IMPACT OF MONETARY POLICY ON CAPITAL FLOWS: A COINTEGRATION ANALYSIS FOR PAKISTAN

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CERTIFICATE

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Author's Declaration

I, Muhammad Zaryab Akram, hereby state that my MPhil thesis titled, **Impact of Monetary Policy on Capital Flows: A Cointegration Analysis for Pakistan** is my own work and has not been submitted previously by me for taking any degree from Pakistan Institute of Development Economics, or anywhere else in the country/world.

At any time, if my statement is found to be incorrect, even after my Masters, the university as the right to withdraw my MPhil degree.

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_____

DEDICATION

I dedicate this effort to my MOTHER (Ammi Jaan), for her firm belief in me.

I owe this Determination and commitment to her

that I had during this entire journey.

There is not even an iota of doubt

that her love & support were

pertinent in the success.

شکریہ امی جان!

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ABSTRACT

The financial imbalance in last recent years leads towards the disputed capital flows among the developed and developing countries. Therefore, policy makers pay much attention on managing the capital flows in order to stabilize their international financial situation. This objectifies us to test the long-run as well as short-run relationship between monetary policy tools and capital flows in the case of Pakistan. By Using the annual data from 1980 to 2019, we applied the Auto-regressive distributed lag (ARDL) technique to find out the long run and short run relationship between interest rate differentials, money supply and net capital flows. The results of our study posit that in the long run if the interest rate differentials increase by 1% then the net capital flows would be increased by 0.5175 million rupees in the long run and while in the short run the effect is of different magnitude that is 0.8457 million rupees. The positive sign with value of coefficient means the inflows of capital in the country. The results of this study also suggest that if the quality of the institutions becomes better by 1 percent it would attract the capital inflows by 0.1840 million rupees, similarly, absorptive capacity have also significant and positive impact on the capital mobility and results suggests that absorptive capacity would raise the capital flows by 0.7487 million rupees. In our study capital flows also shows negative relationship with different independent variables such any increase in the value of exchange rate pushes the capital flows out of the country. According to the results of our study by 1% increase in the real exchange rate, there is an outflow of 0.8323 million rupees. Similarly, a one percent increase in inflation also become the cause of capital outflows by 0.5188 million rupees. Findings suggest that there is need to focus on managing the capital flows by keeping other factors along with monetary policy measures. They should be managed in a way that they should not put any pressure on exchange rate as well as on inflation.

Keywords: Net Capital Flows, Interest Rate Differential, Money Supply, Private Sector Credit, Exchange Rate, Inflation

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CHAPTER 1
INTRODUCTION

Developing countries like Pakistan aspires to achieve higher economic growth with the passage of time. The enormous amount of work is going on to put the economy on the path of economic progress, but there's always hurdles and problems in the way of progression that slows down the process of rapid growth of Pakistan's economy. These barriers are not only limited to the lack of innovation, investment, security issues, lack of savings, increased ratio of consumption and lack of human capital, which clearly explains the slow economic growth and progress of the country. However, there are many ways that a country can adopt to improve its economy's health such as handling the issues in conventional way by controlling inflation, exchange rate, fiscal policies, and monetary policy. But an important side that is being ignored, not focused, and not properly explored is the role of capital flows in shaping the economy. From last two decades, not only developing countries but also developed countries are focusing on the management of capital flows to fight against the financial crisis. Therefore, it is the time to put some light on the role of capital flows and their management through proper channels such as through monetary policy. Capital flows either outflow or inflow both can be beneficial for an economy if managed properly.

To control the capital flows efficiently, countries have adopted different methods and policies to achieve the economic growth and these policies include fiscal measures and monetary policy measures and they have found that the most effective policies which helped them to manage capital flows are the instruments of monetary policy. Capital flows

not only proved beneficial for developing countries but also shows significant impact on developed countries. Since 1990s the developed economy like United States has seen a rapid growth and changes due to the emergence of capital inflows from other countries. For instance, "Global Saving Glut" (GSG) hypothesis by Bernanke & Kamin (2011) emphasized on a fact that capital inflows from other countries including Asian countries to United States increased rapidly, helped US long term interest rates to lower down than it was expected. According to the results of a study done by Nwokoye & Oniore (2017), they found short-term and long-term determinants of foreign capital flows. The determinants were large money supply, nominal exchange rate and spread of interest rate. These are the statistically significant determinants. While inflation rate found to be insignificant in long run.

In 20th century after the emergence of International monetary fund, capital flows became one of the most important components of any country's economy. Most importantly, in last two decades two waves of large capital inflow passed through many emerging economies (Asian Crisis in 1997 and GFC in 2008). Moreover, the capital flows helped to deliver the economic advantages of increasing financial integration. Not only this, but policy makers faced important challenges because of their capacity to generate over-heating, increased vulnerability to crisis and loss of competitiveness. To eradicate these adverse effects, policies in emerging markets have responded to large capital inflows in number of ways (Kose & Terrones, 2009).

Over time, Johnson & Frenkel (1976) found that different policies have been adopted to manage balance of payments of a country. The most crucial policy that has been used is

the monetary policy approach to the balance of payment. David Hume introduced the base for a monetary approach to the balance of payment. Nowadays, policy makers adopt the monetary policy approach majorly instead of fiscal policy for the achievement of desired economic goals. The change of focus does not mean that neither the monetary mismanagement is the only cause and nor the monetary policy is the only cure available. But the this will bring a more appropriate cure for the economic problems. Focusing on monetary policy approach will also tackle the ignorance by other policies and macroeconomic measures to tackle the problem of deficit and surplus.

With the passage of time, monetary approach to balance of payments have been adopted by many developed as well as developing countries. Such as in Pakistan, the impact of monetary policy on balance of payments have been examined. It has been found that in the determination of foreign reserves to Pakistan in long run and in short run, not only domestic credit but also the output and real effective exchange rate have a significant impact (Khan, 2008).

Moreover, in case of Pakistan the conclusion has been drawn that monetary policy approach to balance of payments is not solely phenomena. While gross domestic product of the country, domestic credit, and policy rate (i.e., interest rate) have significant relation with the net foreign assets with respect to monetary theory predictions (Umer & Ghazali, 2010). Now is the time to focus on the focus on monetary policy approach towards the capital flows which are a major part of balance of payments. Therefore, my study will focus on the interest rate channel of monetary policy to capital flows in case of Pakistan.

Capital flows are inclined by domestic as well as global factors. While investors and recipient countries are provided the opportunity to earn benefits from capital flows. But also, the sensitivity of flows to economic conditions makes recipients countries exposed to sudden reversals. Over the time, developing countries are facing the challenges of designing economic policies that can extract the most benefits from capital flows. Some have adopted flexible exchange rate policies, and some have adopted the different policies such as expansionary and contractionary monetary policy to restrict the capital inflows and outflows (Glick & Moreno, 1994).

During the past two decades, policy makers have changed their behavior along with the changing patterns of capital flows and have applied the important implications for monetary instruments and tools of macroeconomic policy in various economies. For instance, along with the adoption of the Euro and the stability pact's weakening, have important implications not only for other non-euro central banks but also for the European Central Bank, not only limited to Europe (Feldstein, 2005). Moreover, in the end of 1990s the economic crises that hit Asia and Latin America also brought the macro level (but not universal) pivot towards the pegged exchange rate regimes to managed floating rates, it was the need of the time to bring the change in the monetary policy of such countries. These changes can be seen in the case of Mexico. In Mexico the inflation rate goes down to more than 4% just because its system shifted from overvalued pegged exchange rate to freely floating regimes.

As discussed earlier those macroeconomic policies are of much importance for the capital flows. According to the central banks in many countries, the most important

macroeconomic policy is monetary policy. The basic objective of the introducing and implementation of monetary policy is to influence the objectives of macroeconomic policy, price stability and the balance of payments (BOP) of a country, and also included economic growth and employment generation (Sulaiman & Migiro, 2014). Not only this, but also another important task carried out by the monetary policy makers, is to make the interest rates freely floating and also regulating the money supply within the economy. Major institutions like financial markets and banking sector's intermediation not only manage the monetary policy but also play the role in managing overall price level, effective exchange rates, and economic growth. If they work efficiently, it will not only increase the capital formation but also put the economic growth on a faster track. In addition, monetary transmission has some trustable channels, such as exchange rates, asset prices, credit management, and (long-term) real interest rates. While the expectations are also one of the key channels for this reason that it shows the expectations about monetary policy stance (Chaudhry & Farooq, 2012).

From the beginning the discussion is based on the responses of monetary policy towards capital flows in case of many countries. Many developed as well as developing countries are working on management of the interest rate to control the flow of capital (outflow or inflow). Therefore, this study will discuss the nexus between capital flows and the components and instrument of the monetary policy in case of Pakistan. The focus of our study will be on how the capital flows and their components response to the monetary policy. In the end, we will be able to suggest that which policy should be adopted i.e.,

contractionary, or expansionary monetary policy in Pakistan to restrict or control capital flows.

1.1 Problem Statement

As mentioned earlier, capital flows have emerged as the most important component of international trade and transactions across the borders. Specifically, in developing countries capital flows play an important role in boosting the economy. Developed and developing countries tilt towards capital flows but they also bear the consequences of high surges of capital inflows and outflows. Although capital flows proved helpful but with severe consequences, this forced the policy makers to focus on the management of capital flows. Therefore, it is a good time to investigate the relationship between capital flows and policies made. In this backdrop, this study investigates that how monetary policy affects the capital flows in Pakistan or how capital flows respond to the changes in monetary policy.

1.2 Research Questions

1. How the monetary policy effects the capital flows and its components?
2. Which component is more responsive to monetary policy?

1.3 Significance of Research

In 2010, after Global Financial Crisis (GFC) most of the countries have adopted macroeconomic policies majorly monetary policy to control inflow and outflow of capital. Similarly, Pakistan has also adopted the macroeconomic policies to control the capital flows. In most of the developing countries, capital inflows have played a significant role in boosting the economy. Same is the case with the economy of Pakistan. State Bank of Pakistan uses monetary policy as a tool to control the capital inflows and outflows of Pakistan. Therefore, results and key takeaways of this research will help the decision makers to know the evidence from Pakistan that how monetary policy approach has helped in controlling the capital flows and what changes are required in future.

1.4 Objectives

This study pursues the following specific objectives to investigate the above-mentioned problem statement:

1) To test the nature of nexus between capital flows and tools of monetary policy approach in the case of Pakistan.
2) To check which component of capital flows is more responsive to monetary policy.

1.5 Organization of the Study

In chapter 1 introduction, significance of the study and research objectives are discussed. The chapter 2 of the study covers the detailed review of the literature regarding advanced economies, emerging market economies and Pakistan. Chapter 3 of the study holds the econometric methodology, which includes unit root testing of the data and discussion of the selection criteria of co-integration and estimation techniques. After that, Chapter 4 discusses the sources of data and definitions of variables. Chapter 5 includes the estimations and detailed discussion of long run as well short run results. In the end, chapter 6 discusses the conclusion of this study and recommends the suitable policies.

CHAPTER 2

REVIEW OF LITERATURE

There is a huge array of literature on effects of components of monetary policy on capital flows i.e., nexus between interest rate of a country, broad money supply, inflation rate, exchange rate and capital flows. There are many studies available on the inflation rate and capital flows, exchange rate and components of capital flows i.e., foreign direct investment and foreign portfolio investment that how these are interrelated. It is also discussed in literature that under which we tried our best to discuss and cover the multiple dimensions and aspects in a way that how monetary policy affects the capital flows. In relation to Pakistan, there is a limited literature available which discuss the to-the-point subject. Further the literature on capital flows is discussed in different ways below.

2.1 Capital Flows-Monetary Policy: Evidence from Advanced Economies

Applying restrictions of capital flows can affect both sides- source and recipient countries. As observed by Ghosh & Sugawara (2014), using the data from 1995-2012 of 31 source to 76 recipient countries. The results suggest that Capital Account Restrictions (CARs) influence the flow of literature in both ways either it is inflow or outflow, and if the restrictions are imposed on both sides, then there seems to be decline in the capital flows. On the contrary it is also observed that such restriction increased the influx of capital flows

instead of reducing the flows. These outcomes of the study posit that there should be coordination on both the sides while designing the policies otherwise it can be harmful for both recipient and source countries.

In a study Bruno & Shin (2015) examined the relationship between monetary policy and capital flows. Using the data of US from 1991-Q1 to 2010-Q2, they studied that changes in US monetary policy have a signinficant impact on the international cross border capital flows and also on the dolllar exchange rate. They found that contractionary monetary policy measures in US resulted in the decline of the interenational capital flows and also became the cause of the decline in the international banks dollar exchange rate.

Examining the impact of monetary policy on flows of the capital. Kiendrebeogo (2016) used the data of 98 emerging markets and developing economies (EMDE), and non-unconventional monetary policies of advanced economies (non-UMP AEs) from 2007-2012. The results posit that because of Fed's monetary policy adopted because of global financial crisis of 2008 have been the cause of movement of portfolio investments from U.S. to EMEDs and up-to some extent to non-UMP AEs. Moreover, these policies have been the cause of more net inflows than equity flows. He also examined that degree of UMPs effects on capital flows vary from country to country depending on their degree of capital mobility and financial stability.

The relationship between Fed's unconventional monetary policy (UMP) and cross border flows have been observed in literature that how the UMP effects the capital flows to and from the emerging market economies (EMEs). In this regard, a recent research has been done by associating the effect with the degree of economic growth and volatility with

capital flows. Caballero & Simsek (2020) examined the quarterly data of 46 EMEs using the LSDV model. The findings suggests that the unconventional monetary policy plays a significant role in determining the capital flows. The magnitude of the effects of UMP on capital flows can be measured through three ways; first the type of flow, the relationship and access to financial capital flows of all the EMEs to United States and the type of measures adopted the results also suggest that debt flows, and other flows are the important drivers of capital flows. Moreover, UMP has affected the foreign direct investment mostly as compared to other components of capital flows.

2.2 Capital Flows-Monetary Policy: Evidence from Emerging Market Economies (EMEs)

From last few decades there is a growing debate on the pros and cons of capital flows. This debate extends to the managing of capital flows in different emerging and developing economies. There is a vast literature available in this regard. These capital flows are managed by different policies such as through fiscal policy and most importantly monetary policy because capital flows include the money inflow and outflow from a country, that's why there is a great debate is ongoing that which policy can manage the capital flows in a better way.

The possibilities of expansionary monetary policies in the propelled nations for years to come have reestablished the discussion over arrangement choices to adapt to huge capital inflows that are, at any rate somewhat, determined by low interest rates in the huge centers.

Using the data of many emerging economies, Magud & Vesperoni (2014) found that the countries with less flexible exchange rates, their bank credits arises speedily and inclines to foreign currency. Not only this but they also attract more capital inflows as compared to countries with more flexible regimes. Moreover, these economies also enjoy the fruits from regularity authorities that discourages the banks to lend or borrow from external markets. These policies include currency-dependent liquidity requirements and marginal reserve requirements on lending from abroad.

There are many important features are discussed in the literature of capital flows but the main three are-as follows. First of all, the two type of factors named as push and pull factors, which helps to examine the determinants of flows at global as well as individual country level. Just like, Ahmed & Zlate (2014) studied the push vs pull factors and their impact in determining the capital flows. They estimated the UMP variations' impact on net portfolio and equity flows of capital in 12 emerging market economies. They have also introduced the dummy variables quoting the variations' exact period and their implication in that specific period. Not only this but they have also estimated the long interest rates of treasury and then calculated their effects on capital flows.

FDI in emerging countries is one of the most important component of capital flows. The attempts are made to check the viability and substitutability of FDI flows with capital flows and also estimated that whether FDI flows increase or decrease the capital formation and it helps to achieve the balance of payments stability. It has been tested on the data of different developing countries. The results suggest that when FDI is free of other balance-of-payments streams it increments capital arrangement within the have nation by

impressively more than it does when FDI is Granger-caused by a few other balance-of-payments streams. In spite of the fact that FDI might still swarm out locally financed speculation indeed in the event that they were autonomous at large but it can still raise capital arrangement in the event that it is endogenous. (Fry & Blanchet, 1999)

In post 80s and early 90s, the global flows of FDI in case of developing countries and in general has been emerged as the official flow of capital Pushpa (2003). It has been observed that despite liberalizations of economy, there was not any significant impact on inflows of FDI to the host countries. Even the figures show a notable decline in flow of capital i.e., from 50% to 18% (Mody & Murshid, 2005). But after the Asian crisis the taxonomy of capital has changed and FDI has become the most important component of private capital flow to emerging and developing countries. Not only economic liberalization is enough to attract the FDI but there are many other factors. Such as one of the most important factors for an investor to invest in a country is its stable exchange rate. According to the research of Lucas (1993) the exchange rate of a country is highly and negatively interlinked with the FDI flows to the country from abroad. While on the contrary, a paper has found exchange rate as the empirically significant component of FDI in case of receiving economies (Nakamura & Oyama, 1998).

Elbadawi (1999) provided evidence by investigating the inflows in the way of foreign aids received by developing countries which leads to improvement in exchange rate. Using the data of 62 developing countries including 28 from Africa, Elbadawi (1999) examined the relationship between official development assistance (ODA), private capital flows, real exchange rate (RER) and non-traditional exports. The results suggested that many African

as well as non-African countries which are aid dependent faced or likely to face an overall overvaluation of real exchange rate. Moreover, results also suggested that ODA has direct effect on non-traditional export through non-coherent RER comparative to its equilibrium.

In literature, the monetary approach to balance of payments have been tested by Aghevli & Khan (1977) for 39 developing countries. They have found through highly significant results on a cross sections basis, that the mechanism of monetary approach of balance of payments theory is equally strong for the developed and developing countries.

To manage capital flows, the degree of capital mobility always plays an important role. But in developing economies, it is seldom estimated. The responses of policies, (fiscal policy and monetary policy), to manage the capital flows can only be calculated or examined only through the degree of capital mobility. An attempt has been made in this regard, using the data of many developing economies (Haque & Montiel, 1991). Although it is different among countries, the capital mobility in most the developing economies is uncommonly higher than it is expected or assumed.

There is a debate on the benefits and consequences of capital flows from decades. Neoclassical economists support this view that capital flows are suitable for an economy as they can create new resources for growth stimulation and accumulation of capital in developing countries even having capital shortages. In this regard, FitzGerald (2001) theoretically argued that the rise in capital inflows leads to decrease in interest rates, which help to rise investment and economic growth. But on the other hand, by using the data of 17 emerging economies Bekaert & Viskanta (1998) empirically found that equity capital

flows are positively related with key macroeconomics indicators (including growth and inflation).

In the era of 1990s, many developing and transitional countries were attracting larger influx of foreign capitals in the form of FDI, FPI and many other reasons like interest rate parity etc. these capital flows have the tendency to destabilize the different economies. Undoubtedly, there were many benefits such as the financing constraints were eased because of larger capital inflows but these inflows have aroused concerns about rising inflation and unsustainably higher real effective exchange rate. In this regard, Haque & Sharma (1997) have provided a general overview of policy responses to capital flows. In their view there are three major types of policies which are used to manage capital inflows. These are sterilization, exchange rate appreciation and fiscal policy, where sterilization is under the control of central banks and can be done through the monetary base. These policies respond to capital inflows in different manners depending on what causes capital inflows i.e., through shifts in money demand curve, or changes occur in productivity of domestic capital or through external factors (e.g., changes in international interest rates). In the end, they suggested that mix of these policies should be adopted according to the condition of different economies.

Caballero & Simsek (2019), not only developed the structure of gross capital flows but also analyzed their role in global financial stability. In their model, the data and the estimations suggest that when a country experiences asset's increased sale, foreign investments go abroad (fickleness) while domestic investments flow back to home from abroad (retrenchment). When countries have estimated expected returns and financial

development, the benefits of retrenchment dominate the costs of fickleness and gross flows increase overall prices. Fickleness not only creates a coordination problem because it encourages local policymakers to restrict capital inflows. When countries are of different nature, capital flows are needed to be pushed by other mechanisms that are real output and available security measures, that can be undermine by the receiving country.

In 2013, with the increasing pattern of volatility in global financial markets, it has become the most important debate between the policy makers and academics that how the monetary policy normalization in US effected the portfolio flows. This relationship is examined in the literature. Using the data of 23 emerging market economies, Dahlhaus (2014) studied the effects of U.S. unconventional monetary measures stabilization on capital flows i.e., portfolio flows. Results suggests that impact of monetary policy normalization on portfolio flows, is expected to be economically small, as a share of GDP. But the impact seems to be same as it has been seen in the time span of rise in the yield spread of US long-term bonds. Moreover, they found that the impact of policy normalization is on emerging market economies depend on the extent of their liabilities.

2.3 Capital Flows-Monetary Policy: Evidence from Individual Economies

The huge variations in flows of capital are interlinked with subsequent credit and investment booms, overall price level, overvaluation, imbalances in real exchange rate, current account deficit and financial sector's downgrading and capping in financial crisis

and occurring long term losses in the output of a country. There is now a growing consensus that higher growth is not fully caused by the fully open capital account. Not only this, but this also expose to the financial crises more than before. Such as, the GFC in 2008 has revealed the situation that this is not only true for developed economies but also true for emerging market economies (EMEs). Mohan & Kapur (2009) used the data of India to test the integration between capital flows and instruments of monetary policy. They found that the challenges posed by capital flows volatility can be managed through different ways through lesson from Indian experience. Through Indian experience the lessons that are being learned are that focus of monetary policy should be diverted from inflation targeting. Monetary policy is not the only instrument which has the potential to control capital flows volatility but also requires other markets to be focused such as money, credit, bonds, and currency markets.

In Australia during 60s and 70s, there was a strong nexus between capital flows and monetary policy that has been reviewed and statistically proved by the researchers in the literature. In a paper, Porter (1974) analyzed the integration of capital flows with the measures of monetary policy in Australia under the hypothesis that net capital flows are a mechanism through which public removes any excess demand for money and focus is on that capital flows are being caused by monetary policy. Using the data from 1961-1972, the results posit that 48 percent variation in monetary policy (i.e., restriction or expansion) was offset by the variations in capital flows. Moreover, the long-run effect of sustained monetary restriction led to increase in foreign exchange reserves that was enough to boast capital inflows and to destabilize the money supply.

The trilemma pattern of open economy emphasizes that an economy might not hit the exchange rate anymore, allow capital mobility, and may not run monetary authorities' decisions independently at the same time. In the middle of late 1980s many developing countries manage the trilemma by closing the capital accounts and managing the combination of exchange rate stability and monetary policy independence. China, among these countries, has faced this trilemma while attempting to seek the monetary policy independence and by limiting the exchange rate and while facing the huge amount of international capital flows at the same time. In a paper, Glick & Hutchison (2009) using the data of China from 1998-2007, examined the trilemma for Chinese inflation. The results of the study posit that there is a significant relationship exists between trilemma of stable exchange rate, international reserve accumulation and inflation. The results of the model suggested that under a scenario of limited exchange rate flexibility and rapid foreign exchange reserve accumulation, the model predicts a rapid increase in inflation if sterilization continues to have limited effectiveness.

Sackey (2001) found that inflows of foreign aid have no relationship with exchange rate. But even with the high-level aid dependency, aid inflows cause the depreciation in real exchange rate. The capital inflows include different categories like foreign direct investment, official development assistance, workers remittance and investment in stock and bonds (portfolio). Moreover, he also suggested that with high aid-dependency policy makers should assure that sound macroeconomic policies prevail in the economy along with other policies.

Capital flows are sensitive for the economy as well as for the political developments within the country and abroad. Reversal in capital inflows may be caused by changes occur in conditions of the foreign financial market. The sudden reversal of capital flows (i.e., outflows or inflows) ca create turbulence in the balance of payments account of a country. Kwack (2001) studied the behavior of different Asian countries in managing the capital flows through monetary policy and sterilization policy. Using the data from 1985-1996, the statistical effectiveness of monetary policy has been assessed in managing the capital flows. Results suggested that Asian countries jointly adopted the operation of foreign exchange market intervention and of high rate of sterilization which led to a change in the exchange rate. Moreover, it is concluded that the use of floating exchange rate could have the capacity to avoid the financial crisis in Asia.

In a study, Berument & Dinçer (2004) examined the impacts of capital inflows on the macro-level performance in the emerging as well as small open economy i.e., Turkey. Using monthly data from 1992:01 to 2001:06 and a recursive VAR model, they found that positive innovations in capital inflows leads to appreciation of the domestic currency, and also increase growth output and money supply, but also become the cause of decrease in interest rates and prices in the short run. They also found that the exchange rate regimes have no substantial influence on the effects of capital flows on macroeconomic performance.

Monetary approach played a critical part within the Asian encounter with flows of capital to the domestic country from abroad. Central banks utilized financial approach to control the danger of overvaluation, but the outcomes of the study show the increments in interest

rates pulled in extra inflows. Observational estimation of the study appears that tight financial approach was a proved as a key factor of flows to not only to Indonesia but also to Thailand for a long time, which the freedom of money related arrangement diminished amid the influx period (Bond, 1998).

The role of financial authorities (such as banks) in controlling monetary policy have also been examined in the past. Corbo & Matte (1984) examined the role of states banks in controlling the monetary measures in Chile. They found that there was compensatory effect in movements of private capital in the period of study although it was very small. Therefore, they concluded that central bank had a control over money supply up to some extent. Same results have been observed by Argy & Kouri (1974) even under fixed exchange rate in some European economies such as Dutch and Italian.

In case of Latin American countries and Far Eastern economies Antzoulatos (1996) found that real exchange rates tend to be appreciated by capital inflows and not only this, but consumption, investment and economic growth also increases.

Germany has seen in a different way. In literature, the findings of Porter (1972) about reserve requirements does help to elucidate several factors leading up to speculative crises. The attempts to neutralize capital flows resulting from pursual of independent monetary policies are found to be significantly offset by the capital flows, with the result that a comparatively small degree of monetary independence is obtained at the expense of an outsized amount of fluctuation within the foreign reserves position. Consequently, the attempts to achieve the internal balance leads to the intensified the external imbalance situation.

The relationship between capital flows and monetary policies most important component i.e., interest rate was accepted in mid-1960s widely. In international economics this relationship was accepted by both theorists and empiricists. For instance, in his famous article Robert A. Mundell generally accepted the relationship and wrote that "… at high rates of interest the net flow of capital will be larger, or the net outflow will be smaller, than at low rates of interests" (Mundell, 1963).

Branson & Salant (1970) concluded a research on United States data set in which they found that capital flows provide a generally correct and small estimate of capital outflows which is being generated by the easing of monetary policy. They also estimated that exchange rates should be adjusted slowly through crawling peg system which can compensate or control the movements in capital accounts. This would help monetary policy to free from balance of payments handling and thus monetary policy can work more effectively for the domestic needs.

The relationship has been reviewed by Pablo et. al. (2017). Using the monthly data of U.S. of pre-GFC and post global financial crisis of 2008. By applying GVAR model, they found that an expansionary unconventional monetary policy shock significantly increases portfolio outflows from the U.S. Moreover, they also find that emerging market economies with flexible exchange rate system are also affected by the U.S. unconventional monetary policy. So, this shows that monetary policy does have a significant role to play in managing the capital flows.

Moving forward in exploring the literature we found another evidence which identifies the relationship between capital flows movement affected by monetary policy. In this regard,

Tillmann, (2016) examined the monthly data of U.S by adding an indicator of financial conditions of emerging markets. Using Qual VAR model, the results of the study found that due to abrupt raise in Quantitative Easing by central bank leads to the robust increase in emerging markets' equity prices, exchange rate and capital flows, and reduces the bond spreads too.

After the Global Financial crisis of 2008, Central Bank of Republic of Turkey (CBRT) have adopted two new tools of monetary policy to manage capital flows i.e., the interest rate corridor and reserve option mechanism (ROM). In the case of Turkey, Ahmet Faruk Aysan & Kilinc (2014) concluded that both tools have played an important and effective role in managing the capital flows. Interest rate corridor helped in smoothening the supply of foreign reserves while ROM have help in managing the demand side of foreign exchange. By allowing other banks to hold foreign exchange reserves at CBRT during capital inflow periods and then by withdrawing of these funds, ROM has managed the sensitivity of exchange rate to shifts in foreign exchange supply.

Cavoli & Ramkishen, (2006), in their paper develop an easy model to look at the explanations for the increased capital inflows into designated Asian economies within the 1990s before the currency crisis of 1997–98. They developed a model and used in the paper shows that subsequent capital inflows and arbitrage of interest rate may lead to full sterilization, better capital movement and slow mechanism of response to monetary tools or sometimes the sum of all three. In an organized framework they designed the model, and the study runs different type of empirical tests of the proposed links among the flows of capital, the extent to that they have been sterilized and interest rate arbitrage within the

these countries (i.e., Indonesia, Korea, Malaysia, the Philippines, and Thailand) which were hit by crisis during the period of 1990 to 1997.

Capital flows are the part of balance of payments except current account. It also includes error and omissions as a part of the balance of payments. This part of BOP holds the record of unrecorded capital inflows as unclassifiable item in it. This has been examined and concluded by Porter (1972) that when corporations in Germany anticipated that loans would not approve, they turned to the external sources and such type of capital inflows are not recorded. While these are recorded in the error and omissions sections of the balance of payments account as unclassified items. Moreover, he also found that the impact on monetary base caused by the changes in the average reserve requirements tends to be adjusted by the capital flows amounting to 80 percent of the changes in required reserves.

In the pre-Global Financial Crisis (GFC), monetary policy was the important driver of capital flows. As reviewed earlier due to change in U.S monetary measures, the capital flows to and from developing economies used to be affected by the variations in United States' monetary policy. But after the GFC scenario has been changed and now it is believed that monetary policy is not the only driver of capital flows but there are many others. For instance, Clark & Kamin (2020) examined that monetary policy is no more the driver of capital flows but there are two other causes of capital flows. Using the data from 1994-2015, they found that advanced economies' monetary policies do not seem to be the prime drivers of capital flows, but the result of the model suggests that movement in commodity prices and economic growth differentials explains the flows of capital flows (i.e., surges and declines in capital flows) more precisely than the monetary policy.

2.4 Capital Flows-Monetary Policy: Evidence from Pakistan

Like other developing countries it is best time that Pakistan should also explore the unattended side of capital flows that how important they are in shaping economy. From last few decades the importance of cross border international flows has been observed through different examples of developing as well as developed countries. But there are a few examples that freely floating capital flows either inflows or outflows cause damage to the economy's health. That's why it is of keen importance that focus should not only be on the flow of capital but also on the management of capital flows through various policies such as measures of monetary policies which is the most important tool of the central bank of any country.

From 1990s, there was a huge surge of capital flows in Pakistan that was of $.5billion from 1993 to 1994 and then remained robust at $4.4 billion for a long period of time. These private inflows proved helping in easing the foreign exchange reserves and also helped to cope up with budget deficit. But the economy had observed the increasing pressure on demand and capital inflows also put the banking sector at systematic risk. In a study by Khan M. Z. (1996) used the data of Pakistan and found that among other policies monetary policy measures such as sterilization is proved to be the most effective policy mix for Pakistan to control the outflows and inflows of Pakistan and exlained the proper channel to curb the bad impacts of capital inflows or outflows in Pakistan.

In case of Pakistan, the effects of monetary policy on balance of payments are as follows. Over the period of 1962-2005, the real output, real exchange rate and household credit play

a vital part within the assurance of foreign reserves in Pakistan in long-run as well in short-run. Khan (2008) found that the financial specialists sterilize the FX reserves by 12% and 34% in long-run and short-run respectively. One imperative arrangement suggestion from the observational examination is the legitimacy of the monetary approach to the adjustment of repayments and the viability of monetary approach depend on the nature of the money request work. As the determination of cash request work experiences a alter, the prove for money related approach has moreover changes.

Using the data of 1972-2002, Dar et. al. (2004) has been concluded that in Pakistan, long-run as well as short-run relationship between FDI and exchange rate does exist and with degree of openness of an economy as well. FPI has played a pivotal role in boosting the economy of Pakistan. Aziz et. al. (2015) using the data from 2005-2014 of Pakistan found the relationship of FPI with trade degree of openness, growth rate of real GDP, market capitalization, inflation rate and exchange rate. According to results, the market capitalization and trade degree of openness are positively and significantly related to FPI. Inflation rate is negatively and significantly related to FPI. While exchange rate has positive but insignificant relationship with FPI in Pakistan.

In case of Pakistan the phenomena of monetary policy approach to balance of payments have been observed by Umer & Ghazali (2010). The main purpose of their study is to examine the monetary approach to balance of payments theory and its implications in case of Pakistan. Using the data from 1980-2008, they found that monetary approach to balance of payments is not solely phenomena. While overall output, policy rate and Domestic credit have empirically approved relation with net foreign assets with respect to monetary theory

predictions. Moreover, excess of money supply is clearly the loss of foreign reserves which policy makers of Pakistan should keep in their minds.

Another attempt has been made in the literature to investigate and estimate the domestic credit policy reaction function. To examine the monetary implications of sterilization policy and interventions made in Pakistan by using the data from 1982Q3 to 2001Q2. The results suggested that about 72% of foreign reserve inflows in long run while 88% in short run have been sterilized by Pakistan's central bank authorities (Qayyum & Saqib, 2004).

The nexus among exchange rate and capital lows is of great importance and it has been believed that it exists even in the case of Pakistan. In the case of Pakistan, Ahmed (2009) tested this relationship and found that the overvaluation has been increased by the 0.75% in 2001 to 22.9% in 2007. The cause of this overvaluation is the rise in foreign direct investment from 2005 to 2007 and due to the rapidly increasing remittances from 2002 to 2007. In this paper, the results suggested that Dutch Disease still prevails in Pakistan.

In a study, Ali & Sajjad (2017) analyze the effects of capital flows on money supply in the case of Pakistan. Using the date from 1974 to 2014, they applied the different tests and ARDL cointegration technique found that foreign direct investment, inflation rate, exchange rate and CPI effects the gross domestic product (GDP) in a positive manner while total reserves, private investment and most importantly money supply has a negative impact on GDP.

Pakistan's economy has faced a large capital inflow in different ways such as in the form of foreign debt, foreign direct investment, remittances, portfolio investment from last few

years. In this regard the study of Ali et. al. (2014) examined the effects of capital inflows on the economic growth of Pakistan. Using the data from 1972-2013, they found that capital inflows negatively affect the economic growth of Pakistan in long-run. They also calculated the causality between debt service, foreign direct investment, and inflation. Not only this but the results found the bidirectional causality between remittances and economic growth.

The degree of sterilization means how much Central Banks can control the capital flows or can neutralizes the effects of capital flows through intervention by managing the monetary tools of an economy. In a study, using the monthly data from 1982 to 2013, Gilal & Mahesar (2016) examined the degree of sterilization on managing the capital flows in case of Pakistan. They found that State Bank of Pakistan can partially sterilize the effects of capital inflows. Because of this sterilization it resulted into the foreign assets which are reliable with the perfect asset substitutability. This study suggests that in Pakistan monetary authorities are not independent to take policy decision because it also effects foreign assets in the opposite direction.

2.5 Concluding Remarks

From the literature discussed above, the importance of net capital flows in the prosperity and development of an economy is clear. Not only emerging economies but also advanced countries get benefits from the flow capitals from one economy to other. It is clear from the literature that the excessive flow of capital for any country can be vulnerable sometimes and useful on other times. There are multiple factors that can affect the flow of capital and

can be helpful in managing the capital flows. From the above discussed literature, one of the most important factors is interest rate differential and that's why it is important for the policy makers to consider the capital flows while making changes in the monetary policy.

The policy makers may face challenges while devising the monetary policy as the changes in interest rate can increase or decrease the flow of capital. It means that policy makers can control the capital outflow and inflow through interest rate differential. As the capital will flow towards that economy, which has the higher interest rate and that's why it is important to consider the capital flows while making changes in interest rate of a country.

From literature it is evident that there are many other factors which effect the capital mobility across the borders that is why it is important to study and found those factors in detail. After review of the literature in depth, it is evident that empirical literature is missing some factors and update information in the case of Pakistan that is why it is need of the hour that this study is intended to make its contribution to find out those factors.

CHAPTER 3

THEORETICAL FRAMEWORK AND ECONOMETRIC METHODOLOGY

In this chapter we will discuss different type of estimation techniques which we will use in this study. This chapter discusses the theoretical framework that explains the different direct and indirect channels through which the components of monetary policy affect the capital flows. Moreover, in this chapter we also discuss the different econometrics techniques to estimate the results including unit root tests and co-integration techniques in detail.

3.1 Theoretical Framework

David Hume has introduced the nexus between capital flows and tools of monetary policy. Hume introduced the theory of specie flow mechanism in 1752, to demonstrate mercantilists' false belief that a nation could continuously accrue gold by exporting more than it imported. Hume presented that as a nation accrued, domestic prices would rise until the nation’s surplus in exports was eliminated. The example Hume used to explain this is that when two nations are connected through international then the attempt to accumulate the gold above its natural level is futile. Since then, this theory is being used to explain the monetary approach to balance of payments. This theory helps to correct the imbalances in balance of payments through monetary policy approach (Salvatore, 2013).

The theory which explains the relationship of monetary policy and capital flows is the *Classical Specie Flow Mechanism*. This theory explains the monetary approach to balance of payments, as capital flows are a major part of balance of payments of a country. According to this theory, an exogenous shock to the money supply in a country causes inflation. This leads to deficit in balance of trade by diverting the demand abroad. The existing trade deficit is covered through net monetary outflow, resulting in the declining money supply and then prices, until and unless the transnational effectiveness is bounced back. Because of money supply flowed to abroad, the prices and money supply return to their original level. Looks like, specie flow mechanism relies on two restrictive assumptions, one is that, to identify the trade deficit because of the money outflow, it is clear that there is no capital mobility. While the second assumption is that potential money supply flowed abroad leads to fall of the demand of the domestic currency. This implies that same type of currency is considered for both international and domestic transactions (Nwokoye & Oniore, 2017). In literature, the monetary approach to balance of payments have been tested by Bijan and Mohsin (1978) for 39 developing countries. They have found through highly significant results on a cross sections basis, that the mechanism of monetary approach of balance of payments theory is equally strong for the developed and developing countries.

There are different channels through which the capital flows are affected by interest rate under different exchange rate regimes are:

Under fixed exchange rate:

$$\downarrow i \rightarrow M^s \uparrow \rightarrow Capital\ outflows \uparrow \rightarrow Net\ Capital\ Inflows \downarrow$$

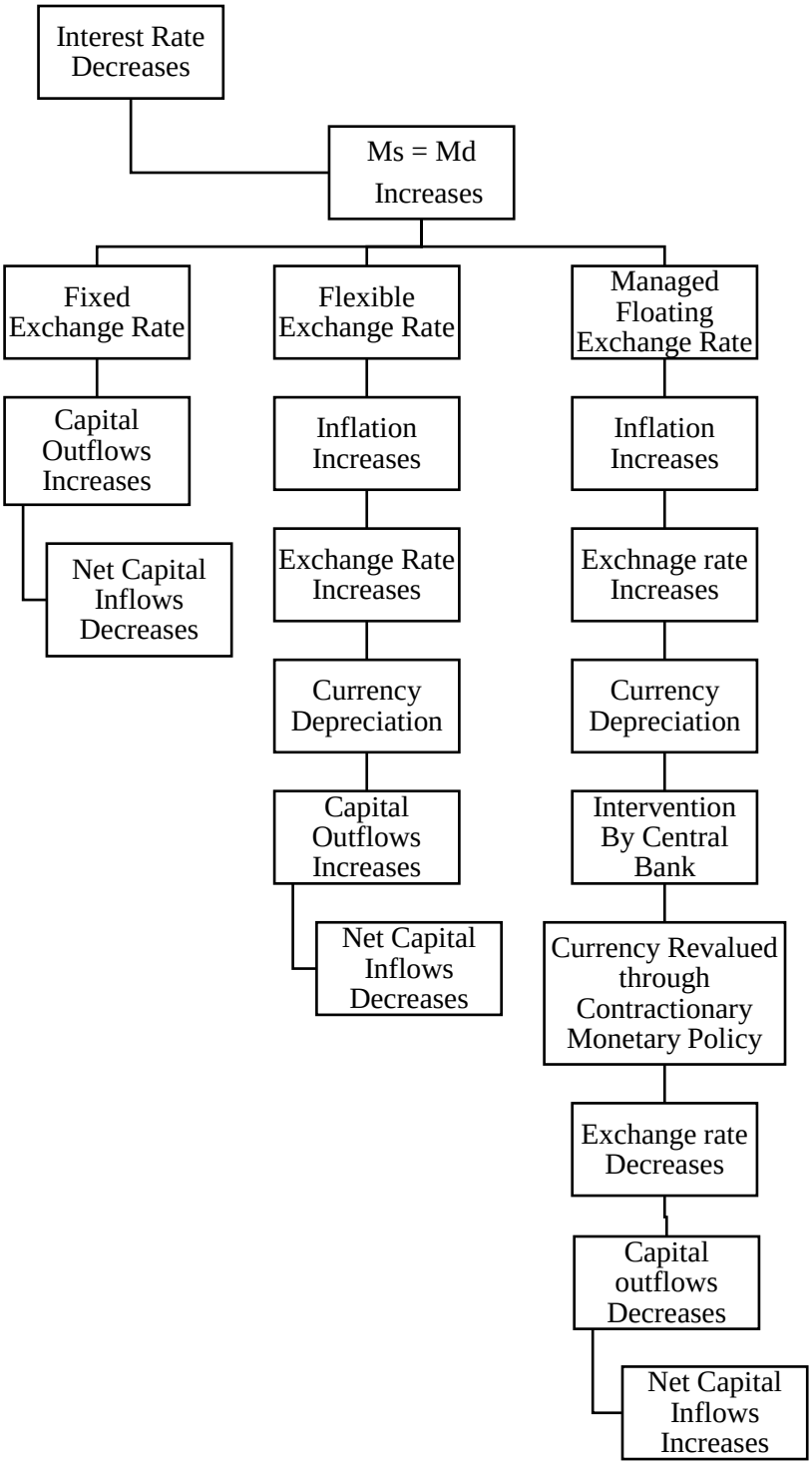
Then here comes the second channel under flexible exchange rate system:

$$\downarrow i \rightarrow M^s \uparrow \rightarrow Inflation \uparrow \rightarrow ER \uparrow \rightarrow Currency\ Depriciates \rightarrow Capital\ outflows$$
$$\uparrow \rightarrow Net\ Capital\ Inflows \downarrow$$

Another channel showing the indirect effect of interest rate on capital flows:

$$\downarrow i \rightarrow M^s \uparrow \rightarrow Inflation \uparrow \rightarrow ER \uparrow \rightarrow Currency\ Depriciatse$$
$$\rightarrow Intervention\ by\ Central\ Bank \rightarrow Currency\ Revalaution \rightarrow ER \downarrow$$
$$\rightarrow Capital\ outflows \downarrow \rightarrow Net\ Capital\ Inflows \uparrow$$

Fig. 3.1: Mechanism of Monetary Policy Approach to Capital Flows



Source: Salvatore (2013)

In the above chart, the mechanism of the monetary policy approach is explained in an elaborative manner. It can be seen that the impact of interest rate on net capital flows can be divided in to three sub-categories that are: fixed, flexible, and managed floating exchange rate regimes.

3.1.1 Fixed Exchange Rate

In fixed exchange rate there is a direct impact of the interest rate on capital outflows i.e., if there is a decrease in the interest rate it will increase the money supply (because of the inverse relationship between the money supply and interest rate), which means that due to fixed exchange rate the purchasing power of the individuals will increase and they will spend more on items across the borders which in results will increase the capital outflows and ultimately leads to the decrease in the net capital inflows (as Net capital flows = Capital inflows – outflows).

3.1.2 Flexible Exchange Rate

The behavior of capital flows is entirely different in case of flexible exchange rate regime as compared to fixed exchange rate regime. In flexible exchange rate regime, interest rate is associated with inflations rate, the interest rate decreases the inflation increase. It is because of the reason that due to decline in interest rate individuals prefer to hold money instead of keeping it in the banks and that’s how the money supply increase in the market. This leads to change in the value of the currency as the value of the domestic currency depreciates in terms of foreign country and as a result the outflow of capital increase. Finally, this leads to the decreased in net capital inflows.

3.1.3 Managed Floating Exchange Rate

In managed floating exchange rate regime, the central bank plays its role and interferes through different ways to manage the capital flows. The channel remains the same till the currency depreciation as in the case of the flexible exchange rate. The main difference between these two regimes is that in flexible exchange rate regime the fluctuations in interest rate and exchange rate are determined through market forces that is demand and supply. While on the other hand in managed float exchange rate regime, central banks intervene in the market and manage the exchange rate through monetary policy tools to control the capital flows. The central banks have the power to increase and decrease the flow of capital inflows or outflows. When the exchange rate decreases, and currency depreciates then the central bank intervenes and try to revalue the currency this leads to decrease the exchange rate and as a result the net capital inflow increase and vice versa.

3.1.4 Model

The propose of this study is to check the effects of monetary policy on capital flows. To do so, we have taken the major determinant of monetary policy i.e., interest rate. But the interest is not solely affecting the capital flows, that's why we have used several control variables such as inflation rate, exchange rate and the broad money supply. So, we have constructed a model used by Cavoli & Rajan (2006), Gordillo (2012) and recently by Nwokoye & Oniore (2017). The model is expressed as follows,

Capital flows = f (INFR, EXR, Component of Monetary policy) (3.1)

The econometric equation of this model is as follows.

$$KF = \alpha_0 + \alpha_1 INFR + \alpha_2 EXR + \alpha_3 (Components\ of\ monetary\ policy) + \mu \qquad (3.2)$$

KF is capital flows as dependent variable, INFR is inflation rate, EXR is the exchange rate, and components of monetary can be interest rate differential and money supply, while μ is the error term.

3.2 Econometric Specification

The data we will use in this study is time series data. Before we use stationary data to find out our desired results it is of great importance to check the stationarity of the data. We cannot proceed further without checking stationarity because if the series is not stationary then it will give us inappropriate results. The problem of non-stationarity arises because of shocks and that's why the series do not stay or fall back to its mean value. So that's why it is of great importance to check stationarity firstly and for that we will apply unit root test. Furthermore, we will discuss the unit root testing, after that we will discuss the co-integration techniques that we will discuss in this paper to estimate long-run as well as short-run co-integration between variables.

3.2.1 Unit Root Testing of Time Series Data

The studies of econometric analysis have revealed that mostly macroeconomic and financial times series data are non-stationary and non-stationary series result in inappropriate and spurious relationships (Engle & Granger, 1987). To check whether the series are stationary or not, there are different tests that are used in the literature. These tests are recommended by Maddala & Kim (1998) and Hamilton (1994). The test that we

will use is Augmented Dicky Fuller test (ADF) in this study to check the stationarity of the series. ADF test is discovered and presented by Dicky and Fuller (1979). This test is used because it is an autoregressive unit root test and in this order is not known. The lags in this test can be determined through two criterions i.e., first is Schwarz Information Criterion (SIC) and the second is Akaike Information Criteria (AIC). The probability of rejecting the null hypothesis i.e., the series has a unit root, is increased and both criteria use almost same lag length. The ADF test results of all variables i.e., capital flows (dependent variable), inflation, real effective exchange rate, interest rate and broad money supply, are given in a table in tables section of the paper. All variables are non-stationary at level with intercept only while all are stationary at first difference with intercept only.

The AR (1) series of the dependent variables are presented below,

$$\Delta KF = \alpha_0 + \gamma KF_{t-1} + \alpha_2 t + \varepsilon_t \quad (3.3)$$

Here ΔKF (Δ means the I (1) operator) denotes the dependent variable, that is capital flows, t is the time trend, KF_{t-1} is the 1st lag of KF_t and ε_t is the error term.

Here we can use the Dicky-Fuller test on equation 3.3,

$$KF = \alpha_0 + \alpha_1 KF_{t-1} + \ldots\ldots\ldots\ldots\ldots\ldots + \alpha_{p-1} KF_{t-p+1} + \alpha_p KF_{t-p} + \omega_t \quad (3.4)$$

Now to get the ADF equation, add and subtract $\alpha_p KF_{t-p+1}$

$$KF = \alpha_0 + \alpha_1 KF_{t-1} + \alpha_2 KF_{t-2} + \ldots\ldots\ldots\ldots\ldots\ldots + \alpha_{p-2} KF_{t-p+2} + (\alpha_{p-1} + \alpha_p) KF_{t-p+1} + \alpha_p \Delta KF_{t-p+1} + \omega_t \quad (3.5)$$

Now, subtract and add the $(\alpha_{p-1} + \alpha_p) KF_{t-p+2}$ in equation 3.5 we will get:

$$KF = \alpha_0 + \alpha_1 KF_{t-1} + \alpha_2 KF_{t-2} + \ldots\ldots\ldots\ldots\ldots\ldots - (\alpha_{p-1} + \alpha_p) KF_{t-p+2} - \alpha_p \Delta KF_{t-p+1} + \varepsilon_t \quad (3.6)$$

By continuing this process, we have:

$$\Delta KF = \alpha_0 + \gamma KF_{t-1} + \sum_{i=2}^{p} \beta_i \Delta KF_{t-i+1} + \varepsilon_t \quad (3.7)$$

Where $\gamma = 1 - \sum_{i=1}^{p} \alpha_i$ and $\beta_i = - \sum_{j=1}^{p} \alpha_j$ (3.8)

Here in equation 3.7 γ is a very important coefficient, where if $\gamma = 0$ then this indicates that equation has a problem of unit root and is integrated of level 1 i.e., I (1) and when $\sum \beta_i = 1$, this shows the sum of coefficients of the differenced equation is 1 and $\gamma = 0$ so it turns out that the unit root exits.

In ADF test we assume that along with the constant variance the residuals are independent. One important points arises because of this process i.e., the coefficient γ can't be calculated properly and the term γ and its standard errors, which are the part of the final equation without any AR term. So, that's why the equation (3.3), a simple regression is not suitable for this purpose when the data is generated through the process of equation (3.7) is true. Here exists the problem that the order of AR is unknown and the suitable lag length criteria. There could be a possibility is that the intercept and the trend are not known to the (3.7) equation.

3.2.2 Lag Length Selection Criteria

After checking the stationarity of the data and getting the required series the next step is to choose the appropriate lag length. To select the lag length, the technique that is used is

restricted VAR which explains and helps that how much lags we will use and good for the model. The condition to choose lag length is that it is chosen when Akaike Information Criterion and Bayesian Information Criterion possess minimum values.

3.2.3 Co-integration Approach

The main purpose of our study is to check the nexus among the tools of monetary policy on net capital flows. To check the robustness of the relationship between dependent and independent variables we need to estimate our model through a co-integration approach. There are different types of tests for cointegration approaches. There are two main techniques one is The Johansen Juselius (J.J) technique and other is Autoregressive Distributed Lag (ARDL) model. The best among these two is Autoregressive Distributed Lag (ARDL) proposed by Pesaran & Smith (2001). These techniques have a lot of advantages over the Johansen co-integration approach. Firstly, Johansen technique is good for large data sets, which unfortunately developing countries do not possess. While on the other side, ARDL model is the best model among these two to estimate the co-integration in small data sets (Ghatak & Siddiki, 2001). Secondly, another benefit of using ARDL model is that all other co-integration techniques require the variables to be stationary at the same level that it is either I (0) or I (1), while ARDL is suitable to apply on the data with different level of stationarity i.e., mixture of I (0) and I (1). Thirdly, in Johansen technique we need to select a lot of choices but in ARDL we do not put this much effort, choices such as the order of VAR and selection of lag length. Finally, in ARDL model the variables can have different lag lengths but Johansen technique do not allow this.

3.2.4 Auto-Regressive Distributed Lag (ARDL) Model

Auto-regressive Distributed lags (ARDL) co-integration method is the mostly adopted model to estimate and found the existence of co-integration among time series data in long-run as well as in short-run. The advantages of Auto-Regressive Distributed Lag (ARDL) approach over Johansen techniques have already been discussed. The ARDL approach can be used when the variables are integrated at different levels such as at I (0) or at I (1) or mixture of both. But there is a limitation in ARDL i.e., it cannot be applied if the order of integration exceeds I (1) this means that not any variable should be of integration level I (2). Hence, when the dependent variable is I (1) only then we will apply Auto-regressive Distributed Lag (ARDL) model to estimate our data.

Here is the equation of the following ARDL model.

$$KF_t = \gamma + \alpha_i KF_{t-i} + \cdots + \alpha_n KF_{t-n} + \beta_0 X_t + \beta_1 X_{t-1} + \cdots + \beta_y X_{t-n} + \delta_0 IRD_t + \delta_1 IRD_{t-1} + \delta_2 IRD_{t-n} + v_t \quad (3.9)$$

$$KF_t = \gamma + \sum_{i=1}^{n} \alpha_1 KF_{t-i} + \sum_{i=0}^{n} \beta_1 X_{t-i} + \sum_{i=0}^{n} \delta_1 IRD_{t-i} + v_t \quad (3.10)$$

KF_t represent the capital flows and *IRD* represents the independent variable i.e., interest rate differentials. Here $X_t$is a vector of control variables (Real effective exchange rate (REER), Institutional Quality, Trade Openness, Exchange rate volatility, Infrastructure, Credit to Private Sector, Stock market capitalization, Size of Economy, Inflation, Money Supply) and $v_t$is an error term.

There are some core advantages of using ARDL model. This model provides us the most robust results and it performs well when the sample of the data is small. It also gives us the

short run as well as long-run vigorous results. The ARDL model doesn't need the pretesting of the variables i.e., the test to check the relationship among variables in level is applicable irrespective of whether the underlying regressors are either I (0) or purely I (1), or mixture of both.

3.2.5 Error Correction Model (ECM)

$$\Delta KF_t = \gamma + \sum_{i=1}^{p} \alpha_i KF_{t-i} + \sum_{i=1}^{p} \beta_i X_{t-i} + \sum_{i=1}^{p} \delta_i IRD_{t-i} + \theta ECM_{t-1} + v_t \qquad (3.11)$$

Autoregressive Distributed Lag (ARDL) technique for estimation uses the $(P+1)^l$number of regression where p denotes the maximum number of lags and l shows the variables that are used in the model. This is the main reason that ARDL techniques is considered as the best technique to choose the lag length of all the variables. There are three types of criteria available for the model selection which are as follows, Schwartz Bayesian criteria (SBC), Akaike's Information criteria (AIC) and Log likelihood criteria (LR).

After the selection of the lag length criteria and find the lag length, ARDL is used to estimate the long-run relationship between the regressor and dependent variable. By estimating the long-run relations there is need of finding the short-run relationship as well. After analyzing the relationship in long-run as well as short-run, above-mentioned error correction model (ECM) is also applied as it tells us the speed of adjustment of shocks or fluctuations occur in the short-run, in other words, how much time is required for a fluctuation to adjust in the long-run.

3.2.6 Diagnostic Test

To check the robustness of the long-run and short-run results, the models are passed through the multiple diagnostic tests and stability tests. These tests also include normality, check the serial correlation, heteroscedasticity, r-squared, Durban Watson stats, CUSUM and CUSUMQ.

3.2.7 Different Variations of ARDL Equations

By applying the ARDL estimation technique, 5 different models are estimated to check the impact of different independent variables by adding and replacing one by one.

In model 1, the independent variables used are real effective exchange rate (REER), inflation (INF), size of economy (SE), money supply (MS) and interest rate differential (IRD).

$$KF_t = \gamma + \sum_{i=1}^{n} \alpha_1 KF_{t-i} + \sum_{i=0}^{n} \beta_1 REER_{t-i} + \sum_{i=0}^{n} \beta_2 INF_{t-i} + \sum_{i=0}^{n} \beta_3 SE_{t-i} + \sum_{i=0}^{n} \beta_4 MS_{t-i} + \sum_{i=0}^{n} \delta_1 IRD_{t-i} + v_t \quad (3.12)$$

In model 2, the money supply is replaced by the financial development (FD) which is used as the proxy of "credit to private sector", the reason behind selecting this instead of money supply is that money supply is not the only influential part of the monetary policy there are other factors as well such as credit to private sector.

$$KF_t = \gamma + \sum_{i=1}^{n} \alpha_1 KF_{t-i} + \sum_{i=0}^{n} \beta_1 REER_{t-i} + \sum_{i=0}^{n} \beta_2 INF_{t-i} + \sum_{i=0}^{n} \beta_3 SE_{t-i} + \sum_{i=0}^{n} \beta_4 FD_{t-i} + \sum_{i=0}^{n} \delta_1 IRD_{t-i} + v_t \quad (3.13)$$

In model 3, to check the impact the exchange rate volatility on capital flows REER is replaced with *ERVol*, it is replaced to avoid the problems of collinearity among the variables.

$$KF_t = \gamma + \sum_{i=1}^{n} \alpha_1 KF_{t-i} + \sum_{i=0}^{n} \beta_1 ERVol_{t-i} + \sum_{i=0}^{n} \beta_2 INF_{t-i} + \sum_{i=0}^{n} \beta_3 SE_{t-i} + \sum_{i=0}^{n} \beta_4 FD_{t-i} + \sum_{i=0}^{n} \delta_1 IRD_{t-i} + v_t \quad (3.14)$$

In model 4, the REER is taken along with institutional quality index to find out the impact of institutional quality on KF and added an interactive term (i.e., $IQ * IRD$).

$$KF_t = \gamma + \sum_{i=1}^{n} \alpha_1 KF_{t-i} + \sum_{i=0}^{n} \beta_1 REER_{t-i} + \sum_{i=0}^{n} \beta_2 INF_{t-i} + \sum_{i=0}^{n} \beta_3 SE_{t-i} + \sum_{i=0}^{n} \beta_4 FD_{t-i} + \sum_{i=0}^{n} \beta_5 IQ_{t-i} + \sum_{i=0}^{n} \beta_6 (IQ * IRD)_{t-i} + \sum_{i=0}^{n} \delta_1 IRD_{t-i} + v_t \quad (3.15)$$

In model 5, along with the already selected independent variables there is an addition of one more variable which is Absorptive capacity and also an interactive term that is $AC * IRD$, to check the whether the absorptive capacity only effect capital flows or it also boost the interest rate differential and lead to net capital flows.

$$KF_t = \gamma + \sum_{i=1}^{n} \alpha_1 KF_{t-i} + \sum_{i=0}^{n} \beta_1 REER_{t-i} + \sum_{i=0}^{n} \beta_2 INF_{t-i} + \sum_{i=0}^{n} \beta_3 SE_{t-i} + \sum_{i=0}^{n} \beta_4 FD_{t-i} + \sum_{i=0}^{n} \beta_5 IQ_{t-i} + \sum_{i=0}^{n} \beta_6 (IQ * IRD)_{t-i} + \sum_{i=0}^{n} \beta_7 AC_{t-i} + \sum_{i=0}^{n} \beta_8 (AC * IRD)_{t-i} + \sum_{i=0}^{n} \delta_1 IRD_{t-i} + v_t \quad (3.16)$$

3.3 Variables Construction and Data

Now the variables that are used previously in the literature mainly net capital flows and components of monetary policy will be discussed below. The variables are theoretically explained in this chapter which are defined in the literature. Moreover, this chapter also discusses the sources of the data and time period of data used in this study.

3.3.1 Variables

The variables that we will use in our study are capital flows (KF) as a dependent variable and independent variables are the tools of monetary policy i.e., money supply (MS) and nominal interest rate (IR), and two control variables which are inflation rate (INFR) and exchange rate (EXR)

3.3.1.1 Net Capital Flows (KF)

Capital flows are defined as the flow of capital from one to another country (i.e., it can be of two types either inflow or outflow). Net capital flows can be calculated by subtracting the outflows from inflows. The most important thing to note here is that capital flows do not include exports and imports, movements of goods, between two economies. It is, therefore, primarily the movement of resources, predominantly from advanced economies to developing and emerging economies in the form of foreign portfolio investments and foreign direct investment. Obadan (2004) also includes “other investment” section of balance of payments and reserve assets. These flows, either portfolio or direct investment can either be inflows or outflows (Cavoli & Rajan, 2006). Moreover, Capital flows are

calculated through the financial account surplus plus error and omission in the balance of payments (Nwokoye & Oniore, 2017).

3.3.1.2 Components of Monetary Policy

The components of monetary policy are interest rate and money supply. These components have significant relationship with the capital flows.

1. **Interest Rate Differential (IRD):** Interest rate differential is basically the difference between the interest rates of two economies. In this study we have taken the difference of foreign interest rate i.e., US interest rate and domestic interest rate of Pakistan. In this study we will calculate the interest rate differential by taking the difference between Federal Funds rate for US and State Bank's Annual policy rate for Pakistan. Long term interest rate has been taken for Pakistan because we have used annual interest rate. State Bank of Pakistan's announced interest rate in Monetary policy statement is take as the measure of monetary policy. If the domestic interest rate is higher than foreign interest rate, it attracts foreign investors to invest in the country which generates a capital inflow and in result it relieves the pressure on domestic monetary tools (Bond, 1998). The expected relationship between net capital flows and interest rate differentials is positively significant. (Agenor & Üçer, 1997).
2. **Money Supply (MS):** It is one of the important factors that affect capital flows. It is measured as the percentage of GDP, if the money supply is higher in the economy, then larger will be the opportunities for investment and hence there will be a direct relationship between money supply and capital inflows and a negative

relationship with the capital outflows. So, relationship of net capital flows and money supply is based on the magnitude of inflows and outflows (Gordillo, 2012). It is basically the M_2 of a country.

3.3.1.3 Other Controlled Variables

Exchange Rate (EXR)

Exchange rate can be measured as the annually changing the exchange, where a positive variation demonstrates the depreciation of the currency, and a negative variation shows the appreciation of the currency in terms of foreign currency. The expected sign of the exchange rate is positive and significant. For instance, the capacity to which capital flows can change reserves can be determined through exchange rate variations. In floating exchange rate, in which the financial authorities of a country have no active role in managing the reserves, a capital inflow will not be the only responsible for an increase in reserves. In contrast, during managed-floating exchange rate regime, the monetary authorities intervene to stable the currency's value and keep it away from over-heating, and the changes in reserves occurred by the inflow or outflow of capital. Exchange rate (EXR) has been used in the investigation of measuring the effects of monetary policy tools on net capital flows. (Bond, 1998) (Cavoli & Rajan, 2006).

Exchange Rate Volatility

Exchange rate volatility is considered to be having the worst impact on the flows of capital because it increases the uncertainty for the demand of export led firms. This also effects

the profitability of foreign direct investment and have also considerable impact on the portfolio flows by creating the uncertainty in the stock market (Goldberg & Kolstad, 1995).

Inflation Rate (INF)

Inflation rate is considered to have significant and positive impact on net capital flows. This variable is used in estimating the effects of monetary policy tools on net capital flows. (Cavoli & Rajan, 2006) (Bond, 1998)

Institutional Quality (IQ)

Institutional quality is directly related with the flows of capital across the border. From findings of the literature, it is suggested that good institutions have positive impact on capital flows as they attract the foreign capital in the country (Wei & Wu, 2002)

Financial Development (FD)

The capital flows of a country depend on the financial markets of that country; the more and more stability of financial markets attracts more capital flows. In specific, the stable and developed financial markets are the first and foremost condition for international capital flows (Garibaldi, 2002). We have used the data of domestic credit to private sector as financial development of the country and expected a positive relationship between financial development and capital flows.

Absorptive Capacity Index

Principal Component analysis (PCA) is used to develop the absorptive capacity index it is because of the reason that PCA is used to convert the large data sets into small data sets to

extract the information from large data sets in an effective manner. Absorptive capacity index is constructed by combining financial development, trade openness, and infrastructural development. The expected relationship between absorptive capacity and dependent variable is positively significant. (Kinoshita & Lu, 2006)

Trade Openness

It is defined as the "(Exports + imports) / GDP of country" by Shahbaz & Butt (2007) and this formula explains that whether the economy is export led or import oriented. Trade openness is an important part of any economy's growth and development because one cannot grow everything domestically. Here comes the concept of relative and absolute advantage, thus it has keen importance as by opening trade with other countries helps to grow at rapid rate as it eases the mobility of capital across the borders.

Infrastructure

The attractiveness of a location is determined by the development of its infrastructure and availability of resources. A well developed and managed infrastructure helps to attract and communicate with the companies across the borders and through information gathering process for the business and the contacting the parent companies directly reduces the costs associated with business. the number of telephones per 1000 people is used as a proxy for infrastructure development as it shows positive relationship with FDI and FPI flows. (Funke & Arezki, 2005)

3.3.2 Sources of Data

To evaluate the impact of monetary policy on capital flows, we have used the annual data from 1980 to 2019, thus giving us the total of 40 observations. The sources to extract data for real effective exchange rate, inflation rate, broad money supply, interest rate differentials are World Development Indicators-World Bank, and State Bank of Pakistan.

CHAPTER 4

EMPIRICAL RESULTS

The main purpose of our research is to estimate the effects of monetary policy tools on net capital flows and to evaluate the relationship among the capital flows and instruments of monetary policy in Pakistan. The focus of the study is to check that how capital inflows response to the changes in the monetary policy decisions, specifically to interest rate and interest rate differentials. This study mainly focusses on the hypothesis that interest rate differential is positive and significant related to net capital flows. In the previous chapter, we have discussed the methodology and, sources and specifications of the data in detail. This chapter includes the unit root testing of all the variables to check the integration level of all the series. In the end, the estimated results of the applied methodology and bound test to check the long-term relationship and short-term results of the different models are presented.

4.1 Unit Root Test

The studies of econometric analysis have revealed that mostly macroeconomic and financial times series data are non-stationary and non-stationary series result in inappropriate and spurious relationships (Engle and Granger, 1987). That's why the variables used in this study are examined for their stochastic properties, using traditional unit root test. The test that was used is Augmented Dicky Fuller (ADF) test, the reason of using ADF is that it is the most effective way to check the existence of unit root in the

series and to identify the level of integration (Hamilton,1994). Estimates of unit root testing are given in the Table 4.1.

Table 4.1: Unit Root Test					
	ADF	**Lag**		**ADF**	**Lags**
REER	-0.9986	0	***ΔREER***	-5.1600	1
M2	-0.2322	0	***ΔM2***	-4.9497	1
Interest Diff	-4.3141	3	--	--	--
Log per capita	-0.8544	4	***ΔLog per capita***	-4.1305	0
Institution	-0.0864	0	***ΔInstitution***	-4.6606	2
Trade Openness	-0.5486	1	***ΔTrade Openness***	-7.6370	3
Infrastructure	-0.2994	2	***ΔInfrastructure***	-5.1014	4
Exchange rate volatility	-6.2014	3	--	--	--
Domestic Credit over GDP	-0.6202	4	***ΔDomestic Credit over GDP***	-6.5373	2
Stock market capitalization	-0.6687	2	***ΔStock market capitalization***	-8.4027	1

The negative values of ADF of all the variables shows that it rejects the null hypothesis that unit root exists in the series and rejecting the null hypothesis means that series are stationary at different levels of integration. The interest rate differentials and exchange rate volatility are integrated at level 0 (i.e., I (0)).

4.2 Co-integration Test

The Autoregressive Distributed Lag (ARDL) bound test method has been implemented in estimating the long-run co-integration between capital flows and regressors. There are different co-integration approaches to examine the long-run relationship such as Engel-Granger, Johansen test and ARDL. The reason why ARDL is used in this study because the variables are of different order of integration that some are I (0) and some are I (1).

In any autoregressive model, the lag length selection is the most sensitive step. We have estimated 5 models with different lags i.e., lag 1, 2 and 3. The most optimal lag in all models is lag 2, although lag 2 has shown that co-integration exists and proved to be the best lag. But to check the robustness and to leave no ambiguity we have tested these models at lag 1 and then on lag 3, both estimates shown that co-integration does exist. The results of the models with different lag lengths are presented in the Table 4.2.

Table 4.2: Bound Test for the Existence of a Long Relationship

F-Statistics

	Lags 1	**Lag 2**	**Lag 3**
Model 1	17.023	11.833	9.190
Model 2	12.213	11.546	8.292
Model 3	14.750	11.826	8.949
Model 4	9.416	8.330	8.033
Model 5	9.467	8.844	7.919

Note: The upper bound of Pesaran et al. (2001) 's critical value is 5.23 at 1 per cent of the significance level. The higher calculated value shows that the rejection of no cointegration null hypothesis.

The results indicate that the value of F-statistic is greater than the critical values (i.e., 5.23) for all the models at different lags at one percent level of significance. That's why it leads to the rejection of null hypothesis (i.e., long-run relationship does not exist) at one percent level of significance. Therefore, it can be inferred that co-integration exists between variables.

4.3 Long-run Estimates

As discussed previously that variables of our study are co-integrated and the long-run relationship between regressand and regressors does exist, we have estimated the error correction model (ECM) and long-run models to check the sturdiness of the relationship. The results of the long-run estimations are presented below in table 4.3.

The estimates of Model 1 show that IRD has positive and significant impact on the net capital flows Makhetha-Kosi & Ngonyama (2016), and similarly, the size of economy has also significant and positive impact on net capital flows while other variables REER, Inflation and money supply have significant but negative relationship with net capital flows. The estimates of the model suggest that a one percent change in IRD would increase net capital flows by 0.1394 million rupees. Similarly, a unit change in the size of the economy would also bring rise of 0.2869 million rupees on net capital flows. While on the other hand, a unit increase in money supply would decline the net capital flows by 0.1934 million rupees which is consistent with the result of the study of Bond (1998), and one percent unit rise in REER would also decrease the net capital flows by 0.1361million rupees. Same as in the case of inflation, a percent increase in inflation would decrease the flows of capital by 0.2738 million rupees. These findings are consistent with Nwokoye & Oniore (2017).

Table 4.3: Long Run Estimate of the Determinants of Capital Flows					
Independent Variables	**Model I**	**Model II**	**Model III**	**Model IV**	**Model V**
Interest Rate Differential (IRD)	0.1394***	0.4417***	0.5767***	0.7664***	0.5175**
	(0.0264)	(0.1564)	(0.1466)	(0.2008)	(0.2127)
REER	-0.1361***	-0.8956***	--	-0.2771**	-0.8323***
	(0.0390)	(0.2654)	--	(0.1273)	(0.1967)
Inflation	-0.2738*	-0.6114***	-0.7662***	-0.8052***	-0.5188***
	(0.1588)	(0.1588)	(0.2557)	(0.1656)	(0.1796)
Size of Economy	0.2869**	0.7732***	0.4474**	0.2901**	0.5546***
	(0.1363)	(0.1176)	(0.2261)	(0.1358)	(0.0989)
Money Supply (M2)	-0.1934**	--	--	--	--
	(0.0547)	--	--	--	--
Credit to Private Sector	--	0.3331**	0.8073**	0.3979**	0.6377***
	--	(0.1265)	(0.4799)	(0.1726)	(0.1088)
Exchange Rate Volatility	--	--	-0.8759*		--
	--	--	(0.4487)		--
Institutional Quality	--	--	--	0.7715***	0.1840**
	--	--	--	(0.1632)	(0.0785)
*Institution *Interest Differential*	--	--	--	0.9988**	0.9924***
	--	--	--	(0.3868)	(0.1362)
Absorptive Capacity	--	--	--	--	0.7487***
	--	--	--	--	(0.1864)
*Absorptive Capacity*IRD*	--	--	--	--	0.4576**
	--	--	--	--	(0.1963)
constant	0.2491***	0.9484***	0.0615**	0.2470	0.0175
	(0.0864)	(0.1777)	(0.0368)	(0.3332)	(0.0965)
Diagnostic					
Normality	0.5710	0.4740	0.4128	0.4859	0.9575
Serial Correlation	0.2377	0.3350	0.3977	0.7530	0.8338
Heteroscedasticity	0.7654	0.6905	0.5138	0.1660	0.6757
Functional Form	0.2512	0.2975	0.7777	0.2250	0.4790
Note: The Standard Errors are in Parentheses. *, ** and *** show 10 percent, 5 percent, and 1 percent level of significance respectively					

In model 2, we have replaced the money supply with credit to private sectors, it is because of the reason that transactions of private sector are also managed by central banks through monetary channels. That's why to avoid the issue of multicollinearity and spurious results, we have chosen credit to private sector. In this model, the signs of coefficients of variables other than credit to private sector are similar to model 1, but there is a difference in the magnitude of coefficients. Such as, impact of IRD changes from 0.1394 to 0.4417 million rupees, REER's magnitude changes from 01361 to 0.8956 million rupees, effects of inflation also rise from 0.2378 to 0.6114 percent and similarly coefficient of size of economy changes from 0.2869 to 0.7732 million rupees. The focus in this model is credit of private sectors, it has a significant but positive relationship with net capital flows. If there is a unit increase in the credit to private sectors it would raise the net capital flows by 0.331 percent which is opposite to that of money supply.

In model 3, we have taken exchange rate volatility instead of REER to check the effects of exchange rate volatility on net flows of capital. We have dropped REER to avoid the problem of multicollinearity between REER and exchange rate volatility. Likewise, previous models, the impact of IRD, inflation, size of economy and credit to private sectors remains the same but there is change in magnitude as shown in the Table 3. Even exchange rate volatility has the same impact as REER, i.e., it has significant but negative relationship with net capital flows. If there is a unit increase in the exchange rate volatility it would bring 0.8759 million rupees decline in the flows of capital.

In model 4, we have made two changes, first is that we have replaced the exchange rate volatility by REER back as both have significant and negative impact on net capital flows.

Secondly, we have checked the impact of institutional quality on the flows of capital. For this we have taken institutional quality index and multiplied it with IRD as well to check the robustness of the relationship. The statistically results show that if quality of institutions raised by 1 unit, then it would increase the capital flows by 0.7715 million rupees. But theoretically it means that better the institutional quality the more will be the mobility of capital flows that means capital will flow more freely. All other variables have similar and significant impact on the capital flows as observed in the previous models.

In model 5, we used another control variable which is the absorptive capacity, to check whether the economy has the potential to absorb or manage the capital mobility. The results of all other variables including IRD, REER, Inflation, Size of economy, credit to private sector and institutional quality are similar as calculated in the previous models. The focus of this model is mainly on absorptive capacity and the results posit that there is a positive and significant relationship between absorptive capacity and net capital flows. The table shows that if there is a unit increase in the absorption capacity then the capital flows would be increased by the 0.7487.

4.3.1 Discussion on Long-run Results

After analyzing the long-run relationship between the independent variables and dependent variable, we have reached at a conclusion which addresses the objectives of our study that there exists a robust and significant relationship among the net capital flows and tools of monetary policy. From the empirical results of our study, it is evident which is consistent with the results of (Makhetha-Kosi & Ngonyama, 2016) that higher the interest rate differentials more it will attract the capital inflows and more will be the mobility of capital.

As the interest rate is the main instrument of monetary policy through which central banks control the flows of capital. In the case of Pakistan, it shows high significance as discussed above. But from the long-run results, it can be seen that interest rate is not the only factor that effects the capital mobility. There are other factors such as institutional quality, absorptive capacity and exchange rate which have significant relationship with the capital flows, and they are also needed to be closely monitored and considered when it comes to the managing of the capital flows.

The key factors in determining the flows of capital also include exchange rate. From the long run and short run results of this study it is clear that exchange rate has a significant and negative impact on the capital flows. This indicates that if the exchange rate increases then the domestic currency depreciates relative to the foreign currency this leads to the capital outflows increases while the net capital flows become negative. As the value of the currency is declining the purchasing power of the individuals is declining and that's why they have to pay more for the services abroad or for the imports that's the capital outflows increase and net capital flows become negative.

There are other factors that are also important when it comes to determinants of capital flows, these are absorptive capacity (it includes the infrastructural development, financial development, and trade openness) and institutional quality. The absorptive capacity shows a positive and significant relationship with the capital flows because of the reason that if we look at the developed countries why there is huge influx of capital flows towards them. This question can be addressed by the absorptive capacity index as they have good infrastructure, there trade policies are sound and attracts foreign investors to invest. Same

is the case with the institutional quality, the better the institutions more it will attract the capital flows to the country. As institutional quality index includes the corruption ratio in the national level institutions and also the portrays the law-and-order situation of a country. If the institutions are in better position, it means that they can provide security to the foreign investors and residents of foreign as well as overseas citizens. That's there is a dire need to focus on the managing the capital flows.

4.4 Short Run Estimates

Table 4 below contains the short run estimates of our study and also have the value of error correction model. The table shows that all the signs are as expected and fulfilled as interest rate differential and all independent variables except exchange rate volatility which shows positive trend towards capital flows in short run. In all the models of long-run the coefficients have relatively stronger effect on net capital flows as compared to short-run.

The most important factor in the estimates of table 4 is the value of error correction model (ECM), that tells us about the time shocks will take in long run to stabilize. The value of ECM is presented in the results indicates that it is statistically significant, and the negative sign shows that the co-integration in the long run between the variables was established in the short run. ECM coefficient is -0.1167 in model 1, which posit that with the speed of 11% the shocks or variations of short run adjusted in the long run by this speed.

Table 4.4: Short Run Estimates and Error Correction Term					
	Model I	**Model II**	**Model III**	**Model IV**	**Model V**
ΔInterest Rate Differential (IRD)	0.3457*	0.1973*	0.3699**	0.1181***	0.8457***
	(0.1800)	(0.1053)	(0.1374)	(0.0398)	(0.1579)
ΔREER	-0.1886*	-0.8994***		-0.8947**	-0.9644
	(0.0963)	(0.1877)		(0.3736)	(0.8240)
ΔInflation	-0.3771	-0.3575	-0.2787***	-0.7833***	-0.2190
	(0.2496)	(0.2667)	(0.0680)	(0.1779)	(0.1308)
ΔSize of Economy	0.8520**	0.2506**	0.1904***	0.2396***	0.5682**
	(0.4026)	(0.1026)	(0.0323)	(0.0762)	(0.1855)
ΔMoney Supply (M2)	-0.9856***				
	(0.0675)				
ΔCredit to Private Sector		0.8512***	0.7819***	0.3910**	0.9646**
		(0.1562)	(0.1891)	(0.1985)	(0.4188)
ΔExchange Rate Volatility			0.9840**		
			(0.4874)		
ΔInstitutional Quality				0.4387**	0.0916**
				(0.1826)	(0.0499)
*ΔInstitution *Interest Differential*				0.8471*	0.0848***
				(0.4972)	(0.0187)
ΔAbsorptive Capacity					0.5808
					(0.8876)
*ΔAbsorptive Capacity*IRD*					0.7656***
					(0.1902)
constant	0.9369***	0.3865	0.0687*	0.5387	0.9132*
	(0.2552)	(0.4557)	(0.0387)	(0.5729)	(0.4239)
ECM	-0.1167**	-0.1155**	-0.1082**	-0.1437**	-0.1257***
	(0.0489)	(0.0406)	(0.0378)	(0.0700)	0.0218)
Diagnostic					
R-Squared	0.5710	0.4740	0.4128	0.4859	0.5751
F-Stats	6.2377	5.3350	4.3977	6.7530	6.8338
Durbin Watson Stats	1.7654	1.6905	1.5138	1.6600	1.6757
CUSUM	Stable	Stable	Stable	Stable	Stable
CUSUMSQ	Stable	Stable	Stable	Stable	Stable

In model 2, the value of coefficient of ECM is -0.1152, this indicates that fluctuations in short run are adjusted by 11.52% every year and would be completely adjusted in next 7 to 8 years towards equilibrium. In model 3,4 and 5, the adjustment speed is 10.82%, 14.37% and 12.57% simultaneously. All other regressors are showing the significant and similar results with different magnitudes in comparison with long-run estimates.

4.5 Diagnostic Test

To check the reliability of the estimates the models are approved through some important diagnostic test. These tests include test for normality of the data, the serial correlation, heteroscedasticity, and functional form and also includes CUSUM and CUSUMQ test to check the stability of the models. The p-values of 0.2377 for first model, 0.3350 for second model, 0.3977for third model, 0.7530 for model 4 and 0.8338 for model 5 in table no. 3. It indicates that there is no serial correlation and p-values of 0.7654 for model 1, 0.6905 for model 2, 0.5138 for model 3, 0.1660 for model 4 and 0.6757 for model 5 rejected the claim of existence of Heteroscedasticity. Similarly, the p-values of functional form and normality also satisfied the assumptions of the models. In table 4 the values of r-square (i.e., 0.5710, 0.4740, 0.4128, 0.4859, 0.5751) implied that the variables are well explained within the models. The DW stats have also confirmed that there is no serial correlation. Finally, in the end CUSUM and CUSUMQ also proved that the estimated models are stable.

CHAPTER 5

CONCLUSION

This study examined the relationship among the monetary policy tools and net capital flows and to evaluate that how flows of capital respond to the variations in monetary policy instruments and decisions in Pakistan. This study found that the significant determinants of capital flows in short run and long run are interest rate differential, money supply, credit to private sector, real effective exchange rate inflation and institutional quality. Since 1990s capital flows has been emerged as the solution to the many problems of the economy in the developed countries and over time the developing countries also start managing the international flows through different macroeconomic policies mainly by monetary policy.

To analyze the determinants of the international capital flows in Pakistan we have used the annual data from 1980 to 2019. Then the bound test approach of Autoregressive Distributed Lags (ARDL) is used to estimate the relationship between the variables which gives the confirmation of existence of long-run co-integration between net capital flows and monetary policy instruments (i.e., interest rate differential and money supply). The highly significant impact of interest rate differential on capital flows is 76.64%, it means that if interest rate differential will change by 1% then net capital flows would be change by 0.7664 million rupees. Not only the interest rate differentials change the flow of international capital but there are other factors also have a significant impact on the mobility of capital flows of Pakistan, such as institutional quality has a significant impact. It is not only supported by literature, but our calculations also indicates that if the quality

of institutions will become better than it would also increase the mobility of the capital flows in a positive manner. Likewise, the ECM term also shows the significant relationship among the factors of monetary policy and net capital flows in short run and value of ECM (i.e., -0.1082) confirms that fluctuations in short run would be adjusted in long run by 10% of yearly basis in next 7 to 8 years. The interest rate differentials have an impact of 84.57% in short run while credit to private sector has 96.46% impact and institutional quality and absorptions capacity have 9.16% and 58% influence on the capital mobility.

5.1 Policy Recommendations

Since the empirical evidence of this study has revealed that monetary policy instruments such as money supply and interest rate have significant impact on net capital flows. Along with instruments of money supply there are other variables such as financial development, inflation rate, real exchange rate and interest rate differentials have considerable and significant influence on the net capital flows. Taking into account the results of this study, it is proposed that policy makers should focus on the monetary policy tools in a way that they can control the overflow either in the form of capital inflows or outflows, capital flows should not put pressure on the other factors such as inflation and real exchange rate. Although capital flows prove helpful in making economy better but there are other countries which also face negative influences of excessive number of flows. Moreover, policy makers should also focus on enhancing the absorptive capacity and to improve the institutional quality.

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