1992 periods, so managed float exchange rate system was followed. During these years, rupee experienced annual rate of depreciation ranging from 2.3 percent to 28.28 percent. Figure 1.3 depicts the depreciation of Pak rupee against US dollar for the 1982-1992 periods. It can be observed from the data that most of the times Pak rupee has been experiencing high and low fluctuations.

State Bank of Pakistan brought technical adjustments which were supported by direct devaluations onward 1993. However, SBP managed the exchange rate for rupee by other methods viz-a-viz free market forces rather than traditional direct devaluations and it seems to be stabilized and appreciated since 2000.

¹² trading of a security takes place outside official market hours.



Figure 1.3. *Pak Rupee Depreciation versus US Dollar from 1982 to 1992*. Source: State Bank of Pakistan

The Graph of exchange rate continuously shows a deprecation trend in Pakistan. Rupee started to depreciate its value since March, 1982. It was depreciated by 17 percent in 1996 compared to 1995 and 16 percent in 1998 in comparison of 1997. Rupee has over-valued against the US dollar lowering the trend only in 2002. However, many reasons are likely for appreciation of Pakistani currency such as 9/11 incident and Afghan war took place since 2001 which added value to the foreign reserves and exchange rate in Pakistan economy in terms of grants to fight the war for terrorism on the land Pakistan.

Moreover, trend of depreciation in Pak rupee did not stop there. It depreciated roundabout 0.6 percent during the financial year 2005-2006. The exchange rate got the value from PKR 59.6266 to PKR. 60.0218 Per US dollar in the year. While in open market, US dollar received the value of PKR. 60.0 for this period which was only 0.02

percent premium. The depreciation of rupee had a value of 0.5 percent as compared to the financial year 2004-2005. Alternatively, it would be fair to say that exchange rate remains stability during fiscal year 2005-2006. Afterwards, rupee has been depreciated haphazardly and facing down worse more or less 84% till to the financial year 2013-2014 as compared to 2005-2006. The analysts have observed several factors that contribute depreciation or fluctuations in the exchange rate including political instability, economic instability, worsening law and order situation, interest rates and ineffective fiscal and monetary policies in Pakistan.

Exchange rate plays vital role in the demand and supply of the foreign exchange. International investor incline to invest in the country where exchange rate is less volatile and stable. In the prevailing scenario of high volatility and instability in the exchange rate, discourages inflow of foreign direct investment in Pakistan, as a result, Pak rupee value is decreasing day by day. The value of Pak rupee has been worsened and weakened day by day due to deteriorating law and order situation and political instability since the early 1970s'. In addition, many other factors are also accountable for this worsening scenario that shed the foreign direct investment, international trade, remittances, and so on which leads badly depreciation of rupee in 2013 and one US. Dollar crosses 100 Pak rupee. Out-look of the worsening situation of Pak rupee can be grasped in Figure 1.4.



Figure 1.4. *Exchange Rate Trend in Pakistan versus USD* Source: website of state bank of Pakistan

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Figure 1.4 posits a bleak scenario of Pak rupee since 1980. It shows a worsening situation of exchange rate that affects the macroeconomic variables in Pakistan such as trade, debt services, money supply, and gross domestic product. Pak rupee lost its value against U.S dollar was exchanged about PKR 110 in open market that makes import costly, eroding the purchasing power parity of the domestic households in the country.

1.8.3 Remittances

Actually, "Remittance" can be defined as transfer amount to home country by the migrants from abroad. The workers' remittance is a mechanism to transfer resources from developed to developing economies. Globalization is the one of the features that is

responsible for increasing financial inflows in terms of remittance towards emerging economies. Remittance is a barometer to measure the economic conditions of the economies of migrants.

The money transfers are made in two ways-regular and irregular; former is an official channel while the later one is unofficial and could occur domestically and internationally. The remittances sent by migrants abroad to the home country for their specific purpose are making monetary inflows. It takes an official procedure if remittances are sent through approved channels that remit funds. Otherwise, it follows an informal or unofficial root if they are sent through un-registered channel such as migrant itself, fellow migrants, or in some countries introduced Hundi, Chitti or Hawala¹³. The State Bank of Pakistan has opened several legal channels to encourage workers to send money through formal procedures, instead of Hundi, Chitti, and Hawala that are used to transfer remittances through illegal channels.

There are three types of workers working abroad namely unskilled, semi-skilled and skilled workers or brain drain. Several problems are related to theoretical motive or perspective behind the workers' remittances. However, it is considered that flows of remittances are liable to redistribution of income and the causes of demand for money. There are three causes such as transactions, precautionary and speculative motives-holding money is hardly found in the fortune of low-income countries. Specifically, it is possible that transactions and speculative motives could be source of influencing to remittances and short-term capital flows while other perspective could be due to

¹³ Money is deposited in host country and received from their partners in the home country.

altruistic and precautionary considerations for longer period focus. If remittances follow closely speculative and self-interest motive then remittances' flows could be expected to widen the differentials for real interest-rates between the migrants' home and host country and mean the lack of political and economic stability at the migrants' home country.

Furthermore, on the following altruistic consideration by remittances' flows, it could be expected about economic conditions either deterioration in destination country or improvement in the source country. Moreover, the remittances' inflows keeping the track of altruistic consideration are supposed to use for transactions purposes whereas inflows devising through it are deposited to boost up volume of foreign currency or transformed into speculative perspectives like investment cards in terms of real estate and financial sector.

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Pakistan has been facing many problems domestically as well as globally. Remittances are growing and showing remarkable resilience in relation to foreign direct investment (FDI) even during and after the period of global financial crisis. Remittances has been a contributing source to developing economies as foreign exchange inflows. Among the top ten recipients of remittances economies of the world, five of them belong to Asia, including, China, India, Bangladesh, Philippines, and Pakistan. The developing economies all over the world received remittances amounting \$235 billion, \$289 billion, and \$338 billion in the years 2006, 2007, and 2008 respectively (World Bank Report, 2010).

After the incidence of 9/11, the remittances-inflows have sharply increased each year except for 2004. Remittance inflows remained more than double in year 2002 (\$3.55 billion) as compared to year 2000 (\$1 billion). The workers abroad sent \$ 4.8 billion in year 2003 while \$3.8 billion in the year 2004, portraying a fall of 8.7% and \$ 6 billion in the year 2007. On the advent of democratic government, remittance inflows coupled to \$6.5 billion in 2008. Pakistan received more than \$ 13 billion in terms of remittances inflows in fiscal year 2012 while crossed the \$ 14 billion and \$ 15 billion in the years 2013 and 2014, respectively. This achievement is remarkable resilience in the history of remittances in Pakistan. This massive rise in remittances inflows adds contribution in reducing poverty and current account deficit, increasing foreign reserves and economic growth, and stabilizing currency exchange rate.

The remittances, money sent by workers abroad to their families and relatives in home countries have been playing a contributory role in foreign exchange reserve and Pakistan's economy. Pakistanis settled abroad like North America and Western Europe are the main source of remittances for Pakistan. In addition, Pakistan has been receiving billion dollars in terms of remittances from oil rich Arab countries since 1973.

According to the World Bank (2011), Pakistani Diaspora of seven million workers contributed above US\$11.2 billion in fiscal year 2011. Remittances follow an increasing trend. Pakistan received the amount of remittances \$13 billion, \$14 billion and \$14.9 billion in the years 2012, 2013, and 2014 respectively. The major contributor countries

consist of Kingdom of Saudi Arabia (KSA), United States (US), United Arab Emirates (UAE), GCC countries (including Kuwait, Oman, Qatar and Bahrain), United Kingdom (UK), Canada Japan, Australia and European Union (EU) countries such as Switzerland and Norway and so on.

The major rise in the remittances shares in the history of Pakistan in year 2011. After that remittances continuously follow increasing trend. The State Bank of Pakistan documented in the report of February, 2015 about inflow of remittances towards Pakistan. The Kingdom of Saudi Arabia (KSA), UAE, USA, UK, GCC (including Qatar, Bahrain, Oman and Kuwait) and EU are the major remittances sharing countries to Pakistan. The workable environment in major remittances contributing countries shared rise in the remittances from year 2011 to 2014 as shown in Table 1.1.

The percentage rise in the remittances in 2012 as compared to 2011 from KSA, UAE, USA, UK, GCC (including Qatar, Bahrain, Oman and Kuwait) and EU are 918.47%, 836.26%, 870.69%, 1181.4%, 807.48 and 911.98% respectively. The amount of remittances rises in terms of value and percentage in all the countries shown in the Table 1.1. Maximum percentage rise takes place in the UK that is 1181.4%.

Remittances has remained the second main source after exports as foreign exchange earnings in Pakistan. According to World Bank report, Pakistan has ranked twelfth position in terms of remittance inflows in the world in 2009 while moved up to seventh position in 2014. During the last four decades, millions of working abroad Pakistanis sent significant amount of remittances in the country.

Table 1.1

KSA 291.2 2965.8	2674.6	918.47
UAE 216.5 2027	1810.5	836.26
USA 167.6 1626.9	1459.3	870.69
UK 117.56 1506.5	1388.9	1181.4
GCC 131.54 1193.7	1062.2	807.48
EU 28.08 284.06	255.98	911.61
Source: State Bank of Pakistan		(USD Million)

Comparison between Remittances of Pakistan in year 2011 & 2014.

Historically, remittances has remained more stable than portfolio inflows and foreign direct investment. In addition, remittances has also remained stable as compared to aid inflows. Workers' remittances are considered as an important source of foreign reserves for the countries like Pakistan which is capital deficient. The steadily growing remittances contribute positively in improving the position of balance of payment and reducing dependence on the external borrowing in the economy of Pakistan. Significant amount of remittances-inflows also helped the country in recovering from the oil-shocks' adverse effects, redressing unemployment, and improving the living standard of the recipient households.

Figure 1.5 clearly shows that there is upward trend in the remittance inflows in Pakistan from 2000 to 2014. The global economic recession could not affect the inflows of remittances in Pakistan. Rampant growth in remittances suddenly occurred after 2010 due to mobility of fair amount work force abroad. Economic history of Pakistan has shown remittance inflows as stable and countercyclical. Workers from abroad remit more money to assist their families during natural calamities and crises.



Figure 1.5. Trend of Remittances Post 9/11 in Pakistan

Source: State Bank of Pakistan

According to the speech made by the governor of State Bank of Pakistan, Diaspora of Pakistani workers have widened to 10 million and it is expected that remittances amount to about 16 billion dollars in the coming years. Theoretically as well as empirically, it is argued that remittances of the working abroad workers contribute not only in improving economic conditions of the home country but also help in reducing poverty.

1.9 Summary and Organization of Study

The organization of the study will be arranged as follows. Chapter one discusses the background, problem statement, research questions, research objectives, scope of study, significance of study, and organization of study. The literature review and methodology are presented in chapter two and three respectively. Results and discussion are in chapter four and conclusions and recommendations in chapter five.



CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

As earlier mentioned in chapter one, main objectives of this study are to investigate the impact of exchange rate along its volatility, remittances, and financial liberalization in estimation of money demand in Pakistan. Stable money demand is an essential tool to devise a mechanism for efficient and optimal monetary policy. This chapter reviews literature on theories regarding money demand and empirical work on money demand including variables related to the money demand.

2.2 Money Demand Theory

The money demand model has remained very important in monetary economics. It is a critical component regarding monetary policy. The monetary policy tries to achieve its announced targets including economic growth and price stability with the help of stable money demand model.

The study on money demand has been extended theoretically and empirically since it was first introduced. Many studies have been conducted empirically on the basis of its theoretical foundations. The primary aim of these studies is to confirm findings on the theoretical work. Classical theory argues that money demand stability is the main goal to empirical research. The enigma regarding stable money demand function can be resolved including various factors that were not considered before. Incorporation of these factors would justify the theoretical basis and could interpret the optimality of money demand function.

Alternatively, it is a challenge to determine the most suitable variables that steps that could well interpret money demand. The choice regarding these factors is related to our grasp about multiple functions and roles that money performs in our society.

The term money is defined as such as medium of exchange, unit of account and store of value. First, a medium of exchange can be utilized as a source of payment made against goods and services. It is a tangible asset. Money is exchanged for goods rather than goods for goods in pre-historic days. Second, a unit of account states that the standard units of money are quoted for the prices of goods and services. A unit of account which makes the prices quoted in money terms.

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McCallum and Goodfriend (1989) have argued that most of the economies have usually regarded money as medium of exchange a commodity that valued (provided utility) in addition to medium of exchange function during most of the monetary history. Third, a store of value is the value of money today and in future by which one can purchase goods and services. This concept of money resembles the concept of wealth. However, fiat money plays a very vital role in all the society despite being made up of paper or a cheap material as a worthless token. If it is worthless, what motives regarding real balances of money need to hold it? Due to its capability, the main motives of money serve as a medium of exchange and store of the value. However, the unit of count role of money is not linked with the role of money as medium of exchange as argued by Wicksell (1906) and Niehans (1978). So, there are three main motives of money that create a necessity to hold stock of it. It serves as medium of exchange, a unit of account, and store of the value.

This is very simple understanding and basic starting point about the theories regarding money demand, which is presented below. Monetary theory makes an attempt to establish a connection between the demand for money and other macroeconomic variables under the shade of these three different theories (approaches).

2.2.1 Quantity Theory of Money

A group of classical economists described the only role of money is as medium of exchange and as a unit of account. Money was considered "neutral" with no impact on real variables. Before 1900, studies on quantity theory of money had focused only on market equilibrium rather than the choice of individual; hence there was desolate place for money demand behavior in early writings. Even the classical contribution of Mill (1848) and Wicksel (1906¹⁴) is vacant from the notion of money demand. They, including Fisher (1911), made recognition that under certain conditions there is need to hold some particular amount of money desired by agents in economy, but could not explain in relation to agent's choice. This whole scenario was modeled by famous economist Fisher in his equation of exchange that is also known as Fisher's equation of exchange.

¹⁴ See McCallum & Goodfriend (1989), "Demand for Money: Theoretical Studies".

2.2.1.1 Fisher's equation of Exchange

This theory was developed by a classical economist Irvin Fisher more or less 100 years ago. Fisher (1911) argued that nominal income is related to money demand in the economy and introduced an equation of exchange:

MV = PY.

In this identity 'M' stands for money supply, 'P' for general price level, and 'Y' portrays the aggregate output or aggregate income. 'V' shows the velocity- number of times the currency circulated for specific purpose throughout the year in the economy, which bridges the money and aggregate output. The equation of exchange, which is an identity, indicates the amount of money, multiply by the number of times it is exchanged for purchasing goods equals to quantity of goods multiplied with their price.

There are two principal assumptions set by Fisher for quantity theory of money. Firstly, it kept velocity in the short-run as a constant which is influenced by innovation and technology Secondly, flexible prices and wages make the output Y at its full employment level, keeping it constant in the short-run like other classical economists. Fisher perceived constant velocity in the short run, considering technological changes and institutions occur slowly over the time. Fisher as a classical economists believed that flexible prices and wages guaranteed the output at its full employment level keeping constant in the short run.

It is assumed in equation (2.1) that both variables M and Y are independently determined of other concerned variables. In this framework, equation (2.1) can be counted as a money demand function, where M/P is the demand for real balances, and proportional to Y. Moreover, if V and Y are kept constant then changes in price level P would be proportional to M, the quantity of money in the market equilibrium, which makes money "neutral".

2.2.1.2 Cambridge Cash Balanced approach

"Cash Balance" is an approach that was formulated by Pigou (1917)¹⁵. In this framework, it analyzes the relationship between money supply and money demand. This approach takes into consideration the quantity of money demand to be affected by expected transactions' volume. Further, he recognizes that individual faces a choice and foregone "investment income would affect the velocity. Therefore, M, the nominal money demand is proportional to Py, the nominal personal income. So, equation (2.1) takes the form of as:

$$M = \frac{1}{V} \times Py.$$
(2.2)

If 1/V is replaced by k which is a constant. Further in the perspective of market equilibrium, $M^d = M$ equation becomes

Where, *P* y stands for aggregated personal income for the whole economy.

¹⁵ This principle was discussed in the Marshall's unpublished work in early (1871), for further detail see Whitaker (1975), pp. 165-68.

If someone assumes the money market in equilibrium, equation (2.3) can be transformed as

$$M_s = kPy = M_s \times \frac{1}{k} = Py = M_s V = Py.....(2.4)$$

When economy is at its full level of employment with constant V, a change in M will cause a proportional change in P that further causes the hypothesis of money neutrality in quantity theory of money. At that position, it is identified that k might rely on some other affecting factors like wealth and interest rate. Pigou proposes that future uncertainty influences money demand.

The negative relationship between anticipated inflation and money demand was documented by Marshall (1926). Cannon (1921) was the first who proposed this relationship. Besides this, he clearly mentioned that the concept of relevant money demand is a demand for stock of money. Lavington (1921) introduced the concept of marginality in the analysis of money demand. Agent, who consumes and holds the interest bearing securities and portfolio of money under marginal conditions, must be satisfied to have an optimal and efficient solution for it. Despite this attempt, he remained indecisive in adding one dollar in cash balances with adding it in one period. Later on, Fisher (1930) corrected this fault. Both of them concentrate their work on the opportunity cost of money holding and recognize interest rate as main factor of it. On the other hand, Cambridge approach mainly focuses on the volume transaction.

Hicks (1935) put forwarded an argument about building money demand theory based on traditional value theory, where demand for money by agents becomes choice related problem marginally. Hicksian investigation is with regard to one's decisions about the amount of money and holding of securities at specific time by individual (one's portfolio assets), subject to constraint of wealth. Further, he argued that agents will hold relative amount of money willingly, where interest bearing assets exist other than money in the money market. As a result, these assets' yield and risk affects demand. He also stated that, at least in the short-run, the agent's portfolio might be influenced by transaction costs of investments in the securities and more elaborated agent's total wealth causes his money demand as well. So, it can be further deduced that the income or wealth affects money demand, whereas money demand is independent of interest rate under the umbrella of quantity theory of money. However, many economists started to introduce various factors other than income during the time of Great Depression.

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2.2.2 Neoclassical Approach

After the Great Depression, there were many flaws that made classical economics failure. The flaws became reasons to introduce new theories such as Keynesian theory and post-Keynesian theory against the classical economics. This section reviews detailed discussion about Keynesian theory and post-Keynesian theory along with their corresponding models developed by the economists of that era. Keynesian theory ws a revolutionized theory after the Great Depression in 1936.

2.2.2.1 Keynesian Theory

Keynes (1936) strongly emphasized the role of interest rate sensitivity in macroeconomic analysis for money demand in his publication "General Theory. He explored the motives of holding money balances by people and their arising consequences. Keynes proposed three motives that make people hold money: the transaction motive, precautionary motive, and the speculative motive. The first two motives depict money's role as medium of exchange, while the latter, which is Keynes contribution to money demand theory shows money's role as store of value. Money and bonds are considered as alternative assets in speculative motive, while bond holding depends upon its rate of returns. The speculative motive produced the concept of "the speculative demand for money" or "Liquidity Preference" nominated by Keynes and relevance of interest rate was proposed by Marshall, Pigou, and Hicks in money demand function. This strong argument, made by famous economists of that period, incorporated the interest rate as key contributing factor in money demand. Now, the presentation of money demand function can be made as:

 $M_d = f(y, i)$(2.5)

Where *i* stands for current interest rate.

A major and strong implication made by Keynes introducing interest rate as a factor in new money demand that makes irrelevant the assumption of constant velocity of circulation. He also formalized the second motive which is precautionary that shows money's role as medium of exchange. Several money demand theories erupted due the role money extended in the field of monetary economics.

2.2.2.2 Post Keynesian Theories

After Keynes, many new theories regarding money demand took birth and role of money became vibrant. The role of money as a store of value gave birth to the "Portfolio Models", where money is considered as one of many assets in the portfolio. The medium of exchange role of money give rise to the transaction models, which are further categorized as "Inventory Models", "Precautionary Demand models", and other models such as "Shopping Time and Cash in Advance Models". In this framework, most of the optimization models are developed with the support of mathematical theory. Many important considerations regarding payment practices, transaction cost, and forgone interest rate are well explained in these models:

i. Inventory Theoretic Approach

Besides Baumol (1952) and Tobin (1956), many economists proposed for recognition of transaction motive and its application to the inventory theoretic model for money's transaction demand. They recognized the yield returns for financial assets rather than money, but their transaction cost of the transaction moving from the assets to money linked to inventories of money. Therefore, the problem of agent involves two adjusting considerations: First, money does not pay interest while assets pay and second, due to un-synchronization in the flow of expenditure and income, money is needed for transaction, while assets' transaction cost is necessary for each transaction.

The problem with agent is that higher average money holdings will reduce transaction cost but, in the same time, will affect the forgone interest income for the assets. The interest income on the assets may or may not be worth cost and inconvenience in transaction of financial assets other than money involved, depending upon the maturity and payment frequency of assets. The solution to this problems where agent minimizes transaction cost and forgone interest income, leads to square-root law in which average money holdings of an agent is shown by

$$M_d = \frac{1}{2} \sqrt{\frac{2bt}{r}}.$$
(2.6)

Where r portrays rate of interest on bond and b shows the transaction cost or brokerage charge for conversion assets into cash.

Dividing by price level to both sides of equation (2.6) forms real transaction demand for money depends on real transaction cost, real interest rate and the real transactions level. Miller and Orr (1966) further extended this model by introducing uncertainty related to expenditures and receipts flow. The summary regarding extension to basic model for inventory approach can be found in Barro and Fisher (1976) and Cuthbertson and Barlow (1991). Roley (1985) also documents several research works on this inventory theoretical framework.

ii. Precautionary Demand for Money Approach

Agents hold money balances for precautionary motive is already mentioned earlier. Dombusch and Fischer (1990) argued that inflows as uncertainty are treated in the precautionary model for the money demand; households optimize the amount of cash balances through precautionary motive to hold by weighting interest cost versus the advantages missed without sufficient liquidity. These models play a key and contributing role in empirical estimation regarding money demand function in class of "Buffer-stock models" in theory of money demand.

iii. Other Models

In addition to above, there are many models in the area of monetary economics but few are discussed under the title of "Other Models" such as the "Cash In Advance Models" and "Shopping Time Models", under the transaction role of money.

Lucas (1980) and Svensson (1985)¹⁶ discussed in full details about the "Cash In Advance Models". In these models, medium of exchange as role of money is linked to monetary assets of the economy by the assumption that consumption of agent is constrained with amount of money brought into economy at that time. In a nut shell, total consumption and total production are equal by keeping constant to the velocity of circulation, resembles equation (2.1). Therefore, demand for money is less responsive to interest rates changes than the models that use money and consumption less stringently.

On the other hand, McCallum and Goodfriend (1987) suggested models such as "Shopping Time Model" by overcoming the shortcomings of "cash in Advance Model". In this model, agent's utility function is a function of consumption and leisure and his objective is to maximize it. Agent lessens his shopping time and increases his leisure time due to medium of exchange as role of money. So, there is a positive relationship

¹⁶ These models alternatively introduce money for agent's utility function. Lucas (1980) presents the micro foundations and inculcate agents' optimizing behavior to extend support theoretically for transaction money demand.

between agent's quantity of money balances and leisure time throughout the economy. "Shopping Time Model" provides opportunity cost of holding money as interest rate and transactions conducted. Sidrauski (1967) also presented a similar function for money demand in "Money in Utility Model".

2.2.2.3 Money as an Asset Approach

This is a model, in which money is treated as an asset, focuses the role of money as a store of value. This model solves the problems of agent in allocating his wealth among different number of assets or portfolio by generating money demand in this framework. Some sort of income and flow of services or utility are generated by each asset. The portfolio's choice depends upon two main factors that are expected rate of return and risk regarding each asset. Besides liquidity and safety, money yields benefit of facilitating transactions by comparing with other non-monetary assets. The models in this group were introduced to explain the relationship between money demand and interest rate, while wealth and liquidity are key variables in the formation of money demand.

Tobin (1958) witnessed that the wealth, degree of risk aversion, and characteristics of mean-variance distribution of risky assets are main sources for agent's portfolio to maximize expected utility in this model or framework. There is an implication of this model that negative interest elasticity prevails for money demand preference. In this framework, agent attempts to optimize his expected utility subject to the assets available, their risk, and agent's own preferences for risk aversion. According to the

Tobin's suggestion, an individual will hold some portion of his wealth in terms of money because return utility of money is more ascertained than income generating assets.

Barro and Fisher (1976) challenged the idea proposed by Tobin that money might be deteriorated in worth or value due to price level changes, so it reminds that it is not totally risk-free. However, there are many other assets like money with the same risk characteristics but with higher return. Hence, the agent's risk-aversion assumption alone provides insufficient basis regarding holding money.

Samuelson (1958) introduced yet another group of models such as "Overlapping Generations Model" that became more famous during 1980¹⁷. In this group of models, role of money is also characterized as a store of value and regarded as assets that work like medium of exchange to ease inter-temporal exchange of an agent's perishable commodities that were endowed him at the time of birth. However, the durability of money makes the agents more to consume for the lifetime periods. McCallum and Goodfriend (1989) criticized the models for the fact that households have tendency to hold money in the existence of other interest earning assets.

Arango and Nadiri (1981) apply portfolio model for assets holdings to familiarize developments to monetary policy in domestically money demand. Their research infers that both money supply and demand in one country are affected by monetary developments in other country. Fluctuations in exchange rate expectations have a

¹⁷ For further detail see Wallace (1988).

vibrant role in decision making for agent's portfolio. The sensitivity between the domestic and foreign assets regarding substitutability, affects his money demand. The money demand portrays that theoretically effects of changes in exchange rate and foreign interest rate are partly offset through real cash balances in domestic market¹⁸. Theoretical developments in the literature regarding fluctuations in exchange rate proposed that it could have either positive or negative effects on money demand, in terms of wealth and currency substitution effect respectively.

2.2.2.4 Consumer Demand Theory

Friedman (1956) proposed a theory regarding consumers' demand that is termed as consumer demand theory, in which households prefer to have goods because households are provided utility by the goods. Friedman does not pose a question about the money holdings by households. He argued about the quantity theory of money in Cambridge approach that the money remains to the households under various preferences. He favors portfolio approach by the Neo-Keynesian for money demand but presented a valid argument for inclusion of real goods in portfolio as they provide stream of utility or services. The implication of his argument suggests that broad range of variables regarding opportunity cost such as proxy for real goods' yield as expected inflation. Theoretically, it is relevant in the explanation of money demand. He also proposed wealth as a key factor for money demand.

Various approaches to money demand have been discussed in the earlier section. Different economists produced different theories of economics in their era. One theory

¹⁸ For discussion refer Arango and Nadiri (1978)

invalidates the other in form of model and implication. Little account is created for their contradiction among the different approaches.

Pigou was the first who specially made insight to grasp the money demand through quantity theory of money. The "Cash Balance Approach" branched out the formal connection between real income and money demand in economy. Using theory as a basis, Keynes introduced his new theory regarding money demand with motives that leads the reasons why agents hold money. They introduced interest rate in money demand as an explanatory variable was their main innovation. A wide variety of models regarding money demand have been established by Post-Keynesian economists, which can be mainly grouped into three categories such as transaction, assets, and consumer demand theory.

The "Inventory theoretic approach" emphasized on medium of exchange function introducing transaction cost under certainty. On the other hand, "Precautionary Demand for Money Approach" focused on the medium of exchange function inducing transaction cost under the degree of risk. Whereas, the "Cash in Advance Models" make further illustration to function for money demand as medium of exchange and concentrated the transactions' role on money demand.

The "Assets portfolio approach" treats money as an asset and its role is a store of value which estimates money demand function under the behavior of portfolio optimization. This group of models deals with the agent's portfolio comprising one or more assets with different yield and risk characteristics and concentrates on the role of interest rate in money demand. It also connects the domestic money demand with foreign monetary developments via fluctuations through expected exchange rates. The consumer demand theory focuses on the role regarding price level in function for money demand.

Commenting on this theoretical work, it can be concluded that the money demand is positively related to total transactions and inversely to opportunity cost of holding money. The remaining issue is about the choice of variables with scale and opportunity cost for holding money like income or wealth and interest rate or inflation respectively.

Since the last several years, many researchers have made attempt to resolve this unsettled question by developing money demand functions for various countries and tried to incorporate correct explanatory variables. Besides the decisive role of money from which demand is derived, there are several other economic elements such as exchange rate and volatility of exchange rate, remittances, financial liberalization, financial innovation, and country's specific issues, whose unique prevalence might affect the money demand to respond independently in a conducive economic environment. The next section would create an account for review of empirical work on the area of money demand conducted in developed and developing economies.

2.3 Empirical Work on money demand

The early empirical work mostly emphasized on velocity of circulation along with institutional factors that affect the long run variations and behavior of money demand.

The General Theory by Keynes provided primary and necessary foundation for empirical estimation of money demand. These studies concentrated on testing forecast made through liquidity preference framework and there exists negative relation between interest rate and money demand. One approach to the same problem was to establish a positive relationship between the velocity of circulation and interest rates. Another approach to this problem was to differentiate between active and idle (speculative) balances and establish a valid relation between speculative balances and interest rates. In this framework, money demand function takes the form of

 $\frac{M_d}{P} = ky + f(r).$ (2.7)

Where, y depicts the income or GNP, r, the interest rate, the term $\frac{M_d}{p} - ky$ shows speculative balances which can be related to r with the assumption that K is a constant and reciprocal of velocity of money.

On the basis of Brown (1939), Tobin estimated the above money demand function for periods 1922-1945. Tobin established a close relationship between interest rate and speculative balances. The specific form of estimated money demand function, found in the literature today was primarily constructed for annual data with constant elasticities using log-linear form can be expressed as:

$$\log\left(\frac{M_t}{P_t}\right) = \alpha_0 + \alpha_1 \log y_t + \alpha_2 \log r_t...(2.8)$$

....

Where, y is the scale variable as income or wealth and r is the interest rate showing an opportunity cost.

Voluminous work on money demand has been conducted in monetary economics. These studies differ from one another in terms of choice of independent and dependent variables and sample periods. Most of them do not produce comparable results; however, they have generated common conclusions in number of ways.

First, several proxies for scale variables have been used in the studies on money demand. The scale variable such as income or wealth, which is permanent or measured regardless of choice, is also statistically significant. The elasticity of scale variable remained in the range from 0 to 2 and on. Ball (2001) argued that income elasticity less than unity has several implications in terms of monetary policy.

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Second, choice variables for money demand are interest rate and inflation-known as opportunity cost. The interest rate holds negative relation to money demand. The negative relation between money call rate and real money demand is supported by (Bahmani-Oskooee, 2002; Bahmani-Oskooee & Economidou, 2005; Qazi *et al.*, 2009; Achsani, 2010; Damardeh & Izadi, 2011). It is proved that various interest rates are statistically significant in estimation of money demand. They have elasticities in the range of -0.1 to -0.2 for the short-run whereas from -0.2 to -0.8 for the long-run.
Several studies on money demand could not find elasticities for interest rates to be significant in developing countries for various reasons; such as regulatory limits over interest rates, inadequate approach to the banking sector and, non-banking sectors. In such circumstances, inflation rate provides better empirical results than interest rates. This happens because regulated rates do not reflect expected inflation rate accurately. A rise in expected inflation leads to substitute physical assets to money. Therefore land, inventories, and other assets become more valuable than bonds.

The inflation possesses positive relation to monetary aggregates. Friedman (1956, 1959) also proposed inflation when agent's portfolio is partly considered as combination of financial and other goods and where inflation predicts the rate of return of financial assets. This argument was supported empirically by many researchers such as Dombusch and Fisher (1990), Bahmani-Oskooee (1996), Arizie and Shwiff (1998), Nell (2003), and Sriram (1999).

There are several studies which have included other exogenous variables besides scale and choice variables such as exchange rates with different proxies for different economies. After estimating money demand function in the body of literature, it was focused on the stability of function for money demand to be estimated for the sample under consideration. It has several implications in implementing an optimal monetary policy in the economy.

2.3.1 Money Demand in Developed Countries

The money demand function has been estimated with different variables and techniques in the developed countries. There is an ample empirical work on the demand for money in developed countries. Little account is reviewed as follows:

Since many studies including Goldfeld *et al.* (1973) and Goldfeld and Sichel (1990) employed a lagged dependent variable within money demand, incorporating dynamic of adjustment, in the Partial Adjustment Model (PAD). Incorporation of dynamic terms enhanced the importance of the method. Most of the previous studies yielded similar results for both annual as well as quarterly time series data. The results using quarterly data supported only the narrow money stocks that depend on gross national product, saving deposit rate, short-term interest rates and lagged real money balances using annual data for both monetary aggregates.

After the episode of stability during the 1970s, money demand function in the U.S. and other economies became unstable and caused sizable and over-prediction errors that never existed in the past (See Boughton, 1981; Golfeld, 1976). The studies used data of the post 1973, matters worsened and the estimates of money demand had abruptly changed in their values. These new revelations about money demand made it more interesting and have become enormously researchable topic in the area of monetary economics. The specific objective of the studies was to re-estimate the parameters' "lost" value and re-find its stability. On the other hand, recent research emphasizes on improvement of functional specification and appropriateness of econometric technique. Though much progress was made, instability still remained an unsettled issue.

Resolving this unsettled issue, various approaches have been worked out to improve the money demand functional specification and dynamic through adjustment process with different innovations. An adjustment through financial innovation was one of the improvements. Miller and Orr (1966) argued that changes in money demand can be modeled like transaction cost reduction which reduces uncertainty of expenditures and receipts. Since there is dearth of reliable data so these financial innovations have proved it difficult in economic specification.

Arango and Nadiri (1981) develop money demand function for open economy using Portfolio Approach. They incorporate additional explanatory variables like international interest rate and exchange rate. The results of the study confirm that both the international interest rates and exchange rate play important roles in the agent's portfolio decisions. They argued that studies on money demand function that ignores such variable will result in biased with functional misspecification.

Another way to resolve the issue regarding misspecification was to ponder about alternative measures of interest rate and transactions wealth. The roles of interest elasticity and wealth are proposed and allowed by recent research, making contradiction with earlier work. It also introduces money's own rate of return as a measure. Some researchers consider own definition of money which is narrower than M₁. Due to these novelties, money demand with unusual behavior remains unexplained.

A totally distinctive and extremely reliable methodology was to think about the dynamic of adjustment process. This came as a need to cope the issues connected with Partial adjustment model and brought about the improvement of the "Buffer Stock Models" and later to the "Error Correction Models". The observed non-stationarity regarding explanatory variables in the equation of money demand prompted the presentation of the cointegration method for money demand estimation. Most of the studies with cointegration method and error correction model are abundant in the literature of developed economies including Germany, U.K, Japan, Canada, and U.S throughout all the years.

Miller (1991) used quarterly time series data to estimate money demand function for U.S. with Engle-granger¹⁹ cointegration method by including income, price level, and, interest rate as independent variables. He conformed cointegartion to M2 only as guidance to implement monetary policy. Hafer and Jansen (1991) used quarterly time series data to estimate money demand function for U.S. for two different time periods by employing the Johansen and Juselius²⁰ technique. They estimated function for money demand including income and interest rates. The results provided evidence in favor of M₂ relative to M₁ in the long-run. Moreover, Bahmani-Oskooee (1991) used quarterly data to estimate function for money demand in U.K. with period of 1973-1987. He included real effective exchange rate in the money demand function and results reveal that it is significant and exert impact on money demand.

¹⁹ See Engel and Granger, (1987) two-steps procedure

²⁰ See Johansen and Juselius, (1990)

From the literature reviewed, we can say that there are many studies in developed countries have employed dynamic techniques to estimate function for money demand. For example, Muscatelli and Papi (1990) analyzed money demand for Italy, Hoffman and Rasche (1991), Hafer and Jansen (1991), and McNown and Wallace (1992) for USA, Adam (1991) and Johansen (1992) estimated money demand for UK, Karfakis and Parikh (1993) estimated for Australia, Hansen and Kim (1995) and Bahmani-Oskooee and Bhol (2000) is for Germany, Bahmani-Oskooee and Shabsigh (1996) and Miyao (1996) for Japan and Bahmani-Oskooee and Barry (2000) also estimated money demand function for Russia. In addition, a large number of studies including Hansen and Kim (1995), Hamori (1999), and Bahmani-Oskooee (2001) have been conducted in the developed economies to determine the stability for the function of money demand employing cointegeration analysis.

2.3.2 Money Demand in Developing Countries

Majority of the studies that are present in the literature has analyzed money demand function involved developing and under developed economies. Domowitz and Elbadawi (1987) used the time series annually data over the period of 1958-1977 to estimate money demand in Sudan by employing Error Correction Model and Partial Adjustment Method. The error correction model gained advantage over Partial adjustment Method and provided evidence about stability of nominal cash balances. Rao and Shalabh (1995) investigated function for money demand in India with annual time series data form 1951-1952 to 1991-1992. They used error correction approach and found the elasticities of narrow money demand with respect to income and interest rate 1.50 and -0.42 in the

long-run. These are higher in absolute terms than the values 1.38 and -0.31 of the conventional model. They further argued that these differences do not matter but they are very essential for the decisions on financing budget deficit through the creation of money balances.

Arize, Spalding, and Umezulike (1991) estimated a money demand function for Thailand using quarterly data from 1973Q1 to 1985Q4. The findings supported the role of foreign interest rate in the domestic money demand function and proposed the monetary authorities to consider the effects of external factors to which domestic money demand responds in order to formulate stabilized policies. Fielding (1994) estimates a money demand function in four African economies including Kenya, Nigeria, Ivory Coast, and Cameroon by employing cointegation analysis. He concludes that cointegration exists among broad money, real income, and inflation only in case of Nigeria. Lee and Chung (1995) worked with quarterly time series data from 1973Q1 to 1990Q4 to estimate money demand function for Korea. The results provide empirical evidence for stability of M₂ but not for M₁. Broad monetary aggregate is influenced by income, exchange rate, and curb market rate, characterizing the Korean economy's openess in the international money market.

Chowdhury (1997) also estimated function for money demand in Thailand using narrow and broad monetary aggregates along with income, interest rates, price level, and exchange rate. The long-run elasticites of M_1 with respect to income and foreign interest rate are not statistically significant and raise the question about the stability of M_1 . On the other hand for M_2 , long-run elasticites are in range and that make M_2 stable. The coefficient of exchange rate remains statistically significant and supports the currency substitution hypothesis in Thailand. Besides the mentioned studies, there are many other studies in the developing economies. For example, Bahmani-Oskooee (1996) investigated behavior of money demand for Iran, Semudram (1981), Ghaffar and Habibullah (1987), Habibullah (1989), and Tan (1997) estimated money demand function for Malaysia, Ghartey (1998) considers the function for money demand in Ghana, Weliwita and Ekanayake (1998) investigated function for money demand in Sri Lanka.

Moreover, Randa (1999), Adam (1999), and Henstridge (1999) are the three studies conducted in Tanzania, Zambia, and Uganda, respectively. Anoruo (2002) examined the stability of money demand function for Nigeria in the period of Structural Adjusted Program (SAP). By employing Johansen and Juselius cointegration analysis for the data between the real M₂, economic activity and discount rate, result concluded the stability for M₂ and termed is a monetary policy tool in order to stimulate economic activity in the country. Nell (2003) also estimated money demand for South Africa. Bahmani-Oskooee and Rehman (2005) examined the behavior for money demand in Asian Developing economies. Rao and Singh (2006) and Sumner (2009) estimated money demand function for India and Thailand, respectively. Rao and Kumar (2009) examined money demand function for 14 Asian countries using panel data. Moreover, Arizie and Nam (2012) investigated money demand functions for Asian economies including Pakistan, Malaysia, Korea, Thailand, the Philippines, and Sri Lanka over the quarterly time series data ranging from 1973Q1 to 2003Q4. Ahumada and Garegnani (2012) also estimated a money demand function with different forecasting approaches for monetary policy variable (M₂) by different methods such as naïve models, forecasting windows, VAR in differences and Robustified devices for Argentina.

First and foremost difference between developed and developing countries relates to data. Former one gathers all the data about macroeconomic variables while later faces the unavailability of it. Thus it can be concluded that basic foundations of money demand function are introduced in the developed countries by employing various techniques. The research in developing countries follows the foot-steps of the developed countries.

2.4 Literature Regarding Variables Under Studied

Money demand is one of the most important areas in monetary economics. It has been gaining great attention incorporating variables besides the interest rate and income, checking relevant variables' integrating properties, and testing stability of money demand function in the literature. This study focuses the conducted work on the money demand including exchange rate along with its volatility, remittances, and financial liberalization.

2.4.1 Money Demand and Exchange Rate

Conversion value of one currency in terms of other currency is known as exchange rate. If Pak rupee is exchanged against US dollar, is also termed as exchange rate. Moreover, currency of one country can purchase the currency of other country *viz-a-viz* price of one currency in terms of other vice-versa is called exchange rate. There are two types of exchange rate; nominal and real. The real exchange rate can be stated as the nominal exchange rate that possesses inflation differentials regarding trade partner countries. It is very important and used for a country's foreign trade by which competitiveness is measured. Thus, it is expected that exchange rate may cause the instability in the domestic money demand function.

Nobel Laureate, Mundell (1963) was the first who introduced the significance of exchange rate in money demand, including other traditional variables. In an open economy, mobility of capital and growing foreign trade may influence the stability of money demand function. But he could not produce empirical evidence about the exchange rate. McKinnon (1982) showed his advocacy for this channel of effects introducing currency substitution hypothesis which proposed that the external monetary shocks in international financial markets would influence the money demand functions of the countries with flexible exchange rates.

Since the early 1980s researchers have been concentrating the influence regarding monetary developments on function for money demand. (See, for example, Arango & Nadiri, 1981; McKinnon, 1982; Bahmani-Oskooee & Pourheydarian, 1990; Bahmani-Oskooee, 1991; Chowdhury, 1997; Tan, 1997; Weliwita & Ekanayake, 1998; Khalid, 1999; Ibrahim, 2001; Bahmani-Oskooee & Rehman, 2005; Bahmani, 2012; Arize & Nam, 2012; and Anwar & Asghar, 2012). The exchange rate has empirical findings that

divided researchers into two groups due to the impact of monetary developments on the functions for money demand. First, Arango and Nadiri (1981) opined about the behavior of exchange rate that domestic currency depreciates (or foreign currency appreciates). It increases the value of foreign assets and rise in the wealth of country and demand for cash balances. This signalizes that exchange rate leaves positive impact on money demand and it is known as "Wealth Effect". Second, Bahmani-Oskooee and Pourhedrian (1990) pinpointed about the behavior of exchange rate that domestic currency depreciates with further expectations about the future depreciations (or foreign currency appreciates). It increases holdings of foreign currency which diminishes the wealth of country and demand for cash balances. This gestures that exchange rate leaves negative impact on money demand and it is known as "Currency Substitution Effect".

The impact of variations in exchange rate on money demand an open economy can be seen through the foreign financial sector. According to Arango and Nadiri (1981), exchange rate performs a vital role in domestic money demand. Agenor and Khan (1996) propose that domestic and foreign money through portfolio shifts gesture for the role of foreign exchange rate variable through substitution effect in the body of literature. On the other hand, there is wealth effect for the exchange rate on money demand is considered due to depreciation of exchange rate with future expectations about depreciation would increase agents' the asset portfolio in terms of foreign securities(see for example, Bahmani-Oskooee and pourhyderian, 1990; Mohammad, Baharumshah, Z.A, and Muzafar Shah , 2000; and Sharif-Renai, 2007). Whereas, many studies do not support to any effect of exchange rate in estimating money demand for

both developed and developing countries (see for example Arango & Nadiri, 1981; Arize & Shwiff ,1993; Bahmani-OsKooee & Rhee,1994; Sumner, 2009).

Since the advent of era of floating exchange rate regime in 1973, the detailed review of empirical work for exchange rate on the money demand in both developed and developing countries have been taken into consideration. First of all, it will be discussed for empirical evidence of the exchange rate in the estimation of money demand function in the developed economies. Later on, it would be considered for developing economies of the world.

2.4.1.1 Money Demand and Exchange Rate in developed countries

Money demand model estimated with econometric techniques may remain biased due to omission of opportunity cost of foreign financial sector such as exchange rate. Empirically, several studies have investigated the impact of exchange rate on the demand for money in the developed economies and the results have almost remained mixed and ambiguous.

McKinnon *et al.* (1984) furnished the evidence for currency substitution in estimating money demand function for the US. McNown and Wallace (1992) also estimated function for demand for money for quarterly data from 1973Q2 to 1988Q4 in the US by employing a cointegration technique developed by Johansen and Juselius (1990). They concluded that issue of cointegration in money demand function could be resolved by

introducing exchange rate for M_2 but not for M_1 . The results supported the wealth effect hypothesis since the coefficient of exchange rate is positively significant.

Arize and shwiff (1993) estimated money demand function for Japan using quarterly data from 1973Q1 to 1988Q4 by employing Johansen and Juselius cointegration technique. The results provide sufficient evidence about currency substitution effect with negative and statistically significant coefficient of exchange rate in both long-run and short-run. On the other hand, Bahmani-Oskooee and Wang (2007) estimated money demand function for China using quarterly data from 1983Q1 to 2002Q4 with the dynamic modeling econometric approach ARDL for China. The result does not indicate any effect in the long-run as well as Short-run.

Bahmani-Oskooee and Ng (2002) estimate the money demand function for Hong Kong with quarterly time series data that covers the period of 1985Q1-1999Q. The independent variables include real income, domestic and foreign interest rate and exchange rate. By employing the Autoregressive Distributive lag model, the results confirmed the hypothesis of currency substitution effect as the coefficient of exchange rate is negative and statistically significant. Zhao and Li (2015) studied the behavior of money demand during hyperinflation after Word-War II for China using two popular schedules log-log and semi-log models and showed the better performance of log-log model as compared to semi-log model. They further recommended the schedule of log-log for the analysis of hyperinflation in the behavior of money demand.

Following evidence in the literatures particularly from discussed studies, we conclude that no any firm conclusion about the specific effect of exchange rate in the estimation of money demand in the developed world.

2.4.1.2 Money Demand and Exchange Rate in developing countries

There is ample literature about the exchange rate as an exogenous variable in money demand function. There are empirical views about the exchange rate in terms of currency substitution hypothesis, wealth effect hypothesis, and neither. Hence, little account is reviewed to explain the effect of exchange rate in the estimation of money demand in the developing economies.

Arize (1994) examined money demand function for the three countries including Pakistan, Singapore, and Korea with quarterly data covering the period 1973 – 1990. He used the Johansen and Juselius cointegration test with income expected inflation, domestic and foreign interest rates, and expected exchange rate as the independent variables. The results provided support that foreign variables have contributory role in money demand function. Lee and Chung (1995) examined the money demand for Korea introducing income, different proxies of interest rates, and exchange rate as the independent variables. By using quarterly data covering periods from 1973Q1 to 1990Q4 and employing cointegration technique, they concluded that coefficient of exchange rate is negative and statistically significant hence, supports the currency substitution hypothesis in Korea. Kogar (1995) estimated money demand function for the two countries including Turkey and Israel by using the Johansen and Juselius cointegration technique. He used income, inflation and exchange rate differentials as the exogenous variables. With the inclusion of both inflation and exchange rate in money demand function, narrow money (M_1) and broad money (M_2) are stable in the long run for both countries. His findings proposed that sensitivity of exchange rate in money demand function signals for support of the currency substitution hypothesis in both Turkey and Israel. The results also show existence of long-run relationship supporting the stability of money demand.

Darat and Mutawa (1996) examined money demand function for United Arab Emirates (UAE) with time series that ranges over 1974Q1-1994Q2, incorporating independent variables; non-oil real gross domestic product, expected inflation, domestic and foreign interest rate, and exchange rate. A "koyk" Partial adjustment Scheme was applied and their empirical findings showed a statistically significance for the negative coefficient of exchange rate at 10% signaling a weakness toward the hypothesis of currency substitution in UAE.

Tan (1997) estimates function on money demand for Malaysia using quarterly data from 1973Q1 to 1991Q4. By employing Johansen cointegration analysis and general to specific approach, the results report that the coefficient of exchange rate is negative and statistically significant showing effect on only (M_1) real balances of narrow money demand but not (M_2) Broader one. Thus study supports the currency substitution hypothesis. Mohammad *et al.* (2000) also examined the empirical study on money

demand for Malaysia. The results of the study did not support to any hypothesis. Moreover, Ibrahim (2001) estimated money demand function for Malaysia and found the exchange rate with negative effect on function for money demand. He further concluded the dominancy of wealth effect hypothesis on money demand showing the coefficient of stock prices as a statistically significant.

Weliwita and Ekanayake (1998) examine money demand for Sri Lanka using quarterly data from period 1978Q1 to 1994Q4. By employing Johansen-Juselius cointegration and error correction analysis, results report that the coefficient of exchange rate is negatively related to M₁, the real cash balances and is statistically significant. They further proposed that relationship for M₂ with exchange rate remains indecisive. The exchange rate exerts an enough amount of bearing over domestically money demand due to openness of Asian economies to the rest of the world. Besides to this, Jayasooriya (2010) also estimated a study on demand function for Srilanka using time series annual data from the period 1960 to 2007. He used a dynamic model VAR cointegration approach, including real output, interest rate, exchange rate, and minimum wage as the exogenous variables. Results of the study portray that the coefficient of exchange rate is negative but statistically insignificant with monetary aggregates. Author interpreted the pragmatic evidences regarding the fluctuations in exchange rate and minimum wage rate should be adjusted with changes in money demand because they make the economic shocks and money demand vulnerable and insecure respectively.

Randa (1999) also estimated money demand function for Tanzania with quarterly data that cover the period 1974Q1-1996Q4. By employing Johansen's maximum likelihood and dynamic modeling procedure, the results support the currency substitution hypothesis concentrating on the stability of standards of monetary aggregates; M_0 , M_1 , and M_2 .

Civcir (2003) examined the study on money demand function for Turkey with income, inflation, interest rate and expected exchange rate as the independent variables. By employing Johansen's cointegration analysis, the results emphasize for the incorporation of exchange rate as determinant of money demand and support the currency substitution hypothesis in Turkey. Besides this, Bahmani-Oskooee and Karacal (2006) also estimated money demand function for Turkey using time series monthly data that covers the period from 1987M1 to 2004M6. By employing an ARDL Bound test with income, inflation, interest rate, and exchange rate as the exogenous variables and narrow and broad money aggregates as the endogenous variables, findings of study witness the presence of currency substitution hypothesis hence, the coefficient of exchange rate is negative and statistically significant.

Bjornland (2005) estimated money demand function in Venezuela. He used the quarterly time series data covering the period 1985Q1-1999Q1 with real income, price level, and interest rate on domestic assets inside the country, interest rate on domestic assets outside the country, foreign interest rate, and exchange rate as the independent variables. By employing the Johansen and Juselius cointegration analysis, the results confirm that domestic currency would be demanded less due to expected depreciation in the long-run signaling support to currency substitution hypothesis.

Bahmani-Oskooee and Wang (2007) examined a study on money demand in china incorporating real income, domestic and foreign interest rates, and exchange rate as the exogenous variables. By using Quarterly time series data over the span of 1983Q1-2002Q4 and employing an ARDL bound test, the findings concludes that exchange rate is negatively affecting both money aggregates M_1 and M_2 . But it is statistically insignificant at conventional significance level showing the weak evidence for currency substitution.

Sharif-Renani (2007) also estimated function for money demand in Iran using annual time series data from 1985 to 2006. By employing an ARDL technique with output, inflation and exchange rate as the independent variables over monetary aggregates, the results reveal that coefficient of exchange rate is positive and statistically significant with only M_1 supporting the wealth effect hypothesis in the economy of Iran.

Valadkhani (2008) estimated a study on money demand for the six countries including China, Japan, Malaysia, the Philippines, Singapore, and Fiji. He used the annual time series data over the time span of 1975-2002 with real output, inflation rate, interest rate, exchange rate, and US interest rate as the independent variables and the monetary aggregates as dependent variables. By employing a standard least square based technique Engle-Granger, two steps procedure, the results report the statistically insignificant coefficients of the exchange rate and foreign interest rate with negative sign signaling the support for the currency substitution hypothesis and capital mobility hypothesis in the long-run for all the six countries.

Baharumshah, Mohd, and Masih (2009) documented a study on money demand for China using quarterly time series data over the period 1990Q2 -2007Q4. By employing ARDL Bound test cointegration technique, they report that the exchange exerts the negative effect but is statistically insignificant at conventional level of significance. Further, they interpreted the results as the pegging of china currency with US dollar and the connection of exchange rate with differential regarding domestic interest rate and foreign through the Fisher effect.

Abdullah, Ali and Matahir (2010) estimated money demand function for the five ASEAN countries consisting Thailand, Malaysia, Singapore, Indonesia, and the Philippines. By employing an ARDL cointegration procedure, the results of the sampled data reveal that coefficient of exchange rate is positive and statistically significant signaling the support for the wealth effect hypothesis in all the six countries. Moreover, Yilmaz, Oskenbayev and Kanat (2010) also estimated empirically money growth function for Kazakhstan introducing GDP, interest rates, and real effective exchange rate an exogenous variables. The results of the study reveal that the estimated coefficient of exchange rate is negative and statistically significant supporting currency substitution hypothesis in the estimated money demand.

Dritsaki (2011) examines money demand function for Hungry using quarterly data from the period 1995Q1 to 2010Q1 introducing income, inflation and exchange rate as the exogenous variables and M_1 and M_2 as the endogenous variables. By employing an Autoregressive distributed lag (ARDL) Bound test, author reports that the coefficient of exchange rate is statistically significant and negatively affecting the both M_1 and M_2 witnessing the existence of currency substitution hypothesis in Hungry.

Sahadudheen (2011) conducted study on money demand function for India dealing with time series data that covers the period of 1998Q1-2009Q2 with real income, interest rate, and real effective exchange rate as the independent variables. By using Johansen and Juselius cointegration technique, it is found that the coefficient of exchange rate is negative and statistically significant confirming the existence of wealth effect hypothesis in India.

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Azire and Nam (2012) estimates the money demand function for the seven countries comprising Pakistan, India, Srilanka, Thailand, Malaysia, Philippine, and Korea with income, interest rate, and exchange rate as the independent variables and (M_1) narrow and (M_2) broad monetary aggregates as the dependent variables. The Quarterly time series data were used from the period 1977Q1 to 2009Q4. By employing panel cointegration technique, results confirm that the coefficient of exchange rate is positive and statistically significant hence, the wealth effect hypothesis is supported in all the seven countries.

Bahmani-Oskooee and Bahmani (2014) conducted study on money demand function for Korea making use of the annual time series data that holds the period of 1971-2010 with interest rate, exchange rate and volatility of exchange rate as the exogenous variables. By employing an ARDL cointegration procedure, findings signal to support the currency substitution hypothesis in Korea on the basis of positive and statistically significant coefficient of exchange rate. However, Kurihara (2015) estimated money demand function for Japan using quarterly data from 2002Q1 to 2014Q2. He employed the OLS, GMM, and Robust estimation method and found currency substitution effect on the basis of negative coefficient of exchange rate while, there is no long-run effect of stock prices on money demand in the case of Korea.

Furthermore, in context of Pakistan the empirical results of exchange rate in money demand are not in harmony. Different studies produce different results; for example Hossain (1994), Azim *et al.* (2010), and Anwar and Asghar (2012) support for the currency substitution hypothesis. On the other hand, Khan and Sajjid (2005) confirm the evidence of wealth effect hypothesis.

Empirical studies in the body of literature conducted on money demand in both developed and developing economies of the world provide conflicting evidence about the relationship between exchange rate and the money demand. However, these studies do not validate a firm conclusion such as hypothesis of currency substitution effect, wealth effect or neither. Thus exchange rate is gaining deeper insight as determinant of money demand. There is dire need to study exchange rate in money demand hence, it is included in this study for further analysis in case of Pakistan. Since the sample size differs from the previous studies in terms of time frame so, it is not expected for the same results as mentioned above.

2.4.2 Money Demand and Volatility of Exchange Rate

Volatility of exchange rate is defined as uncertainty in exchange rate or fluctuations in exchange rate. Volatility in exchange rate warns the investors to consider prevailing conditions of the economy. The more volatility lowers the investment while the less volatility broadens the investment. Stability of the exchange rate is positive symptom and encourages new investment in the economy. The more investment in the economy ascertains the increasing in number of transactions of the money among the households and the firms.

After incorporating exchange rate in money demand function for an open economy, exchange rate volatility also becomes one of the core economic issues. It has gained deeper insight in the decade of 1970's by many researchers. It affects many macroeconomic variables such as foreign trade, foreign direct investment, and aggregate monetary and non-monetary stocks that remain accountable for the appropriate quantity of money in the economy. Empirical literature furnishes mixed conclusions; for instance, Cushman (1983), Thursby and Thursby (1987), and Peree and Steinherr (1989) report the adverse effects of exchange rate volatility on trade flows. On the other hand, Gotur (1985) and Lastrapes and Koray (1990) conclude non sensitivity of trade flows to exchange rate volatility. Since the impact of volatility of exchange rate affects the trade

flows, it also affects the economic activities in economy, ascertaining specific amount of money in it.

Voluminous research has been conducted on exchange rate volatility that mainly affects foreign trade such as import and export (international trade). Since the end of Bretton wood system world-economies started journey from fixed to flexible exchange rate, and they have been receiving sudden shocks or fluctuations in terms of volatility of exchange rate. This shift in regime has attracted many researchers with specific objective to analyze the impact of exchange rate volatility on trading activities (Aftab *et al.*, 2012).

Theoretically, it is believed that more the volatile exchange rate, more the risk and vice versa. The higher the volatility the lower the volume of foreign trade due to introduction of risk for future profit through export trade. The firms can lessen the amount of uncertainty by making timely payments through forward markets in the short-run. It may also endanger foreign trade indirectly by affecting firms' investment decisions in the long-run. However, investors (traders) are left with limited possibilities regarding trade claims for future cash flows (Viaene & De Vries, 1992; Wei, 1999). Hence, they are made the risky markets to shift away. Arguing for the facts, it is costly or impossible to hedge for the investors that are risk averse. Therefore, volatility of exchange rate

would shorten risk-adjusted profit through foreign trade²¹, reduce the monetary transactions; hence, it may affect domestic money demand.

Since the beginning era of floating exchange rate in 1973, researchers and policy makers have focused to examine the effects of volatility of exchange rate on the volume of foreign trade. However, previous empirical conducted studies on exchange rate volatility have produced mixed results regarding its impact on trade flow. First strand of the studies argues that volatility of exchange rate would increase cost for risk-averse households who would prefer domestic trade over foreign trade. Second strand comprises the undiversified exchange risk households; if it is expensive or impossible to hedge for them, expected risk adjusted profits through trade would be shortened when the volatility of exchange rate rises.

There is continuous debate on the type of exchange rates systems for effective and optimal monetary and fiscal policy among researchers. The opponents claim that fiscal policy is more efficient under the regime of fixed exchange rates, while its proponents argue about the efficiency of monetary policy under the regime of floating exchange rates. However, theory of economics proposes that both policies exist under the regimes regarding exchange rates depending upon the degree of sterilization. Mundell (1963) argued, regarding floating rates, that the efficiency of both fiscal and monetary policy would depend upon sensitivity regarding money demand towards exchange rate.

²¹ An exporter, who is very risk averse, may export more in high risk, worries about revenue fall. Alternatively, an individual, who is less risk averse, may export less in high risk, considers less attractive returns on export.

Precisely, he made a conjecture regarding the fluctuations in exchange rate in following words

"The demand for money is likely to depend upon the exchange rate in addition to the interest rate and the level of income; this would slightly reduce the effectiveness of a given change in the quantity of money, and slightly increase the effectiveness of fiscal policy on income and employment under flexible exchange rates, while, of course, it has no significance in the case of fixed exchange rates.²²" Mundell (1963, p. 484)

There are more chances of the volatility under the regime of floating exchange rate system. Friedman (1953) astonished the audience arguing on the eve of celebration for flexible exchange rate system that instability in exchange rate is a mirror for economic structure and flexible exchange rates are not always unstable, but depends upon the degree of sterilization for the economic conditions of the country. Further, it was argued that instability of exchange rate is a barometer for economic volatility. There are different regimes of exchange rates that channelize volatility through different mechanisms, for example, when exchange rates are floating then 'liquidity' or 'money supply' shocks exert effects on nominal exchange rates under the fixed exchange rate regime. Volatility prevailing in the system cannot be lessened by regimes, only transformed to one another locus. The economy is considered like a balloon where volatility is squeezed from one part and transformed elsewhere²³.

²² Refer for further details Mundell (1963, p. 484).

²³ This hall-mark argument astonished many by increased magnitude of exchange rate volatility after Bretton wood system break up in 1973, see for more details Mussa (1979) or Obstfeld, etal. (1995). During seventies and eighties, much of the influential work in international finance was geared towards rationalizing the apparently high level of floating exchange rate volatility; for more details refer to Dornbusch (1976), whisch is the masterpiece in the literature.

Friedman (1982) documented that uncertainty in foreign exchange markets can be caused by erratic behavior of exchange rates. If domestic currency, compared to foreign currency, is experiencing higher exchange rate volatility, the domestic investors attempt to incline towards substitute assets for safety and move away from riskier domestic currency; hence domestic money demand may decline.

Mcgibany and Nourzad (1995) estimated money demand function for US using the quarterly time series data covering the time span of 1974Q1-1990Q4 with effects of exchange rate. By focusing short-run dynamics, they analyzed the money demand function, which is not only affected by exchange rates but also their volatility. While domestic interest rates volatility shoots up, uncertainty in financial markets of the economy increases. The findings of the study reveal that the coefficient of exchange rate volatility is negative along with statistical significance. It affects the broad money's demand function. The authors conclude that an increase in exchange rate volatility causes decline in domestic money demand.

Exchange rate volatility possesses real economics cost. It exerts impact on price stability, profitability of firms, and financial stability of the country. Majority of the countries attempted to reduce fluctuations in their domestic currencies through regulating constraints over exchange rate movements such as crawl band, monetary measures like changes through domestic interest rates, intervening foreign currency market, and restricting capital inflow and outflow of the country. In the absence of any specific procedure to lessen this risk, exchange rate volatility would further shorten the amount of international trade. Ethier (1973) stated that the volume of trade would be shortened if the traders are not ascertained about the firm's revenue affected by exchange rate. This uncertainty could be ameliorated, however Clark (1973) argues that the volume of exports might be affected because of risk-averse traders but it can be lessened through the forward markets. Baron (1976) explores that due to non-development of forward markets, traders may still be concerned about exchange rate risk. This process may affect the money demand in the economy.

Furthermore, Hooper and Kohlhagen (1978), incorporating both the demand and supply, introduced theory about the risk aversion by analyzing the impacts of exchange rate volatility on trade quantities and prices. Gagnon (1993) predicted "upper bound", theoretically related to the negative effect's size. However, later studies theoretically explain that rise in exchange rate volatility might increase trade volume and may have opposite effect. Viaene and de Vries (1992) document that exporters and importers are risk averse; so they oppose the risky trading and their roles are interchanged respectively. It favors the positive sign for volatility coefficient for one partner and negative for other; hence one may be winner of the monetary aggregates and other may be the looser.

Franke (1991) shows that firm might generally gain through rise in volatility when it responds as an increase in volume of export. Sercu (1992) also demonstrates that volatility widens the base for trade, as it maximizes the likelihood that prices received

by the traders may increase the trading costs. Sercu and Vanhullerb (1993) made an argument that the rise in volatility increases exporting firms' value and encourages exporters. Dellas and Zilberf (1993) explain that exchange rate volatility positively affects the trade by employing assets-market approach. Broll and Eckwert (1999) state a remarkable conclusion that volatility enhances the value of exports for traders; since potential gains would be increased with this risk from trade, the trade volume would increase accordingly. Since trade increases, employment and output would increase, and consequently money demand may increase.

Many studies prevailing in the body of literatures have not considered any impact of volatility over the volume of foreign trade. Willett (1986) provided evidence about the expected trade reduction and hypothesized that increased international risk in floating regime of exchange rate, volatility cannot be neglected. While both international and domestic risks totally behave differently. So the consideration of exchange rate volatility as the determinant variable in the studies of money demand will add the value in the literature as previous studies yield inconsistent results.

One might guess that the uncertainty in the price of traded goods shortens the volume of trade, as risk-averse economic agents face possible losses due to the fluctuations in the exchange rate. Thus, economic agents cannot choose the risky dealings. Alternatively, it has been hypothesized that volatility of exchange rates can compound the volume of trade as exporters and importers opt to enhance the trade flows to earn a certain level of income by hedging the decrease in the value of goods per unit and increasing the

amount of goods sold or bought. The conclusion of exchange rate volatility is supported by many researchers such as McKenzie (1999) and Bahmani-Oskooee and Hegerty (2007) in the literatures.

Benita and Lauterbach (2007) documented an argument that the policy measures, followed by central government, were temporarily or partly successful in controlling volatility of exchange rate. Since previous decades of regulations, domestic policy, and increased globalization have reduced the attitude towards speculation. Consequently, money supply and demand have abruptly changed due to improper handling of monetary aggregates by the central banks. As a result, most of the economies have been experiencing several problems such as low economic growth, high inflation, and unemployment.

During and after the Asian financial crisis central banks of Turkey, Brazil, and Russia, excessively intervened under the managed exchange rate system which brought more harmful results. Consequently, countries like Turkey, Chile, Brazil, Thailand, and Korea intended to allow their currencies to free-floating. Simultaneously, twenty five countries followed "pegged" system for their currencies to Euro by choosing another solution alternatively.

Calvo and Reinhart (2002) argued that foreign exchange markets are intervened by the central banks even in free-floating countries. The intervention takes place in form of direct sales and purchases of the currencies. The more famous tool of intervention is

changing real interest rate domestically²⁴. It has remained the main objective of researchers to develop the model for monetary policy of the central bank adopting rule of interest rates. Clairda, Gali, and Gretler (1999) and Monacelli (2004) argued that central banks make an adjustment using short term rate when output, inflation and exchange rate deviate from the announced target levels. These above mentioned are the factors that may have linkage with money demand function.

There is voluminous research on the impact of exchange rate volatility via international trade (see for instance Bahmani-Oskooee and Hergerty, 2007; Coric and Pugh, 2010; and Verheyen, 2012). Uncertainty among international transactions is expected with incorporation of exchange rate volatility. Hall *et al.* (2010) investigated that exchange rate uncertainty shortens the economic welfare and households cannot enjoy same bundle of goods and services against the currency. By lowering economic welfare, money supply might be affected in the economy.

Nonetheless, there is no any apparent relationship between international trade and exchange rate volatility in theoretical and empirical perspective. In theoretical perspective, exchange rate volatility has unclear impact in terms of positive or negative on foreign trade (Verheyen, 2012). Empirical studies, using different proxies and econometric techniques for exchange rate volatility like cointegration and panel data analysis, find no any clear and unanimous consensus regarding the impact of exchange rate volatility on international trade, which may affect the money demand (Zelekha & Bar-Erfat, 2011; Nishimura & Hirayama, 2013).

²⁴ Refer for further details Rose (1996), Calvo and Reinhart (2002)

Several studies have been conducted on the role of exchange rate volatility in international trade in developed and industrialized economies. A meager amount of attention has been paid to volatility of exchange rate in developing economies. Review of empirical studies, considering the impact of exchange rate volatility on the money demand, follows.

According to Coric and Pugh (2010), there is an adverse effect of exchange rate volatility and foreign trade in the study of 49 economies that covers the period of 1978 to 2008. These findings are mainly significant in developing economies where future forwards and option markets are not relatively well developed. Exchange rate volatility could deter country's trade in international markets. So, output inflation may be changing agents' money demand and it is affected transitively by exchange rate volatility. In this regard, Bahmani-Oskooee and Bhol (2008) covered a study between US and India on the trade data in 40 industries with ARDL bounds testing approach and discovered the mix findings about the coefficient of exchange rate volatility. It has mix results of negative and positive impacts in the short-run within 16 out of 40 industries. These effects remain for short-run but do not remain in many cases for the long-run.

Bahmani (2011) estimated money demand for the 15 less developed countries (LDC) using annual time series data with ARDL bound testing approach. She proposed that exchange rate volatility could affect money demand and concluded that exchange rate volatility exerts short run effects on real broad money aggregates (M_2) in LDCs.

However, short run effects do not sustain in most of the countries. Bahmani and Bahmani-Oskooee (2012) estimated money demand function for Iran with annual time series data for post-revolutionary period of 1979 to 2007. By employing an ARDL bound testing approach, they argued that exchange rate volatility sources the uncertainty into expectation effect or wealth, it may affect money demand.

To the best of the researcher's knowledge, there is limited number of studies regarding money demand where volatility exchange rate is introduced as a contributing factor estimating money demand function in all of the economies of the world. The empirical studies analyzed the impact of exchange rate volatility in estimating money demand has shown ambiguous results.

According to suggestions proposed by Bahmani (2011) and Bahmani and Bahmani-Oskooee (2012), there is a dire need to incorporate exchange rate volatility in estimating function for money demand in the case of other economies. There is hardly any study that has considered exchange rate volatility as determinant in money demand for Pakistan. So this variable needs to be analyzed in context of Pakistan.

2.4.3 Money Demand and Remittances

Remittances are transferred money to home country by foreign workers. Like other factors, it may also exert impact on the development and welfare of the country for an open economy. Remittances, is one of the sources of the financial inflows, and it is substitute of foreign aid in developing countries such as Pakistan and may affect the

money demand. Since the 1980s policy makers and economic development experts in Pakistan and other developing economies have been focusing on the role of remittances in economic development. Remittances has been gaining importance as a source of development finance. 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).

Almost all the researchers have agreed over the economic impact of remittances in the economies of developing countries as the enough portion of labor force is working abroad. However, remittances' transfers bring the households 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.

Almost all the studies about remittances are related only to developing countries despite the fact that its use cannot be easily tracked out due to obvious reasons. Bourdet and Flack (2003) and Carling (2004) argued that these inflows are mostly utilized for education and residential construction purposes. Besides this, the World Bank has documented in its various reports that remittances has immensely contributed in socioeconomic development of several low-income economies. For example, remittances of Mali workers residing in France alone have assisted the 60 percent infrastructure building of the country and furthermore, association of 40 Malian migrants have supported to 150 projects over a decade in their home country.

International remittances show development impact, which depends upon the continuous flows by which money can be remitted across the international borders. Internationally money transfers to the developing countries would be increased significantly, if cost is lowered marginally and smooth channels of transfer money are promoted. Developing economies could perform this task by attracting recipients of the remittances with lot of incentives as they could save their more money in the domestic banking sector. Offering attractive exchange rate and enhancing efficiency of the banking sector are the ways to formalize the transfers within developing countries. In some Asian countries, formal banks are only in the urban areas, while the country-side households are left with no option but be under the mercy of informal financial services which leads to high cost and the risk.

Islam (2003) stated the role of remittances in alleviating trade deficit in Bangladesh between 1990 and 2000. This experience is not only peculiar to Bangladesh but countries like India, Pakistan, and Sri Lanka also found the role of remittances in improving current account balance. Muco, Sanfey and Taci (2004) argued that remittances inflows have largely facilitated the stability between inflation and exchange rate during the early transition years (1993-1996) in Albania. The increased remittances inflows and underground economic activity through smuggling and contraband goods and services have raised the foreign currency circulation and simultaneously lowered the

demand for domestic currency. Muco *et at.* (1999) and Haderi *et al.* (1999) provide empirical evidence that the remittances explain more variations in inflation rather than money supply in the developing countries.

Mutume (2005) conducted the study for Sudan and argued that migrants were using informal channels to avoid the restrictive foreign exchange rules. The country simply devalued the currency and this strategy brought the migrants exchanging currency at official rate. Consequently, official channels were promoted by this strategy remitting money home. Similarly, in Uganda where financial markets were liberalized, foreign denominated assets and trade in foreign exchange rates were allowed, and remittances remained at rise within official channels.

After foreign direct investment, remittances are the most out-sourcing factor within Pakistan economy. Remittances mainly improve households' consumption trends and are not used for investment purpose in Pakistan. Kock and Sun (2011) empirically proved that remittances has been increasing since last three decades in Pakistan. Suleri and Savage (2006) documented that after 90's, substantial remittances' initiatives and projects have internationally been launched by different donors like the US, the UK, and multilaterals particularly Asian Development Bank (ADB) , Inter-American Development Bank (IADB), and the World Bank. The recorded significant increase in remittances inflows in Pakistan made it more important and interesting. In developing countries, remittances has remained under the debate of researchers, policy makers and academics for their viable impact on economic development and growth. Many previous studies have shown that the sources such as labor surplus, innovative technologies, foreign aids, Foreign Direct Investment (hereafter FDI), and opportunity cost on investment have contributed in economic growth (for instance, Lewis, 1954; Solow, 1956; Romer, 1986; Barro, 1991).

Remittances are considered an important source regarding foreign income for developing countries. Several prevailing issues in developing economies can be resolved by remittances such as bridging gap of balance of payment and addressing issues of inflation through development process. Remittances facilitate labor intensive countries through structural adjustment program (SAP) by sending human capital abroad. According to the argument by Ratha (2007) and Orozco (2010), remittances can be fruitful for workers' families and relatives during natural calamities and financial crises. The remittances' inflow generally leads to alleviation poverty, training skills, health improvement, better education and wide range of other benefits. All of the above activities performed by remittances' inflows have connection with income that affects the money in economy.

Remittances are playing vibrant role in boosting up income that is viable for future consumption and stable investment in developing countries (Ratha, 2005). They contribute in various ways in the economic growth and development of the country. Due to less volatility, remittances add value in funding compared to foreign direct investment

and private capital flows (Buch, Kuckulenz, & Manchec, 2002). Remittances are blessing disguise for the developing and under developed economies like Pakistan; as they are already passing through the energy crisis like oil, gas price shocks, and electricity. Therefore, remittances can be a facilitator to reduce the impact of external shocks on the balance of payment. It is expected that when households' income increases with remittances inflows, consumption pattern also smoothly improves and theoretically money demand would be affected.

Remittances proved their due significance in foreign exchange reserves as compared to other traditional sources such as export and international aid for Pakistan. Remittances contribute in both foreign exchange and economic growth and development as well. Hence, it is an essential to identify their economic impacts on the other macroeconomic variables in Pakistan.

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Remittances exert their impact with respect to exchange rate regimes. Ball, Lopez, and Reyes (2013) showed the impact of growing remittances, under the fixed regime of exchange, increases money supply and inflation; while under the flexible exchange rate regime temporarily does not affect money supply, reduce the amount of inflation, and shoots up real exchange rate. Reinhart and Rogoff (2004) proposed that increase in remittances causes rise in price level by shifting resources form tradable sector to non-tradable sector. Negative shock in tradable sector cannot adjust the price level in international market under the regime of fixed exchange rate system. Thus, there would be prevention for nominal depreciation. The resulting effect reduces rise in price level
and output of tradable sector. Alternatively, international price level can be set under the regime of flexible exchange rate system. Consequently, remittances inflow causes to appreciate exchange rate and to raise the price level and money demand may also fluctuate.

Remittances' inflows widen the pace of economic growth and development in the home country with the increase in domestic saving and investment as well. Rapoport and Docquier (2005) claimed that migration is a brain drain throughout the sphere of globe that makes the human capital scarcer in the home country and make it more abundant worsening income equality across the richer countries. It is responsibility of authorized institutions to balance the amount of money supply in the economy. Kaufmann and Mastruzi (2007) stated that the impact of remittances depends upon institutional factors like availability of financial services, political stability, political freedom, and assurance in the economic growth and development.

Remittances can be source of improvement for macroeconomic conditions of the both host and home country of the labor or in either, as Vergas-silva and Haug (2006) argue that remittances trigger improvement in macroeconomic conditions in host country as compared to home country. Economy receives two effects from remittance; first, it is reliable source of earning to foreign exchange, a viable tool to alleviate poverty, a mechanism to share risk, a secure investment source, and a way to future consumption (Ratha, 2005). Second, remittances, being un-earned national income, have dire negative impacts on the economy. When remittances are injected in an economy without any production purpose, it surges the relative price level. Moreover, work hard becomes less attractive for remittances receiving families and hence it declines. Consequently, beneficiaries may prefer leisure to more relying on remittances. The remittances may rise family consumption and encourage them to invest in real estate rather than investment in productive assets (Amjad & Ahmed, 1986; Chami, Jahjah, & Fullenkamp, 2005). It is claimed that remittances tend to move in counter cyclical direction with gross domestic product within workers' home country. In response, workers are expected to support more their families and relatives during down turn in the economy to compensate the losses that may happen due to factors responsible for crisis such as unemployment and inflation. Therefore remittances can facilitate in resolving stemmed crises in the economy.

Recently, remittances has been gaining due importance as multilateral tool to improve economic conditions in time of recession. Remittances inflows have remained one of the crucial issues for monetary and fiscal policy of developing economies, for example Giuliano and Ruiz-Arranz (2005) conducted study and find that remittances has surpassed the export revenue, foreign direct investment and international aid within several developing countries. Even, World Bank (2006) reported the higher amounts of remittances than foreign direct investment in developing countries because of the efficiency in remittances receipts.

Rajan (2006) explored that remittances, foreign direct investment, and export revenue have remained the stable source to financial inflows rather than debt and foreign aid.

Stark and Bloom (1985) discovered that workers' remittances play vibrant and dynamic role in increasing wealth and income and ensuring against the future calamities. Faini (2006) showed the financial inflows tend to exert viable impact on economic growth with investment climate and economic prospects in the recipient countries. He further argued that remittances serve as a tool to counter financial stocks such as crops failure, adverse trading and maintaining consumption levels. Consequently, monetary transactions may be affected in the economy.

Pakistani workers earn money abroad in foreign currency where they work like US dollar, Saudi Riyal, UAE Dirham or Malaysian Ringgit and thus remit money to their homes in foreign currency. The emigrants use transmission method that often allows the recipients to remit amount in home country in US dollar (for example formal remittances through banks that permit to have in US dollar)²⁵. Therefore, household that receives may decide whether to convert in Pakistani rupee or keep them same in US dollar. If the recipient is using Pakistani currency for consumption or investment purpose then it would convert them in Pakistani rupee. If recipient may not be willing to convert whole received amount from abroad in Pakistani rupee than they keep some amount in foreign currency. For example, it is generally argued that households in developing countries wish to keep financial assets into foreign currency, avoiding unexpected depreciation risk into domestic currency. The informal dollarization within country can also validate to hold the stocks into both currencies.

²⁵ Home country is the country of origin of the immigrant. Host country is the destination country of the immigrant. Household or recipient refers to the family of the immigrant in the home country.

Researchers are divided into two strands on the implication of remittances because of complicated relationship with exchange rate. In first strand, most of the previous studies propose that recipients convert received remittances partly into domestic currency (for instance, including Faini, 1994; El-Sakka and McNabb, 1999; Higgins, Hysenbegasi, and Pozo, 2004; Yang, 2008) and provided empirical evidence that remittances exert impact on exchange rates. Another strand of researchers has an argument that country's domestic currency is appreciated by remittances (Amuedo-Dorantes & Pozo, 2004; Bourdet & Falck, 2006). Appreciation of exchange rate can introduce a phenomenon like "Dutch Disease²⁶." In this phenomenon, country's currency appreciates; its export becomes more expensive in international market. Consequently, tradable sector's competitiveness shortens. Imports of the country become relatively cheaper and the current account of country remains at risk.

In addition, demand increases and prices generally rise within non-tradable sector with remitted money while prices in tradable sector cannot fluctuate relatively in small open economy. It shifts resources from tradable sector (industry and agriculture) to non-tradable-sector (services) affecting the competitiveness of country's tradable sector with respect to non-tradable sector (Rajan & Subramanian, 2010). Several studies like Jones and Olken (2005) and Rodrik (2008) have argued that the traded goods sector is the channel through which an economy absorbs best practices from abroad. The absence of these learning-by-doing spillovers, which may be critical for long run productivity

²⁶ The term "Dutch disease" originates from a similar phenomenon that occurred in Holland, which was caused by the development of the natural gas industry, resulting in an export boom with large foreign exchange currency inflows. For further details see Verga-Silva (2009).

growth, could be one constraint on the growth. The aforementioned shifts among resources that reduce the competitiveness have been found in several developing countries. Amuedo-Dorantes and Pozo (2004) conduct study for 13 Caribbean and Latin American countries and conclude 22 percent appreciation in real exchange rate followed by 100 percent rise in remittances.

Moreover, Bourdet and Falck (2006) suggested that remittances adversely affect Cape Verdean economy's competitiveness through official development assistance. Acosta, Lartey, and Mandelman (2009) documented that inflows of remittances appreciated the exchange rate in 109 developing countries covering period from 1990 to 2003. This phenomenon is termed as "Dutch Disease" which causes to rise the household income and make biased the consumption in the tradable sector in an economy. Kapur (2004) also argues that remittances in small developing countries results in appreciation to exchange rate. Among remittance-receiving countries, remittances also lower competitiveness through reduction in labour supply (Bussolo & Medvedev, 2007; Görlich, Mahmoud & Trebesch, 2007). However, there is still no firm consensus on adverse effects of remittances on country's competitiveness for example, Rajan and Subramanian (2005) argue that remittances and other financial flows are totally different and Grabel (2008) proposes that remittances and other financial flows are similar for short-term, but they wholly depend on economic policies. Alternatively, Mongardini and Rayner (2009) find that remittances lose linkage power to exchange rate appreciation for Sub-Saharan Africa study.

Abdul-Mumuni and Quaidoo (2016) conducted a study on the effects of remittances on inflation in Ghana using annual time series data from 1973 to 2013. They employed the bound testing approach and found a long-run relationship between international remittances and inflation but not in the short-run. The implication of the results was to reduce transfer fee of remittances enhancing consumption path and demanding more for the domestic currency for smooth economic growth. More or less, the role of remittances through other variables such as exchange rate, income or interest rate may exert effect on money demand. Thus, the impact of remittances on money demand is still ambiguous.

To the best of our knowledge, there is hardly any other study that considers remittances as determinant of money demand except Adentusi and Ahortor (2008) and Vergas-Silva (2009). Adentusi and Ahortor (2008) examined relation between remittances and narrow money demand employing VAR technique for Ghana and found no any effect of remittances on money demand. Vergas-Silva (2009) conducted study for Mexico using money demand, remittances, and exchange rate by employing variance decomposition, impulse response function and structural vector error correction model readdressing the issue of endogenity among remittances and exchange rate as well with others. They find remittances exerting negative impact on US dollar money demand with statistical significance. It was empirically observed that remittances granger-cause the money demand and suggested to incorporate in the studies for other various countries. The suggestions for the incorporation of remittances are still unattended. Pakistan is a labor-intensive country like Ghana and Mexico and is highly dependent on the remittances inflows of emigrants working abroad. Therefore, this study adds remittances as an exogenous variable in estimating function for money demand in case of Pakistan. Since Pakistan is different from Ghana and Mexico in many terms such as Population, GDP, unemployment rate and inflation rate with (182.1 million, 515.4 billion, 7.7 percent, 11 percent), (24.9 billion, 82.4 billion, 11 percent, 9.2 percent), (25.9 million, 48.14 billion, 11.2 percent, 11 percent), and (114.9 billion, 1.8 trillion, 4.8 percent, 4.1 percent) respectively; hence, it is not expected that results of remittances in the money demand for Pakistan may match with Adentusi and Ahortor (2008) for Ghana and Vergas-Silva (2009) for Mexico.

2.4.4 Financial liberalization and Money Demand

Conceptually the main objective of financial liberalization is to improve resource allocation and management in an economy. Liberally performing financial sector contributes to the economic development in an economy. The real economy is closely inter-linked with financial sector in terms of monetary and fiscal policies. Financial liberalization results positive effects influencing, among other thing, trade and growth in the real economy. However, financial liberalization may have some worsening consequences in terms of instability. For instance, with an easy entry to financial institutions can increase the number of financial institutions including banks. They may hoard nonperforming loans, unbalanced portfolios of assets and liabilities, and many collapses as seen in Philippines in 1996 (Zaidi 2005:288). Financial innovation plays critical role in money demand. Theoretically it has been well focused in the body of economic literature. Money demand can be more interest elastic by creating additional money substitutes (Tobin, 1965). Lieberman (1977) argues that increasing use of credit, properly synchronizing expenditures and receipts, reducing mail float, rising use of monetary substitutes, and effective payment mechanism are responsible to decrease transition money demand in the economy.

The financial reforms can interpret the trend behavior of money velocity at different stages of the development in an economy. Bordo and Jonung (1990) find that technical progress has two influences on the trend behavior of money in financial sector dominating at its specific stage of the development. During the first stage, rise in the monetization characterizes the economy and demand deposits and cash are rapidly used for transactions avoiding earlier dependence on the barter trade. Consequently, transaction demand for balances increases more than income and the negative trend characterizes the velocity. During the second stage, financial liberalization introduces a wide range of highly liquid and tradable securities substituting money as a store of value. The money balances are economized with growing funds transfer and financial innovations in the economy. Consequently, money balances grow slowly in relation to volume of transactions and positive trend characterizes the velocity over the time. Hence the trend behavior of velocity takes the form of U-shaped pattern. Money demand function cannot be modeled easily with such patterns.

The body of empirical literature has been evaluated on the impact of financial liberalization in various forms on money demand. Studies are collected on money demand whether it is affected by financial reforms. First, if it is affected, it is expected to use M_2 providing evidence some economies of scale with negative effects on money demand. Furthermore, real deposit rate responses rapidly money demand being purely market based. Second, if financial reforms have continuously created near money assets. This may contribute instability in money demand. This lacks the well-defined and long-run relationship between the determinants and money i.e cointegration tests might fail to support the cointegration.

Empirically, financial liberalization may influence money behavior with different channels of the financial reforms in the body of literature. Proliferation of financial institutions has created competition among institutions including banks, enhanced intermediation; spur advances, introduced technology (ATM, electronic transfer, bank cards), assured availability of financial instruments substitute to money. They may contribute to lower money demand as these developments facilitate the converting money substitutes into money. However, money demand may spur over time because of rise in monetization of financial deepening and economy in the developing countries (Melnick, 1995). The studies conducted by Dekle and Pradhan (1999) and James (2005) argued that money demand can be changed in either direction by financial innovations. Furthermore money can be transformed into various categories. With interest rates liberalization on time deposits, households may change their assets from demand deposits and currency to time deposits raising (lowering) velocity of narrow money (broad money) (James, 2005). Arrau *et al.* (1995) urged to incorporate financial innovation as a policy variable estimating money demand. Siklos (1993) for the five countries US, UK, Canada, Norway, and the Sweden and Melnick (1995) for the Israel analyzed money demand function and reported establishing notion of cointegration by introducing financial innovation as an independent variable. Arrau *et al.* (1995) estimated money demand function for ten developing countries including Argentina, Brazil, Chile, India, Israel, Korea, Malaysia, Mexico, Morocco, and Nigeria using different proxies for the financial innovation. By employing simple household model, they concluded the vital role of financial innovation in estimating money demand and argued that inflation rate increases its role and fluctuations.

Sekine (1998) estimated money demand and analyzing role of wealth in Japan. The results of the study show that money demand becomes more stable with financial liberalization and wealth effect. Dekle and Pradhan (1999) estimated money demand functions for the four ASEAN countries including Singapore, Indonesia, Malaysia, and Thailand inducing real income, interest rate, and financial liberalization as explanatory variables. By employing Johansen's Full-Information Maximum Likelihood procedure, it is revealed that all variables move together in the same direction in the long-run and concluded that financial liberalization makes the money demand stable. It is a fact that deregulations of interest rates, competition in banking sector, liberalization of restrictions on capital flows cross the borders in these countries has remained higher than the other developing countries.

Pradhan and Subramanian (2003) estimated money demand function for India in the presence of structural break. By employing three steps, procedure for stability of money demand was tested with financial reforms. The results of the study confirmed that financial reforms contribute to the stability of money demand in India.

James (2005) estimated money demand for Indonesia analyzing the effects of financial liberalization (particularly, financial innovation and institutional regulations). By employing ARDL bounds testing approach by Pesaran *et al.* (2001), it was found that financial liberalization affects to the stability of money demand.

Akhtaruzzaman (2007) analyzed the money demand for Bangladesh by looking at the effects of globalization and financial liberalization. By employing Johansen and Juselius cointegration analysis with ECM, it was found that stability of money demand is affected by only financial liberalization but not by globalization. Furthermore, it was established that currency substitution should be focused of policy due to its effective role in the monetary sector.

Zouhar and Kacemi (2008) investigated money demand function for the Morroco by analyzing impact of financial liberalization on the stability of money demand. By employing the Johansen Maximum-Likelihood procedure, the results revealed the existence of the long-run money demand function. The stability test concluded absence of structural break in money demand function. Rao and Kumar (2009) analyzed money demand function for the 14 Asian countries employing three alternative panel data methods of Pedroni, Mark and Sui and Breitung. They showed the dominancy of M_1 but other monetary aggregates cannot be ruled out among the countries under sample supporting the stability of money demand with financial reforms.

Haghighat (2011) investigated money demand function for Iran by including income, inflation, exchange rate, and financial reforms as exogenous variables in the model. By using JJ cointegartion with ECM technique, it concluded about the stability of money demand and also stressed for inclusion of financial reforms in the model to strengthening the power of prediction.

Dunne and Kasekende (2016) estimated money demand function for 34 sub-sahara African countries using annual time series data for the period 1980-2013. By employing the panel data estimation technique, the results show that financial innovation explains money demand function in the region. They further suggested that mobile money in the region can have important implications for the future policy design in the region.

Financial liberalization has not gained proper attention as an exogenous variable on the studies of money demand in Pakistan. Majority of the studies like Abe *et al.* (1975), Mangla (1979), Khan (1980), Khan (1992), Khan (1994), Khan and Ali (1997), and Qayyum (2001) estimated money demand incorporating income, inflation, interest rate, and exchange rate as independent variables. Hsing (2007) examined function for money demand in Pakistan including GDP, domestic interest rate, and foreign interest rate as

explanatory variables. Employing three techniques together- Box-Cox transform, log linear, and linear, empirical results confirm that money demand is positively affected by GDP and negatively affected by both the domestic and foreign interest rates. None of the above mentioned studies includes financial liberalization as an exogenous variable in money demand in Pakistan.

The number of studies regarding impact of financial liberalization on money demand in Pakistan is no satisfactory. Since the number of the studies do not add value to the literature. Studies among others are Khan (1994) estimated money demand including income, inflation, real interest rate, short term and medium term maturities' nominal interest rates, exchange rate and financial liberalization as exogenous variable from the period 1971Q3 to 1993Q3 in Pakistan. By employing Engle-Granger two step procedure for establishing cointegration, results reveal the stability with all the variables except financial liberalization.

Hye *et al.* (2009) investigated money demand for Pakistan incorporating economic activity, inflation, financial innovation, interest rate, exchange rate, and stock prices as explanatory variables. By using JJ cointegration and Fully Modified Ordinary Least Squares (FMOLS) methods, it is portrayed that estimated coefficient of financial innovation is positive and statistically significant in both long-un and short-run.

Khan and Hye (2013) estimated money demand for Pakistan including GDP, real deposit rate, exchange rate, and financial liberalization as explanatory variables in the

model. By employing JJ cointegeration and ARDL models, empirical findings confirm the significant role of financial liberalization in both short-run and long-run. Based on the evidence from the reviewed studies, financial liberalization as an independent variable is included to analyze it impact on money demand in Pakistan.

There are many motivations for the court of enquiry. Arguably, money demand is simply household's wish to hold money. In the past literature, money demand has been investigated in various dimensions but particularly focus remained on its determinants and the stability. Validation of monetary policy relies upon the existing firm relationship among the money demand and its determinants along stability. Different economists have identified different determinants that exert effects on the money demand. The familiar determinants are output, inflation, interest rates, exchange rates that can show their significant impact on money demand. This study extends the canvass for money demand function by incorporating exchange rate, volatility of exchange rate, remittances, and financial liberalization as the additional exogenous variables simultaneously.

2.5 Stability of Money Demand

After estimating money demand function, there is a problem of stability with the estimated function. Stability relationship is prerequisite for both the devising and monitoring effective monetary policy. When central bank holds control over monetary balances, it can exert impact over macroeconomic policy. If money demand remains unstable then monetary policy becomes inefficient. Existence of stability among money

demand and its contributing factors is a signal to efficient and optimal monetary policy (Hacker & Hatemj-J, 2005). Its importance has worldly opened a new chapter in the empirical research over the previous decades. It was the Goldfeld (1973) who recognized the issue of stability with money demand function and wrote about it as follows:

"Put another way, Is there any evidence of either systematic long-run shifts or marked short-run instabilities that make historically estimated relationships unsuitable for forecasting purposes?" (Goldfeld, 1973, p. 579).

Establishing stable money demand function for USA by Goldfeld attracted other researchers towards this core issue, using data for the period of post 1970. These studies have been attempting to recognize various other components that could share contribution to the stability of function for money demand. For instance, Enzler, Johnson, and Paulus (1976) made financial innovations responsible for shift in money demand in USA that was caused movements on income and interest rates. In addition, Boughton (1981) argued that shift in exchange rate regime could be attributed towards instability of money demand function in USA. However, Arango and Nadiri (1981) argued that not only shift in exchange rate regime was attributed, but also closing down the foreign exchange rate market due to Oil Producing Exporting Countries (OPEC) oil embargos. Gorden (1984) highlighted this point in following words:

"some of the post-1973 instability in the short-run money demand function may be the side effect of shifts in the Phillips curve that occurred as a result of supply shocks in 1973-75." (Gorden, 1984, p. 404)

At last, Girton and Roper (1981) portray that instability is produced by currency substitution, because of changes in the anticipated exchange rate fluctuate exchange rate largely.

Most of the studies regarding money demand mentioned above have identified factors for testing instability and are almost in the context of United States. Many other countries have attempted to deal with at the best of their level by several reforms like financial innovations, trade liberalization, privatization of state-owned properties, freezing of prices, and floating exchange rate etc. In the countries where political and economic instability are experiencing, depreciation may append a new avenue for further depreciation, affecting households' domestic money balances. This currency substitution could introduce unstable money demand function and thus lessen monetary policy's predictability and effectiveness.

Since the nineties, new techniques like cointegration and error correction mechanism (ECM) were developed in econometrics for both the short-run and long-run. The time series data remained well focused in almost all the areas and there was no exception for money demand in the literature. Most of the earlier empirical studies that employed the new techniques in the area of economics and finance, mainly focused cointegration properties regarding money demand within developed countries. For instance, Chow (1966), Hafer and Jansen (1991), Hoffman and Rasche (1991), McNown and Wallace (1992) for USA; Bordo and Choudhri (1982) for Canada; Karfakis and Parikh (1993) for

Australia; Adams (1991) and Johansen (1992) for the UK; Jawadi and Sousa (2013) for US and UK; Muscatelli and Papi (1990) for Italy; Miyao (1996) and Bahmani-Oskooee and Shabsigh (1996) for Japan; von Hagen (1993) and Hansen and Kim (1995) for Germany; Bahmani-Oskooee *et al.* (1998) for Spain and Bahmani-Oskooee and Barry (2000) applied the technique to estimate the money demand for Russia.

Bahmani-Oskooee and Chomsisengphet (2002) criticized almost all the studies conducted before on the basis of establishing cointegration as a signal for stable money demand. However, by quoting (Laidler,1993), They made an argument that after establishing cointegration in testing constancy of the parameters in the long-run ,one needs to add short-run dynamics for stability test. Consequently, they rechecked broad money demand (M_2) in USA, Canada, Norway, Switzerland, Sweden, France, Italy, Japan, UK, Australia, and Austria. After checking stability tests introduced by Brown, Durbin, and Evan (1975) through tests cumulative sum (CUSUM) and cumulative sum square (CUSUMS) in cointegration model, it was observed instability for M_2 in UK and Switzerland²⁷.

As far as literature relates to Asian countries, most of the studies have developed money demand function either by traditional techniques or cointegration methods without stability tests. For example Prasad (1994), Bhattacharya (1995), Rao and Shalabh

²⁷ It should be mentioned that Hoffman et al. (1995) and Bahmani-Oskooee et al. (1998) who applied the Hansen-Johansen (1993) test to determine whether the number of cointegrating vectors and their associated eigen-values changed over time. In the absence of any significant change in eigen-values, they interpreted their finding as a sign of stability. However, when the short-run dynamics was incorporated in the testing procedure, Bahmani-Oskooee and Bohl (2000) and Bahmani-Oskooee and Barry (2000) found instability in the demand for money in Germany and Russia respectively.

(1995) and Pradhan and Subramanian (1997) for India; Khan (1980, 1994), Khan and Reza (1989), Ahmad and Khan (1990), Khan (1992) and Hossain (1994) for Pakistan; Metin (1994) for Turkey; Tan (1997), Marashdeh (1997), Ibrahim (1998, 2001) for Malaysia; Arize *et al.* (1991), Chowdhury (1997) and Bahmani-Oskooee and Techaratanachai (2001) for Thailand; Bahmani-Oskooee and Rhee (1994); Lee and Chung (1995) for Korea²⁸.

Above mentioned studies possess two short-comings: First, earlier studies in late eighties employed traditional methods such as regression based ordinary least squares estimated elasticities for income and interest rates. The results were biased, invalid and called "spurious". Second relates to more recent techniques by which, it is attempted to resolve the problems of spurious regression. They have pointed out the sign of cointegration as parameter stability without working out any stability tests.

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Furthermore, Bahmani-Oskooee and Sungown (2002) considered cointegration properties regarding money demand in Korea, despite the cointegration relationship among included variables in money demand function, estimated parameters loose stability²⁹. Authors concluded that despite of cointegration among money demand variables, yet instability could be expected for estimated elasticities. Cho and Ramirez (2016) estimated money demand function in Korea using quarterly time series data over the period of 1973Q3-2014Q4. They employed the Johansen Cointegration methodology

²⁸ It should also be indicated that Bahmani-Oskooee and Malixi (1991), Arize (1994), and Khalid (1999) included a few Asian countries in their analysis of the demand for money.

²⁹ The finding of an unstable demand for money for Korea was similar to the results obtained for Germany by Bahmani-Oskooee and Bohl (2000) and for Russia by Bahmani-Oskooee and Barry (2000).

with VECM model using real income, interest rate and narrow and broad money demand. Empirical results of the study reveal that both of the money demand functions are stable under the period reviewed.

One can claim about stability or not until stability tests may be applied. The reasons behind instability of money demand function can be referred in many ways such as structural break during financial crisis of 1997 in Asian countries could have impact on others as well. Almost majority of researchers are conventionally agreed on the point that success and effectiveness of monetary program crucially rely upon the stable money demand function. The stability of money demand function validates that money supply have influence upon several economic variables including income, inflation, interest rates, exchange rate, so forth (Halicioglu & Ugur, 2005).

Therefore, issue of stability of function for money demand becomes an interesting researched topic to test the effectiveness and success of monetary program. It is necessary to recognize the due role of rapidly growing liberal and global financial markets that introduce nascent monetary programs. Through specification of money demand function, monetary policy should clearly inculcate the impact of factors by including opportunity cost for foreign variables in an open economy. Thus, it needs to evolve macroeconomic situation, financial institutions' development, and degree of economic openness as well while, opportunity cost for foreign variable is chosen appropriately.

In the context of Pakistan, stability has gained a fair amount of attention by researchers with introduction of financial reforms since the early 1990s. It seems to appear that due to reforms in financial and external sector, money demand function may not remain as stable as before. Post to 1990s', most of the studies do favor the stability hypothesis (Arif, 1996). These studies accumulate (Hossain, 1994; Khan, 1994; Quyyum, 2005; and Azim *et al.*, 2010). Khan (1994) and Anwar and Asghar (2012) supported the stability hypothesis through empirical evidence. Though studies differ in several ways such as methodology employed, time span covered and data level frequency, final conclusions share fair degree of uniformity.

In Pakistan, there are many issues related to monetary and fiscal perspective. The some of them are high-lighted as income, interest rates, inflation, exchange rate, volatility of exchange rate, and remittances are not properly maintained by their respective authorities. So, properly estimated money demand function is still remained an enigma for stability for various standard of money. Some found broad money demand as stable and narrow money demand unstable for example Khan and Sajjid (2005) and Anwar and Asghar (2012) whereas Hossain and Ali (1994) and Qayyum (2005) found narrow money demand stable and instability for broad money demand.

2.6 Gap in the literature

Since the literature is lacking of the study including exchange rate, with its volatility, remittances, and financial liberalization simultaneously. This study attempts to estimate function for money demand in Pakistan, incorporating exchange rate and its volatility,

remittances, and financial liberalization along with scale variable and opportunity cost of holding money stocks. It bridges the gap in the literature of money demand extending the model hardly ever used with these variables. It also introduces the variables of exchange rate volatility and remittances simultaneously, which have hardly ever been used as determinants of money demand function in context of Pakistan. Finally, it focuses on the issue of stability of model that has remained puzzling almost all over the world including Pakistan.

2.7 Summary of literature Review

This section reviews the summary of the variables considered as the dependent and independent in the literature. Empirical studies about the exchange rate could not furnish a uniform consensus about the sign of exchange rate. Hence, the empirical relationship with money demand is still a debatable issue. Volatility of exchange rate is also taken in the literature review which could not get the firm conclusion about the sign and statistical significance. Hence, its empirical results are still undecided. Different researchers view differently about the remittances for the economy. On one hand, some researchers support the remittances as a good sign for the economic development and growth while on the other hand; remittances are not supported well for the economy. The financial liberalization also could not create firm conclusion. Thus no any firm and valid empirical relationship exists. Stability of money demand is also disputable issue in the economy. The results differ from one to another on the basis of monetary aggregates. Some researchers empirically support the stability of narrow money demand while

others support broad money. Therefore, the issue of stability of money demand could not get uniform consensus and it has still remained an enigma in the economy.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter covers planned methodology for this research. This chapter is divided into six sections that explain research design and framework of the study, theoretical framework of the model, estimation technique for the model, variable measurement, data source and coverage, and the chapter summary. Every section is described with details from theoretical and empirical perspective.

3.2 Research Design and Framework of the Study

This study is based on prevailing theories of economics and empirical studies earlier conducted in the context of both developed and developing countries. This proposed study plans to use quantitative technique using secondary data. The previous studies could not unanimously agree at a single point due to controversial views about significance and consistency of findings among both the developed and developing economies as well. The set of variables that is proposed for this study has hardly been worked out exactly in the previous studies in the context of Pakistan economy.

3.3 Theoretical Framework

Most of the literature on money demand focused on the relation between explanatory variables and quantity of money demanded. Theoretically, money demand function relates scale variables and opportunity cost to money demanded (Cagan, 1956). Thus, it can be posited as:

$$(M_t)=$$
 f(S_t, O_t).....(3.1)

Where M_t is the quantity of money demanded, S_t is the scale variable showing the economic activity in the economy, and O_t relates the opportunity cost of holding money. The selection of monetary aggregates as a dependent variable and scale variable and opportunity cost as the independent variables depend on the money demand function's theoretical background. Empirically, it varies from study to study.

The first issue in estimating money demand function relates to the choice of monetary aggregate as the dependent variable. According to economic literature, there are two approaches for estimation of money demand; transaction approach and asset approach (Harb, 2003). In the former, households have the choice to hold interest bearing assets or holding liquid money as store of value. Thus, returns on money holding and interest bearing assets will decide the allocation of their portfolio. On the other hand in the latter approach which is based on consumer demand theory, consumers drive their utility by holding financial and real assets along with money. The appropriate monetary aggregate

chosen in the money demand function depends on the approach used. The transaction approach concentrates on the liquid assets of money and suggests the narrow money as monetary aggregate. While, the asset approach focuses on the role of real and financial assets and uses broader measure of money. Despite that Goldfeld and Sichel (1990) put forwarded an argument that selection is an arbitrary for monetary aggregates.

The scale variable shows the transaction regarding economic activity in estimating demand function for money. The role of money in the chosen approach can decide the selection of this variable. The role of money in the transaction approach is as medium of transaction. Thus, GDP, Gross National product (GNP), and Net National Product (NNP) are the most common proxies for scale variable. Permanent income, can be also used as proxy of scale variable, which is composed of present and future expected incomes. However, the level of income is less inclusive than transaction measure such as GNP. The income elasticity of money demand has several implications in the real world. First, unitary income elasticity supports the quantity theory of money. Second, the value of 0.5 supports the Baumal Tobin inventory theoretical approach. Third, a value more than unity it supports the perception of money as "luxury".

Opportunity Cost of holding money is also one of the key determinants of money demand in foundation. There are several proxies used for this variable such as inflation rate and various structures of interest rates. Interest rates are mostly determined by under-developed financial systems and non-monetary market institutions in developing countries, where they already suffer. The inflation was theoretically included as determinant of money demand by Friedman (1956, 1969) in his pioneering work. Its inclusion is based on the fall of purchasing power parity of the value of money in real terms. Interest rate is used when financial systems are well developed but both can be used in mixed situation.

According to Ericsson and Sharma (1999), there are at least two reasons for determination of money for theories of money demand in economics. First, it is related to inventory while the second is related to portfolio including income, expenditure streams and other assets respectively. Goldfield (1973, 1976) estimated a conventional form of money demand on the theoretical grounds as follows

Where M is the real amount of money balances, Y is the scale variable while the Z is the opportunity cost of holding money. The literature is full of the discussion about the selection of opportunity of cost of holding money. The selection for interest rate and rate of inflation plays a crucial role for practical matter. The combined importance of interest rate and inflation cannot be neglected in the money demand function and some researchers such as (Mcgibany & Nourzad, 1995; Bahmani-Oskooee, 1996; Qayyum, 2005) have used both inflation rate and interest rate in study conducted for developing countries. So, by including both inflation and interest rate, the model takes the following form

$$\log(M_{t}) = a_{0} + a_{1}\log(Y_{t}) + a_{2}\log(R) + a_{3}\log(\pi_{t}) + \varepsilon_{t}$$
(3.3)

This is all about a closed economy. With an open economy, the exchange rate has been used to compare the currencies of the countries. Hence, Bahmani-Oskooee (1996) proposed the model for money demand in the following form

Besides these variables, volatility of exchange rate might also affect money demand. With increasing in volatility, investors would move from riskier to safer assets. With this substitutability, money demand for domestic currency may decline. On the basis of above discussion, the model proposed by Bahmani-Oskoee and Bahmani (2012) is in the following form

$$\log(M_{t}) = a_{0} + a_{1}\log(Y_{t}) + a_{2}\log(I) + a_{3}\log(\pi_{t}) + a_{4}\log(ER_{t}) + a_{5}\log(VX_{t}) + \varepsilon_{t}\dots(3.5)$$

The study of Vergas-Silva (2009) empirically included remittances in estimating money demand indirectly through real output or exchange rate. So the proposed model of this study is

$$\log(M_{t}) = a_{0} + a_{1}\log(Y_{t}) + a_{2}\log(I) + a_{3}\log(\pi_{t}) + a_{4}\log(ER_{t}) + a_{5}\log(VX_{t}) + a_{6}\log(RM_{t}) + a_{6}(FL) + \varepsilon_{t}$$
(3.6)

Where t = 1, 2, 3, ..., 43.

For the consistency and efficiency, the model estimated in equation (3.6) is considered under the assumptions. \mathcal{E}_t is white noise or disturbance term in the model that follows normal distribution with zero mean [$\mathrm{E}(\mathcal{E}_t)=0$], constant variance [$\mathrm{E}(\mathcal{E}_t^2)=\sigma^2 \mathrm{I}$] for all t and $[E(\mathcal{E}_i, \mathcal{E}_j)=0 \text{ if } i\neq j]$. All the a_is' are the Best Linear Unbiased Efficient (BLUE) under the above assumptions.

Whole scenario of the proposed model is posited in Figure 3.1 that shows the framework of the study which portrays a linkage between the set of dependent and independent variables. Money demand is considered as dependent variable while the scale variable, opportunity cost variables, exchange rate, volatility of exchange rate and remittances come under the umbrella of independent variables. The arrows are used to show the theoretical impact of the set of dependent variables to independent variable.



Figure 3.1. Framework of the Study

The model to be estimated in estimating money demand equation and its stability is as in equation (3.6). The descriptions of the dependent and independent variables and hypotheses developments based on the previous empirical work are as follow:

3.3.1 Dependent Variable

Since the money demand is not directly observable. The money supply has been considered as dependent variable assuming money market in equilibrium. The dependent variable includes the narrow and broad monetary aggregates in order to determine more appropriate alternatives. The description about each of the dependent variables is given in the following subsection.

3.3.1.1 Money Demand

The dependent variable M is the desired money balances in terms of M_1 or M_2 . The classification of money stock is mainly categorized into narrow and broad money stocks. Narrow money comprises all assets that are readily convertible as a medium of exchange in daily routine of the life. M_1 is referred as narrow money and includes sum of currency in circulation and demand deposits in commercial banks. M_2 is referred as broad money which includes sum of M_1 and less liquid assets like commercial banks'

time deposits, savings and loan associations' deposits, and mutual funds deposits in money market (Miles & Scott, 2003). Portfolio opportunities are rendered by M_2 and also exercised store of value function.

 M_1 has been widely focused in several earlier studies, following the assumption about more stability of M_1 . When this perception was lost, several research studies turned to M_2 .There are some studies (among others, Moosa, 1992; Hossain, 1994; Marasdeh, 1997; Siddiki, 2000; and Qayyum, 2000) in developing countries that have used M_1 with the argument of less developed banking system and poor financial intermediation.

Later on, nascent financial instruments were created and development of financial system that led to the attraction of M_2 used in money demand for estimation. Several studies have referred M_2 as a better choice to estimate money demand function such as Hafer and Jansen (1991); Laider (1993); Bahmani-Oskooee (1997); Arize and Shwiff (1998); Ewing and Payne (1999); Majid (2004); Dahalan, Sharma, and Sylwester (2004); Bjorlan (2005). However, there is no consensus in the literature hence, many researchers still estimate money demand function using both narrow and broad monetary aggregates. On the basis of above discussion, this study would use both measures of monetary aggregates- M_1 and M_2 in estimating money demand function.

3.3.2 Independent Variables

The set of independent variables in the proposed model consists of scale variable that includes gross domestic product (GDP), choice variable including interest rate and

inflation, exchange rate, volatility of exchange rate, remittances, and financial liberalization. The discussion about their incorporation in the money demand equation (3.6) is described as follows:

3.3.2.1 Scale Variable (Gross Domestic Product GDP)

Yt represents real GDP. It is called Scale variable since it is a measure of transaction for economic activity. Assets-oriented theories focus on wealth as scale variable. However, transaction-oriented theories rely on income level. Regardless of the theoretical preferences, the income level as a scale variable has been extensively chosen for the reason that wealth cannot be measured easily. Most studies have settled for Gross National Product (GNP) or GDP as a measure of current income level.

Consumption is also used as a scale variable for income level in the Cash Advance Models. Wealth has been used only in a very few developed countries as the data in most countries is unavailable. All developing countries have almost used real GDP as proxy for scale variable due to readily availability of data and satisfying criteria for both income and wealth. This study being in-line with previous practices uses GDP version of income as the scale variable. Money balances are assumed to follow an increasing function of income. Hence, the coefficient of GDP is expected to be positive.

3.3.2.2 Choice Variables (Interest Rate and Inflation)

The choice variables are often called opportunity cost which includes interest rate and inflation. 'I' is the interest rate while π portrays the rate of inflation in the proposed

model. They both represent opportunity cost for holding money. It includes own rate of money and the alternative assets' rate of return. The studies assume zero own rate of return on money. Literature reveals different choices can be used for return on alternative assets. The studies that follow transaction view use various short-term rates arguing that they are close substitutes to money demand. The long-term interest rates are mostly used in the asset approach.

However, Laidler (1966) includes some different measures of opportunity cost other than the previously used as the money demand is not sensitive of used measures for opportunity cost. Since various proxies are available for opportunity cost depending on the sample size, the interest rates with whole spectrum taken simultaneously or different combinations have been extensively used as a measure of own rate of return on money or alternative assets' return (domestic or foreign). In addition, some studies also use call rates as proxy for opportunity cost for interest rates that are negatively related to real money demand. This negative relationship between the call rate of money and real money demand is supported by Bahmani-Oskooee (2002), Bahmani-Oskooee and Economidou (2005), Qazi *et al.* (2009), Achsani (2010), and Damardeh and Izadi (2011).

The choice of opportunity cost variable whether interest rate or inflation matters. Since most of the Asian developing economies have inadequate financial system, it is necessary to consider inflation rate as a best alternative for interest rates (Yashiv, 1994; Sarwar *et al.*, 2013). Furthermore, Harb (2004) uses interest rate only for GCC's six

countries arguing that no excessive inflation has been experienced in these countries. But the interest rate and inflation are used simultaneously in money demand function in several studies such as Mcgibany and Nourzad (1995), Bahmani-Oskooee (1996), and Qayyum (2005).

The opportunity cost of holding money relative to financial assets is expected to yield a negative influence on money demand, so it is expected to be negative with money demand. The opportunity cost of holding money (i.e. inflation rate) relative to real value of physical assets exerted negative effects on money demand; hence it is also expected to be negative with money demand. Effects of an increase in expected inflation keeps the households away from monetary aggregates and adjust to its substitute real assets. In view of above detailed discussion, this study also includes both variables inflation rate and interest rate as an opportunity cost variable in estimating money demand function.

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3.3.2.3 Exchange Rate and Volatility of Exchange Rate Related Hypothesis Development

This section defines the terms exchange rate and the volatility of exchange rate and develops the hypothesis related to the exchange rate and volatility of exchange rate. The account for each variable has been created as follows:

ER shows the official exchange rate in nominal terms and defined as number of units of domestic currency per US dollar. When economy is open, it is necessary to evaluate impact of foreign opportunity cost on cash holdings like exchange rate in the economy.

The importance of exchange rate was highlighted by Mundell (1963). He proposed to use exchange rate as exogenous variable in the estimation of money demand function. Due to open nature of the economy, it was supported by many researchers such as Bahmani-Oskooee and Pourhedrian (1990) for Canada and the US., Bahmani-Oskooee (1991) for UK, Majid (2004) for Malaysia, Bhamani and Rehman (2005) for Asian developing economies, Dahmardeh and Izadi (2011) for Iran, suliman and Dafalla (2011) for Sudan, Anwar and Asghar (2012), and Mall (2013) for Pakistan. Following the evidence from the body of literature in both developed and developing economies of the world, this study considers exchange rate as one of the independent variables in estimating money demand in Pakistan.

Now in this section, this study plans to develop the hypothesis for the exchange rate. Exchange rate possesses a bearing on the money demand in both developed and developing economies. A Nobel Laureate, Mundell (1963) was the first who introduced the significance of exchange rate in money demand, considering to other traditional variables. In an open economy, mobility of capital and growing foreign trade may convert the money demand function into unstable. McKinnon,(1982) showed his advocacy for this channel of effects introducing currency substitution hypothesis which proposed that the external monetary shocks in international financial markets would influence the money demand functions of the countries with flexible exchange rates.

During the last three decades, researchers have been emphasizing on the influence regarding monetary developments on function for money demand incorporating exchange rate as an exogenous variable, (See for example, Arango & Nadiri, 1981; McKinnon, 1982; Bahmani-Oskooee & Pourheydarian, 1990; Bahmani-Oskooee, 1991; Chowdhury, 1997; Tan, 1997; Weliwita & Ekanayake, 1998; Khalid, 1999; Ibrahim, 2001; Bahmani-Oskooee & Rehman, 2005; Bahmani, 2012; Arize & Nam, 2012; Anwar & Asghar, 2012). The researchers are divided into two groups that perceive the impact of monetary development on the functions for money demand with coefficient sign of exchange rate. They support two different hypotheses in terms of "wealth effect" (see for instance Arango and Nadiri, 1981) and "substitution effect" (see for example Bahmani-Oskooee, 1996; Pourhedrian, 1990; Agenor and Khan, 1996). The sign of the coefficient of exchange rate is not clearly confirmed as positive or negative. Based on the studies by Tan (1997), Weliwita and Ekayanake (1998), Bahmani-Oskooee and Ng (2002), Civcir (2003), Bjornland (2005), Bahmani-Oskooee and Karkal (2006), Bahmani-Oskooee and Wang (2007), Baharumshah et al. (2009), Sahaddheen (2011), Azirie and Nam (2012), Jilani et al. (2013), and Bahmani-Oskooee and Bahmani (2014) suggest the hypothesis that the effect of exchange rate on money demand can be positive or negative.

On the other hand, VX is the volatility of exchange rate. Exchange rate volatility is also considered as one of the independent variables in the estimation of money demand. Theoretically, volatility of exchange rate affects the money demand and it may yield results in terms of expectation effect or wealth effect. The sign of the coefficient of the volatility of exchange rate is still puzzling. The variable exchange rate volatility has been worked out in many previous studies such as Mcgibany and Nourzad (1995) for

US, Bahmani-Oskooee and Bhol (2008) for India and the US, Coric and Pugh (2010) for developing economies, Bahmani (2011) and Bahmani and Bahmani-Oskooee (2012) for Iran. They argued that the households could decide about substitutability of their assets like safer assets for the riskier assets through exchange rate volatility. Based on the empirical evidence in the literatures, this study includes the volatility of exchange rate as an exogenous variable in the estimation of money demand function in Pakistan.

The theory of exchange rate volatility proposes the economic condition of a country. It warns the investors about investment on the basis of economic conditions of the country. The higher volatility the higher would bring cause of the financial distress and bankruptcy and disturb the foreign investment. Cushman (1983), Gotur (1985), and Lastrapes and Koray (1990) argued that the exchange rate volatility exerts its impact on many macroeconomic variables such as foreign trade, foreign direct investment, and aggregate monetary and non-monetary stocks that might affect the transaction of money demand in the economy.

Instability of exchange rate is a barometer for economic volatility (Friedman, 1982). Different mechanisms of volatility are channelized with different regimes of exchange rates. When exchange rates are floating then 'liquidity' or 'money supply' shocks effect on the nominal exchange rates while only money supply in case of fixed exchange rates regime. Volatility prevailing in the system cannot be lessened by regimes, only transformed to one or another locus. The economy is considered like a balloon where volatility is squeezed from one part and transformed elsewhere³⁰.

Mcgibany and Nourzad (1995) argued that the money demand function is not only affected by the exchange rate but also by volatility of exchange rate focusing on shortrun dynamics. The findings of the study reveal significantly negative coefficient of the volatility of exchange rate. It affects the broad money's demand function. The authors concluded that an increase in exchange rate volatility might cause a decline in domestic money demand.

There are several studies regarding the impact of exchange rate volatility via international trade. Exchange rate volatility could deter country's trade in international markets. So, output and inflation may be changing agents for money demand and it is affected transitively by exchange rate volatility (For instance, Bahmani-Oskooee & Hergerty, 2007; Coric & Pugh, 2010; Verheyen, 2012).

Uncertainty among international transactions is expected through induction of exchange rate volatility that shortens the economic welfare (Hall *et al.*, 2010). Exchange rate volatility possesses real economics cost that shadows on price stability, profitability of firms, and financial stability of the country. Majority of countries attempted their fluctuations in domestic currencies by regulating constraints over exchange rate

³⁰ This persuasive argument leads many to be surprised by the magnitude of the increase in exchange rate volatility following the breakup of Bretton Woods in 1973, e.g., Mussa (1979) or Obstfeld, etal. (1995). Indeed, much of the most influential work in international finance during the 1970s and 1980s was geared towards rationalizing the apparently high level of floating exchange rate volatility; Dornbusch (1976) is the classic example.
movements such as crawl band, monetary measures like changes through domestic interest rates, intervening foreign currency market, and restricting capital inflow and outflow of the country.

In theoretical perceptive, exchange rate volatility has positive or negative impact on foreign trade (Verheyen, 2012), whereas empirically there is no any clear and unanimous consensus regarding the impact of exchange rate volatility on international trade (Zelekha *et al.*, 2011; Nishimura & Hirayama, 2013). Moreover, Core and Pugh (2010) provided the adverse effects of exchange rate volatility on international trade that may affect the money demand while Bahmani-Oskooee and Bhol (2008) had mixed results for both the short and long run.

There are several studies on the volatility of exchange rate but could not properly conducted with money demand (see Bahmani-Oskooee & Bhol, 2008; Zelekha *et al.*, 2011; Nishimura & Hirayama, 2013). Only few of the studies tackle the problem of exchange rate volatility like Bahmani and Bahmani-Oskooee (2012) estimated money demand function in Iran. They argued that exchange rate volatility sources the uncertainty into expectation effect or wealth; it might affect money demand. The sign of the coefficient of volatility of exchange rate is still ambiguous in the estimation of money demand function. So following Mcgibany and Nourzad (1995), Bahmani-Oskooee (2012) in the body of literature review, this study proposes the hypothesis about the exchange rate and volatility of exchange rate in Pakistan as follow

 H_1 : The exchange rate and volatility of exchange rate positively affect money demand function in short and long-run.

3.3.2.4 Remittances and Hypothesis Development

RM stands for remittances in the model. A foreign worker transfers money to its home country that money is called remittances. Like other factors, remittances exert its impact on the development and welfare for the country. Remittances may cause impact on the estimation of money demand. Vergas-silva and Haug (2006) suggested that remittances trigger on better macroeconomic conditions in host country compared with home country.

Remittances could not affect the narrow money demand in Ghana, argued by Adentusi and ahortor (2008). While Vergas-Silva (2009) proposed to include remittances as an exogenous variable in the estimation of money demand and concluded that remittances could positively affect the domestic money demand. There is no unanimous consensus among the researchers about the sign of the coefficient of remittances. But, almost all the researchers are agreed over the economic impact of remittances. However, impact of remittances' transfers depends upon the available financial services in the country. Pakistan is also labor-intensive country like Ghana and Mexico. Hence, this proposed research also introduces remittances as an independent variable in the estimation of money demand in Pakistan. Some researchers have found that country's domestic currency is appreciated by remittances (Amuedo-Dorantes & Pozo, 2004; Bourdet & Falck, 2006). Appreciation of exchange rate can introduce a phenomenon like "Dutch Disease." Consequently, tradable sector's competitiveness shortens. Imports of the country become relatively cheaper and current account of the country remains at risk. In addition, demand rises and prices generally increase within non-tradable sector with remitted money while prices in tradable sector cannot fluctuate relatively in small open economy. It shifts resources from tradable sector (industry and agriculture) to non-tradable-sector (services) affecting the competitiveness of country's tradable sector as compared to non-tradable sector. More or less, it is expected that the amount of money demanded in the economy may be affected.

Among remittances-receiving countries, remittances also lower competitiveness through reduction in labor supply (Bussolo & Medvedev, 2007; Görlich *et al.*, 2007). However, there is still no unanimous consensus on adverse effects of remittances on country's competitiveness: for example, Rajan and Subramanian (2005) argue that remittances and other financial flows are totally different while Grabel (2008) proposes that remittances and other financial flows are similar for short-term, but they wholly depend on economic policies. Alternatively, Mongardini and Rayner (2009) find that remittances lose linkage power to exchange rate appreciation for Sub-Saharan Africa study. Since the sign of the coefficient of remittances is still puzzling and unclear. So, following evidence from the literature particularly from the studies of Vergas-Silva and

Haug (2006), Adentusi and Ahortor (2008) and Vergas-Silva (2009), this research intends to develop a proposed hypothesis as follow

H₂: Remittances positively affect money demand in both the short-run and long-run.

3.3.2.5 Financial Liberalization and Hypothesis Development

The variable FL stands for financial liberalization in the model. Financial liberalization has remained an integral part of Economic and Structural Reforms (ESR) in developing countries like Pakistan (For instance Ahluwalia, 1999). Most of the financial reforms in Pakistan has been implemented between the period 1990 and 1996. It enlists a gradual deregulation of interest rates and state-directed credit policies, reduction in banks' reserve requirements, entry of non-bank financial institutions, reduced restrictions on entry and operations of private (domestic and foreign) banks, and privatization of public sector banks (see SBP, 2000; Arun & Turner, 2002).

Various proxies have been used to capture the impact of financial liberalization in estimating money demand. Several studies such as Guncavdi *et al.* (1998) used dummy variable for the financial liberalization capturing the time trend. Arrau *et al.* (1995), Dekle and Pradhan (1999) and James (2005) used proxy of institutionally related variables for the financial liberalization. On the other hand, Siklos (1993) and Khan and Hye (2013) adopted monetary indices. This study plans to use dummy variable as a proxy for financial liberalization. Since the year 1990, it has been implemented in Pakistan.

The effects of financial liberalization can be analyzed in the short-run and long-run. Majority of the studies like Dekle and Pradhan (2003), Pradhan and Subramnanian (2003) for india, James (2005) for Indonesia, Akhtaruzamman (2007) for Bangladesh, Zouhar and Kacemi (2008) for Morroco, Rao and Kumar (2011) for 14 Asian economies, and Khan (1994), Hye et al. (2009) and Hye and Khan (2013) for Pakistan have concluded that money demand is affected by financial liberalization both in the short-run and long-run. On the basis of evidence shown in the studies reviewed, this study proposes hypothesis as follow

H₃ : Financial liberalization positively influence money demand in the short-run and long-run.

3.3.2.6 Stability and Hypothesis Development

After the estimation of money demand function, there is need to check the stability for the estimated function. Stability relationship is prerequisite for both designing and monitoring effective monetary policy. When central bank holds control over monetary balances, it can exert impact over macroeconomic policy. If money demand remains unstable then monetary policy becomes null and void. Stability among money demand and its factors is a signal to efficient and optimal monetary policy (Hacker & Hatemj-J, 2005). Examining stable money demand function for USA, Goldfeld (1973) attracted other researchers towards this core issue, using data for the period of post 1970. These studies attempted to recognize various other components that could share contribution to instability of money demand function. For instance, Enzler *et al.* (1976) made responsible financial innovations for shift in money demand in the USA that became cause to movements on income and interest rates.

In countries where political and economic instability is experiencing, depreciation may append a new avenue for further depreciation, affecting households' domestic money balances. This currency substitution could introduce unstable money demand function and thus worsen/lessen monetary policy's predictability and effectiveness.

An argument made by a distinguished Indian banker and academician Rangarajan (1999) about stability that one's denial for stable money demand functions indirectly lessens the scope of an optimal monetary policy that plays an efficient role for inflation management. It is necessary to recognize the due role of rapidly growing liberal and global financial markets.

Through money demand specification, monetary policy should clearly inculcate the impact of open economy factors by including opportunity cost for foreign variables. Thus, it needs to evolve macroeconomic situation, financial institutions' development, and degree of economic openness as well while opportunity cost for foreign variable is chosen appropriately.

In Pakistan, there are many issues related to monetary and fiscal perspective. The respective authorities are not maintaining income, interest rates, inflation, exchange rate, volatility of exchange rate, and remittances. So, properly estimated money demand function still remains an enigma to stability for various standard of money like M1 and M2. Some found broad money demand as stable and narrow money demand unstable for example Khan and sajjid (2005) and Anwar and Asghar 2012), whereas Hossain and Ali (1994) and Qayyum (2005) found narrow money demand stable and instability for broad money demand. On the basis of above discussion, this study develops its fourth and final proposed hypothesis as follow

H₄ : Money demand function is stable in Pakistan.

3.4 Estimation Technique

This study intends to determine relationship between the money demand (M_1 and M_2) as dependent variable and exchange rate, volatility of exchange rate, remittances and financial liberalization (ER, VX, RM, FL) as independent variables in the long-run and short-run including Y, I, and π as control variables. Answering the long-run and shortrun relationship among the exogenous and endogenous variables described in the model, both Cointegration test and Error Correction Model have been employed.

3.4.1 Stationarity Tests

Prior to the calculations, it is essential to analyze the descriptive statistics and correlation analysis in order to capture outliers for all the variables through summarized points and degree of association among the variables through correlational analysis. This analysis makes the variables in the precision and describes economic overview for whole the data set in this study. Thus, descriptive statistics have been calculated as minimum and maximum, mean, and standard deviation and pair-wise correlation in chapter four.

It is necessary for the cointegration technique to determine the order of integration of each variable. However, as noted in the literature, depending on the power of the unit root tests, different tests yield different results. It is necessary to check stationarity to know the order of integration about the time series data before applying cointegration technique. However, literature notes several unit root tests addressing the integration properties of the data. It depends upon the power of the unit root tests yielding different results such as; Augmented Dickey-Fuller (1979, 1981) (hereafter ADF) proposed a test for stationarity and emphasized to difference a variable, as it can attain the stationarity, is termed order of integration. The order of integration is denoted by (d) and said to be integrated of order (d), if series has (d) unit roots. If d=0, the series Y_i (where Y_i be the, M₁ the narrow money demand, M₂ the broad money demand, ER the Exchange Rate, VX the volatility of exchange rate, and RM the Remittances) is stationary at level. ADF tests the coefficients' significance in AR(p) – Autoregressive with p augmentation terms i.e $(\Delta Y_{t-1}, \Delta Y_{t-2}, ..., \Delta Y_{t-p})$ in the model as follows:

Where equation (3.7) is model with drift and without trend and equation (3.8) is model with both drift and trend. P shows the number of lags and determined on the well-known criterion basis such as AIC and BSC selection. The null and alternative hypotheses of the model are set as follows:

 H_0 : The series is non stationary or series has unit root , or $\gamma_1 = 0$

H₁: The series is stationary or series has no unit root , or $\gamma_1 \neq 0$

Null hypothesis of unit root (non-stationary variable) would be rejected, if computed value of t is greater than critical value. The series is termed to have zero order of integration or stationary at level. Alternatively, if the series is non stationary at level, differencing is needed to achieve the sationarity which supports the argument of non-auto-correlated residuals.

Phillip Perron (1982) (hereafter PP) is also to use test for stationarity which resembles the ADF test. Both ADF and PP tests possess same models with intercept only and intercept plus trend. They both possess the same null hypotheses and use the same critical values, although PP has used arbitrary lags as compared to ADF.

Finally, Kwiatkowsky, Phillips, Schmidt and Shin (1992) (hereafter KPSS) is also employed for stationarity. The KPSS test often selects fewer differences than the ADF test or a PP test. A KPSS test has a null hypothesis of stationarity, whereas the ADF and PP tests assume that the data have non-stationarity. Consequently, the KPSS test will only select one or more differences if there is enough evidence to overturn the stationarity assumption, while the other tests will select at least one difference unless there is enough evidence to overturn the non-stationarity assumption. These three ADF, PP, and KPSS tests clearly look for different aspects of nonstationarity.

The stationarity of time series ensures about the absence of systematic fluctuations in mean and variance through the time. Whereas, if time series has non-stationarity, there would be possibility of misleading and spurious results using core tests in econometrics which are more focused on interpretation of econometrics findings. The highly employable test statistics cover the t, F, χ^2 statistics, (R²) coefficient of determination, and Lagrange Multiplier (LM) test and so on.

3.4.2 ARDL Bound Testing Approach with Error Correction Model

This study would employ more comprehensive and recent technique, Auto-regressive Distributed Lag (ARDL) Bounds testing approach to establish the relationship among different measures of real money balances and all exogenous variables related to the discussion for both long-run and short-run. According to Cook (2006), the ARDL technique for cointegration analysis has more power and gains more advantages over Engle and Granger (1987) a single equation technique (hereafter EG) and GLS-based cointegratrion tests. First, the ARDL technique remains free from order of integration for variables as EG takes it serious to be I(1) for cointegration analysis. Second, the ARDL technique can differentiate between exogenous and endogenous variables

whereas, EG method may suffer from endogeneity problem. Third, the ARDL technique also estimates model for long-run and short-run simultaneously, removing problems regarding auto-correlation and omitted variables. Thus, the ARDL technique for cointegration analysis yields unbiased and efficient estimates, since it avoids the problem that may occur because of existence of endogeneity and serial correlation. This approach is also more appropriate for small sample size (Haug, 2002).

The generalized ARDL $(p,q_1, q_2,...,q_k)$ model by (Pesaran, Shin and Smith,1997; Pesaran and Shin, 1998; and Pesaran *et al.* 2001) can be expressed as follow:

$$\alpha(L, \mathbf{p})\mathbf{y}_{t} = \alpha_{0} + \sum_{i=1}^{k} \beta_{i}(L, \mathbf{q}_{i})\mathbf{x}_{it} + \varepsilon_{t}$$
(3.9)

Where L is a symbol for lag operator which is defined as $L^{j}y_{t} = y_{t-j}$; α_{0} is a constant; and x_{it} and y_{t} are exogenous and endogenous variables respectively, x_{it} is the ith exogenous variable for i=1,2,3...,k and

$$\alpha(L, p) = 1 - \alpha_1 L^1 - \alpha_2 L^2 - \dots - \alpha_p L^p$$

$$\beta_i(L, q_i) = \beta_{i0} + \beta_{i1} L^1 + \beta_{i2} L^2 + \dots + \beta_{iq_i} L^{q_i}$$

There is no any difference among lags of variables and all are equal in the long-run such as $y_t = y_{t-1} = y_{t-2} = \cdots = y_{t-p}$ and $x_{it} = x_{i,t-1} = x_{i,t-2} = \cdots = x_{i,t-q}$ where $x_{i,t-q}$ is the qth lag of ith exogenous variable. Thus, the long-run equation for ARDL model can be framed as follow:

$$y = \alpha + \sum_{i=1}^{k} \beta_{i} x_{i} + \upsilon_{t} \qquad \alpha = \frac{\alpha_{0}}{\alpha(L, p)},$$
$$\beta_{i} = \frac{\beta_{i}(L, q)}{\alpha(L, p)} = \frac{\sum_{j=1}^{q} \beta_{ij}}{\alpha(L, p)}, \quad \upsilon = \frac{\varepsilon_{t}}{\alpha(L, p)}$$
...(3.10)

The ARDL model can be represented by Error Correction Model (hereafter ECM) as follow:

$$\Delta \mathbf{y}_{t} = \Delta \, \stackrel{\wedge}{\alpha_{0}} + \sum_{j=1}^{p} \stackrel{\wedge}{\alpha_{j}} \Delta \mathbf{y}_{t-j} + \sum_{i=1}^{k} \sum_{j=0}^{q_{i}} \stackrel{\wedge}{\beta_{ij}} \Delta x_{i,t-j} + \gamma_{0} (\mathbf{y}_{t-1} - \sum_{i=1}^{k} \gamma_{i} \mathbf{x}_{i,t-1}) + u_{t}$$

Where Δ stands for the first difference; $\hat{\alpha}_{i}$, $\hat{\beta}_{ij}$, and are the short-run estimated coefficients from equation (3.9); and all γ_{i} 's ,where " i" runs from 1 to k, are the long run coefficients in the model in equation (3.11) and γ_{0} is the speed of adjustment due to shocks in the short-run towards the long-run equilibrium.

.....(3.11)

Alternatively, equation (3.11) can be represented in Error correction model as follow:

$$\Delta \mathbf{y}_{t} = \hat{\alpha}_{0}^{\hat{}} + \sum_{j=1}^{p} \hat{\alpha}_{j}^{\hat{}} \Delta y_{t-j} + \sum_{i=1}^{k} \sum_{j=0}^{q_{i}} \beta_{ij} \Delta \hat{x}_{i,t-j}^{\hat{}} + \alpha(L, \mathbf{p}) \text{ECM}_{t-1} + u_{t}$$

$$ECM_{t} = y - \hat{\alpha} - \sum_{i=1}^{k} \hat{\beta}_{i} x_{it} \qquad (3.12)$$

Where, $\alpha(L, p)$ is the coefficient that gauges the speed of adjustment and main objective of ECM is to capture the short-run dynamics. The value of the coefficient of error correction term should lie between -2 and 0 (Samargandi *et al.*, 2015). The coefficient of ECM term, fallen outside the range, would imply clues for "overcorrection" or" divergence" from the equilibrium.

There are three possibilities to estimate an ARDL model. First, when all of the series are stationary at level or I(0). Simply, OLS estimation would be used to model the data. Second, when all of the series are stationary at their first difference or I(1), but data lack

the cointegration. An OLS technique would be used to model the data with appropriate differences of each series. Third, when all of the series are same ordered integrated and data do not lack cointegartion. In this situation, an OLS based regression model estimated for long-run relationship among the variables at their levels and an ECM estimated by OLS that provides the speed of adjustment short-run towards equilibrium in the long-run in the cointegrating space among variables. Thus, the above ARDL model suggested by Pesaran *et al.* (2001) into equation (3.9) and equation (3.11) can be converted in terms of the model of the study as follows:

$$\log(M_{t}) = a_{0} + a_{1}\log(Y_{t}) + a_{2}\log(I) + a_{3}\log(\pi_{t}) + a_{4}\log(RER_{t}) + a_{5}\log(VX_{t}) + a_{6}\log(RM_{t}) + a_{7}(FL) + \varepsilon_{t}$$
(3.13)

$$\Delta LnM_{t} = \alpha + \sum_{i=1}^{p} \beta_{i} \Delta LnM_{t-i} + \sum_{i=1}^{q^{1}} \delta_{i} \Delta LnY_{t-i} + \sum_{i=1}^{q^{2}} \gamma_{i} \Delta Ln\pi_{t-i} + \sum_{i=1}^{q^{3}} \eta_{i} \Delta LnI_{t-i} + \sum_{i=1}^{q^{4}} \lambda_{i} \Delta Ln(RER)_{t-i} + \sum_{i=1}^{q^{5}} \theta_{i} \Delta Ln(VX)_{t-i} + \sum_{i=1}^{q^{6}} \theta_{i} \Delta Ln(RM)_{t-i} + \rho_{1}LnM_{t-1} + \rho_{2}LnY_{t-1} + \rho_{3}Ln\pi_{t-1} + \rho_{4}LnI_{t-1} + \rho_{5}Ln(RER)_{t-1} + \rho_{6}Ln(VX)_{t-1} + \rho_{7}Ln(RM)_{t-1} + \rho_{8}(FL) + \varepsilon_{i}$$

.... (3.14)

And in terms of Error correction model, model can be described as below

$$\Delta LnM_{t} = \lambda_{0} + \sum_{i=1}^{p} \lambda_{1i} \Delta LnM_{t-i} + \sum_{i=1}^{q1} \lambda_{2i} \Delta LnY_{t-i} + \sum_{i=1}^{q2} \lambda_{3i} \Delta Ln\pi_{t-i} + \sum_{i=1}^{q3} \lambda_{4i} \Delta LnI_{t-i} + \sum_{i=1}^{q4} \lambda_{5i} \Delta Ln(RER)_{t-i} + \sum_{i=1}^{q5} \lambda_{6i} \Delta Ln(VX)_{t-i} + \sum_{i=1}^{q6} \lambda_{7i} \Delta Ln(RM)_{t-i} + \lambda_{8}ECM(-1) + \lambda_{9}(FL) + \upsilon_{t}$$

.....(3.15)

By specifying the long-run money demand model in equation (3.13), equation (3.14) and an ECM in equation (3.15),the short-run as well as the long-run effects of all the right-hand side variables in equation (3.13) would be estimated in one step, which is a major advantage that error-correction model has in comparison to other specifications. Following Bahmani-Oskooee and Tanku (2008), Dahmardeh and Izadi (2011), and Anwar and Asghar (2012) used a set criterion for optimum lags, this research would also select the optimum lags by well-known set criteria such as Akaike information criteria (hereafter AIC), Bayessian Schwartz criteria (hereafter BSC) or Hannan Quinn Criteria (hereafter HQ) estimating equation (3.14) depending on the optimal results.

 $\beta_i, \delta_i, \gamma_i, \eta_i, \lambda_i, \theta_i$, and θ_i are the coefficient estimates of all the first-differenced variables in the first part of equation (3.14) and explain the short-run effects while the second part long-run effects explained by the estimates of are $\rho_1, \rho_2, \rho_3, \rho_4, \rho_5, \rho_6$, and ρ_7 . It is essential to justify the joint significance of lagged level variables as a sign of cointegration in order for the long-run coefficients to be meaningful. The null hypothesis of no cointegration defined as $H_0: \rho_1 = \rho_2 = \rho_3 =$ $\rho_4 = \rho_5 = \rho_6 = \rho_7$ would be tested against the alternative hypothesis H_1 : $\rho_1 \neq$ $0, \rho_2 \neq 0, \rho_3 \neq 0, \rho_4 \neq 0, \rho_5 \neq 0, \rho_6 \neq 0, \rho_7 \neq 0$ by means of well acquainted F test statistic- a asymptotic distribution is non-standard regardless of the order of variable likely to be I(0) or I(1). Pesaran et al. (2001) highly recommend the standard F test with new lower and upper critical values which create critical value band³¹, they tabulated. They provide an upper bound critical value when assuming all variables likely to be I(1)

³¹ The F-test can be used for this type of cointegration with two sets of lower and upper critical values mechanized by Pesaran *et al* (2001).

and they provide a lower bound critical value when assuming all variables are likely to be I(0). In case of mixed order of cointegration such as variables are likely to be I(1) and I(0), the authors show that the upper bound critical value would be still valid, which is a major advantage because, there is no any other substitute test statistic for the mixture of stationarity among all of the series.

There is a restriction for all of the series not to be I(2) or more order. It eliminates all pre-unit root testing because almost all of the economic series are I(0) or I(1) (Bahmani, 2011). The ARDL bounds testing approach would be highly appropriate in the case of our money demand model, portrayed in equation (3.13). Since it is expected the mixed results of stationarity among the variables related to the model. According to Bahmani (2011), money and income remained likely to be I(1) while the inflation rate and the measure of exchange rate volatility likely to be I(0) in her study.

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After establishing long-run relationship under appropriate lag selection criterion such as (AIC), (SBC), and (HQ) Criterion, static part of the model has been estimated with longrun estimates. After the estimating long-run coefficients, equation (3.15) was used to estimate the dynamic error correction. The coefficients λ_{1i} , λ_{2i} , λ_{3i} , λ_{4i} , λ_{5i} , λ_{6i} , and λ_{7i} are the short-run dynamics in equation (3.15) while λ_8 shows the speed of adjustment towards the equilibrium in the long-run. A negative and statistically significant value of the coefficient of Error Correction Term (ECT) in the range of negative two and zero signalizes convergence (Samargandi, Fidrmuc, & Ghosh, 2015). On other hand, the positive coefficient of ECT) shows the divergence. In such cases, ECM (-1) term is an appropriate to determine cointegration and is useful to establish it (Kremers *et al.*, 1992) and Banerjee *et al.*, 1998). The error correction term for ECM is derived from the long-run model for M_1 and M_2 . The coefficients were obtained by normalizing the equations for the both monetary aggregates.

3.4.3 Battery of Diagnostics

Following the estimating models for long-run and short-run, a battery of proposed diagnostic tests are reported in chapter four. First, Lagrange Multiplier test statistic (hereafter LM) checks the residuals to be free of auto correlation in the model. It is a chi squared (χ^2) distributed with four degrees of freedom. Second, Normality Test is used to test the normality of residuals based on the reported values of skewness and kurtosis. It is a chi squared (χ^2) distributed with two degrees of freedom. Third, Autoregressive Conditional Hetroskedastic (ARCH) test statistic has been used for homoscedastic residual that ascertains the residuals with constant variance. This test statistic is Chi-Squared (χ^2) . Finally the fourth, Ramsey Regression Equation Specification Error Test (RESET) test statistic has been used to check the functional misspecification of the model. It is also a chi-squared (χ^2) distributed with one degree of freedom. Almost in all of the above test statics, the null hypothesis is rejected if tabulated value of test statistic is more than critical value or p-value is less than 5 percent. The implication of rejected null hypothesis in each of the above first three test statistic supports autocorrelation free, homoscedastic, and normally distributed residuals respectively. On the other hand p value is more than 5% level the null hypothesis of the correctly specified

model is accepted for the RESET test statistic and the model is said to be well-specified model.

3.4.4 Stability Tests for Parameters

After estimating the models for short-run and long-run, there exists the question of stability of models. The stable money demand function supports the regulation of an efficient and optimal monetary policy. A stable money demand function predicts the relation between the quantities of money and related to the key variables that have linkage with money to the real sector of economy (Judd & Scadding, 1982; Friedman, 1987). It is necessary requirement for formulation an optimal monetary policy to check the stability of coefficients in the long-run. Laidler (1993) and Bahmani-Oskooee (2001) pointed out the problems of instability that could result to inadequacy of short run modeling dynamics and departures from relationship in the long-run. Therefore, it is necessary to incorporate the short-run dynamics of parameters' constancy in the long-run.

In this scenario, CUSUM and CUSUMQ tests suggested by Brown *et al.* (1975) have been applied. The CUSUM test-cumulative sum of recursive residuals for the optimal model carries out for the first set of n observations. The test statistics of the models are described as follows:

$$W_t = \sum_{r=k+1}^t \frac{w_r}{s}$$
....(3.16)

for t = k+1,...,T

where, w stands for the recursive residual defined above and s shows the standard deviation of the recursive residuals w_t . If the vector β remains constant from period to period, $E(W_t)=0$, but if β changes, will tend to diverge from the zero mean value line. The significance of any departure from the zero line is assessed by reference to a pair of 5% significance lines, the distance between which increases with. The 5% significance lines are found by connecting the points:

$$[k, \pm -0.948\sqrt{(T-k)}]$$
 and $[T, \pm 3 \times 0.948\sqrt{(T-k)}]$(3.17)

Movement of W_t outside the critical lines is suggestive of coefficient instability.



The expected value of S_t under the hypothesis of parameter constancy is:

$$E(S_t) = \frac{(t-k)}{(T-k)}.$$

.....(3.19)

which goes from zero at t=k to unity at k=T The significance of the departure of S from its expected value is assessed by reference to a pair of parallel straight lines around the expected value. The CUSUMSQ test provides a plot of S against t and the pair of 5 percent critical lines. As with the CUSUM test, movement outside the critical lines is suggestive of parameter or variance instability. The cumulative sum of squares is generally within the 5% significance lines, suggesting that the residual variance is somewhat stable. This test updates and plots recursively against the break points. The stay of CUSUM statistic plot within the critical bounds of 5% significance level would be considered stability of coefficients in the long-run and short-run over the study period witnessing about the absence of structural change. Similarly, The CUSUMQ test-cumulative sum of squared recursive residuals carries out for the first set of n observations. This test also updates and plots recursively against the break points. The stay of CUSUMQ statistic plot within the critical bounds of 5% significance level would be considered stability of the coefficients in the long-run and short-run over the study period providing evidence about the absence of structural change. We would rely upon the results of these tests presented graphically in the coming chapter four.

3.5 Measurement Universiti Utara Malaysia

This section reviews the measurement of all the dependent and independent variables. The dependent variables include narrow money demand and broad money demand and independent variables enlist the real income, interest rate, inflation, exchange rate, volatility of exchange rate, and the remittances. The measurement of the variables in the proposed model is considered as follows:

Real Income(Y): The variable in the study, Real Income (Y) is measured as real gross domestic product expressed in million rupees at constant price for year the 2006.

Inflation Rate (π): It is a persistently substantial change (continuous rise) in price level in the overall economy. GDP deflator is used as proxy to find inflation rate and defined as follows

Where GDP-Deflator (t) is the current year's GDP-deflator and GDP-Deflator (t-1) is the previous year's GDP-Deflator.

Interest Rate (I): The opportunity cost of holding money stock is termed as interest rate. The proxy of domestic interest rate is taken as discount rate issued by the State Bank of Pakistan.

Narrow Real Money (M_1): Narrow nominal monetary aggregate (m_1) which is sum of currency in circulation plus demand deposits. It is deflated by GDP deflator for the year 2006 to obtain narrow real money.

Broad Real Money (M_2): Broad nominal monetary aggregate (m_2) which is sum of m_1 and quasi money. It is deflated by GDP deflator for year the 2006 to obtain broad real money.

Exchange Rate (ER): The exchange rate defined as number of units of Pak rupees per U.S. dollar. This reveals that depreciation of domestic currency reflects an increase. It is nominal exchange rate.

Volatility of Exchange rate (VX): Exchange rate volatility is an indicator that captures the risk experienced by investors because of unpredictable fluctuations in exchange rates. Since, the data is unavailable on volatility of exchange rates under the period of the study in Pakistan; hence, this study intends to measure it by GARCH Model technique suggested by Bollerslev (1986). It has also been used before by Alam and Ahmad (2011).

Remittances (RM): The variable under study, RM is expressed in million rupees and it is deflated by GDP deflator for year the 2006 to obtain real remittances.

Financial liberalization (FL): The variable under study, FL is a dummy variable to capture the effect of financial liberalization in the model. It is measured in terms of 0 (zero) and 1 (one). FL equals to one for the year 1990 and after and zero for the year before 1990 (see Guncavedi *et al.*, 1998).

3.6 Data Sources and Coverage

The thesis employed time series annual data ranging from time period 1972 to 2014, representing sample size of 43 observations. Data regarding monetary aggregates including M1 and M2, Income, discount rate, and remittances has been taken from website of State bank of Pakistan, various issues of Statistical year book and economic survey of Pakistan. The data about exchange rate and inflation have been taken from the World Data Indicator-2014, International financial statistics (IFS). Due to the non-

availability of data for the exchange rate volatility, it has been generated through GARCH (1, 1) model as previous generated by Bollerslev (1986). The variables used in the study are included money balances (M1 and M2), income, inflation, discount rate, exchange rate, volatility of exchange rate and remittances has been converted into real and logarithmic form. In Literature, logarithmic transformation is a common procedure in order to control outliers and make calculation easier (Cho & Ramerez, 2016). In addition, financial liberalization has been taken as dummy variable pertaining value zero before 1990 and one for after in the data.

3.7 Chapter Summary

This chapter outlines the research design and framework of the study that includes set of exogenous, endogenous along with scale variables and opportunity cost variables. It focuses on the data source and coverage along with variable measurement. This study discuses model and its estimation in which ARDL model is proposed for short-run and long-run, using annual time series data from 1980 to 1914. This chapter further explains hypotheses development for this study on the basis of prevailing economic theory and empirical work conducted in developed as well as developing countries. The model and its estimation technique would be used to answer the developed hypotheses in this study.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Introduction

This chapter is devoted to the presentation of results and discussion. The Autoregressive Distributed lag technique that takes into account Bounds testing approach was employed to analyze the long-run effects and the short-run dynamics of exchange rate, exchange rate volatility, remittances, and financial liberalization on the real narrow money demand and real broad money demand. In addition, we examined the long-run effects and the short-run effects of other particular variables that include real income, discount rate, and inflation rate. Finally, we investigated the stability for both estimated models.

4.2 Empirical Results

Before analyzing both short-run and long-run relationship in the estimated models for both the real narrow money demand and real broad money demand equations, descriptive statistics and correlation matrix are discussed in the next two sections (section 4.3 and section 4.4). In section 4.3, all the variables used in this study are precisely described in terms of their mean, minimum, maximum and standard deviation which is termed as summary of the variables. Section 4.4 takes account the pair wise Pearson's correlation between the set of independent variables. It shows the strength of association between variables as positive or negative relationship. Correlation of coefficient lies between -1 and +1. The nearer the value to the ends, the stronger the

relation between the variables while the nearer the value to zero, the weaker the association between the variables.

4.2 Descriptive Statistics

This section presents the descriptive statistics of all the dependent and independent variables used in the model. It tries to captures a simple quantitative summary of the collected data set and tells all about the details of interpreting the results and trends that put the data in perspective. It explores and posits an overview of all the variables in the analysis. All variables are expressed in real terms deflated by GDP deflator of base year 2006 except for discount rate and volatility of exchange rate in order to facilitate the comparison. Table 4.1 presents the quantitative summary of sample consisting of the time span of 1972-2014 (43) observations in terms of the mean, minimum, maximum, and standard deviation of the variables. It depicts the mean for M1 is 1140 billion with ranges from minimum of 19.9 billion to maximum of 8930 billion with standard deviation of 2170 billion. The mean for M2 is 1940 billion that ranges from minimum 27.7 billion to highest of 11000 billion with the variability of 2780 billion. M1 and M2 are the dependent variables in the study. Since M1 is a part of M2 by definition and it is wholly contained into M2. The mean, minimum, maximum, and standard deviation of M2 is higher than the values of M1. Thus, M2 grows more than M1 and fluctuate more than M1 on the basis of mean and standard deviation of the aggregates. So in case of Pakistan, M2 is more volatile than M1 due to several components in it as compared to M1.

The set of independent variables used in the model are Y, I, π , RER, VX, and RM. The gross domestic product is the proxy for the real income (Y) has a mean of 5560 billion ranges from minimum of 1640 billion to the maximum of 25400 billion with standard deviation of 402 billion. Discount rate (I) has mean 10.89% with the lowest of 6% and highest of 20% with 2.89% standard deviation. Inflation rate (π) possesses mean of 10.41% ranging from 2.46% to 25.44% with standard deviation of 5.71%.

Table 4.1

Estimation Results of Descriptive Statistics using all the quantitative variables in the model

Description	Symbols	Mean	Minimum	Maximum	Std. Dev.
Narrow Money Demand	M1	1410*	19.9*	8930*	2170*
Broad Money Demand	M2	1940*	27.7*	11000*	2780*
Gross Domestic Product	Y	5560*	1640*	25400*	4020*
Discount Rate	Ι	10.89674	6	20	2.89366
Inflation Rate	π	10.40743	2.463093	25.43683	5.713664
Exchange Rate	ER	38.64056	8	101.97	29.33484
Volatility of Exchange Rate	VX	6.415908	0.414175	26.33312	7.322937
Remittances	RM	631*	0.72*	18800*	2850*

Note: * shows amount in Pak Rupee Billion

Source: Authors' Calculations

On the other hand, exchange rate (ER) which is number of Pak rupee against US. dollar has mean of 38.64 rupee with the lowest value of 8 rupee and highest value 101.66 rupee with standard deviation of 29.33 rupee. Volatility of exchange rate holds mean of 6.42 with minimum value of 0.414 and maximum of 26.33 with standard deviation of 7.32. Remittances (RM) has mean 631 billion ranges from 0.72 billion to 18800 billion with standard deviation of 2880 billion. The trend of remittances in Pakistan has increased after 2000 since specific number of skilled labor has remained out of country that support their families by remitting amount in Pakistan.

The descriptive statistics are not computed for financial liberalization (FL) as it is a dummy variable with values zero and one. Since the descriptive statistics about the independent variables in Table 4.1 reveals that Y grows fast as compared to R on the basis of average value and also fluctuates more than R on the basis of standard deviation. I grows more than π but has low fluctuations on the basis of standard deviation. In the similar fashion, ER fluctuates more as compared to its volatility. Aggregately, Y has the highest mean and the highest standard deviation of all the variables in Table 4.1 since it is the gross domestic product, showing the sum of all activities of the economy of Pakistan.

4.4 Correlational Matrix

This section reports the correlations among all the independent variables in the model. When variables are continuous in nature, their coefficient of correlation is called Pearson's coefficient of correlation. It gauges the strength of association between two variables. The value of the coefficient of correlation lies in the range of negative one (-1) to positive one (+1). Its numerical value -1 or +1 shows the perfect negative or positive association between the variables, while the zero value witnesses the absence of association. Table 4.2 depicts the values of Pearson's coefficient of correlations among the independent variables. The variable real income (Y) is positively correlated with (I, ER, VX, and RM) with correlation values 0.157, 0.343, 0.413, and 0.525 respectively while it establishes negative correlation with inflation rate (π) with value of -0.054.

Table4.2

Estimation Results of Correlation Matrix Using all the quantitative Exogenous Variables

	12/	12	_			
	Y	I	π	ER	VX	RM
Y	÷4					
Ι	0.157					
π	-0.054	0.204				_
ER	0.343	0.212	0.032	si t i Ut	tara Ma	laysia
VX	0.413	0.004	-0.032	0.481		
RM	0.525	-0.033	-0.079	0.432	0.496	

Source: Authors' Calculation

Moreover, discount rate (I) holds positive correlation to all of the variables while the inflation rate (π) holds negative correlation to all except the discount rate (I). Other remaining variables ER, VX, and RM have positive correlation to all except for inflation rate (π). The coefficient of correlation with other independent variables is not computed for financial liberalization (FL) as it is a dummy variable with values zero and one only. All correlations among variables are less than 0.5 except between real gross domestic output (Y) and the remittances (RM) with correlation value of 0.525 that does not create

any specific problem among all the independent variables. A best model is one which is free from the problem of multicolinearity between the set of independent variables. Thus it is expected that multicolinearity among all the independent variables does not exist. The results of the correlations among the set of independent variables are described in the Table 4.2 as follows.

4.5 Stationarity of Variables

Most of the data in economic and financial time series are non-stationary including money demand variables and these results would lead towards spurious regression which cannot be used for prediction or policy purposes. At the first stage of empirical analysis, the order of integration for the included variables must be confirmed not to be I(2) so as to apply the ARDL Bounds Testing approach. The order of integration can be confirmed by employing standard tests for stationarity. We begin to check the stationarity of each variable/series by using the ADF, PP, and KPSS test. The null hypothesis of ADF test and PP test states that the variable under consideration has unit root against the alternative hypothesis that it has no unit root. On the other hand, the null hypothesis of KPSS describes that the variable under consideration has no unit root against the alternative hypothesis that it has unit root as described above in the ADF and PP test statistics.

Two types of models are tested under these tests of stationarity. Model 1 includes a constant and no trend, while model 2 includes both constant and trend. The results for model 1 and model 2 are presented in Table 4.3 at the level and first difference for each

variable under consideration in the study. The critical values of the above tests are given in Fuller (1976), Phillips and Perron (1988), and Kwiatkowski *et al* (1991) respectively.

The results in the log-level form for all the variables in this study are given in Table 4.3 with the ADF, PP, and KPSS stationarity test statistics. All the variables include constant only except LNM1 and LNVX that possess trend too.

The results show that for the variable LNM1, we can reject the null hypothesis of unit root with trend and constant. So LNM1 is stationary at level. For the variable LNI, and $LN\pi$, the null hypothesis of unit root can be rejected with constant only. So LNI and $LN\pi$ are stationary at level. The results for LNVX and LNRM reveal that the null hypothesis of unit root can be rejected at the level with constant and trend and constant respectively. Thus the LNVX and LNRM are stationary at level. Thus the variables LNI, $LN\pi$, LNRM with constant only and LNM1 and LNVX with constant and trend are stationary at level. Hence the order of integration of the variables LNM1, LNI, LN π , LNVX, and LNRM is I(0).

On the other hand, the results for variable LNM2 portrays that null hypothesis of unit root can be rejected at the first difference with constant only. So, it can be concluded that LNM2 is stationarity at first difference. Finally, the null hypothesis of unit root for variables LNY and LNRER can be rejected at the first difference with constant only. So, LNY and LNRER are stationary at first difference with constant only. Thus the order of integration for the variables LNM2, LNY, and LNRER is one. Hence, Table 4.3 shows the order of integration as mixture of I(0) and I(1) for all the variables used in this study.

It ensures the absence of I(2) for all the variables that ascertains to apply the ARDL Bounds Testing approach. The stationarity is not checked for financial liberalization (FL) since it is a dummy variable that has values either zero or one.



Table 4.3

Test Statistics	Models		LNM1	LNM2	LNY	LNI	LNπ	LNRER	LVX	LNREM
		С	0.15	-0.35	-0.37	-3.21**	-4.62***	-1.05	-0.78	-3.08**
	Level	C+T	-3.57**	-2.25	-1.17	-3.24*	-4.85***	-0.45	-9.85***	-3.79**
ADF		С	-5.42***	-5.05***	-6.56***	-4.54***	-7.49***	-4.81***	-13.87***	-6.50***
	First Diff	C+T	-5.38***	-4.99***	-6.82***	-4.44***	-7.38***	-4.79***	-13.68***	-5.96***
		С	0.07	-0.38	-0.37	-2.96**	-4.69***	-1.14	-0.89	-3.16**
	Level	C+T	-3.21*	-2.5	-1.14	-2.75	-4.67***	-0.99	-7.70***	-3.93***
РР		С	-5.38***	-4.92***	-6.56***	-5.52***	-11.19***	-4.94***	-17.26***	-6.49***
	First Diff	C+T	-5.36***	-4.84***	-7.03***	-4.42***	-11.02***	-4.86***	-16.36***	-5.96***
		С	-0.80***	0.80***	0.4*	0.22	0.09	0.66**	0.74***	0.31
	Level	C+T	0.07	0.17**	0.15*	0.09	0.09	0.15*	0.15**	0.11
KPSS	First Diff	С	0.08	0.07	0.27	0.13	0.05	0.21	0.38	0.25
		C+T	0.06	0.07	0.11	0.05	0.05	0.14	0.16	0.08

Stationary Results of ADF, PP, and KPSS Test Statistics for the Data from 1972-2014

Note: 1."*", "**" and "***" indicate the significant results at the 10%, 5% and 1% level respectively

2. The null hypothesis of ADF and PP is "There is unit-root". While KPSS is "There is no unit-root".

4.6 Bounds Test Results

Times series are analyzed to grasp the underlying structure and function producing a series of observations. The first assumption for time series is to follow at least a systematic pattern. The most general trends consist of trends (linear or quadratic) and seasonality (systematically random over time). Dynamic effects for the Long-run and short-run can be answered in several ways by efficient time series techniques. There are many time series methods to answer the above questions including FMOLS, the Johansen Maximum Likelihood (JML), the ARDL bounds test of Pesaran and Shin (1999) and the London School of Economics (LSE)-Hendry General to Specific (GETS) method. The former two methods require all variables should be I(1) but later two relax these requirements of holding all variables as I(0), I(1) or mixture of I(0) and I(1). The main advantage of ARDL model to (GETS) framework is to take sufficient number of lags capturing the data generating process (Laurenceson & Chai 2003). Due to flexibility in the modelling of ARDL, it can be employed irrespective of order of integration (Pesaran & Pesaran (1997). Hence, ARDL Bounds approach is applied for cointegration analysis in this research.

This study investigates the well-known hypothesis of no cointegration in the long-run of the time series data annually from 1972 to 2014 in Pakistan. Both the narrow real monetary aggregates narrow (LNM1) and broad real monetary aggregates (LNM2) are adopted as dependent variables. To employ the ARDL Bounds approach, two steps are required. The first step focuses on the presence of long-run relationship between the variables in the basic model by comparing the F-statistics with critical values consisting on lower bound and upper bound. F-statistics are sensitive to the number of lags imposed on each first differenced variable.

Hence, before analyzing the ARDL bounds testing approach, we need to select the optimal lag length. There are many criterion that were used to select the optimal lags for the model including AIC, BSC, and HQ. Since the selection of lag length is an arbitrarily and does not follow any specific criterion and researcher needs an efficient estimation (Bahman-Oskooee & Brooks, 1999; Bahman-Oskooee & Wang, 2007). Burnham and Anderson (2002, p. 287) stated that (HQ), "while often cited, seems to have seen little use in practice". According to the argument by (Claeskens & Hjort, 2008, ch. 4), HQ is more important than SBC and AIC and further pointed out that its value would be the least in comparison to other criteria due to its rigorous formula. However, due to the low number of observations (43) in the data set, up to four lag order is imposed.

The results of the bound test are reported in Table 4.4. It can be seen from Table 4.4 that the test outcome depends upon the lag length. Since the computed F-statistic value falls above the upper bound reveals that the null hypothesis of no cointegration can be rejected at the 5% and 1% level with lag length of 3 and 4 respectively. Table 4.4 provides sufficient evidence about the existence of the long-run relationship between LNM1 and LNY, LNI, LN π , LNRER, LNVX, and LNRM as independent variables. Thus the variable LNM1 and set of its independent variables move in the same cointegrating space. On the other hand, the F-statistic value for LNM2 with all the

explanatory variables also lies above the upper bound in the Table 4.4. It witnesses about the presence of long-run relationship at the 1%, and 5% level respectively. Thus, we reject null hypothesis of no cointegration between LNM2 and set of independent variables. Hence, there is a similar movement between the LNM2 and the set of its independent variables in the same cointegrating space.

Table 4.4

Bounds Test Results for Long Run Relationship in Basic Models of LNM1 and LNM2

Lags	LNM1	LNM2	Critical Values		α
1	2.06	0.91	Lower Bound	Upper Bound	
2	2.34	1.13	2.12	3.23	10%
3	4.75**	4.1**	2.45	3.61	5%
		// -			
4	7.12***	4.72***	3.15 ersiti uta	-4.43 alays	1%

Note: 1. The critical value bounds for F(LnM1 & LNM2|LNY, LNI, LNπ, LNRER, LNVX, LNRM) for lower bounds and upper bound with six regressors are given in the table above at the level of significance 10%, 5%, and 1%

Hence, the reported results shows that we can reject the null hypothesis of no cointegration in the long-run at the all the mentioned levels above in Table 4.4. Since the F value falls above the upper bound of critical value at the 1% level of significance in both cases of the real narrow demand for money model and real broad demand for money model with four number of lags selected on the basis of HQ.

^{2.} Asymptotic critical values are taken from Pesaran *et al.* (2001) generated by EViews 9. ** and ***

indicate that the F-statistic falls above the 5% and 1% upper bound.

Therefore, we can conclude that both the LNM1 and LNM2 move in the same cointegrating space along with the set of their independent variables including real income (LNY), discount rate (LNI), inflation rate (LN π), real exchange rate (LNRER), exchange rate volatility (LNVX), remittances (LNRM), and financial liberalization (FL). Thus there is long-run relationship between the dependent variable LNM1 and LNM2 and the set of independent variables.

After selecting the optimal lag length, optimal model is to be selected out of several models that has minimum value of HQ. The ARDL Bounds approach estimates $p(p + 1)^k$ regressions achieving optimal number of lags for each variable, where p is the maximum lags used and k shows the number of dynamic variables in the model. Since we are employing annual time series data with small number of observation (43), p=4 lags have been selected as the maximum lag on each first differenced for both dependent and all independent variables in the model following (Bahmani & Bahmani-Oskooee, 2013). As indicated by Pesaran *et al.* (2001), the lag length for each variable need not to be identical except for the identification purposes above. One needs to be aware of the tradeoff that exists between including a sufficient number of lags to mitigate residual serial correlation and the risk of over-parameterization of the ARDL model.

We therefore select a parsimonious model for the long-run money demand, using the HQ as a guide. Thus, we estimated an efficient ARDL models for (LNM1) and (LNM2)

with HQ as ARDL (1, 3, 4, 2, 0, 4) and ARDL (2, 3, 0, 4, 4, 1) respectively. EViews 9.0 estimated 62500 models using the formula for each (LNM1) and (LNM2) and out of which top twenty models are selected that are the most efficient on the basis of the least value of HQ. The graphs for each (LNM1) and (LNM2) of twenty models are posited in Figure 4.1 and Figure 4.2 respectively. Since the top twenty models are ordered according to their HQ values for LNM1 and LNM2 respectively.

The order of ARDL model was plotted along horizontal axis and the values of HQ along the vertical axis. The model for LNM1 is ARDL (1, 3, 4, 2, 0, 2) which possesses the minimum value of -2.507 among all the remaining models in the Figure 4.1. Thus it is termed as optimal model among all the models. The order of the model for LNM2 is ARDL (2, 3, 0, 4, 4, 1, 1), holds the lowest value of -3.333 among all the remaining models in the Figure 4.2. Therefore it is the optimal model for LNM2 among all the remaining models. It can be concluded that the starting initial models on the horizontal axis are the efficient models in both Figure 4.1 and Figure 4.2 because they possess the least value for HQ of -2.507 and -3.333 for LNM1 and LNM2 models, respectively.


Figure 4.1. Graph of Top Twenty Models through Hannan- Quinn Criterion for LNM1

-3.20 -3.22 -3.24 -3.26 -3.28 -3.30 -3.32 Universiti Utara Malaysia -3.34 (m რ m ิล Ń Ć Ń ิด 4 4 4 4 4 4 Ś 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 ó Ļ, , Ś 'n Ó, ó Ó Ó Ó Ó Ó Ó. 'n Ó Ĺ, Ó Ó Ó Ó 'n 'n ώ , Ś ώ. 4 , Ś ώ. ώ ώ. ς, 4 ς, ς, 4 ю́ ς, ς, ю́ Ś

Single Single

Hannan-Quinn Criteria (top 20 models) for LNM2

The next step is to estimate the long-run effects and short-run dynamics for the monetary aggregates models through the set of independent variables. The coefficients of long-run static solution have been determined for the optimum ARDL model for money demand function by the specific criteria HQ while, the short-run dynamics have been estimated by the associated ECM for the models of both LNM1 and LNM2. In the specification of standard rule of HQ, the optimal ARDL (1, 3, 4, 2, 0, 4) and ARDL (2, 3, 0, 4, 4, 1) models have been chosen for the real narrow money demand and real broad money demand, respectively shown in Table 4.5.

Since both of the models of real narrow money demand and real broad money demand are in the log linear functional forms. So, the estimated coefficients are called elasticities. The long-run coefficient estimates (elasticities) for both the models of real narrow money demand and real broad money demand are reported in Table 4.5.

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The results of the ARDL model show the coefficient of real income is statistically significant at the 1% level in the model of real broad money demand while is statistically not significant in the real narrow money demand even at the 10% level. The result is consistent with Keynesian school of thought that there exists a positive relationship between income and the money demand. Thus it confirms with the expected sign of real income which is positive in both real narrow money demand and real broad money demand functions.

Table 4.5

Model	ARDL(1, 3, 4, 2, 0, 4)	ARDL(2, 3, 0, 4, 4, 1)
Regressor	LNM1	LNM2
LNY	0.009	0.035
	(0.615)	(2.953)***
LNI	-0.149	0.227
	(-0.887)	(2.729)**
LNπ	-0.172	-0.263
	(-1.787)*	(-2.272)**
LNRER	0.929	0.417
	(5.983)***	(1.894)*
LNVX	0.075	0.204
	(1.820)*	(4.979)***
LNRM	0.356	0.160
	(4.417)***	(3.177)***
FL	0.205	0.204
	(3.422)***	(2.222)**
C 2	11.531	17.585
AB	(4.630)***	(8.982)***

The long-run Elasticites Using the ARDL Approach for LNM1 and LNM2.

Notes: Numbers inside the parentheses are the t-values. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

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Moreover, the long-run coefficients of income elasticity of LNM1 and LNM2 are 0.009 and 0.035 respectively. The long-run coefficients are less than unity reveal a small response to real money balances due to changes in real income. These results are in line with the studies of Bahmani-Oskooee (2002) for Hong Kong and Pradhan and Subramanian (2003) for the case of selected developing countries, however, contrary with the works of Sichie and Kamau (2012) for Kenya. The results also show that the real broad money demand has a higher income elasticity than real narrow money demand. The interpretation can be elucidated as the demand for real broad money relies on the households' desire to hold money as an asset, besides holding it as transaction motive. In the case of Pakistan, income is concentrated in few hands and wealthy households accumulate more assets. Hence, illiquid assets are traded more as compared to currency as such for narrow money, the elasticity of income is low. This glimpse of the results implies that one percent rise in real income increases real money balances in the range of 0.009%-0.035%. This is also an indication of the lack of economic development and monetization in the case of Pakistan where small response of monetary balances due to changes in real income. Finally, the result reported in Table 4.5 reveals that real income is not the most significant determinant of real narrow money demand in Pakistan.

The opportunity costs of holding money were represented by the discount rate and inflation rate variables. Interest rate elasticity of money demand is expected to be negative in sign. The result is in line with theory in the case of real broad monetary balances but statistically insignificant in the case of real narrow money balances. The coefficient of the interest rate is small indicating that the money demand is inelastic with respect to interest rate. The small magnitude of interest rate coefficient may be the result of financial repression and under-developed money market in the country (Akinlo, 2006). This scenario supports the economic theory since the higher the discount rate, the less the incentive to hold money.

On the contrary, interest rate elasticity of real broad money demand has sign against the theory and is statistically significant at the 5% level. The interest rate elasticity of money demand is higher compared to income elasticity of both real narrow and broad

money demand, indicating that income elasticity of money demand is more inelastic than the interest rate elasticity of money balances. The results reported in Table 4.5 indicate that money demand is more sensitive to real income as compared to interest rate. This is consistent with the fact that majority of the households in Pakistan are poor. Hence, they are only concerned with income rather than interest rates.

In addition, the inflation rate elasticity of money demand has negative sign consistent with the theory and is statistically significant with real broad money balances at 5% level while statistically significant at the 10% level for the real narrow money balances. The results implies that a one percent rise in inflation rate decreases real money balances about 0.172%-0.263% on average. It further shows that inflation rate significantly influences real broad money more than real narrow money balances. It supports our theoretical expectation that as inflation rate rises, the demand for money falls. This indicates that people prefer to substitute physical assets for money balances as interest rate increases. The results are consistent with Artis and Beyer (2004) for Europe, Bahmani and Bahmani-Oskooee (2012) for Iran, and Anwar and Asghar, 2012) for Pakistan.

The sign of the coefficient of exchange rate is positive and statistically significant at the 5% in case of real money demand. In the case of real narrow money demand, it is significant at the 1% level. The exchange rate elasticity of money balances is 0.929 and 0.417 in the case of LNM1 and LNM2, respectively. The results imply that a one percent increase in exchange rate of Pakistani rupee raises the money demand by about

0.417% to 0.929%. Since the exchange rate is defined as number of Pak rupee in U.S dollar, an increase in exchange rate reflects depreciation of Pak Rupee. The positive sign of coefficient of exchange rate posits that demand for both real narrow and broad monetary aggregates increases as Pak rupee depreciates supporting the wealth hypothesis –appreciation in the foreign currency (depreciation in the domestic currency) increases the value of foreign assets held by Pakistani, enhancing the wealth of country and demand for cash balances in the literature. The results of our study are consistent with others that support the wealth effect hypothesis (For example, Arango and Nadiri, 1981; Bahmani-Oskooee, 1991; Chowdhury, 1997; Tan, 1997; Weliwita & Ekanayake, 1998; Khalid, 1999; Ibrahim, 2001; BahmaniOskooee & Ng, 2002; Bahmani-Oskooee & Rehman, 2005; Bahmani, 2012; Arize & Nam, 2012; and Anwar & Asghar, 2012). On the other hand, the results are contrary to Agenor and Khan (1981), McKinnon *et al.* (1984), and Bahmani-Oskooee and Pourheydarian (1990) which argue for the currency substitution effect.

The coefficient of exchange rate volatility is positive and statically significant at the 1% level with real broad money demand while is significant with real narrow money demand at the 10% level. The coefficient of exchange rate volatility elasticity of money balances is 0.075 and 0.204 for LNM1 and LNM2, respectively. The results imply that a one percent increase in exchange rate volatility of Pakistani rupee raises the money demand for about 0.075%-0.204%. The positive sign of coefficient of exchange rate volatility in Pakistan posits that exchange rate uncertainty results in more holding of the domestic currency and less holding of foreign currency. The results of our study are

consistent with Bahmani (2011) for Less Developed Countries (LDC). However, it contradicts the results of Mcgibani and Nourzad (1995) for the U.S. and Bahmani and Bahmani-Oskooee (2012) for Iran, as they argued that the exchange rate volatility induces investors to substitute safer assets for riskier currency.

The coefficient of remittances is positive and statically significant at the 1% level in case of both real broad money demand and narrow money demand. The remittances elasticity of money balances is 0.356 and 0.160 for LNM1 and LNM2, respectively. The results imply that a one percent increase in remittances raises the money demand about 0.160% to 0.356% on average. The effect of remittances on real narrow money is more pronounced as compared to real broad money demand. The positive sign of coefficient of remittances in Pakistan is an indication that positive shock to remittances tends to increase money demand. The advent of remittances increases income of the households resulting in improvement of consumption path. As the consumption path of the households improves, the demand for monetary balances increases. The remittances also cause to increase real exchange rate of Pak rupee, discouraging exports to the world market, further worsen the money demand. The results of our study are consistent with the study by Vergas-Silva (2009) for Mexico and remain contrary to the works of Adentusi and Ahorter (2008) for Ghana in the long-run.

Finally, the coefficient of financial liberalization is positive and statistically significant at the 1% level in both cases of real broad money demand and narrow money demand. The estimated coefficients of the money balances LNM1 and LNM2 with financial liberalization (FL) are 0.205 and 0.204 respectively. This glimpse indicates that real money balances i.e LNM1 and LNM2 rise 0.205% and 0.204% due to one unit increase in financial liberalization. The results further imply that due to financial liberalization (FL), money demand increases about 0.204% to 0.205% treating other variables constant.

The effect of financial liberalization on real narrow money is about the same as on real broad money demand. The coefficient values in the case of both monetary aggregates are less than unity and near to zero suggesting the weak role of financial liberalization (FL) in Pakistan. According to the Keynesian line of argument, low interest rates stimulate – rather than discourage– investment. Keynesian believe in 'prior investment' policy (expected effect).The results portray that Financial Liberalization is not consistent with the expected effect (Keynesian school of thought). A high interest rates policy discourages savings through its negative influence on investment and income (Khatkhate, 1988). However, one of the reasons may be possible due to inappropriate reforms and implementation. It may be inferred that reforms were not efficient to control the money demand supporting the works of Akhtaruzzaman (2007); Khan and Hye (2012).

The short-run coefficients of the variables used in the models for the both real narrow money demand and real broad money demand are reported in Table 4.6. The coefficient estimate is said to be significant in the short-run if at least one of the first differenced lag of variable is significant (Bahmani & Bahmani-Oskooee, 2012). Since it can be seen

from Table 4.6 that the coefficient of LNY is not statistically significant in both real narrow money demand and real broad money demand, it shows the absence of effects of real income on money demand in the short-run implying no support for transactional money demand. This means that in the short-run, increase in real income leads to no effect in the demand for the both monetary balances might be because of households in Pakistan are expecting inflation in near future.

Table 4.6

ARDL(1, 3, 4, 2, 4, 0, 2)	Lags Order				
UTAN	0	1	2	3	4
Δ (LNM1)	<u>-</u>	-	-	-	-
$\Delta(LNY)$	-0.003 (-0.294)	0.000 (0.062)	-0.019 (-2.684)**		
Δ(LNI)	-0.050 (-0.449)	-0.167 (-1.005)	-0.229 (-1.220)	0.328 (2.246)**	
$\Delta(LN\pi)$	-0.087 (-2.959)**	0.064 (1.532)		lavsia	
Δ(LNRER)	-0.191 (-0.731)	-0.048 (-0.122)	-0.377 (-1.211)	-0.467 (-1.981)*	
Δ (LNVX)	0.064 (1.791)*				
Δ (LNRM)	-0.002	-0.123 (-1.278)			
$\Delta(FL)$	0.176 (3.263)***	(/			
ECM(-1)	-0.861 (-5.045)***				
ARDL(2, 3, 0, 4, 4, 1, 1)					
	0	1	2	3	4
$\Delta(LNM2)$		0.766 (3.583)***			
$\Delta(LNY)$	0.009 (1.636)	-0.010 (-1.736)	-0.016 (-3.389)***		
Δ (LNI)	0.112 (1.584)		· · ·		
$\Delta(LN\pi)$	-0.127 (-7.022)***	0.051 (2.515)**	-0.025 (-1.208)	0.052 (2.973)**	
Δ (LNRER)	0.173 (1.207)	-0.458 (-1.775)	-0.735 (-4.110)***	0.496 (3.290)***	
Δ (LNVX)	-0.032	()	(()	

The Short-run Elasticites Using the ARDL Approach for $\Delta LNM1$ and $\Delta LNM2$

	(-0.707)
Δ (LNRM)	-0.090
	(-3.486)***
$\Delta(FL)$	0.101
	(3.056)***
ECM(-1)	-0.495
	(-2.877)**

Notes: Numbers inside the parentheses are the t-values. *, **, and *** indicate significance at the 10%, 5%, and 10 levels respectively.

They do not want to hold their assets in liquid form so that purchasing power of money may not be eroded.

Discount rate has short run effects on real narrow money demand but not on real broad money demand. It further shows that the rise in discount rate causes the fall in the demand for both monetary aggregates (LNM1 and LNM2). As discount rate increase, price for the loan increases and demand for loan decreases implying that demand for both the monetary aggregates also decreases. Inflation rate has sound short-run effects in both LNM1 and LNM2, respectively at the 1% level.

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This means that inflation rate serves as an opportunity cost of holding money in the short-run. This may be attributed as prices increase in the short run, it leads to fall in the money demand in the case of Pakistan, being a developing economy.

Furthermore, the coefficient of exchange rate is significant in both cases of narrow and broad money demand at the 10% and 1% level, respectively. It has negative association with both monetary aggregates in the short-run supporting the hypothesis of capital substitution in the economic theory. On the other hand, the coefficient of exchange rate volatility is significant in the real narrow money demand at the 10% level but statistically not significant in the case of real broad money demand. Therefore volatility

of exchange rate has short-run effects with only real narrow money demand but not with real broad money demand. It supports the explanation that the household care about cash but not treat money as an asset.

The coefficient of remittances in LNM1 is not statistically significant but significant in the case of LNM2 at the 1% level. The results show that remittances has no short-run effects on real narrow money demand but has short-run effects on real broad money demand. The negative association between remittances and both monetary aggregates supports the theoretical explanation that rise in remittances causes the fall in demand for both the monetary aggregates in the short-run. The reason may be attributed to slow process of receiving remittances through financial institutions. As the households do not make transaction smoothly, that decreases the money demand in the short-run.

Finally, the coefficient of financial liberalization is positive and statistically significant at 1% level for both real monetary aggregates. The results reveal that FL has short-run effects on both LNM1 and LNM2, respectively. The positive association between the financial liberalization and both monetary aggregates supports the explanation to the demand for monetary balances rises due to increase in the financial liberalization in the short-run. This scenario may be reasoned such as many new foreign and domestic banks are established after the liberalization of the financial sector of Pakistan. In addition, the proliferation of automated Teller Machines (ATM) and new instruments in the banking sector further facilitate bank transactions. As the public has easy access to these instruments and ATM machines, this causes the rise in money demand in the short-run. Once cointegration is established, it is necessary to borrow stationary residuals from cointegrating vector and error correction model to determine whether the short-run effects translate in the long-run. After estimating the ARDL model, linear combination of lagged variables is replaced by ECM(-1). The model is then re-estimated by imposing the same lag structures selected by the HQ criterion, and looked for the coefficient of ECM (-1) to be significant and negative but not less than -2 (Samargandi *et al.*, 2015). It measures the speed of adjustments towards the long-run equilibrium due to occurrence of shocks in the short-run. This is an alternative and efficient way to establish the existence of cointegration with negative and significant coefficient of ECM (-1) (Kremers *et al.*, 1992). A negative and statistically significant error correction term validates the results of bound test with F-statistic regarding the presence of cointegration between the dependent and set of independent variables (Bahmani-Oskooee & Rehman, 2005).

In order to look at the short-run relationship between the independent variables and dependent variables (LNM1 and LNM2) in equations 4.1 and 4.2 are estimated to obtain the Error Correction Term (ECT).

$$ECM(t) = LNM1 - (0.009LNY - 0.149LNI - 0.172LN\pi + 0.929LNRER + 0.075LNVX + 0.356LNRM + 0.205FL + 11.531.....(4.1)$$

$$ECM(t) = LNM2 - (0.035LNY + 0.227LNI - 0.263LN\pi + 0.417LNRER + 0.204LNVX + 0.160LNRM + 0.204FL + 17.585.....(4.2)$$

The Error Correction Term (ECT) has been included in the short-run equation for estimation. The results of the short-run estimates are presented in Table 4.6.

The coefficient of ECM (-1) carries the expected sign which is negative and it is statistically significant in both models of real narrow and broad money demand. The magnitude of relative ECM(-1) is -0.861 and -0.495 for the models of LNM1 and LNM2, respectively. The magnitude shows the speed of adjustment from short-run disequilibrium towards equilibrium in the long-run. The results in Table 4.6 reveals that deviation from equilibrium is corrected by 86.1% and 49.5% every year for real narrow money demand and the real broad money demand, respectively. Hence it takes two years and more than two years for the money demand to return to equilibrium in the case of LNM1 and LNM2, respectively. The results show that the speed of adjustment in the case of narrow money demand model is faster than the speed of adjustment in the real broad money demand model. One of the reasons is that there is a stronger cointegrating relationship among the LNM1 and set of independent variables as compared to LNM2. As LNM1 contains more liquid components as compared to LNM2 in case of Pakistan. The results of ECM (-1) are consistent with the studies conducted by (Bahmani-Oskooee & Wang, 2007; Baharrumshah et al., 2009; Khan & Hye, 2011; Anwer & Asghar, 2012; Lee & Chang, 2012; Cho & Ramirez, 2016) positing stable speed of adjustment in the long-run despite the changing frequency and span of the data.

4.7 Battery of Diagnostic Tests Results

The estimated ARDL model is employed to test the reliability for forecasting purpose. A battery of diagnostic tests is applied in order to investigate the goodness of fit or the statistical appropriateness of the model. The battery of diagnostic tests include Ramsey(1969)'s RESET test for model misspecification, Lagrange Multiplier (LM) test for autocorrelation, Jarque-Bera test for normality, and ARCH test for hetroskedasticity in the residuals. The test were to explore the accuracy and stability of the model for both real narrow and broad money demand models. The Ramsey's RESET test and LM test are chi-squared distributed with one and four degrees of freedom respectively. The results of the diagnostic tests are reported in Table 4.7.

Table 4.7

Estimation Results of Battery of Diagnostics for LNM1 and LNM2 Models

P	LNM1		LNM2	
Battery Of Diagnostic test	Value	Prob	Value	Prob
BUDI BUDI BASS	Universiti	Utara	Malaysia	
Ramsey RESET Test	0.416	(0.684)	0.865	(0.401)
Lagrange Multiplier LM)	1.82	(0.177)	21.609	(0.001)
Normality Test	1.671	(0.434)	2.833	(0.243)
ARCH Test	0.169	(0.681)	2.963	(0.085)

Note: a. RESET is Ramsey's specification test. It follows χ^2 distribution with one degree of freedom.3.84 the critical value at 5%.

b. LM is the Lagrange multiplier test for serial correlation. I follows χ^2 distribution with four degrees of freedom.9.48 is the critical value at the level of significance 5%

c. Normality Test has Jarque Bera values and all the values in parentheses are probabilities.

d. ARCH Test is for Homoskedasticity of residuals. It follows χ^2 distribution with one degree of freedom.3.84 is the critical value at 5% level of significance.

From Table 4.7, it can be seen that the Ramsey' RESET test that has null hypothesis of "no misspecification in the functional form of the model" cannot be rejected at the 5% level for both models of real narrow money demand (LNM1) and real broad money demand (LNM2). However, the Lagrange Multiplier (LM) test that has the null hypothesis of "no serial correlation" provides sufficient evidence not to reject the null hypothesis in the case of real narrow money demand (LNM1) and also null hypothesis cannot be rejected in the case of real broad money demand (LNM2).

Moreover, the Normality test holds the null hypothesis of normality on the basis of Jarque-Bera's value and probability. The results indicate that the null hypothesis cannot be rejected in both cases of models for real narrow money demand (LNM1) and real broad money demand (LNM2) since the p-value is more than 0.05 in both cases. Finally, the null hypothesis of ARCH test is that the errors are homoscedastic. The results in table 4.7 provide sufficient evidence not to reject the null hypothesis for both the models of real narrow money demand (LNM1) and real broad money demand (LNM1) and real broad money demand (LNM2) at the 5% level.

Hence, it can be concluded that the model for real narrow money demand (LNM1) passes the whole battery of diagnostic tests. The results reported in Table 4.7 reveal that the model for the real narrow money demand (LNM1) is autocorrelation free, normally distributed with constant variance residuals, and a correctly well-specified functional form. On the other hand, the model in the case of real broad money demand LMN2) passes all the tests except for the LM test. Since all the tests support the null hypotheses

except for the LM test. Hence, there is only problem of auto correlation with residuals for LNM2. When the assumptions of hetroskedasticity and autocorrelation are violated, regression is estimated by (New-West, 1986) procedure, it generates the consistent estimates (Hsing, 2007). To overcome the problem of biased standard errors, (Newey-West, 1987) procedure has been conducted for the time series data in this study. It adjusts the occurred problem with errors in the estimated model, validating the results.

4.8 Stability of Parameters

Sensitivity of the model depends upon the sample size (Graham, 1993). Following this proposition, it is essential to investigate the stability of the long-run relationship between the variable for entire period. Alternatively, it is the investigation of parameters' stability. To achieve this task, there are several methodologies that have been utilized in the field of econometrics. Among others Brown *et al.* (1975) proposed two well-known tests Cumulative Sum (CUSUM) and Cumulative Sum Square (CUSUMSQ) for parameters' stability. The CUSUM test uses the cumulative sum of recursive residuals based on the first n observations and is updated recursively and plotted against break point (Ouattara, 2004).

On the other hand, CUSUMSQ test uses the squared recursive residuals in the same manner as CUSUM test. The decision about the parameters' stability relies on the position of the plot relative to the 5% critical bound.

If the plot of the CUSUM and CUSUMSQ stays within the 5% critical bound, the null hypothesis about the stability of the parameters cannot be rejected for the estimated

model. If the plot crosses either one of the parallel lines then it provides sufficient evidence to reject the null hypothesis about the parameters' stability. These tests were applied recursively to the residuals of the error-correction model for the both real narrow money demand model (LNM1) and the real broad money demand model (LNM2).



Figure 4.3(a). Graph of CUSUM Test for LNM1





The graphs of the stability test consisting of CUSUM and CUSUMSQ tests for the real narrow money demand (LNM1) are depicted in Figure 4.3a and Figure 4.3b while for the real broad money demand (LNM2) are depicted in Figure 4.4a and Figure 4.4b respectively. Since the test statistics stay within their critical values at the 5% level of significance for LNM1 and crosses the 5% band for LNM2, it ascertains the stability of the estimated money demand functions only for LNM1 but fails to establish stability for LNM2 with set of explanatory variables real income, discount rate, inflation rate, exchange rate, exchange rate volatility, remittances, and financial liberalization. So, it can be concluded that only real narrow money demand (LNM1) is better monetary aggregates in terms of formulating and implementing the monetary policy.

4.9 Discussion of Results

After estimating the models for both real monetary aggregates with the set of independent variables including real income, interest rate, inflation rate, real exchange rate with its volatility, remittances, and financial liberalization, we discuss our empirical results of the models in this section. The results of the data analysis reported in section 4.4 for the ARDL models based on the HQ criterion for both monetary aggregates with specific order are indeed revealing. A summary of the results involving both monetary aggregates (LNM1 and LNM2) with the focused variables including real income (LNY), discount rate (LNI), inflation rate (LN π), Real Exchange Rate (LNRER), Exchange Rate Volatility (LNVX), Remittances (LNRM), and financial Liberalization (FL) is presented in Table 4.8.

Table 4.8

Summary of Results Estimation in Terms of the Signs and Significance of the Variables in the Models of LNM1 and LNM2

Variables	LNM1		LNM2		
	Long-Run	Short-Run	Long-Run	Short-Run	
LNY	+	-	+	-	
	()	(**)	(***)	(***)	
LNI	-	-	+	+	
	()	()	(**)	()	
LNπ	-	-	-	-	
	(*)	(**)	(**)	(* * *)	
LNRER	+	-	+	+	
	(***)	(*)	(*)	(* * *)	
LNVX	+	+	+	-	
	(*)	(*)	(* * *)	()	
LNRM	+	-	+	-	
	(* * *)	()	(* * *)	(***)	
FL	+	+	+	+	
	(***)	(***)	(* * *)	(* * *)	
ECM(-1)		-		-	

	(***)	(**)		
Battery of Diagnostic Tests				
RESET	Passed	Passed		
LM Test	Passed	Failed		
Normality	Passed	Passed		
ARCH T	Passed	Passed		
Stability				
CUSUM	Passed	Passed		
CUSUMQ	Passed	Failed		

Notes: The empty Parentheses () shows the insignificance and *, **, and *** indicate significance at the 10%, 5%, and 1% levels respectively.

Since the coefficient of real income possesses the expected sign with both monetary aggregates in the long-run. It is statistically significant with real broad money demand while not significant with real narrow money demand. It implies that real income exerts positive effects on the real broad money demand and on the contrary, it does not affect real narrow money demand in the long-run.

On the other hand, Table 4.8 posits the coefficient of real income is statistically significant with both monetary aggregates in the short-run. This contradicts with economic theory since households are expecting inflation in future so they do not hold more liquid assets so as not to erode their purchasing power of their money. Since the policies are not devised for short-run, our concern is the long-run. We turn to the long-run coefficient estimates reported in Table 4.8. It is clear that in the LNM2 money demand specification, real income is highly significant, while in the LNM1 money demand function, the coefficient of real income is not significant. In the nut shell, real income should be considered as determinant of only real broad money demand.

The discount rate (LNI) is an opportunity cost of holding money. Table 4.8 depicts that its coefficient possesses the expected negative sign with real narrow money demand but statistically insignificant in both long-run and short-run. The implication of the not significance leads to conclude the weak effects of the discount rate on LNM1. On the other hand, Table 4.8 reveals that discount rate holds a positive relationship with real broad money demand, contradicting the economics theory. However, it is only statistically significant with LNM2 in the long-run. Since the discount rate elasticity of broad money demand is inelastic near to zero. It shows that borrowers cannot find other option to borrow from elsewhere. Therefore real broad money demand increases due to rise in the discount rate.

In addition, inflation rate is another variable to represent opportunity cost of holding money. Its coefficient holds the expected negative sign with both real monetary aggregates LNM1 and LNM2. It is statistically significant with real monetary aggregates concluding the negative effects on real narrow money demand (LNM1) and real broad money demand (LNM2) in both the long-run and short-run. It is an indication that the household in Pakistan prefer to substitute physical assets for money balances that supports our theoretical expectations.

Exchange rate is also an important determinant of money demand in the case of open economy that keeps the economy connected to the rest of the world. The coefficient of real exchange rate (LNRER) is positive and statistically significant with real narrow money demand in the long-run at the one percent level while statistically significant with negative sign at the 10% level of significance in the short-run. Moreover, the coefficient possesses the positive sign with real broad money demand and statistically significant at one percent level of significance in both the long-run and the short-run.

Moreover, the results reported for the coefficient of real exchange rate in Table 4.8 reveal that real exchange rate has long-run effects and short-run dynamics with both monetary aggregates. The implication of positively signed exchange rate elasticity is that increase in the exchange rate (i.e depreciation of Pak Rupee) i.e depreciation of domestic currency increases the money demand, providing evidence to support the wealth effect hypothesis in the case of Pakistan in the long-run. The negative coefficient of exchange rate in the short-run with narrow money demand supports the currency substitution effect whereby Economic agents attempt to stock their portfolios in terms of foreign currency expecting further weakening domestic currency in the future.

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Exchange rate volatility is a measure of fluctuation in the value of exchange rate. The coefficient of the exchange rate volatility is statistically significant with the real narrow money demand (LNM1) in both the long-run and short-run. However, it is statistically insignificant in the model of real broad money demand in both the long-run and short-run. The results reported in the Table 4.8 reveals that exchange rate volatility exerts impact on the both monetary aggregates in the long-run while it has short-run dynamics with only the real narrow money demand. The results of the coefficient of exchange rate volatility show uncertainty in the wealth effect or expectation effect, implying that a depreciation in domestic currency and appreciation in foreign currency and the rise in

holding of the value foreign assets into domestic currency by domestic residents. This causes to increase in the money demand for domestic currency in the perception of domestic households to increase the wealth. Thus, exchange rate volatility persuades the economic agents to hold more domestic currency.

However, very little is known about the impact of remittances on money demand in the case of Pakistan. The elasticity of remittances possesses positive sign and is statistically significant with both monetary aggregates in the long-run. It indicates that remittances has long-run positive effects in the estimated models of money demands. On the other hand, in the short-run it is statistically significant with only broad real money but statistically insignificant with real narrow money demand. The results indicate that the remittances has strong short-run dynamics with real broad monetary aggregate while weak with real narrow monetary aggregates, implying the households need to convert a meagre portion of remittances into domestic currency to serve their routinely consumption.

The last variable that is financial liberalization describes innovation and advancement in the services provided by the financial sector in Pakistan. The era of financial liberalization in Pakistan started since 1990. According to the results reported in Table 4.8 for the financial liberalization (FL) dummy variable, the coefficient of financial liberalization exerts a positive impact and is statistically significant in both case of real monetary aggregates LNM1 and LNM2 in the long-run and short-run. The results indicate the increase in the demand of both monetary aggregates due to financial liberalization in both the long-run and short-run. This implies that opening new banks and nascent instruments in the financial sector causes to increases money demand in the case of Pakistan economy.

After discussing all the variables in the models, characteristic of the models regarding real narrow money demand (LNM1) and real broad money demand (LNM2) are evaluated through the analysis of error correction term, battery of diagnostics, and stability of the models. The coefficients of error correction terms for (LMN1) and (LMN2) are reported in Table 4.6. Both of the coefficients of error correction terms are negative and statistically significant for both models (i.e LNM1 and LNM2). The estimated coefficient of -0.861 which is statistically significant at 1% for the model (LNM1) indicates that 86.1% of any previous disequilibrium would be corrected (adjusted) in the current year. It would take merely a meager portion of the second year for any disequilibrium in the relationship of the real narrow money demand to be corrected completely. On the other hand, the estimated coefficient of -0.495 which is statistical significant at 5% for the model (LNM2) suggest that 49.5% of any previous disequilibrium would be adjusted (corrected) in the current year. It would take merely two complete year and a minute portion of the third year for any disequilibrium in the relationship of the real broad money demand to be corrected completely. The speed of adjustment for the model of real narrow money demand (86.1%) is faster than the speed of adjustment of the model for real broad money demand (49.5%). The disequilibrium can be corrected within two years for the real narrow money demand while it takes more than two years for the real broad money demand model. Since there is a strong cointegration relationship between the real narrow money demand and set of independent variables as compared to real broad money demand and LNM1 consists of less components as compared to LNM2 in case of Pakistan.

The battery of diagnostic tests used for the goodness of fit of the model are already reported for both real monetary aggregates' models in Table 4.7. Further, it is also summarized in Table 4.8. The results reported in Table 4.8 revealed that the model for real narrow money demand passed all the tests of goodness of fit while, the real broad money demand model cleared all the tests except for the serial correlation Lagrange Multipliers (LM) Test, signaling the presence of serially correlated residuals of the model for LNM2. When the assumptions of hetroskedasticity and autocorrelation are violated, regression is estimated by (New-West, 1986) procedure, it generates the consistent estimates (Hsing, 2007). To overcome the problem of biased standard errors, (Newey-West, 1987) procedure has been conducted for the time series data in this study. It adjusts the occurred problem with errors in the estimated model, validating the results.

Finally, the stability of the real narrow money demand and real broad money demand models were analyzed respectively. The well-known tests, CUSUM and CUSUMQ proposed by Brown *et al.* (1975), have been applied to establish stability of the short-run as well as long-run parameters. Empirical results reported in Table 4.8 reveal that the real narrow money demand (LNM1) model passes both of the tests. It has already been posited in Figure (4.2a) and figure (4.2b) that since the plots of CUSUM and CUSUMSQ statistics do not cross the critical bounds, the (LNM1) money demand

function is stable. On the other hand, broad money demand (LMN2) model clears the CUSUM test but fails in the CUSUMQ test. It has already been depicted in Figure (4.3a) and Figure (4.3b) that since the plot of CUSUMSQ statistic crosses the critical bounds, the (LNM2) money demand function is unstable. Hence, the results reveal that real narrow monetary balances can be used as monetary tools rather than real broad monetary balances due to the instability of the model in the case of Pakistan. The real narrow monetary aggregates should be relied for policy purpose rather than real broad monetary aggregates.

4.10 Summary of Chapter

The results of the analysis reveal that in achieving the specific objectives, the ARDL bounds testing approach is an appropriate for the time series data in our study, since the variables are found in the mixture of the order of integration I(0) and (I(1) and none of the variable is I(2).

The results demonstrate that increase in the exchange rate (for example depreciation in Pak Rupee) leads to increase in the money demand supporting the wealth effect in Pakistan. Similarly, the exchange rate volatility has also positive sign with money demand supporting the wealth expectation hypothesis. Remittances has positive effects in the long-run and negative in the short-run while, financial liberalization has positive effects on both money demand models in the long-run as well as short-run. In addition, other important determinants of the money demand include real income, discount rate, and inflation rate have been discussed. Finally, stability of the money demand models has been analyzed and found that real narrow money demand to be stable while real broad money demand found to be unstable. It is an indication for real narrow money supply to be preferred as policy tool in the case of Pakistan as compared to real broad money supply.



SUMMARY OF MAJOR FINDINGS, POLICY IMPLICATIONS, AND CONCLUSION

5.1 Introduction

In this chapter, we present summary of the results based on the hypotheses of our study, followed by summary of the major findings, and recommendations based on the empirical findings and conclusion. Also, the chapter discusses the limitation of the study and recommendation for future research.

5.2 Summary of Results

A well-specified money demand function is an essential tool to devise an optimal monetary policy, assisting the central bank in its formulation. It guides the policy makers whether it follows a monetary regime targeting interest rate, money supply, or other concerned variables. Moreover, the stability of money demand is prerequisite for any policy-driven change in monetary variables to have predictable effect on output, interest rate, prices, and ultimately open variables such as exchange rate, volatility of exchange rate, remittances and financial liberalization through the transmission mechanism of monetary policy.

There are many studies conducted in developing countries, in which money demand function has been examined through cointegrating properties. The studies have provided evidence about the long-run relationship between the money demand and set of independent variables, including real income, discount rate, inflation rate, exchange rate, exchange rate volatility, remittances, and financial liberalization. However, studies using Pakistani data lacks in terms of incorporating exchange rate volatility and remittances as independent variables in estimating money demand function. There are only few studies that have included exchange rate and financial liberalization but failed to provide better insight on the behavior of the money demand.

In addition, most of the studies in the literature prior to 2000 have explained the findings of cointegration as evidence of the stable money demand function (Bahmani-Oskooee & Bhol, 2000). Following recent advances and innovations in cointegration analysis, this

thesis employs the ARDL Bounds Tests Approach of cointegration to analyze the cointegration properties of money demand in Pakistan. This thesis estimates the functions for both real narrow money demand and real broad money demand with a set of independent variables including real income, discount rate, inflation rate, exchange rate, exchange rate volatility, remittances, and financial liberalization.

The first objective of this study is to determine whether exchange rate and volatility of exchange rate affect the money demand in the case of Pakistan. The hypothesis is that exchange rate and the volatility of exchange rate exert positive effect money demand function in the case of Pakistan. The results of the study show that exchange rate positively affect both the real narrow money demand and real broad money demand in both long-run and short-run. The elasticities of exchange rate of both the monetary aggregates are inelastic indicating that a one percent rise in the coefficient of exchange rate leads to increase 0.929% real narrow money demand and 0.417% real broad money demand respectively. The implication of the positive and negative coefficient of exchange rate in money demand is meant as wealth effect hypothesis and the currency substitution hypothesis respectively.

Arango and Nadiri (1981) first opined about the behavior of exchange rate that if domestic currency depreciates (or foreign currency appreciates), it increases the value of foreign assets and rise in the wealth of country and demand for cash balances, establishing the wealth effect hypothesis. On the other hand Bahmani-Oskooee and Pourhedrian (1990) pinpointed about the behavior of exchange rate that domestic currency depreciates with further expectations about the future depreciations (or foreign currency appreciates). It increases holdings of foreign currency which diminishes the wealth of country and demand for cash balances supporting the "Currency Substitution Effect".

Our results yield a positive and statistically significant coefficient of the exchange rate supporting the wealth effect hypothesis. The results of our study are in line with others (See, for example, Arango & Nadiri, 1981; McKinnon, 1982; Bahmani-Oskooee, 1991; Chowdhury, 1997; Tan, 1997; Weliwita & Ekanayake, 1998; Khalid, 1999; Ibrahim, 2001; Akinlo (2005); Bahmani-Oskooee & Rehman, 2005; Khan & Sajjid (2005); Bahmani, 2012; Anwar & Asghar, 2012; and Arize & Nam, 2012). Further, the results are contrary to the works of Agenor and Khan (1981), McKinnon (1982), Bahmani-Oskooee and Pourheydarian (1990).

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The second part of the first objective of our study is to determine whether exchange rate volatility contributes to the money demand in Pakistan. The hypothesis of our study states that the exchange rate volatility positively affect the money demand in Pakistan. The results of the study show that exchange rate volatility positively affects both real narrow money demand (LNM1) and real broad money demand (LNM2) in the case of Pakistan. Exchange rate volatility elasticity of monetary aggregates is 0.075 and 0.204 for LNM1 and LNM2, respectively. The coefficient of exchange rate volatility is inelastic in both the money demand functions.

The positive coefficient of exchange rate volatility in Pakistan indicates that exchange rate uncertainty results in more holding of the domestic currency and less holding of foreign currency. One of the reason for inelastic coefficient of exchange rate volatility is the majority of the population has income below the poverty line and they remain from hand to mouth. So they did not think even of the foreign currency to fulfil their basic needs. The results of our study are consistent with Bahmani (2011) for Less Developed Countries (LDC) but contradicts the results of Mcgibani and Nourzad (1995) for the U.S. and Bahmani and Bahmani-Oskooee (2012) for Iran. They argued that the exchange rate volatility persuades the investors to substitute safer assets for riskier currency.

The second objective of our study is to determine whether remittances affects money demand function in Pakistan. The hypothesis of the study states that remittances positively contributes to money demand function in the case of Pakistan. The results of the study show that remittances positively affects both the real narrow money demand and real broad money demand in the long-run. Remittances elasticity of money balances is 0.356 and 0.160 for LNM1 and LNM2, respectively. The remittances elasticity of money demand is inelastic for both the real narrow money demand and real broad money demand, respectively. The effect of remittances on real narrow money is more sensitive as compared to real broad money demand.

The remittances is the major contributing factor and playing vibrant role in Pakistan economy after foreign direct investment. The advent of more remittances in country enhances the economic growth in the economy, improving the consumption and investment patterns of the households. The positive coefficient of remittances in Pakistan is an indication that positive shock to remittances tends to increase money demand. The advent of remittances increases income of the households and they possess more money for transaction purpose. The results of our study are in line with the results of Vergas-Silva (2009) for Mexico but contradict to the works of Adentusi and Ahorter (2008) for Ghana in the Long run.

The third objective of our study is to determine whether financial liberalization affects money demand in both the long-run and short-run. Since the early nineties, Pakistan has been introducing financial liberalization in the economy. Introduction of money alternatives such as short-term bonds and equities in the financial markets and deposit rates deregulations constitute financial liberalization including interest rates as an essential feature. Financial innovations are also considered as a part of financial liberalization that enhance the performance of financial sector that provides the liquidity services substitute to the demand deposits and currency. It increases the velocity of money supply in the economy.

The hypothesis of the study states that financial liberalization has positive effect money demand in the case of Pakistan. The results of the study show that financial liberalization (FL) positively affects both the real narrow money demand and real broad money demand in both short-run and long-run. The results show that the coefficient of financial liberalization is 0.205 and 0.204 for LNM1 and LNM2, respectively. The

results imply that financial liberalization increases money demand by about 0.204% and 0.205% for the real narrow monetary aggregates and real broad monetary aggregates, respectively. The effect of financial liberalization on real narrow money is about the same as on real broad money demand. Moreover, the coefficient of financial liberalization is statistically significant for both real monetary aggregates in both the long-run and short run, suggesting that financial liberalization has long-run and short-run effects on both LNM1 and LNM2. It can be concluded that financial liberalization contributes to both real narrow money demand (LNM1) and real broad money demand (LNM2).

Since the coefficient of financial liberalization (FL) in case of both monetary aggregates is less than unity and near to zero implies the role of financial liberalization is not so strong in Pakistan. Thus the results show that financial liberalization does not follow Keynesian school of thought suggesting the process of financial liberalization has not still been in full force in case of Pakistan. However, one reason of that would be likely due to inappropriate reforms and their implementation that let money demand out of control. The results of the study are in line with the works of Akhtaruzzaman (2007) in Bangladesh and Khan and Hye (2013) in Pakistan.

The fourth and final objective of our study is to determine the stability of money demand function in the long-run and short-run. A correctly specified model of money demand ensures the crucial property about the constancy of parameters. Instability among the parameters significantly increases during the financial crisis, where the effect of the traditional determinants of money demand could alter and other determinants could remain significant (Akhtaruzzaman, 2007). If the stability of money demands (both narrow and broad) are unaffected by globalization and financial liberalization reforms, then policymakers can continue to rely on these models for forecasting and for economic policy analysis (Khamis & Leone, 2001; Peria, 2002).

The results of our study reveal that narrow real money demand function is stable but real broad money demand function is not stable. Our results support the earlier studies in Pakistan including Hossain and Ali (1994), and Qayyum (2005). On the other hand, results are contrary to the works of Khan and Sajjid (2005), Azim *et al.* (2010), and Anwar and Asghar (2012). Further, the results of our study suggest that real narrow money stock can be used for monetary policy purposes rather than real broad money stock that remains unstable in Pakistan.

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5.3 Summary of Major Findings

This study mainly examines the stability of money demand function in Pakistan by analyzing the effects of exchange rate, volatility of exchange rate, remittances, and financial liberalization. By employing the ARDL Bounds Test Approach, the results indicate that exchange rate, volatility of exchange rate, remittances, and financial liberalization have positive impact on both of the functions of real narrow money demand (LNM1) and real broad money demand (LNM2) in the long-run. Further, the results reveal that real income has positive effects on both money demand functions with small elasticity indicating money as a necessity in Pakistan economy. On the other
hand, discount rate and inflation rate exert negative impact on money demand in the long-run. Thus all the controlled variables including scale variables and opportunity cost of holding money possess the expected signs according to economic theory.

Moreover, the model of real narrow money demand (LNM1) satisfies the whole battery of diagnostic tests including RESET test for the functional misspecification, Jarque Berra test for the normality of residuals, LM test for the serial correlation of residuals, ARCH test for the homoscedasticity of residuals. Finally, the stability tests including CUSUM and CUSUMSQ tests have been used to check for the parameters' constancy. However, the model for real narrow money demand clears whole the battery of diagnostic tests while the model for real broad money demand passes all the tests except ARCH test and CUSUMQ test. Since the model has hetroskedastic residuals but the results are consistent because estimations were made by Newey-West procedures. Finally, model for the real broad money demand holds instability so it cannot be used for forecasting and policy purposes. Real narrow monetary balances can be used as monetary policy tool as compared to real broad monetary balances.

The aggregate results of the study reveal that exchange rate and exchange rate volatility have positive effects on both monetary aggregate in the long-run, indicating wealth effect and uncertainty to wealth effect. Moreover, remittances and financial liberalization have also positive effects on both monetary aggregates, signaling rise in money demand in the long-run in case of Pakistan. Finally, stability of both the models was examined for policy implementation. The results revealed that only real narrow money demand function can be used for the forecasting and as a policy tool in the case of Pakistan.

5.4 Policy Implications

On the basis of the results specified in money demand functions for Pakistan, monetary policy makers in state Bank of Pakistan (SBP) should consider exchange rate with volatility of exchange rate, remittances, and financial liberalization as key policy factors along with real income, discount rate and inflation rate in conducting monetary policy in Pakistan. We recommend the following among others.

First, the result shows that a depreciation of the domestic currency increases the value of foreign securities held by the domestic residents. If this increase is perceived by the domestic security holders as an increase in their wealth, their demand for domestic cash balances may increase. Thus an increase in the real exchange rate (i.e. depreciation of Pak-rupee) is likely to increase the demand for money showing positive coefficient of exchange rate in the model. On the other hand, when the exchange rate depreciates for a net debtor country (as in Pakistan), the home currency value of wealth falls and this reduces the demand for money resulting the negative coefficient of exchange rate in the both of the estimated models for the monetary aggregates is positive, supporting the wealth effect hypothesis in Pakistan. The efficiency between monetary and fiscal policies could be changed. For instance, since domestic currency is already lacking its confidence among the economic agents. In this situation, implementation of expansionary monetary policy

may compromise its effectiveness, leading to poor economic growth in Pakistan. Thus it is essential to stabilize the exchange rate enhancing economic growth in the country.

On the other hand, the exchange rate volatility leads to increase uncertainty in domestic financial markets and erratic exchange rates can cause uncertainty in foreign exchange markets. Faced with increased volatility of the exchange rate of the domestic currency *vis-a-vis* foreign currencies, domestic investors are inclined to substitute assets they deem safer for the riskier currency so that domestic demand for money declines. Since our results indicate that uncertainty in the wealth effect increases in case of Pakistan. Thus, we recommend the concerned authorities to stabilize the exchange rate by lowering haphazard fluctuations so that investors are attracted to increase the transactions with domestic currency, hence, enhancing economic growth in Pakistan.

Second, the results show that a positive sign of coefficient of remittances indicating a positive shock to remittances leads to increase in money demand. The advent of remittances increases income of the households and provides more money for transaction purpose. According to Hassan (2012), Majority of the remittances enters into country are through hundi/hawala services. The domestic banks should use efficient counter payment services to facilitate the beneficiaries within minimum time to compete against hundi/hawala services. The authorities should take effective measures to facilitate the flow of remittances through proper channels in Pakistan and avoiding entrance of money through illegal channels, since remittances is a major contributor to

the Pakistan economy. . The flow of remittances helps in promoting consumption and hence, enhancing economic growth in Pakistan.

Thirdly, the results indicate financial liberalization positively affects both money demand functions. Since the early nineties, Pakistan has been liberalizing financial sector. Introduction of alternative money such as short-term bonds and equities in the financial markets and deposit rates deregulations including interest rates constitute financial liberalization as an essential feature. Financial innovations are also considered as a part of financial liberalization that enhance the performance of financial sector that provides the liquidity services substitute to the demand deposits and currency. It increases the velocity of money supply in the economy. The result implies that effect of financial liberalization does not follow the explanation of Keynesian school of thought (expected effect). It could be possible due to inappropriate reforms and their implementation. It may be inferred that reforms were not efficient to control the money demand. Therefore monetary authorities are recommended to implement the financial liberalization properly to stabilize real broad money supply hence improving the performance of financial sector for the smooth economic growth.

Fourthly, a correctly specified model of money demand ensures the crucial property about the constancy of Parameters. Since the results show that real narrow money demand function is stable while real broad money demand function is unstable, policymakers in Pakistan are suggested to use narrow money supply as policy tool rather than real broad money supply.

5.5 Conclusion

A well specified money demand function is essential for the central bank of the country in formulating and conducting optimal monetary policy for the economy, whether it may follow the interest rate targeting or money supply targeting regime. The stability of money demand function is necessary for policy-driven change in monetary variables to have predictable effects on the set of independent variables through transmission mechanism of monetary policy. This study analyzes the long-run and the short-run effects of exchange rate, exchange rate volatility, remittances, and financial liberalization on money demand function and its stability in Pakistan using annual time series from 1972 to 2014. The empirical results of the study reveal that both of the real narrow money demand (LNM1) and real broad money demand (LNM2) are cointegrated with the set of variables in Pakistan. It is further confirmed that coefficient of the ECT terms is negative and statistically significant for both the LNM1 and LNM2. The CUSUM and CUSUMSQ tests provide the evidence of stability for only real narrow monetary balances while for the real broad monetary balances, they fail to provide sufficient evidence for the stability. The results also support that real narrow money demand (LNM1) rather than (LNM2) should be used as monetary tool in conduct the optimal monetary policy in Pakistan.

Moreover, the first part of the ARDL model holds the coefficient estimates of all lagged first differenced variables that explain the dynamic adjustment in the short-run. They may not have potentially important implication on the formulation and implementation of monetary policy in Pakistan. The inability to anticipate a structural break and longer time to realize that the break has occurred raise doubt over the use of real monetary aggregates target for short run stabilization. So it is suggested that monetary authorities should focus on stabilization policies only in the long-run.

5.6 Limitation of the Study

The study mainly focuses on the stability of money demand including examining whether the impact of exchange rate, volatility of exchange rate, remittances, and financial liberalization in Pakistan. However, set of independent variables such as exchange rate, volatility of exchange rate, remittances, and financial liberalization that have been considered in estimating money demand functions, covering time period of 1972-2014. Previous studies in the literature were not focused in the case of Pakistan. This study was limited to the time period due to the availability of data of our interest. Besides this, data on the variables such as exchange rate and remittances is available annually only from the specific period of this study while the data for volatility of exchange rate has been generated from GARCH (1, 1) model due to non-availability of data. Moreover, inadequate and limited data in this study, we were assumed to employ a powerful nascent econometric technique such as ARDL Bounds Testing Approach. ARDL has been employed to achieve the specific targets of the study for the long-run and short-run.

5.7 Suggestions for Future Research

In the presence of given limitations, we suggest that researchers should focus on highlighted issues. First, future studies should use rich datasets by expanding their coverage with higher frequencies to include other countries with Pakistan. Second, other potential determinants of money demand can be included by analyzing their effects on money demand this would enlarge the datasets including other countries. This study only examines the effects of volatility of exchange rate on money demand but it did not consider the volatility of interest rates domestic as well as foreign, and prices as determinants of money demand. Therefore, future research should consider interest rates volatility and price volatility to see how they affect money demand and its stability.



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