The Impact of Monetary Policy on Consumption and Investment: Evidence from Pakistan

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CERTIFICATE

This is to certify that this thesis entitled **"The Impact of Monetary Policy on Consumption and Investment: Evidence from Pakistan".** submitted by **Mr. Kazam Raza** is accepted in its present form by the Department of Business Studies, Pakistan Institute of Development Economics (PIDE) Islamabad as satisfying the requirements for partial fulfillment of the Degree of Master of Philosophy in Economics and Finance.

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Abstract

The present thesis highlights the analysis of Pakistan's monetary policy transmission channels i.e. interest rate, consumer price index, exchange rate to consumption and investment. The annual data of all variables included monetary and macroeconomic variables were taken from 1977-2019. To investigate the internal relationship i.e. relationship between short run and long run monetary policy and macroeconomic variables, this study has used VAR (impulse response function), Vector Error Correction Model (VECM) and Johansen and Julius test with respect to I(1) order of all included variables in the model. The results show that interest rate and consumer price index on gross fixed capital formation having negative relationship for whole system including IRFs and VECM model. Also, consumption in comparison with GDP shows highly significant and positive relationship because the relationship between income and expenditure is often called a consumption schedule. Moreover, the results show that monetary variables contribute the greatest impact on consumption and investment. Finally, we also found that, the impact of monetary policy on consumption and investment varies over time.

Chapter 1

Introduction

Monetary Policy is one of the most important macroeconomic policy tools used by the policymakers as it affects both real and nominal variables of the economy. It is necessary to analyze how economy is affected by the monetary policy and how this monetary policy coordinate with other macroeconomic policies in order to evaluate the state of the monetary policy within a given time frame to lessen the distortion and shortcomings of the economy. Policymakers must accurately predict the time and effect of the monetary policy on the economy and the channel and mechanism through which monetary policy affects the macroeconomic variables.

Pakistan, like other developing economies, is a consumption-oriented society having a very high marginal propensity to consume (MPC). Because of the private sector is distinguished as the huge component of the economy's overall aggregate demand. The sector wise analysis of spending approach of Pakistan provides a broader view of the growth drivers that contain investment and consumption. On a nominal basis, private consumption spending was 79.93% of GDP in FY17 compared to 77.77% in FY16, while public consumption spending was 11.78% of GDP compared to 11.26% in FY16. During 1980's the economic growth was over 6% while it dropped down to 4% in the decade of 1990's. The reason behind this fall of the economic activity was the decline in gross investment at a level far below the needs of the economy. Gross investment during 1980s was 17.9% of GDP; it dropped to 17.2% in the first half of the 1990s and fell further to 13.6% in the other half[1]. The downfall in gross investment is because of the decline in both private and public investment.

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[1] All these figures are taken from the various issues of Economic Survey of Pakistan

Now the question emerges how monetary policy affects the investment and consumption pattern. The answer to this query is that monetary policy operates through affecting the components of aggregate demand and in this way affects the real economic activity and inflation. The level of effectiveness of monetary policy lies on the extent of variation in policy and the ability of others to predict, along with this the impact of such modifications on future prospects of the policy also affects the consumer behavior and confidence of the public sector. Monetary policy plays an important role while transmitting their effects in inflation and output in the presence of four channels containing the real variables are exchange rate, interest rate, asset prices and, finally, credit (Mishkin, 1995; Taylor, 1995).

Starting from the "Interest Rate Channel", this channel contains short and long-term interest rates, along with the domestic and business sectors with real interest rates. The rise in short-term interest rates leads to a rise in long-term interest rates, which increases the cost of capital and reduces demand of capital and finished commodities. This might lead to a decrease in investment demand and aggregate demand for these goods (Mishkin 1995).

In macroeconomic models, interest rates are used to examine the impact of interest rate on capital's cost aiming to determine the consumption and investment spending decisions of households and business sectors. The consumer cost of capital is a key factor in determining the capital demand for consumption and investment, especially when it is expended on capital assets. Consequently, the increase in inventories from capital assets includes costs associated with the interest rate changes that affects both spending and investment decisions. Therefore, anticipated age of an asset, which is mostly long-term, regulates the real interest rate and the anticipated asset value of real capital (Boivin et al, 2010; Clarida et al, 2000). Investment decisions taken by the household and corporate sector are also depend on the interest rates as according to the

Tobin's q[2] theory. So, if the market value of an asset is higher than the capital replacement cost then the expenditure on investment is higher (Boivin et al, 2010).

Furthermore, the strategies taken by the monetary authorities also directly affects the interest rates, which depends upon number of factors, including the structure and association of financial market, the response of economic amenities, institutional framework along with the configuration of financial liabilities and assets. As a result, it is one of the major channels, with direct and indirect interest rate gaps accounting for about 80% of investment actions affecting GDP.

In emerging market, by contrary, numerous barriers hinder the channel of interest rate from functioning efficiently. For instance, having advanced financial and credit market, along with the binding restriction of interest rates, particularly in countries where commercial banks are owned by the state, limits the ability of these banks to provide the loans as accord to the commercial values and standard measures (Horvath & Maino, 2006; European Central Bank, 2002). Some people believe that fluctuations in the short and long-term interest rates and the liquidity of small economies that are vulnerable to the world, is the main cause for the shortage of production. (Kuttner & Mosser, 2002).

Monetary policy also operates through the consumption channel and the influence of monetary policy through the consumption channel reflects on the prices of household assets such as real estate and equity, and behaves according to the variations in the market values of stock, real estate and resources of the domestic sector. It can be said that due to variations in the economic standard of these markets, it is impractical to predict the efficiency of this channel in

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[2] Tobin's q theory is described as the market value of an asset divided by the capital replacement cost. The higher the (q) value, the greater the value of asset and the asset value which is greater than the capital replacement cost in turn increases the expenditure of investment.

developing markets (Kamin et al, 1998). The consumption channel takes into account the wealth effect along with the life cycle hypothesis.

The importance of the exchange rate channel depends on the rate of participation of intermediate goods in the production of tradable goods. As this rate increases, so does the impact of exchange rate on demand and GDP increases. On the contrary, if this rate decreases, the impact of exchange rate on aggregate demand will be more limited and therefore accelerate the rate of inflation. The channel of exchange rate is more significant for developing economies as the exchange rate in these economies is greatly influenced by the incompatibilities appear in international markets of exchange.

The association between the exchange rate and interest rate relies on the risk-premium. If the risk premium is more stable and lower, the more efficient the exchange rate perception is in case of the movements in interest rates (Mohanty & Turner, 2008). The exchange rate channel employed open economic model via Uncovered Interest rate Parity (UIP), so as exchange rate fluctuates more, higher the capital outflow and lower the rate of nominal exchange (Zams & Cooray, 2007). Taking into account the level of stability of the economy, a real upsurge in the value of the local currency means a reduction in the price of the imported commodities, which can lessen the domestic inflation directly (called exchange rate pass through). However, it depends on the rate of increase in value of currency, foreign import rates and overall environmental circumstances of the economy, (Kara et al., 2005; Devereux et al, 2003)

The Credit Channel relies on the rate of interest and the internal variations it makes in the premium of external finance that signifies the difference between internal assets (retained profits) and external assets (debt or share of issuance). External financing and its sustained interests reflect the embedded flaw in financial market and the issues, which amenities faced during the

process of obtaining required finance because of inconsistencies in financial data or asymmetric information between borrowers and lenders (Bernanke & Gertler, 1995; Mishkin, 1995). Excessive liquidity from banks can sometimes be a source of credit supply because they can be substituted for foreign debt or capital (Aban, 2013). The borrower's capability to obtain loans is directly related to the external finance premium, which means that requisite external finance premium has an inverse relationship with net wealth.

More importantly, in developing countries, private investment has a decisive role in determining the economic growth than public investment (Oshikoya, 1994; Naqvi, 2002). In viewing of that, many studies have been made in the developing countries with the aim of exploring the determinants of private investment (Abbas, 2003; Atukeren, 2005). Due to financial liberalization, the modification in macroeconomic variable are more likely to change the parameters of investment function, because investment decision is affected by both increased influence of borrowing cost and credit constraints relaxation (McKinnon and Shaw, 1973; Akkina and Celebi, 2002).

There is now substantial evidence to reveal that in long run rate of growth, private investment is the most important determinant. The slowdown in private investment which is mainly resulted from loss of investor's confidence, is also one of the reasons of poor economic performance. So, determinant of private investment and the nexuses of determinants of private and public investment will be beneficial in structuring economic package that promote private investment and also boost economic growth.

This line of work is based on observations, monetary policy takes the actions to influence on economic agents (households and firms). More than this, the consumption pattern of household and investment pattern of firms changes by the change in interest rate. However, in the previous

studies Morten et al (2014), Dilek et al, (2012), Rahman (2010), Elbourne (2008) and Andrade and Divino (2005) discussed monetary policy (the behavior of interest rate). These direct channels of policy rate have a direct influence on inflation and output. While, the effects of monetary policy on indirect channels and the justifications of consumption and investment were not well described in the previous studies.

A timely and well-functioned monetary policy can lead to an increase in inflows (Foreign Direct Investment), keeps the economy safe from internal and external damaging shocks (John B. Taylor (1995), Tillmann (2008), Andrade and Divino (2005)). However, contractionary monetary policy increases the interest rate that damages the public borrowing from internal sources, while this step may widen the fiscal deficit. Furthermore, investment channels would start to hurt badly and overall economic growth of a country slows down. To tackle this issue, for the government of Pakistan is continuously bearing fiscal gap. In this case government of Pakistan has no more other options but to borrow again and again from their internal and external sources and these steps become more expensive for the economy.

Moreover, when monetary policy is altered using policy tools, these tools can become the reason for change in macroeconomic variables in a systematic way. Hence, these policy shocks are sometimes useful as well as damaging for the economy but this depends on the behavior of shocks and socio-economic situations. Thereby, internal or external shocks affect the policy rate and this can lead to change in macroeconomic variables, including inflation and gross domestic product. Therefore, in advanced countries state banks conduct their monetary policy on the basis of overnight interest rate per month. On this account, achieving target is essential otherwise the financial system of a country will face distress.

The current study tries to capture the aims of monetary policy for Pakistan and also find the other macroeconomic variables influence by monetary policy shocks those are not still explored. Nevertheless, Pakistan monetary policy transmission channels, i.e. interest rate, credit, exchange rate, and asset price channels to private consumption and private investment.

1.1 Problem Statement

Monetary policy of an economy plays a pivotal role for government financing when an economy is facing continuous fiscal deficit. More than this, monetary authority tries to handle price stability, foreign inflows, exchange rate pressure, fluctuations in stocks, internal and external payment system, investment and financial imbalances within the country. To tackle these issues, the central bank tried altering its interest rate but real challenge facing by the government is that the Pakistani economy may have truly entered 'Stagflation' Which outlining the phenomenon of an economic condition come together slow growth and relatively elevated unemployment with rising inflation or prizes. Most of the present economic managers not only knowing this situation but also the recent measures of central bank involve the actions, which are customarily exercised to control stagflation. Taking the textbook monetarist view, Governor State Bank, seems to have set his primary macroeconomic objective as reduction of inflation, even at the higher cost of unemployment and lower economic growth in short run. However, the intentions may be noble but it is not so simple and may also create more troubles. Monetary policy principally used to overcome the inflation through increasing the rate of interest, subsequently increasing the borrowing cost and decreasing aggregate demand. Now such tools of monetary policy may or may not be much beneficial in order to reduce inflation in an economy experiencing stagflation, but one thing is clear that the aggressive discount-rate policy definitely

cause the bigger fall in the growth of country's GDP, which in turn worsening the worsening the problem of stagflation, especially in those economies where growth is already neat to the ground.

1.2 Objectives of the Study

After the discussion of monetary policy and their consequences on inflation and output it is essential to interrogate the factors those are not explored in the past studies in case of Pakistan because monetary policy changes not only influence inflation and output but also have impact on consumption volatility, investment, fiscal balances and exchange rate volatility.

- o To examine the impact of monetary policy on consumption.
- o To scrutinize monetary policy impact on investment.

1.2.1 Research Question

- ➤ Can monetary policy impact on consumption?
- ➤ How monetary policy change the behavior of investment?

1.3 Significance of the Study

In practice, State Bank of Pakistan monetary policy have instruments to adopt for achieving macroeconomic targets like stabilizing inflation and sustainable economic growth. However, monetary policy tools include the requirement of statutory liquidity, requirement of the reserve of the cash and open market operations. Therefore, in the previous studies in case of Pakistan having bundle of literature exists on inflation and output growth while in the literature is missing the impact of monetary policy on both investment and consumption. Finally, this is the only study to move the attention of researcher and policy makers to move research on monetary policy on investment and consumption.

1.4 Organization of the Study

The rest of the thesis is structured in the following manner; Chapter two explain the theoretical frame work, literature review for analysis and explore the literature gap. Chapter three give the detailed explanation of the data source, methodology and variable construction. In chapter four we describe estimation and results and chapter five summarizes the conclusion.

Chapter 2:

Literature Review

2.1 Introduction

Monetary policy helps in conquering the goals of sustainable growth of economy and price stability. The efficient transmission mechanism or a healthy performance of monetary policy protect the economy from the damaging effects of different shocks. However, the empirical literature and other studies, examines the monetary policy reaction for different countries by pondering the effect of different mechanisms with different frame work. Monetary policy plays an important role while transmitting their effects in inflation and output in the presence of four channels containing the real variables are exchange rate, interest rate, asset prices and, finally, credit (Mishkin, 1995; Taylor, 1995).

2.2 Theoretical literature

To scrutinize the effectiveness of monetary policy to investment and consumption in case of Pakistan, the understanding of transmission mechanism of monetary policy is prerequisite which can be differentiated into four different channels i.e. asset price channel, exchange rate channel, credit channel and interest rate channel. We have reported below:

2.3 Interest rate Channel:

The Interest Rate Channel contains short and long-term interest rates, along with the domestic and business sectors with real interest rates. The rise in short-term interest rates leads to a rise in long-term interest rates, which increases the cost of capital and reduces demand of capital and finished commodities. This might lead to a decrease in investment demand and aggregate demand for these goods (Mishkin 1995).

In economic literature, the mechanism of transmission of monetary policy through interest rate has been a standard characteristic. According to the Keynesians basic textbook model interest rate channel is the essential monetary transmission mechanism. The traditional Keynesian view is that, contractionary or tight monetary policy heading to uplift the real rate of interest, which increases the cost of capital, due to this high cost the spending on investment decreases, thus leading to decline in aggregate demand and fall in output.

Whereas, the view point of Taylor is that the interest rate has the strong impact on investment spending and consumption. In his paper he also argues that this channel of monetary transmission is a central component of transmission of monetary policy effect to the economy. According to Taylor's model, the contractionary or tight monetary policy enhance the nominal interest rate in short run. Then the real long-term interest rate also increases through combination of both sticky prices and rational expectation at least for a time (Boivin et al, 2010). As the result of these higher real interest rate the residential housing investment, business fixed investment and consumer durable expenditure and inventory investment are decreases, which causes the decrease in aggregate output. Similarly, the investment decision taken by business sector and households are also relevant to the interest rate through the Tobin's q theory.

Some people believe that fluctuations in the short and long-term interest rates and the liquidity of small economies that are vulnerable to the world, which is the main cause for the shortage of production. For those pursuing the tight monetary policy, price viscosity can increase real and nominal interest rates, which may increase the capital cost and reduce the spending on investment, thereby reducing overall demand and real GDP. However, pursuing a loose monetary policy can lead to a reduction in nominal interest rates, which in turn can lead to a

reduction in real interest rates, and shrink the value of capital and thus raise the investment spending and GDP (Kuttner & Mosser, 2002).

Long-term interest rates determine through the variation in the rates of GDP growth and inflation. Subsequently, if the objective of the monetary policy is to preserve the prediction regarding the inflation and GDP growth rates, then there will be no change in long-term interest rates. However, long-term interest rate may change, if the variations in monetary policy are unnoticeable and unanticipated by the individuals. The present value of any asset is inversely correlated with the long-term interest rate and is directly related to the rate of return on total assets (Moreno, 2008; Ando & Modigliani, 1963).

Moreover, the policies adopted by the monetary authorities also effects the interest rate. These policies mainly include the financial organization and market structure, composition of financial liabilities and assets, institutional framework, as well as the reaction of economic facilities. Consequently, this channel also plays the pivotal role in industrial countries, as the gaps between indirect and direct interest rate interpret the movements of investment which effect the GDP.

The competence of this channel varies from one country to another and it depends on numerous factors like level of economic performance, future profits, macroeconomic prospects, speculation along with the variations in risk premium.

2.4 Exchange Rate Channel:

In emerging economies, the exchange rate channel has great importance because exchange rate is substantial tool for private sector predictions concerned to inflation and currencies in such emerging economies, are significantly influenced by infidelity occur in international exchange markets. In addition, the variations in the rates of exchange affect the

overall balance sheet of amenities and of individuals whom liabilities and assets are in foreign currencies.

Similarly, the relationship among exchange rate and interest rate depends upon the risk premium. In case of interest rate movement, the more stable and lower risk premium, the more certain the receptivity of price of interest rate. However, the importance of these channels depend upon the participation rate of intermediate goods in tradable goods production. The higher the rate, the greater the impact of exchange rate on demand and GDP. Conversely, lower the rate of adjustment, lower will be the real exchange rate and higher will be the tradable commodities as compared to non-tradable commodities (Zams & Cooray, 2007).

2.5 Credit Channel:

The credit channel depends on internal changes and interest rate, it causes in the External finance premium. This signifies the variation between internal assets and external assets (debt or share issuance) which involves retained profits. External financing and its sustained interests reflect the embedded flaw in financial market and the issues, which amenities faced during the process of obtaining required finance because of inconsistencies in financial data or asymmetric information between borrowers and lenders (Bernanke & Gertler, 1995; Mishkin, 1995).

Credit channel take account two internal channels that is Balance Sheet Channel and Bank Lending Channel. For Bank Lending Channels, the problem of asymmetric information between depositors (money provider) and commercial banks leads such banks to impose limitation on the sources of funding available to lend against the demand deposits. Therefore, the process of lending becomes more challenging and costly, particularly for small banks where capital is not sufficient as compares to large commercial banks. Following the tight monetary policy, small banks are unable to arrange alternate sources of financing for lending, as a result monetary

authority will pressurize such banks to cut down the lending activities. This provides two evidences, firstly, banks with sufficient liquidity and large capital can mitigate the effects of monetary policy and secondly, the adequacy of bank capital is a crucial factor in its ability to carry on lending activities, particularly, when the movements in monetary policy are reverse (Aban, 2013).

One of the most important changes to be considered is the net wealth, cash flows and liquid assets of the borrowers as such channels play a key role in the financial attitudes and situation of the borrowers that behaves according to the variations in the nominal rate of interest. Additionally, variations in the interest rate can cause alteration in the demand of various kinds of assets and asset values held by the borrowers, which can affect their financial behavior, their ability to obtain loan for investment and consumption, and their net wealth. Thus, the borrower's capability to obtain loans is directly related to the external finance premium, which means that requisite external finance premium has an inverse relationship with net wealth. So, the higher the financial solvency of the borrowers, the less the contradictory interests with the lenders, as the borrowers will be more able to finance themselves and provide greater financial assurance for their liabilities. Monetary policy affects the supply of money in the economy, which affects the interest rates and the rate of inflation. It also affects business expansion, employment, net exports, and credit costs, which all influences the aggregate demand directly or indirectly.

2.6 Asset Price Effect or Consumption Channel:

The channel of asset price model reveals the impact of monetary policy on domestic asset prices such as real estate and shares, and its performance based on the real estate, value of shares, change in market and household sector resources. This channel involves wealth effect which take into account saving, consumption and their application in its lifecycle hypothesis. Moreover, the

changes in inflation and growth rates determine the interest rate in long term. In the similar vein, if the aim of monetary policy reaction is just preserving the prediction related to inflation and growth rates then the interest rate in long run will not change, while if the adjustment in monetary policy are unexpected and imperceptible by individuals, this situation might changes the interest rate in long term. Thus, the long term interest rate is inversely related to the any assets current value and directly related to the rate secured on total asset.

2.7 Empirical literature

John B. Taylor (1995), presents a simple framework through which monetary policy determinants are transmitted into changes in inflation and real GDP. According to this study, monetary framework has been internationalized, the framework of financial market price differentiates quantitatively between market interest rate and, the split-up of nominal GDP between inflation and real GDP has been tackled by empirically estimated staggered price-setting equation which involves long-run monetary neutrality and short-run non neutrality. Mushin, F.S. (1995) provide an overview of monetary transmission mechanisms which includes exchange rate effects, interest rate effects, other asset price and the so-called credit channel. The rationale behind this study is that, in conducting a successful monetary policy, the monetary authorities must assess the accurate time and effect of their monetary policies on economy.

Mushin (2001) studies the transmission mechanisms of monetary policy by focusing the channels other than interest rate channel. This study discussed the role of other asset price in conducting monetary policy. It summarizes transmission mechanisms of monetary operations through exchange rate affect, stock prices and real estate prices, which affect the decisions of consumption and investment of both households and firm and stated that change in other asset prices also play an important role in formulation of monetary policy.

Monetary policy affects the private investment via the channel of interest rate as it changes the value of capital and also affect the net cash flow available to the firm which in turn affects the private investment (Chatelain et al 2001). According to this study, the interest rate channel is effective when fluctuations in market interest rate change the cost of capital and therefore, affects investment. While credit channel is effective when fluctuations in market interest rate alter the condition of balance sheet and the cash flow available to the firms and through it, it affects the private investment.

Andrade and Divino (2005), add evidence on the debate of monetary policy's main objectives followed by the Japanese banks. The impulse responses obtained by estimating structural VEC, confirms the importance of exchange rate in explaining Japanese Banks behaviors. However, the impact of interest rate was not significant or weak on output gap and it does not offset the expansionary impact of devaluation of exchange rate on output gap.

Similarly, Mehrotra in (2007), examine the role of interest rate and exchange rate channels by estimating degrees of openness and different monetary regimes during the deflationary episodes in China, Hong Kong and Japan. The main finding of this paper is that, the interest rate channel was found highly important in both Hong Kong and Japan, while in China interest rate was not found as an important tool of monetary policy. Additionally, this paper also provides evidence regarding the role of external influence during deflation episodes.

Tillmann (2008), proposes empirical approach for assessing the effect of cost channel of monetary transmission within the framework of New Keynesian Philips curve. They generate fundamental inflation series and shows that the impact of interest rate on inflation dynamics was significant and consistent with cost channel of monetary transmission. Whereas Elbourne (2008), estimates structural vector autoregressive model (SVAR) for eight variables of the UK economy

and investigate the role of house prices in the transmission mechanism of monetary policy. Their impulse responses states that the role housing market is not important in the transmission mechanism of monetary policy due to the effect of interest payments on mortgages.

Uncertainty about the oil prices also affects the response of monetary policy on macroeconomic variables. Rahman (2010), focused the uncertainty about oil prices and estimates the asymmetric effects of monetary policy and oil price shock on real economic or macroeconomic activity. This paper extended the literature of both monetary policy shocks and oil prices on real economic activity and using the monthly data in order to distinguish between low and high volatility regimes of price. The results of this paper suggest that, oil price volatility is a key determinant of real economic activity in the US, (in the high oil price volatility the loss of output growth is more as compare to low volatility regime). Moreover, it is also discussed that monetary policy is not only reinforcing the oil price shocks effect but it is also playing a role in the asymmetric response of output to oil price shocks.

In the similar vein, Ahmed in (2011), also examines how macroeconomic performance is affected by oil price uncertainty and monetary policy responses in Malaysia. The main findings of this study shows that the oil price uncertainty has an important and significant impact on conditional oil price volatility, however, dynamic impulse responses reveals that oil price shocks cause a significant and persistent decline in industrial production in Malaysia. They also find that the central bank of Malaysia adopts expansionary monetary policy in response of oil price uncertainty. While, Thomas et al, in (2011), assesses the effect of oil price shocks on consumer price inflation of euro and Spain. They find that the inflationary effect of oil price shocks is limited, though the impact on euro inflation is somewhat less than the impact on Spanish inflation.

The relationship between inflation and interest rate is explored in both empirically and theoretically by many scholars, most of them find the impact of inflation on interest rate while some also investigate the influence of interest rate on price level. In the same way, Dilek et al, (2012) inspect the relationship between deposit interest rates and the consumer price index in case of Turkey. They apply threshold vector error correction analysis (T-VEC) and finds that if the difference between interest rate and inflation exceed the threshold, the shocks in interest rate converges to equilibrium rapidly where as in case of inflation the convergence toward equilibrium is very slow and in significant. Consequently, Kose (2012), empirically examines the relationship of expected inflation and nominal interest rate for the economy of turkey by considering a period 2002 to 2009 when the inflation-targeting regime was implemented as monetary policy. Empirical findings indicate the existence of long-term cointegration between expected inflation rate and short-term interest rate. They also find that the rate of monetary policy depends upon inflationary expectation and monetary policy also effect the long-term interest rate, which implies the real long-term interest rate has influenced by monetary policy.

Morten et al (2014), construct a cross-section of downturn from 24 developed countries and analyses the efficiency of monetary policy during recession accompanying with financial crises. The empirical results of this study suggest that monetary policy during recession, associated with financial crises is less effective whereas monetary policy during normal downturn is more effective and leads to a strong recovery. Additionally, they find that the private sector deleveraging induced recovery is greater during recession.

Ismail et al, (2013) analyses how economic growth is affected by variables of monetary policy within the institutional framework. The results show that a long run relationship exists between variables. They also show that the monetary policy instruments such as, external

reserves, exchange rate and inflation rate are significant and play an important role in determining the economic growth in Nigeria. Accordingly, (Qasim, 2015), predict the impact monetary policy of Jordan and its instrument on inflation and real economic activity, by estimate the effect of Jordan's monetary policy on investment and consumption spending. The results show that investment is negatively affected by lending rate but it does not affect real GDP and consumption in short run. While in long run the co-movement of lagged investment and consumption lending rate may affect the investment. Furthermore, they find that, the co-movement in lending rate and domestic credit affect domestic credit however, the real GDP is effected by the co-movement in lending rate and real GDP.

Helder and Natalia (2018), examine the impact of economic globalization and increase in financial openness on the inefficiency of monetary policy and macroeconomic instability. The main findings of this study denotes that, economic globalization and financial openness are important tools or at least beneficial to improve the efficiency of monetary policy and a stable macroeconomic environment. Furthermore, they observe that countries with low risk of political pressure, higher development level along with the absence of international financial crisis, devise toward a better monetary policy efficiency and macroeconomic stability.

In the same vein, Farrell and Inaba (2016) focus on the relationship between monetary policy and income inequality via financial channels in advanced economies. The paper demonstrates this through wealth and income channel via changes in debt interest payments, changes in return on assets and asset prices. The results find ambiguous effect of monetary policy and income inequality. Moreover, the paper also finds that monetary policy has weak estimates to boost private consumption.

Furceri et al (2018), finds the interaction between short-term changes in monetary policy on income inequality for 32 advanced and emerging market countries over the period 1990-2013. The results suggest that on average contractionary monetary policy shocks in increases income inequality. However, the increase in policy rates increases inequality, changes in policy rates driven by an increase in growth and inflation are associated with lower inequality.

Cross (2019), studies the efficiency of monetary policy to reduce the macroeconomic change in Australian economy. The study uses Structural VAR model to check association of systematic and non-systematic monetary policy on reducing the volatility in real exchange rate, CPI inflation and real GDP for the period 1970-2015. The result suggests the change in monetary policy is associated with reduction in overall macroeconomic performance in Australian economy. As well as by, Mumtaz and Theodoridis (2019) investigates the effects of monetary policy shocks on unemployment and inflation volatility in US. The paper estimates the impact using new Keynesian DSGE model with epstein-zin preferences, search and matching labor friction and impulse response function for the period 1947-2007. The paper concludes that increase in policy rate by 100 base point, increases the unemployment and inflation volatility by 10 percent above its unconditional value. On the other hand, Francisco et al (2019), revisits the evidence of passive monetary policy of US by measuring the Behavioral New Keynesian model. They assume that firms and consumers give less attention to variables into future.

2.8 Pakistan Specific Empirical Literature

The empirical literature on monetary policy in the context of Pakistan focuses primarily on the direct effect of monetary policy on inflation and output. Furthermore, the existing studies emphasize the relative effectiveness of monetary and fiscal policy. For instance, Asif et al (2005), investigate and disentangle the propagation of monetary policy shocks in Pakistan by

using vector auto regressions. A set of key findings to a tight monetary policy point out that, initially the response of aggregate price very minute, but subsequently this response declines persistently and significantly. The results also indicate the important role of banks, which affect aggregate spending through lending private sector. Finally, they found exchange rate channel has less significant by comparison.

(Malik, 2008), attempts to examine the impact of crude oil as well as macro variables on output in case of Pakistan, by using monetary policy, IS and augmented Philips curve. This study founds the strong relationship between oil price and output. This relationship is bell-shaped which represents that, increase in oil prices after threshold level harming the economy. This paper also finds that, economic vulnerability reduces as oil imports shares decreases with rise in income and this is only achievable when there is long term and sustainable growth in GDP. Finally, this study argues that, the rising trend of investment helped a lot in the process of sustaining the growth of the economy.

(Munir & Qayyum, 2014), analyze the impact of monetary policy on macroeconomic variables, using the factor augmented vector autoregressive (FAVAR) in Pakistan. FVAR model provide reliable results and in case of Pakistan, it provides and explain monetary policy results which are articulate with the theory. The main findings of this paper provide assistance to the effectiveness of the channel of interest rate in Pakistan. They said that in Pakistan interest rate is a good instrument and plays a vital role in controlling inflation because the influence of interest rate on inflation (price) is negative. They also provide evidence in case of prices the transmission of monetary shocks are faster than in case of output.

2.9 Literature Gap

After reviewing the existing literature on the monetary policy and its effect on different macroeconomic and financial variables for developed and developing countries including transmission to inflation and GDP, exchange rate effects and interest rate, asset prices and other so called credit channels, real estate prices, decisions of consumption and investment, oil price shocks, monetary policy shocks, consumer price index, credit expansion, internal and external reserves, financial openness, income inequality, private and public consumption and unemployment. To keep these views, there is no single study on the Pakistan economy to determine the impact of monetary policy transmission on macroeconomic volatilities, specifically on consumption and investment, though the study of Qasim (2015) available that investigate these macroeconomic volatilities in case of Jordan. Consequently, this study fills the gap by including the concept of modern monetary theory for Pakistan's monetary policy. However, this study concentrates on changes in policy rate and real economic variables and financial variables considering the increasing interest rate is not controlling the inflation in context of Pakistan.

Chapter 3:

Data and Methodology

3.1 Introduction

A framework has been developed to analyze the variables i.e. private consumption, public consumption, interest rate, consumer price index, real effective exchange rate, gross domestic product and gross fixed capital formation. Time series data of different variables that cover the period from 1977 to 2019. Relevant data is collected from Board Investment Pakistan, Pakistan Bureau of Statistics (PBS), State Bank of Pakistan (SBP), World Bank Development Indicators (WDI) and International Financial Statistics (IFS). Therefore, time series VAR model is estimated by testing for stationarity by the ADF test, Johansen test for co-integration and long run equilibrium, VECM for short run adjustments and convergence.

3.2 Theoretical Framework

Literally, the household consumption patterns depend upon their income how much they consume and how much need to save because this debate is more essential and daily routine discussed in macroeconomic. This debate is appreciated and further explain by different theories but most considered and acceptable is theory of consumption explained by Keynes's) accordingly, we saw that this is the basics of many empirical studies as well as for theoretical studies.

In Keynes point of view consumption is treated as common sense level for general public. Keynes describes throughout with the help of practical examples and on the basis of real life examples never ever included abstract, econometrics and mathematical equations for theory,

and one of revolutionary thing was that no kept the basis utility maximization and consumer behavior, but, accept the knowledge of human nature.

While not included numerical figures for support but instead claims to glean support from "detailed facts of experience." How much economics has changed in seventy years? The prelahminar psychology about for human beings always depends on income when he/she has earned more income from their daily routine economic activities feeling relaxed and spend more on daily routine requirements. All these discussed things are not only for assumption while discussed on the basis of past experienced because as a rule and on the average, to increase their consumption as their income increases, but not by as much as the increase in their income. Keynes (1936)

In the same vein well known economist by Simon Kuznets (Nobel prize winner in the economic reign) defined national income accounts and consumption patterns and pointed as paradox that would not be explained with the assist of simplest linear consumption pattern and consumption function. The Simon paradox theory described the percentage of disposable income that can be consumed in the long run but the controversial of short run, which suggests a proportional consumption function, i.e., that the intercept term a is equal to zero. Therefore, calculated for the whole individual households as well again employing short-run aggregate time-series fluctuations in income and consumption which finally, meaning that the contribution of income consumed fall when income rises.

Another contribution in the similar work done during 1950s while not as much discussed in the same period as gain popularity in the future the debate got the tag reputation with the name of "Relative Income Hypothesis" the explanation of this work is household's consumption

pattern not only depends on its current disposable income, while on current income as well relative to past levels and relative to the income of other households.

More than this, in the literature two other theories gained the fame in life-cycle model in income hypothesis developed by the associated with Franco Modigliani and Milton Friedman. These two theories merged and to become the name with Modern Consumption Theory. From their original form both theories are diverging with each other on different point.

Also moving to discuss the literature related to investment after some relevant discussion on consumption and income analysis. Therefore, John M. Keynes and Irving Fisher both economist gave the over review of the investment theory and described that investment are made until the present value of expected future revenues, at the margin is equal to opportunity cost of capital. The meaning of this discussion is that made until the net present value is equal to zero. Hence, the fundamental difference between the Keynesian view and Fisher view lies in the perception of risk and uncertainty and how expectations were formed.

The objectives of the current thesis are to interrogate the impact of Pakistan monetary policy on consumption and investment by including monetary variables i.e. interest rate, consumer price index and real exchange rate while employing annual data frequency. In the first stance to check the stationarity of the existing data. Afterwards, check an impulse response function (IRFs) analysis for finding internal movement of the consumption and investment when impulse or shocks facing the target variables through different type of monetary policy (Contractionary and Expansionary). To reach on the destination, in this thesis employ different econometric techniques including Vector Auto Regressive, Impulse Response, Johansen and Julius co-integration technique for the long run, Vector Error Correction Mechanism VECM for the short run to check the speed of adjustment.

Table 3.1 Variables

Variables	Name	Data Series	Source
Dependent Variables	*Private Consumption*	*Yearly*	*IFS*
	Gross Fixed Capital Formation	*Yearly*	*WDI*
	Public Consumption	*Yearly*	*WDI*
Independent Variables	*Interest Rate*	*Yearly*	*SBP*
	Consumer Price Index	*Yearly*	*SBP*
	Gross Domestic Product	*Yearly*	*WDI*
	Real Effective Exchange Rate	*Yearly*	*Investing.com*

3.3 Vector Autoregressive (VAR) Model

For the analysis of Monetary policy and macroeconomics gave the idea of specification of model in empirical way Walsh (2017-18) presents much of understanding by the impact of monetary policy transmission channels on consumption and investment or in easy way to describe the idea of him monetary policy impact on macroeconomic variables. Hence, in this discussed case the VAR methodology is best also preferred this idea by Sims (1972, 80).

Therefore, the econometric specification of VAR at the steps for variables selection criteria, lag length and others assumptions of the model. For the matter of fact, VAR model is the

best design to the real time implementation of monetary policy and the context of the country investigated (Walsh 2017).

This study employs the Vector Autoregressive (VAR) to study the impact of monetary policy on consumption and investment. VAR is a solid conduit between economic theory and multivariate time-series regression analysis in order to determine the time path and hence the dynamic response of variables to various disturbances or shocks that occur within the economy.

3.4 Co-integration Test and Vector Error Correction Model

In econometrics co-integration test can be employed to check the long run relation among the variables. However, if the variables are associated and having equilibrium within variables this means that long run relationship exists. So, association and equilibrium within variables and this confirms that variables are cointegrated. As well as, the association of short run within variables meaning that the convergence towards long run equilibrium.

In the present thesis to find out the relationship among the included variables in the whole model and to check the long run association the long run relation within with reference variable to concerned to employ JJ test (Johansen and Juselius test). In spite of that checking the association of monetary and macroeconomic variables.

The Johansen Approach allows the assumptions of any endogeniety/exogeneity of the variables to be avoided. Johansen approach tests the cointegration between the variables with concerning of VAR "Vector Autoregressive Approach".

The VAR specification tested by Johansen Approach is used as follows:

$$x_t = A_0 + \sum_{j=1}^{k} A_j\, x_{t-j} + D_t + \varepsilon_t$$

Where A_0 shows the constant vector, x_t explains the vector of variables which are integrated of order one i.e. I(1), the lags are signified by k, the coefficient matrix is denoted by A_j and ε_t symbolizes the error term also known as idiosyncratic error term or Gaussian error term. The reformulation of vector autoregressive process into Vector Error Correction Model (VECM) is in the following way:

$$\Delta x_t = A_0 + \sum_{j=1}^{k-1} \Gamma_j \Delta x_{t-j} + \Pi x_{t-k} + \sum_{i-1}^{P} \sigma_{1i} D_{t-1} + \varepsilon_t$$

Where $\qquad \Gamma_j \quad = \quad -\sum_{i=j+1}^{k} A_j \qquad$ and

$$\Pi \quad = \quad -I + \sum_{i=j+1}^{k} A_j$$

'I' exemplifies the uniqueness matrix whereas Δ denotes the difference. The number of co-integrating vectors are originate using Trace statistics and the Maximum Eigen Values.

3.5 Model Specification

This study analyzes the internal, short run and long-run association between the macroeconomic variables and monetary variables those are represented by engaging the subsequent model:

Loggfcf$_t$ = β$_0$ + β$_1$ir$_t$ + β$_2$logcpi$_t$ + β$_3$logreer$_t$ + ε$_t$

Logprc$_t$ = β$_0$ + β$_1$ir$_t$ + β$_2$logcpi$_t$ + β$_3$logreer$_t$ + ε$_t$

logpbc$_t$ = β$_0$+ β$_1$ir$_t$ + β$_2$logcpi$_t$ + β$_3$logreer$_t$ + ε$_t$

3.5.1 Model

After discussing the theoretical background of variables, these can be written in following equations form is as follows:

Private Consumption$_t$ = $\alpha_1 + \alpha_2$GDP$_t$ + α_3CPI$_t$ + α_4Exchange Rate$_t$ + α_5Interest Rate$_t$ + Error term$_t$

$\quad$ (1)

Gross Fixed Capital Formation$_t$ = $\alpha_1 + \alpha_2$GDP$_t$ + α_3CPI$_t$ + α_4Exchange Rate$_t$ + α_5Interest Rate$_t$ + Error term$_t$ $\hfill$ (2)

Public Consumption$_t$ = $\alpha_1 + \alpha_2$ GDP$_t$ + α_3CPI$_t$ + α_4Exchange Rate$_t$ + α_5Interest Rate$_t$ + Error term$_t$ $\hfill$ (3)

The dynamics of the short run association and behavior of the variables i.e. convergence towards long run equilibrium path is estimated by employing the following model.

$$\Delta LOGGFCF_t = \alpha_1 + \pi_1\theta_{t-i} \sum_{i+1}^{P} \theta_{1i}\Delta LOGFCF_{t-2} + \sum_{i+1}^{P} \beta_{1i}\Delta IR_{t-2} + \sum_{i+1}^{P} \gamma_{1i}\Delta LOGCPI_{t-2} +$$

$$\sum_{i+1}^{P} \delta_{1i}\Delta LOGGDP_{t-2} + \sum_{i+1}^{P} \mu_{1i}\Delta LOGREER_{t-2} + \varepsilon_1$$

$$\Delta LOGPRC_t =$$

$$\alpha_1 + \pi_1\theta_{t-i} \sum_{i+1}^{P} \theta_{1i}\Delta LOGPRC_{t-2} + \sum_{i+1}^{P} \beta_{1i}\Delta IR_{t-2} + \sum_{i+1}^{P} \gamma_{1i}\Delta LOGCPI_{t-2} +$$

$$\sum_{i+1}^{P} \delta_{1i}\Delta LOGGDP_{t-2} + \sum_{i+1}^{P} \mu_{1i}\Delta LOGREER_{t-2} + \varepsilon_1$$

3.6 Variable Construction

We estimate the Vector Autoregressive model to analyze the impact of monetary policy on Consumption and Investment. The present study considers six variables, three monetary policy variables and three macroeconomic variables. The three monetary policy variables are interest rate, consumer price index and real exchange rate. While the three macroeconomic variables are Public Consumption, Private consumption and Investment.

To measure the inflation rate, 12-month change in consumer price (CPI) is employed, as it is the most commonly measure of inflation. For interest rate we take repo rate, as it is considered the best measure of the monetary policy by the State Bank of Pakistan. To measure the exchange rate, we collect the real effective exchange rate. For Consumption analysis we collect the real household spending. To measure the Investment, we consider Gross Fixed Capital Formation. All the variables are converted into log form except the interest rate.

The abbreviations used for the variables are shown in the table below:

IR	Interest Rate
LOGCPI	Log value of Consumer Price Index
LOGGDP	Log value of Gross Domestic Product
LOGGFCF	Log value of Gross Fixed Capital Formation
LOGPBC	Log value of Public Consumption
LOGPRC	Log value of Private Consumption
LORREER	Log value of Real Effective Exchange Rate

Chapter 4:

Estimation and Results

This chapter encompasses the technical steps towards theoretical linkages through adopting econometric techniques and plausible model for the data generating process for this thesis. Whereas, initial stages cover the descriptive statistics for raw data or logged variables as per relevant situation, check out time series properties for further process, check the internal relations and shocks from the respective variables to apply VAR methodology and impulse response or innovations then for further steps to check the short run and long run relationship among studied variables through Vector Error Correction Mechanisms (VECM).

4.1 Descriptive Statistics

Statistical analysis for quantitative research to check the particular combination of the selected and theoretical linkages variables. Before running regression, it is inevitable to compute central tendency, dispersion and normality of data to prove theoretical hypothesis and what type of information in the selected data set. Technically, statistical analysis initially depends upon the nature of the problem and data generating process as well. It is the basis step for researcher, to design, determine, organize raw data convenient for study. Furthermore, the statistical analysis gives some meaningful information as well as interpretation for the raw data without taking lags or any other mathematical process. As for the extension of some discussion for standard deviation, of class frequency of group is small then the group is regarding homogenous but which pertains to large which essentially leads to heterogeneous. In particular way to describe the level of significance, while, using statistical analysis to construct scattered diagrams

Table 4.1 Descriptive Statistics

Variable	Obs	Mean	Std.Dev.	Min	Max
Logprc	43	6.635	.244	6.195	7.045
Logpbc	43	5.668	.296	5.159	6.22
Loggfcf	43	5.995	.174	5.678	6.303
Loggdp	43	6.707	.26	6.221	7.133
Logcpi	43	1.557	.431	.85	2.261
Ir	43	8.642	2.416	2.14	12.47
Logreer	43	2.1	.119	1.97	2.355

Figure 4.1 Graphical Representation of Variables
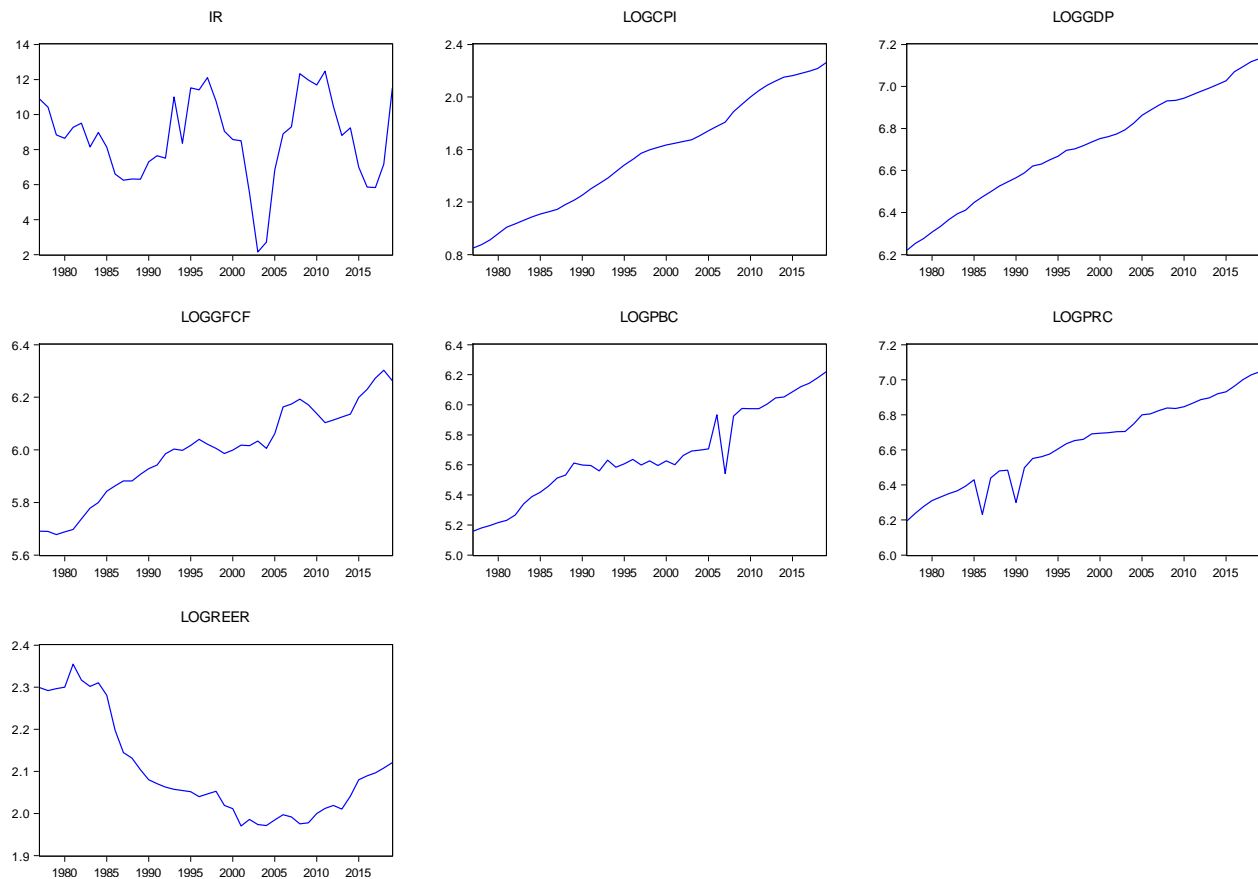
Above graph shows data is not stationary at level because all of the variables data point are often has a unit root or have mean, variance and covariance that are changing over time which is time dependent. So, these variables having trends, cycle, random walk. Therefore, it is a thumb rule for non-stationary data not ready to forecastable and predictable. The regression of non-stationary data lead to spurious regression and inconsistent results in that they may indicate a relationship between two variables where one does not exist. In order to receive consistent, reliable results, the non-stationary data needs to be transformed into stationary data. In contrast to the non-stationary process that has a variable variance and a mean that does not remain near, or returns to a long-run mean over time, the stationary process reverts around a constant long-term mean and has a constant variance independent of time. Finally, its essential to check data through proper channel. So, in this case annual data is employing it is good to further clarification of data generating process to check stationarity by using Augmented Dickey Fuller test.

4.2 Stationarity of Data

For co-integration analysis the stationarity of the variables is a pre requisite. A non-stationary time series gives spurious estimates of regression parameters, therefore, it is necessary to perform unit root test so that variable which are not stationary may become stationary. The ADF test is applied for the stationarity of macroeconomic and monetary variables. The results of ADF Test are as follows:

Table 4.2 ADF Results

Variables	Levels	5%	1st Differ	5%	Order of Int
Logprc	-0.981	-2.952	-9.644*	-2.952	**I(1)**
Logpbc	-0.936	-2.952	-12.873*	-2.952	**I(1)**
Loggfcf	-0.870	-2.952	-4.253*	-2.952	**I(1)**
Loggdp	-2.183	-2.952	-4.677*	-2.952	**I(1)**
Logcpi	-0.167	-2.952	-2.944*	-2.952	**I(1)**
Ir	-2.456	-2.952	-5.111*	-2.952	**I(1)**
Logreer	-1.762	-2.952	-4.374*	-2.952	**I(1)**

*implies that coefficient is significant at 5% level of probability

It can be seen in the above table that none of the variables is stationary at level but when the variables are taken to their 1st difference level than all the variables become stationary. Therefore, the variables are said to be integrated of order 1 i.e. I(1) which confirms the possible co-integration between the variables.

4.3 Co-integration Analysis

The pre requisite of the Johansen Approach is that the same order of integration must be existed between all the variables used in the model i.e. all of the variables must be I(1) and none of them I(2) and so on. As all the variables of the model are integrated of order 1 i.e. I(1) as depicted by the results of ADF Test. Therefore, Johansen Approach is applied in the study to assess the association between the macro economic variables and monetary variables in the long run.

The selection of optimum/appropriate lag length is the first step for the analysis of co-integration in the multivariate context.

4.4 Lag Length

Inorder to select the optimum/appropriate lag length two criteria are used in the study. One is Akaike Information Criteria (AIC) and the other is Schwarz Bayesian Criteria (SBC). The appropriate lag length is one which is depicted in following table.

Table 4.3 Lag Length Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	228.5148	NA	2.75e-14*	-11.35973	-11.06114	-11.25260
1	532.5500*	483.3381	5.99e-20	-24.43846	-22.04976*	-23.58142
2	602.1241	85.62968*	2.68e-20	-25.49355*	-21.01473	-23.88658*

* indicates lag order selected by the criterion

AIC: Akaike information criterion

Basically, optimal lag selection is to make VAR models parsimonious and the purpose of choosing optimal lag is to reduce residual correlation. So, in this model 2 lags are optimum on the basis of AIC (Akaike information criterion). From the output, the selected lag order is indicated by an asterisk sign (*) which is distributed between lags 1 and 2, but mostly on lag order 2. The rule-of-thumb is to select the criterion with the lowest value which again is the AIC at -25.49355 this is because the lower the value, the better the model. We can conclude that the optimal lag length for the model is 2 ahfpnd the best criterion to adopt for the model is AIC.

4.5 Johansen and Juselius Coinegration Test

The relationship between the macro economic variables and monetary variables in the long run is determined by JJ cointegration test. For long run relationship to exist among the variables there must be at least one cointegrating vector. The results of the trace statistics tell the number of cointegrating vectors.

The results of the first model are given below

Table 4.4 Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.663497	101.3588	69.81889	0.0000
At most 1 *	0.451022	56.70375	47.85613	0.0059
At most 2 *	0.336139	32.11622	29.79707	0.0266
At most 3	0.305173	15.31924	15.49471	0.0531
At most 4	0.009502	0.391438	3.841466	0.5315

Trace test indicates 3 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

According to the results of Trace Statistics test given in above table. There exist three cointegrating equations. Therefore, three cointegrating equations are used in the study to establish a long run relationship among the macroeconomic variables and monetary variables.

Table 4.5 Normalized cointegrating coefficients (standard error in parentheses)

LOGGFCF	IR	LOGCPI	LOGGDP	LOGREER
1.000000	0.038798	2.560536	-5.069415	-0.462864
SE	(0.00519)	(0.23691)	(0.41937)	(0.14130)
t-value	-7.47	10.80	-12.07	-3.27

The normalized equation can be written as:

$LOGGFCF_t = -0.038IR_t -2.560LOGCPI_t+5.069LOGGDP_t+0.462LOGREER_t$

These results obtained from the analysis of co-integration are as follows:

This is our first equation of this thesis as per the dependent variable explaining the overall investment in the economy that is gross fixed capital formation. There is significant and negative relationship between interest rate and investment. Similarly, the paper of (Muhammad et al., 2013). examined that there is inverse relationship between interest rate and investment. Hence, an explanation of how the rate of interest influences the level of investment in the economy. Typically, higher interest rates reduce investment, because higher rates increase the cost of borrowing and require investment to have a higher rate of return to be profitable. Private investment is an increase in the capital stock such as buying a factory or machine.

Second coefficient has a significant and positive relationship between consumer price index and investment. Hence the paper of (Hussain et al., 2011) investigated that there is positive relationship between inflation and economic growth. because rising inflation is usually not

beneficial for investments as it creates high interest rates and the increase in prices of goods and services by the companies. Higher interest rates are caused by central bank (monetary authority), who uses short-term interest rates to remove some of the money from the market. One of the causes of inflation is too much money in circulation. However, if it's more expensive to borrow money, then there's less available to use, which slows the increase in prices.

Third coefficient of this equation is significant and positive relationship between investment and GDP. Likewise, (Hussain et al., 2011) the relationship between investment and gross domestic product is significant and positive. Because investment influences the rate of economic growth because it is a component of aggregate demand (AD) and more importantly influences the productive capacity of the economy.

An increase in investment should be a boost to economic growth. Investment means expenditure on capital spending, e.g. buying new machines, building bigger factories, buying robots to enable automation. (in economics investment does not mean saving money in a bank).

Fourth coefficient of this equation represents the significant and positive relationship between investment and exchange rate in case of Pakistan.

Table 4.6 Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.641613	108.1825	69.81889	0.0000
At most 1 *	0.526030	66.11075	47.85613	0.0004
At most 2 *	0.446938	35.49966	29.79707	0.0099
At most 3	0.239329	11.21597	15.49471	0.1986
At most 4	5.69E-06	0.000233	3.841466	0.9896

Trace test indicates 3 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

According to the results of Trace Statistics test given in above table. There exist three cointegrating equations. Therefore, three cointegrating equations are used in the study to establish a long run relationship among the macroeconomic variables and monetary variables.

Table 4.7 Normalized cointegrating coefficients (standard error in parentheses)

LOGPRC	IR	LOGCPI	LOGGDP	LOGREER
1.000000	0.015672	-1.249358	-1.282359	0.175679
SE	(0.00462)	(0.20051)	(0.35235)	(0.12287)

LOGPRC $_t$ = -0.015IR$_t$ +1.249LOGCPI$_t$+1.282LOGGDP$_t$-0.175LOGREER$_t$

The second equation represents the impact of monetary policy on consumption. So, the interest rate coefficient represents the significant and negative relationship between interest rate and consumption because higher interest rates lower consumption through the substitution effect, because current consumption becomes expensive relative to saving households reduce their spending today in favor of spending tomorrow (Aqeel et al., 2001). However, second coefficient has a significant and positive relation with consumption.

Third coefficient has a significant and positive relationship between consumption and GDP (income). Therefore, our results are also matching with the paper of (Aqeel et al., 2001) examined that there is positive relationship between energy consumption and economic growth of Pakistan. Because GDP is an important determinant of consumption, the increase of income will be followed by a further rise in consumption, a positive feedback loop has been triggered between consumption and income (GDP). Finally, there is significant and negative relationship between exchange rate and consumption in case of Pakistan.

The results of the first model are given below

Table 4.8 Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.652169	105.5800	69.81889	0.0000
At most 1 *	0.564294	62.28242	47.85613	0.0013
At most 2	0.374457	28.22011	29.79707	0.0751
At most 3	0.195697	8.985571	15.49471	0.3667
At most 4	0.001380	0.056630	3.841466	0.8119

Trace test indicates 2 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

According to the results of Trace Statistics test given in above table. There exist two co-integrating equations. Therefore, two co-integrating equations are used in the study to establish a long run relationship among the macroeconomic variables and monetary variables.

Table 4.9 Normalized cointegrating coefficients (standard error in parentheses).

LOGPBC	IR	LOGCPI	LOGGDP	LOGREER
1.000000	0.157696	2.890570	-2.980530	-1.723768
SE	(0.02025)	(0.87204)	(1.52500)	(0.52653)

LOGPBC $_t$ = -0.157IR$_t$ -2.890LOGCPI$_t$+2.980LOGGDP$_t$+1.723LOGREER$_t$

Third equation of this thesis discusses the impact of monetary policy on public consumption therefore monetary policy and fiscal policy (public spending and public revenue while this works consists on public consumption) refer to the two most widely recognized tools used to influence a nation's economic activity. Monetary policy is primarily concerned with the management of interest rates and the total supply of money in circulation and is generally carried out by central banks. Fiscal policy is a collective term for the taxing and spending actions of governments.

First coefficient shows the significant and negative relationship between public consumption with relative to interest rate. Similarly, the results of (Munir et al., 2019) shown a negative relationship between consumption and interest rate. Because, higher interest rates lead to lower the consumption level through substitution effect, a current consumption becomes expensive relative to saving households reduce their spending today in favor of spending tomorrow.

Second coefficient of consumer price index is significant and negative relationship with public consumption. The paper of (Ayyoub et al., 2011) supported our results and argue that there is negative nexus between inflation and consumption. Because consumer price index is really just a different way of stating what it is. Inflation is a decrease in the purchasing power of currency due to a rise in prices across the economy.

Third coefficient of this equation is significant and positive with public consumption and income (GDP). The supported paper of (Munir et al., 2019) interrogated that there is positive relationship between consumption and gross domestic product (GDP). Because an increase

of consumption raises GDP by the same amount, other things equal. Moreover, since current income (GDP) is an important determinant of consumption, the increase of income will be followed by a further rise in consumption. Finally, exchange rate and public consumption have significant and positive relationship because that government expenditures influence real exchange rates approximately equally via the resource-withdrawal.

4.6 VECM Results

4.6.1 Model-1

The error correction equation is estimated by using the differences of variables/ lagged values of long-run relationship. The estimated equation for model 1where variable of interest or target variable is gross fixed capital formation of VECM is as follows:

$$\Delta LOGGFCF_t = 0.101 + \sum_{i+1}^{P} \theta_{1i} \Delta LOGFCF_{t-2} + \sum_{i+1}^{P} \beta_{1i} \Delta IR_{t-2} + \sum_{i+1}^{P} \gamma_{1i} \Delta LOGCPI_{t-2} + \sum_{i+1}^{P} \delta_{1i} \Delta LOGGDP_{t-2} + \sum_{i+1}^{P} \mu_{1i} \Delta LOGREER_{t-2} - 0.024$$

The convergence towards equilibrium path in the long run and its speed to adjust is depicted by the adjustment coefficient of LOGGFCF in VECM. The results given in above equation shows that the coefficient of error term of LOGGFCF is less than one with a negative sign and is significant.

The LOGGFCF is adjusted by 2.4 percent which is depicted by the coefficient of error term. The time required to remove the disequilibrium is calculated as (1/0.024 = 42) i.e. approximately 42 months (more than 3 years) are required to achieve the equilibrium path in the long run.

The nexus between investment and interest rate is always considered essential to analyze the economic activity as these variables are important economic indicators in defining macroeconomic activity. However, the unchanged condition of investment in Pakistan has raised

the cost of investment and crates uncertainty in investors. The link between inflation, rate of interest and investment to incorporate a new dimension of call money rate that may enhance the investment opportunities in Pakistan, employing time series analysis for employed to capture both the long and short-run dynamics of the variables in the model. The results of the study indicate that the interest rate have significant effect on investment and thus on economic growth.

4.6.2 Model-2

The error correction equation is estimated by using the differences of variables/ lagged values of long-run relationship. The estimated equation for model-2 where variable of interest or target variable is private consumption of VECM is as follows:

$$\Delta LOGPRC_t = -0.401 + \sum_{i+1}^{P} \theta_{1i} \Delta LOGPRC_{t-2} + \sum_{i+1}^{P} \beta_{1i} \Delta IR_{t-2} + \sum_{i+1}^{P} \gamma_{1i} \Delta LOGCPI_{t-2} + \sum_{i+1}^{P} \delta_{1i} \Delta LOGGDP_{t-2} + \sum_{i+1}^{P} \mu_{1i} \Delta LOGREER_{t-2} - 0.0345$$

The LOGPRC is adjusted by 3.45 percent which is depicted by the coefficient of error term. The time required to remove the disequilibrium is calculated as (1/0.345 = 29) i.e. approximately 29 months (more than 2 years) are required to achieve the equilibrium path in the long run.

Consumption is the most important component of national income accounting and the aggregate demand. It is the ultimate economic activity on which the welfare of the economy depends. So, consumption is comparison with GDP highly significant and positive relationship because the relationship between income and expenditure is often called a consumption schedule. It is used to describe economic trends in the household sector. When there is more money or anticipation of income, more goods are purchased by consumers. Meaning money is spent on expenditures, at times, even if there isn't enough income to cover them. This is a common economic principal used to describe spending trends for national and world economies. A business should consider the relationship between consumption and savings to extract data on

buyer trends within its own industry. The difference between income and consumption is used to define the consumption schedule. When income grows, disposable income rises and thus consumers buy more goods. The result is an increase in the consumption of major purchases and non-essential goods. The increase in consumer expenditures is a direct relationship to income in case of Pakistan.

4.7 Impulse Response Analysis

In the graph blue line represents the impulse response function while the red line shows the 95% confidence interval. Therefore, all of the variables are behaving the same pattern as we discus in the above tables of VECM.

After performing VECM model it is important to check the impulse response function of the impulse and response behavior of the variables. Hence, the impulse variables are examining the monetary policy variables and their response variables are related to consumption and investment. In below graph significantly support as obtained the VECM results because if one standard shock in interest rate then private consumption continuously decreased from period one to still period three after that increase and reach their normal condition from period five to ten.

Figure 4.2 Impulse Response Analysis

Response to Cholesky One S.D. Innovations±2 S.E.
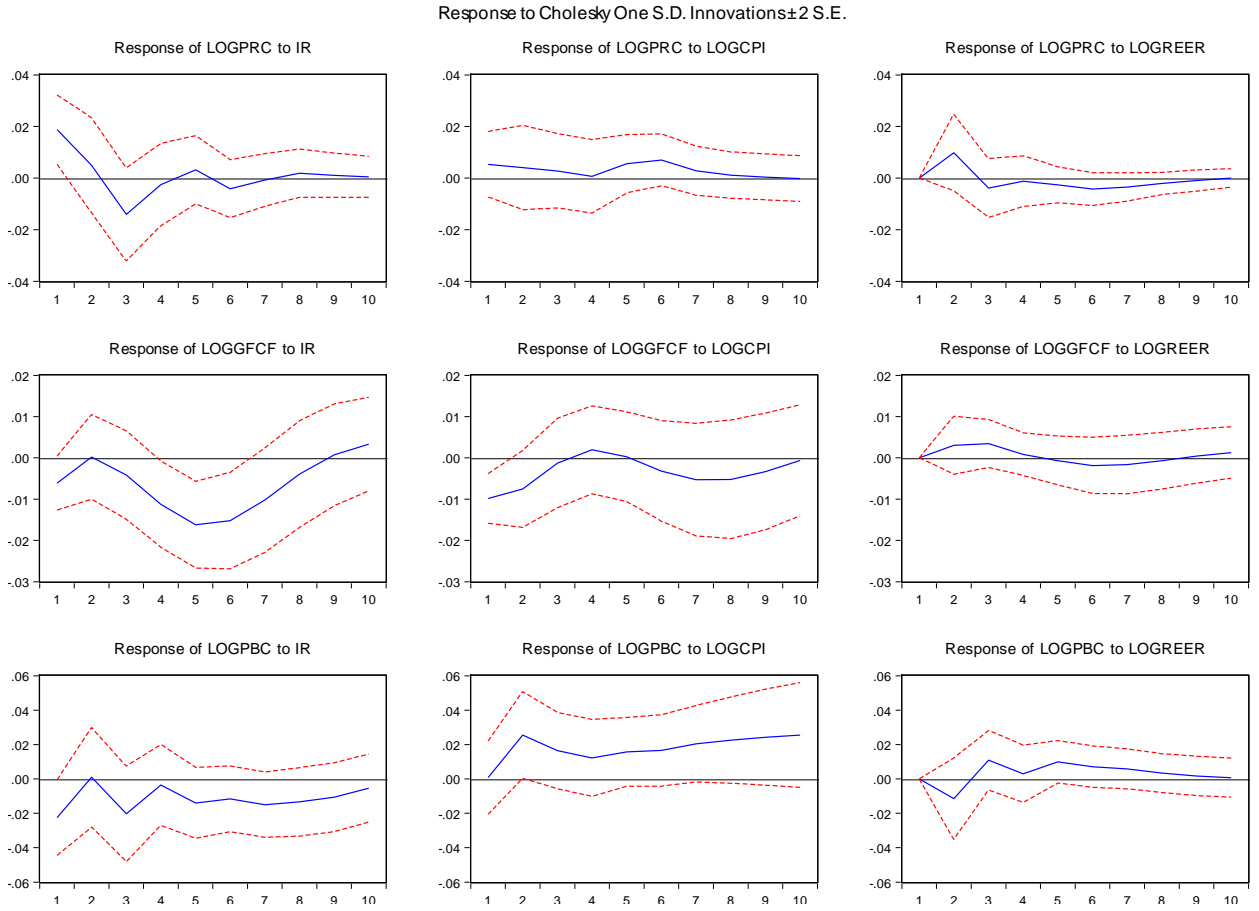
Chapter 5:

Conclusion

The current thesis encompasses the theoretical and empirical nexus between macroeconomic variables those are gross domestic product, private consumption, gross fixed capital formation and gross domestic product and monetary variables including interest rate, consumer price index and exchange rate. In order to explore the dynamics internal relations, long-run as well as in the short run the annual data have been studied covering a time period from 1977 to 2019. For the econometric techniques employing Johensen and Jesulius co-integration and VECM have been used to estimate results. The outcome of this analysis has been further verified by using impulse response function.

The results of ADF implies that the whole time series is non-stationary at level but after taking the first difference the series becomes stationary i.e. I(1). The trace statistics show five cointegrating equations that confirms the existence of long run association between the variables. In the long run there is significant and negative relationship between interest rate and investment. Hence, an explanation of how the rate of interest influences the level of investment in the economy. Typically, higher interest rates reduce investment, because higher rates increase the cost of borrowing and require investment to have a higher rate of return to be profitable. Private investment is an increase in the capital stock such as buying a factory or machine. A significant and positive relationship between consumer price index and investment because rising inflation is usually not beneficial for investments as it creates high interest rates and the increase in prices of goods and services by the companies.

Increasing interest rates are caused by central bank (monetary authority), who uses short-term interest rates to remove some of the money from the market. One of the causes of inflation is too

much money in circulation. However, if it's more expensive to borrow money, then there's less available to use, which slows the increase in prices. Therefore, significant and positive relationship between investment and GDP because investment influences the rate of economic growth because it is a component of aggregate demand (AD) and more importantly influences the productive capacity of the economy. Finally, the exchange rate represents the significant and positive relationship between investment and exchange rate in case of Pakistan.

So, the interest rate coefficient represents the significant and negative relationship between interest rate and consumption because higher interest rates lower consumption through the substitution effect, because current consumption becomes expensive relative to saving households reduce their spending today in favor of spending tomorrow. However, second coefficient has a significant and positive relation with consumption. significant and positive relationship between consumption and GDP (income) because GDP is an important determinant of consumption, the increase of income will be followed by a further rise in consumption, a positive feedback loop has been triggered between consumption and income (GDP).

Finally, there is significant and negative relationship between exchange rate and consumption in case of Pakistan. Since in Pakistan, the currency depreciation is always remained unsolved and under the discussion. Pakistani currency is continuously depreciating over time in the international market that can lead to increase in imports goods and services. Besides, Pakistan is consumption-oriented economy and depreciation of exchange rate inversely effect the consumption pattern of the economy. So, it is clearly show there is negative relationship between exchange rate and consumption of Pakistan. The analysis of VECM describes the convergence which is depicted by the error correction term which shows the speed of adjustment towards the equilibrium path in the long run.

The findings of the study are in line with the economic theory and no apparent contradiction has been found. The performance of consumption and investment behavior may be taken as an indicator of the underlying economy specially of macroeconomic variables. These indications of the results after further robust studies can be used for pre-emptive adjustment in the monetary and fiscal policies to avert recessions, inflations in the economy. The study can be further extended by using data of different frequencies to find the synchronized time duration between the economic variables and stock indices.

5.1 Policy Recommendations

Consumption is the major component of GDP so policymakers use its determinants to fine-tune the economy. This study proposes that policymakers can consider exchange rate volatility in devising the monetary policy of Pakistan.

1. The government of Pakistan should control the situation of law and order to attract

   the foreign investment, which will increase the inflow of foreign currencies that would

   diminish the value of foreign currencies and reinforce the value of Pakistani rupee.

2. Pakistan should progress research and development and better infrastructure and wipe up energy crisis to get healthier its production capacity and to enhance international market share with the support of better-quality export to generate revenue from international market and also reduce the consumption of foreign

products especially luxury items to control the outflow of (USD) or foreign currencies by managing our imports.

3. Pakistan should improve its financial market to magnetize foreign and local investment in the financial asset as currently, Pakistan is going to issue Euro bond this will improve the confidence of investors and the overall financial market will get better, this recommendation is useful in the short run.

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