Credit Channel of Monetary Policy Transmission, Evidence from Pakistan

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- Monetary policy -- Pakistan
- Credit channels
- Bank Credits.

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A thesis submitted in partial fulfillment of the requirements for the Degree of Master of Philosophy/Science in Management with specialization in Finance at
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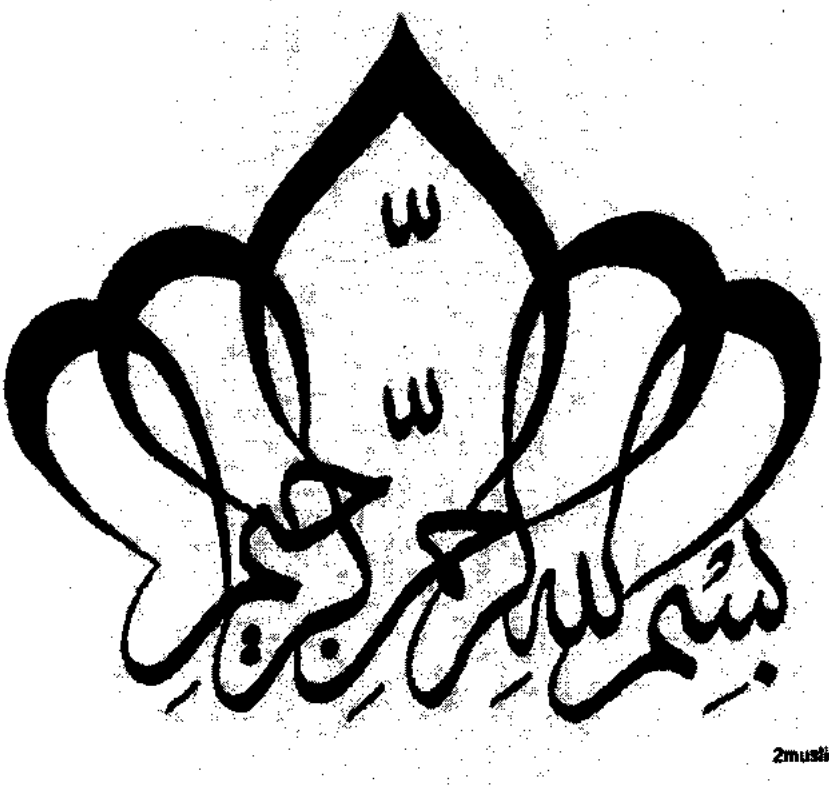

In the name of Allah, the most merciful and beneficent

DEDICATION

I dedicate this thesis to my parents, who has been a constant source of support and encouragement during the challenges of education and life. This research work is also dedicated to my teacher Dr. Syed Zulfiqar Ali Shah whose good examples have taught me to work hard for the things that I aspire to achieve, and support me to complete this research study successfully.

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Date: 4th February, 2015

TABLE OF CONTENTS

DECLARATION

I hereby declare that this thesis, neither as a whole nor as a part thereof, has been copied out from any source. It is further declared that I have prepared this thesis entirely on the basis of my personal effort made under the sincere guidance of my supervisor and colleagues. No portion of work, presented in this thesis has been submitted in support of any application for any degree or qualification of this or any other university or institute of learning.

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To be submitted to the Faculty of Management Sciences, International Islamic University, Islamabad by the Supervisor.

FORWARDING SHEET

The thesis entitled "Credit channel of Monetary Policy transmission, Evidence from Pakistan" submitted by Mr. Arif Saleem Cheema partial fulfillment of M.S degree in Management Sciences with specialization in Finance, has completed under my guidance and supervision. I am satisfied with the quality of student's research work and allow him to submit this thesis for further process as per IIU rules & regulations.

Date:_____ Supervisor Signature:_____

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Abstract

This paper estimates the transmission of monetary policy through bank credit channel in the context of Pakistan. For analysis purpose bound testing cointegration analysis and Error Correction Model is used with General to specific approach. Monthly data for the period of 2002 to 2012 is used in this study. Long run and short run stable relationship is found between variables. Results of this study appear that bank credit channel does not provide additional leverage to authorities for the conduct of monetary policy. It means that increase in interest rate does not decrease the bank credits because banks make adjustment against monetary policy shocks by using their liquid financial instruments. With the latest developments in financial sector, banks have many newly growing sources of funds that permit them to offset the monetary policy shocks.

Key Words: Bank credits, bank deposits, interest rate, exchange rate, asset prices, industrial production index, inflation, monetary policy,

CHAPTER NO.1

INTRODOCTION

1.1 Introduction

This research examines the impact of monetary policy shocks on bank credits and transmission in the economic system of Pakistan through bank credit channel. Bank credit channel is one of the important channel of monetary policy transmission. Change in policy interest rate demonstrates the signals of monetary policy stance. It is worth mentioning here that accomplishment and achievement of monetary policy targets of development with financial stability would depend on how the interest rate signals are transmitted in the economy and how the businesses and individuals react (Jeevan, 2013)

Effectiveness of bank credit channel depends on the stability of financial market of the country. Hence, significance and successful transmission of monetary decisions through credit channel fluctuate from country to country (Hashtam et al, 2005)

Theories of monetary transmission mechanism indicate that there are mainly four channels of monetary transmission such as asset price channel, exchange rate channel, expectation channel and credit channel. Among these channels credit channel is considered most effective channel according to the literature (Mishkin ,1995; Bernanke and gertler,1995; Cuthbertson,1985).

Any change in monetary policy rate of interest will affect deposits and lending rates of commercial banks and other financial institutions that consequently influence the decisions of businesses and individuals regarding spending and investment. Inflation and growth rate will also change with the passage of time.

In the context of this increasing and important role assigned to credit channel as a mechanism of monetary policy, this paper is an attempt to investigate whether monetary policy transmission through bank credit channel in Pakistan is successful or not. Monetary policy is an important

instrument used by an independent central bank of a country to attain the macroeconomic objectives, for example to control the inflation or price level, support the output stability and improve the living standard. Successful implication of monetary policy depends on the appropriate use of instruments such as money supply rule. The selection of policy tool depends on the calculated money demand function and its stability.

On the basis of theoretical literature an equation is derived including the independent variables that influence the supply and demand of bank credit such as deposits, policy rate, GDP, Price level, Real exchange rate and asset prices. Exchange rate and asset prices are used in exchange rate channel and asset price channel respectively by Hashtam et al. (2005). In this research impact of these variables (Exchange rate and asset prices) is included in the credit channel of monetary transmission. In this study it is assume that size or liquidity of banks do not influence the dependence of bank credit on deposit. But on the other hand some researchers like Ehrmann et al. (2001) assumed that dependence of bank credit on deposit influenced by the size or liquidity of a bank.

In our case, for the purpose of generalization banks are size neutral and the transmission of monetary decisions via bank credit is examined at the cumulative level of all banks. This thesis provides evidence in support of bank credit channel from the viewpoint of a rising economy like Pakistan.

The central bank of Pakistan SBP exercises two aggregates, Credit and M2 as a monetary policy instruments to control the rate of inflation and achieve target. For the purpose of controlling the money supply, credit aggregate is exercised as a target instrument. Bank

credit is considered as demand determined at the prevailing interest rate and it may be set by the banks or by the market. Therefore the variables that determine/cause the demand for money equilibrium contain the determinants of equilibrium demand for bank advances, currency demand and government debt. Theories explain that if the monetary authorities recommend using bank credit as an instrument of monetary policy, then the projected demand for credit should be constant and interest rate elasticity of credit demand should be acknowledged and well known to the authorities.

1.2 Significance of the Study

This study investigate bank credit channel in detail in the developing country like Pakistan. Pakistan economy is one of the growing economy with strong banking sector, an investigation of its banking behavior and the practicality of its monetary policy present the significant insight into the bank credit channel.

The study help to recognize the relevant financial variables that increase our understanding of the relationship between the financial and real sector of the economy, it also provide a deep and better understanding of transmission mechanism that would help the policy makers to understand the movements in financial variables more accurately. A good choice of targets depend on comprehensive information about the transmission mechanism of monetary policy; if the credit channel is a significant part of monetary transmission system then bank portfolios required more concentration.

Bank credit or bank advances demand from business sector is examined in developed countries by Hewitson(1997); Moore(1988); cuthbertson(1985); Moore and

Threadgold(1985) etc. but no considerable attention has been given to this main field in Pakistan. Therefore it is very desirable to examine the behavior of business sector for bank credit that will help to understand the behavior of demand for money in the context of Pakistan.

1.3 Research Objective

The objective of this study is to investigate how the monetary policy decisions transmitted in the economy of Pakistan through bank credit channel.

Purpose of this study also include to find out the lag impact of credit channel, how quickly in terms of months or years the monetary policy decisions transmitted in the economy of Pakistan, and what are the relevant financial variables that directly or indirectly influence this transmission channel.

This paper is actually a look into the credit channel as a mediator between monetary policy actions and the adjustments of real economy, adjustments that are usually observed with the output (income).

1.4 Problem Statement:

In Pakistan share ownership is not very common yet and most of the firms rely on bank credit for the financing needs of their businesses as against the equity financing. Therefore it is indispensable for small and medium businesses to understand all those factors that directly or indirectly influence the supply and demand of bank credit and set the future directions for their businesses.

Monetary policy is significantly associated with the pathway of real sector of the economy but accurate mechanism of its transmission still stands a "black box". There is a need to investigate and understand this transmission mechanism with bank credit channel in the context of Pakistan. On the other hand policy makers with adequate knowledge of this channel of transmission able to create favorable credit environment for businesses to contribute positively in the economic development of Pakistan.

1.5 Research Questions:

Q1: How bank credit channel play a role in transmission of monetary policy?

Q2: What will be the lag in transmission of monetary policy through bank credit channel?

Q3: What is the importance of bank credit channel in the economic development?

CHAPTER NO.2

LITERATURE REVIEW

2. *Literature Review*

Few studies have been conducted in the context of Pakistan on monetary policy transmission mechanism at macro level. Hashtam et al. (2005) study the channels of monetary policy transmission in Pakistan by using the Vector Autoregressions (VAR) approach; Monthly data of eight years from 1996 to 2004 is investigated and the results pointed out that tight monetary policy leads first to a decrease in domestic demand, mainly investment demand financed by bank credits, which transforms into a continuing decrease in overall price level. The results also show that banks play an important role in the transmission mechanism through interest rate channel and in addition asset price channel found to be active but exchange rate channel found to be less significant.

Alam and Waheed (2006) has taken first step to investigate the transmission of monetary policy in Pakistan across seven sectors of the economy (Agriculture, manufacturing, construction, finance and insurance, wholesale and retail trade, ownership of dwelling, mining and quarrying) by using the quarterly data of thirty years starting from 1973 to 2003; the results of the study revealed that finance and insurance, manufacturing, wholesale and retail trade sectors turn down in response of the interest rate shocks while the construction, agriculture, mining and quarrying, and ownership of dwellings were found to be insensate to interest rate shocks.

Abdul Qayyum (2002) investigated the demand for bank credit by the private business sector in the context of Pakistan. For this purpose multivariate cointegration analysis, Univariate analysis and error correction mechanism is applied. Long run stable relationship is found between variables. Variables include in the study are interest rate, inflation, industrial production and bank credits. The preferred model which is acquired by using general to specific methodology is

proved to be stable. This study concluded that business sector output is very significant determinant for bank credit demand in Pakistan; imply that behavior of business sector output must not be ignored to attain the objectives of monetary policy. Furthermore, this study also said that interest rate is a significant determinant for bank credit demand by business sector in Pakistan. It means that monetary policy authorities can influence the flow of bank credits to business sector by altering the rate of interest charged on lending. In the conclusive analysis: a tight monetary policy involve high real rate of interest, a high real interest rate has negative effect on bank credit demand by business sector, which in turn reduce the output. The above said situation was exist in the last decade 19^{th} century in Pakistan according to Abdul Qayum(2002). Hussain (2009) analyzed the shock of monetary policy on inflation and GDP. Philip and Muibi (2012) investigated the monetary policy transmission channels in Nigeria impulse on sectoral development by using the secondary quarterly data spanning from 1986 to 2009, Granger Causality and Vector Auto-regressive methods utilized and results revealed that interest rate channel is very significant in manufacturing and agriculture sectors while exchange rate is very effective from monetary policy transmission to wholesale/retail, mining and construction sectors; an important finding with theoretical explanation is that interest rate is fundamental variable in all channels by which monetary decisions transfer trough to the real sector, on the basis of this fact consequent analysis is represented schematically as:

$M_s\uparrow \rightarrow i\downarrow \rightarrow PSC\uparrow \rightarrow P_s\uparrow \rightarrow E_r\downarrow \rightarrow I\uparrow \rightarrow Y\uparrow$

Ms↑ represent the expansionary monetary policy in which government purchases the securities by open market operation, leading to a decrease in (i↓) interest rate, as a result:(a) rise in (PSC↑) bank credits to private business sector; (b) increase in (Ps↑) security prices show the opposite

relationship between interest rate and security prices and (c) fall in (Er↓) exchange rate; these results increase the (I↑) investment and output (Y↑).

2.1 Credit channel with small and large firms

Literature on bank credit channel of monetary transmission mechanism has mainly focused on micro databases. Gertler and Gilchrist (1994), has used quarterly data of USA manufacturing companies and further divided these companies as large and small on the base of gross assets. They concluded that tight monetary policy raises the short term demand of bank credit by large firms for inventory collection.

However, in the period of recession, inventory level dropped sharply. On the other side, tight monetary policy left very small space for small firms to borrow in short run, unlike big firms whose inventory level do not dropped speedily.

In the literature review, it is observed that effectiveness of bank credit channel of monetary policy is based on the assumptions that borrowers in the market are dependent on the banks and monetary policy directly influences the lending power of banks.

Small firms as compare to large firms are less educated of credit environment and have little choices of financing options. Therefore, large firms are less dependent on bank credit as compare to small firms (Marsh, 1982; and Diamond, 1984). As a result, demand for bank credit is empirically examined many times to distinguish the credit performance of large and small firms.

Empirically it is proved that monetary tightening has severely affect on small firms as compare to large firms as they have less admittance to banks and other financial institutions (Gertler and Gilchrist, 1994; and Oliner and Rudebusch, 1994).

There are two methods by which the influence of monetary policy on the willingness of bank lending can be examined, one is to evaluate the portfolio adjustment behavior of banks and 2nd is the impact on price and non price terms of bank lending. In the first method the hypothesis is that monetary policy decisions change the bank deposits and after some time it leads to decline bank loans (Romer and Romer, 1990; and Bernanke and Blinder, 1992). Empirical examination of monetary policy tightening influence on bank portfolio behavior and bank lending is not clear /definite yet. Therfore, Gertler and Gilchrist (1993) investigate demand for bank credit by large and small firms, and conclude that tight monetary policy has no influence on business lending.

Many empirical studies investigate that alternatives for borrowers' net worth has influence investment more for low net worth borrowers than for high net worth borrowers if investment opportunities are constant for all. This means that borrowers' net worth can be influenced by monetary policy. On the other side empirical studies of information related imperfections are spotlights on the effect of monetary policy on borrowers balance sheets.'

In the conclusion of Gertler and Hubbard (1988), during recession internal fund of non dividend paying firms have greater influence on investment. This is a very convincing evidence of Gertler and Gilchrist (1994). Gertler and Gilchrist analyze the attitude of

manufacturing firms by considering the differences in large and small firms' reaction towards tight monetary policy and include quarterly financial reports data. Specifically, large firms inventories, revenues and short term debts do not decline as compare of small firms over a two periods due to a monetary policy tightening and results are also consistent with financial accelerator approach.consequently it is found that interest expense to cash flow ratio is positively related with stock accumulation for small firms and not related with large firms.

Bernanke, Gertler and Glichrist analyze the quarterly financial report firm level data and differences in sales and stocks among small and large organizations; they discover that fluctuations in small and large firm differences are same size as the fluctuations in aggregate manufacturing sector. The reason is that sales of small firms are equal to one third of the manufacturing sector sales.

2.2 Credit channel with small and large banks

On the supply side of bank credit, there are small and large banks that show different response towards changes in monetary policy. Kashyap and Stein (1995) investigate that supply/lending of small banks credits strongly affected by monetary policy tightening as compare to large banks. Some empirical studies have been conducted in the context of india for proving monetary policy transmission through bank credit channel. Pandit et al.(2006), examine that changes in the bank rate transmitted into credit channel by using panel data period 1997- 2002, found that their impact on small banks more severe as compare to large banks.

Virmani(2004) found that monetary policy changes transmission in to economy through bank credit channel by using the data from April 1992 to March 2002. Bhaumik et al. (2010), investigate the influence of banks ownership structure on the transmission of monetary policy through supply of bank credit.

They conclude that banks ownership pattern responded differently to monetary policy initiatives. These responses are also affected by deficit or surplus liquidity conditions, and it is found that monetary policy transmission of bank credit channel is more successful under deficit situation as compare to surplus situation.

Kashyap and Stein (1994) study the lending and financing decisions of commercial banks by applying model of effects of internal net worth on investment decisions. Some earlier researchers examined cross sectional differences in financial decisions of different size non financial firms. Kashyap and stein (1994) also investigate the differences of cross sections in lending and financial decisions of different size banks. For this purpose, they use the quarterly call report data gathered by Federal Reserve and develop the groups of asset size for small and large banks. They found that contractionary or tight monetary policy (calculated as rise in federal fund rate) show a same decrease in growth rate of deposits of all size bank groups. They also found the problem of heterogeneity in the classes of bank size. Therefore, a tight monetary policy increases the bank lending by large banks in the short run period of time. On the other side in contrast there is decrease in bank lending by small banks in the short run. This thing does not represent the differences in bank loan types. A same thing or pattern rises when bank loans are disaggregated to industrial and commercial loans. One of the feasible explanations for

stein and Kashyap patern is that a tight monetary policy decreases the position of balance sheet of small firms as compare to large firms. If the small banks have small firm customers and large banks have large firms customers then a decline in demand for loans by small firms from small banks could be constant with different responses of lending as explained Kashyap and stein.

Kashyap and stein (1995) investigate whether security holdings in monetary tightening period increased by small banks relatively to large banks, they found that security holdings by small banks are less sensitive to monetary policy as compare to security holdings by large banks. To develop a cross sectional differences by the use of bank size does not communicate precisely to the primary theoretical models that enforce the significance of net worth. In this matter bank capital can be a better proxy Rosengren and Peek examine the lending performance of New England Banks in 1990-91 recession.

Their conclusions showed that loans of high capitalized banks decreased by less than the loans of low capitalized banks.

2.3 Credit channel Generalizability

Pandit and vashisht (2011) study the monetary policy transmission from the view point of bank credit demand in Indian market. They use monthly data for ten years from January 2001 to August 2010 of seven growing economies including India; they conclude that change in monetary policy interest rate is a significant determinant for bank credit demand by firms. They found that monetary policy is an important instrument for leading the direction of economic activities.

In our present context, the credit channel of transmission of monetary policy is examined under equilibrium condition of demand and supply of credit at an aggregated level of all banks for the purpose of generalizability. Further our focus is more on identifying the lag at which the change in policy interest rate gets transmitted to bank credit channel and robustness of that lag.

2.4 Affiliation of bank credit with Economic activity:

It is very obvious that there is significant relationship exist between economic activity and bank credit. But it is rational question that either bank credit can be used for forecasting economic activity growth or not. Mostly policy makers make decisions on the basis of available data, hence bank credit data can be used as valuable tool for early estimation of current GDP. Bank credit data can be available with some days delay whereas actual economic activity or GDP data provided with at least 7o days delay.

Bank credit stock and economic activity growth has been investigated in past literature. Calvo et al (2006) found that economic activity recovers after financial crisis without a growth in bank credit stock especially in the emerging markets. This event is known as Phoenix Miracle or Credit less recovery in economic literature. This fact is verified by Claessens et al (2008) for 21 OECD countries. Biggs et al (2012) study the relationship between GDP and change in credit stock, called new borrowing since they are flow variables. They also investigate the correlation between GDP and change in new borrowing that is called credit impulse and new borrowing. They conclude that credit impulse and new borrowing significantly explain GDP Growth in US. They also found

that recovery in economic activity is closely associated to a rebound in bank credits, i.e. bank credit grows at high speed in US recovery times.

Kara and Tiryaki (2013) investigate the relationship between credit impulse and GDP growth in Turkish market and found that 15 percent growth in bank credit stock is compatible with the 4 percent GDP growth in 2013.

2.5 Association of Asset prices with bank credit:

In literature review, relationship between bank credit growth and stock/asset prices has been studied in detail. Asset prices include stock prices, real estate prices (commercial and residential) but real estate data is not easily available that's why stock prices are used as the proxy of all asset prices. Allen and Gale's Model (2000) investigate the reasons of financial crisis which are credit filled asset prices by limited liability debt contracts. Borio and lowe (2002) empirically study the relationship between asset prices and bank credit growth. Finding of this study have implications for preparation of economic policy. Initially they discussed that whether monetary policy target stock price changes along with inflation prices. Secondly they discussed the design of international macro prudential policy. Third, they start a disagreement about the use of marked to market accounting for banks and its effect on banks' credit growth and banks' balance sheet.

Importance of credit channel smooth working in crises times through government intervention during 2008-9 crises intended at securing banking system and attached with maintenance of bank credit growth.

2.6 Relationship between inflation and bank credits.

An emergent literature explains methodology whereby expected rise in the rate of inflation hamper the capacity of financial sector to distribute the resources effectively. Particularly current research theories high light the significance of informational asymmetries in bank credit market and explain how the rise in inflation rate negatively influence the bank credit market and adverse consequence for financial sector performance (Huybens and smith 1998, 1999). The general attribute of these theories is severe informational resistance. Due to this, a rise in inflation rate brings down the real rate of return on assets and money in general. The indirect decrease in real returns worsens the credit market resistance. This credit market frictions show the way of credit rationing grows to more severe when inflation rate increase. Consequently financial sector reduces the loans, resourses distribution becomes less effective and an intermediary activity reduces with negative implications for capital investment. A decrease in formation of capital adversely affects both equity market activities and economic performance (Smith d Huybens, 1999 and smith and Boyd, 1996).

Equity prices are main variable in presenting investors prospects about a specific company as well as the economy. Investors expect a definite rate of return from the investment and if the realized return different from expected return it may cause to adjust the stock prices to earn the expected return (Khurram and Muhammad, 2013).

The inconsistency of returns that is also called risk can be divided into many types of risks such as unsystematic risk/business risk and systematic risk/market risk. Financial

analysts proposed that Investors can only be compensated for market risk and business risk can be avoided by diverse portfolio. As mentioned earlier stock prices can be used for the adjustment of risk by investors and allow them to calculate the required rate of return also called cost of equity. This rate of return is required by stock holders to maintain their investment in the stock. Cost of equity is most commonly measured by two famous models, first is discounted cash flow model and second is Capital asset pricing model. Among all the factors of pricing mechanism, inflation is one of the important factor for all commodity pricing including cost of equity.

2.7 Relationship between exchange rate and credit channel:

According to the model of Mundell Flemming, higher the interest rate disparity will catch the capital inflows and exchange rate will appreciate as a result. On the other side financial analysts trust that high interest rate brings down the demand of money that causes depreciation of currency value because of higher inflation. But the relationship between exchange rate and interest rate can be determined through expected change in exchange rate, means that how expected exchange rate react towards changes in interest rate. According to the Dornbusch's over shooting model, expected exchange rate increase or appreciates with greater ratio as compare to spot rate that exist prior to increase in interest rate to make equal the return on domestic assets with foreign assets. Hence negative association exist between exchange rate and interest rate.i.e., higher the interest rate policy is related with appreciation of exchange rate. But spot exchange rate can be positively influenced due to higher rate of interest policy when expected exchange rate

turn into a rising function of domestic rate of interest. Sargent and Wallace (1981) investigate that a higher interest rate policy show the way of decrease in money demand and a rise in price level because a rise in rate of interest involve a rise in government debt. Consequently exchange rate will depreciate.Similarly future export performance may be adversely affected by an increase in interest rate that will decrease the future foreign exchange reserves and as a result currency will depreciate (Furman and stiglitz, 1998). Furman and stiglitz (1998) state that increase in interest rate likely to affect the exchange rates through two important channels. One is the risk of default and the second is risk premium. According to the uncovered interest rate parity theory these channels do not play any role and on domestic assets interest rate present promised rate of return, that is promised rate of return is equal to actual interest rate receipt. After the financial crisis period, a rise in rate of interest may cause depreciation of exchange rate. The reason is that higher the interest rate policy may reduce the chances of repayment and risk premium increase on domestic assets due to negative effect on economic activity by minimizing the profitability and increasing the cost of borrowing. This concept becomes stronger when the banks and firms have fragile financial position.

2.8 Hypothesis:

Ho: There is no long term relationship between bank credits and monetary policy shocks

H1: There is long term relationship between bank credits and monetary policy shocks

Ho: There is no short term relationship between bank credits and monetary policy shocks

H1: There is short term relationship between bank credits and monetary policy shocks

CHAPTER NO.3

Data and Methodology

3.1 Data

The estimation is done by using monthly data for the period of 2000 to 2012 culled out State Bank of Pakistan. Bank credit is the total bank credit to private sector and Real effective exchange rate (REER) is available from IFS, while data on Karachi Stock Exchange 100 index (KSEI) collected from Karachi Stock Exchange. Data of price level is provided by Consumer Price Index (CPI) that is collected from Federal Bureau of Statistics (FBS). Our estimation of monetary policy stance in Pakistan is the six months treasure bill rate (TB6), it mostly reflect the development in financial market. The motivation to apply TB6 rate comes from Bernanke and Blinder (1992), who empirically and theoretically show that federal fund rate is the best indicator of monetary policy stance.

As the monthly data of GDP is not available, so we apply Industrial Production Index as a proxy for real economic activity. It seems that IPI is a week proxy for GDP because it envelope only 20 percent of the total output; but it is worth mentioning that manufacturing sector has a share of almost 58% in private sector credit off take for the last many years. Data of total deposits of all schedule commercial banks is also available from SBP.

3.2 Methodology

Model of this study is derived from Ehrmann et al.(2001), that is based on the model of Bernanke and Blinder (1988) and Kashyap and Stein (1995). The availability of bank credit (Cs) is actually the function of available amount of deposits (D) and direct

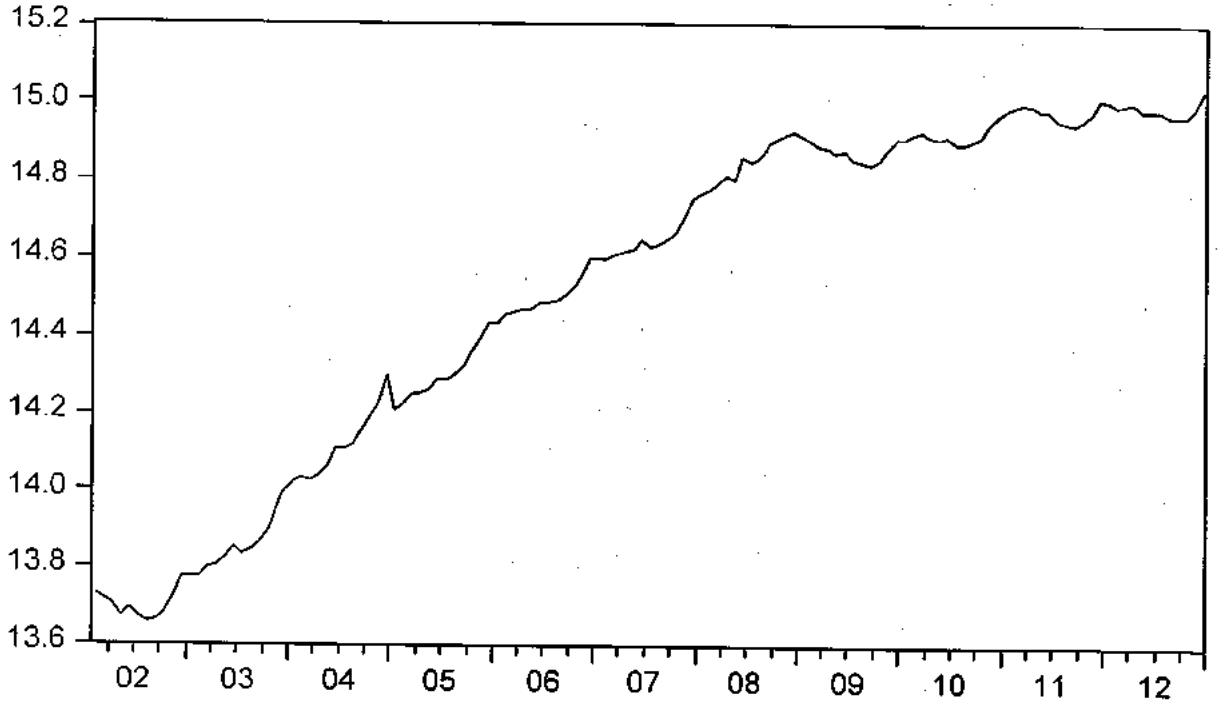
monetary policy rate (TB6). Direct affect of policy rate on bank credit supply arises as it is assumed that either bank exercise interbank market to finance their loans or pursue markup pricing that deposit rates are passed on to lending rates, therefore bank credit supply is specified as. On the other hand demand for bank credit depends on the real economic activity (IPI), price level (CPI), policy interest rate (TB6), stock/asset prices (KSI) and Real effective exchange rate (REER).

Bank credits (CR) and Bank deposits (DS) are converted into logarithm form LCR (log of bank credits) and LDS (log of bank deposits), three variables that are in index form CPI(Consumer price index), IPI (industrial production index) and KSI(Karachi stock index) are converted into returns such as INF(inflation), RIP (Return of industrial production) and RKS (Return of Karachi stock index) respectively.

Consumer price index (CPI) represents the real sector of the economy and Industrial production index (IPI) represents the real economy activity. GDP data is not monthly available, therefore industrial production index is mostly used as a proxy in the literature (Garretsen and swank,2003) and (Morris and sellon, 1995). Real Exchange rate(ER) and interest rate(TB) remains in the same form. Monetary policy is actually deals mainly with the changes of interest rate. Six months treasury bills interest rate (TB6) is used in the analysis as a policy variable. This is an adequate indicator for monetary stance (Bernanke and Blinder,1992).

Graphical presentation of all variables is given here.

LCR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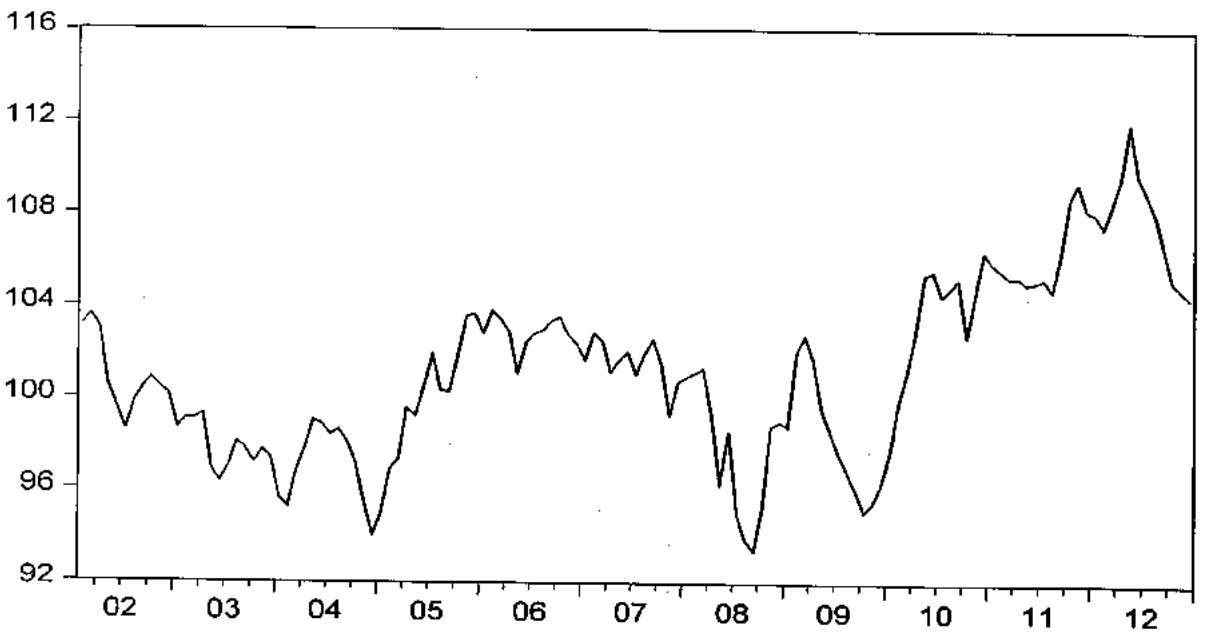
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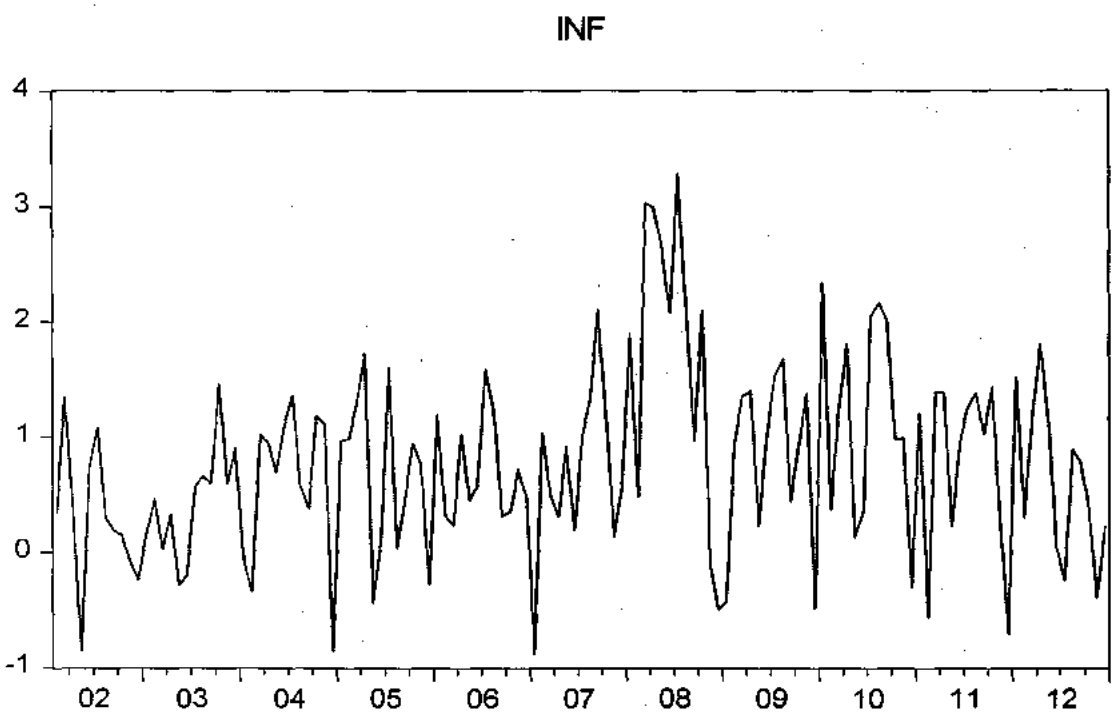
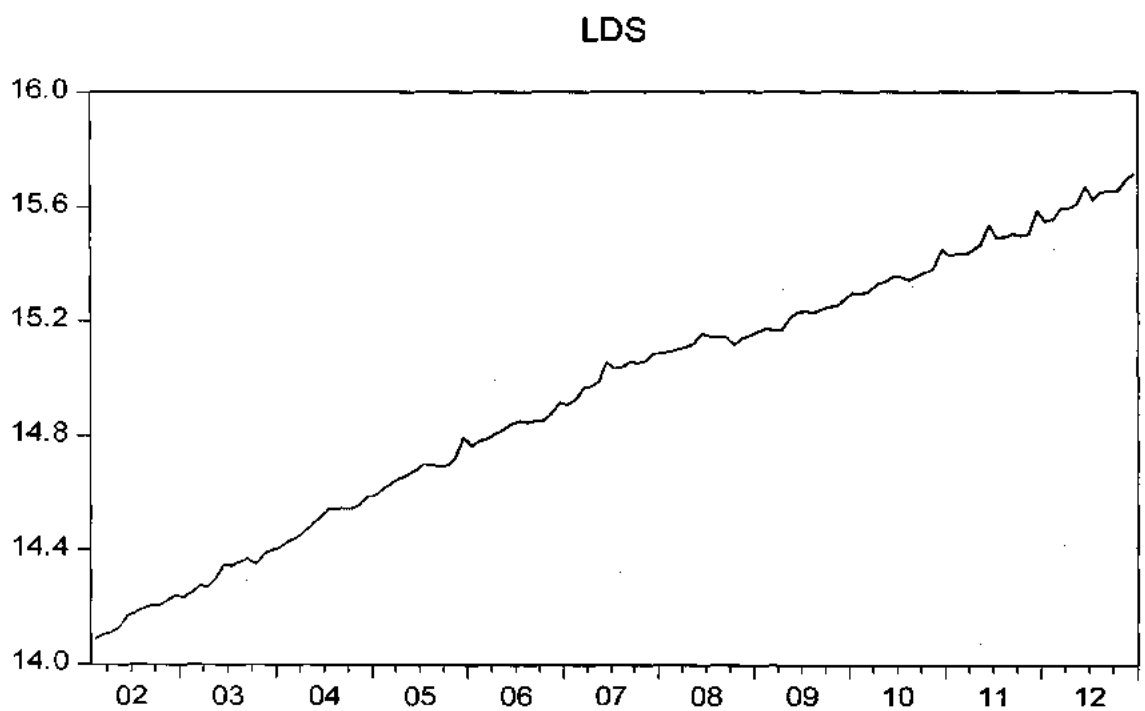
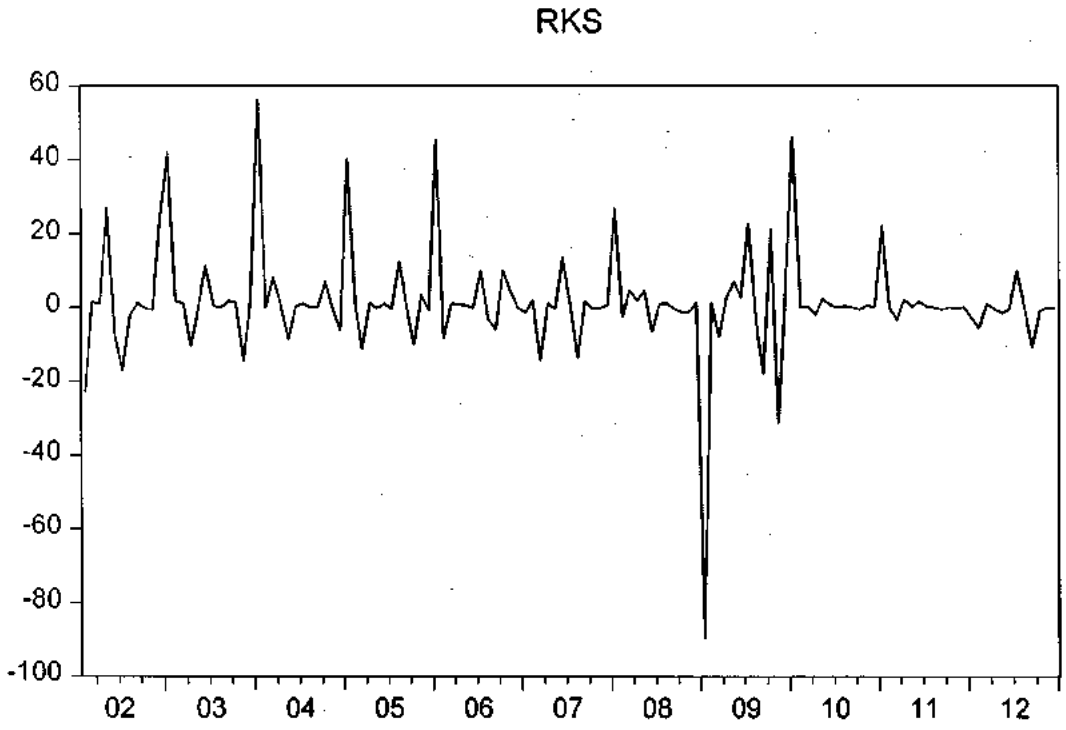
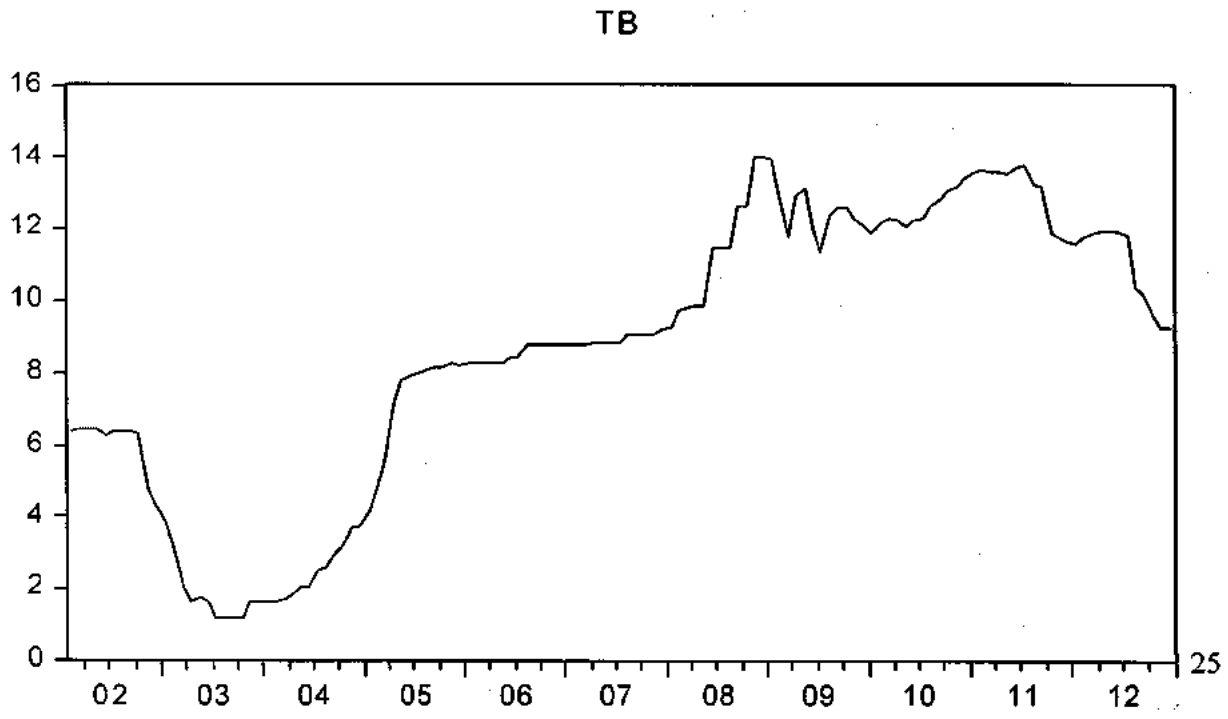
Exchange rate (ER) graph show trend in the data series and become stationery after taking first difference of the series while the graph of inflation (INF) show that data is stationary at level.

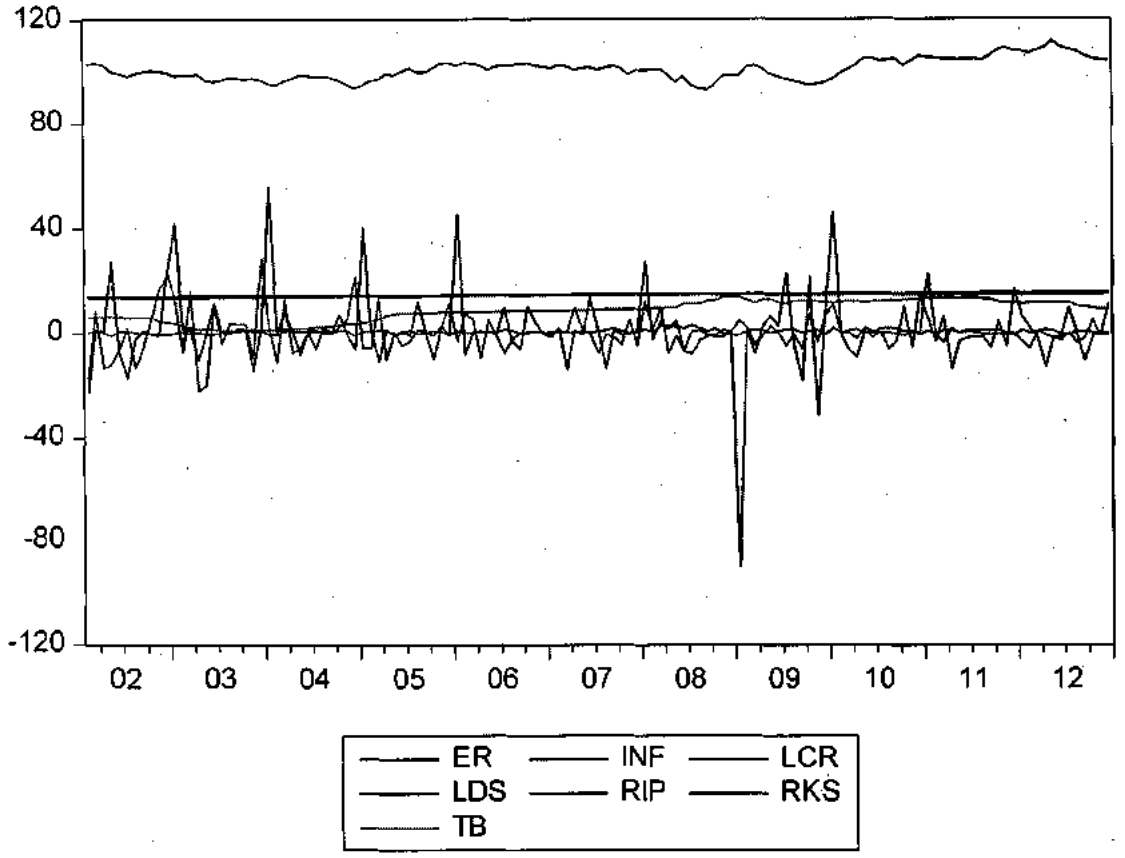




Log of bank deposits data show perfect trend in the data series. It means that LDS is not stationary at level; therefore first difference is needed to be taken to make the LDS series stationary.







Graphical presentation of all variables show the intercept and trend of each variable exist in the data.INF, RIP and RKS do not show trend in the data, these are seems to be stationary at level and confirmed by unit root test result in the Table 2. Remaining four variables LCR, LDS, ER and TB show trend in the graphical presentation that means these variables are not stationary at level. Bank credits to private sector (LCR) and bank deposits (LDS) both show positive trend without any downfall or irregularity, even though tight and expansionary monetary policy shocks are represented interest rate graphical presentation. In the beginning period of 2002, interest rate (TB) starts to fall rapidly from 6.4%. In the end of 2003, interest rate reached to its lowest level of 1.2%. This period of time show the expansionary monetary policy shock to boost up the economic activities. After that interest rate slowly increased from 2004 to 2011, this period of

time represent the tight monetary policy. But after the mid of 2011 interest rate again starts to decrease which show the expansionary shock. In the result of these monetary policy shocks it is observed that consumer price index, industrial production index and assets prices moves up and down accordingly. Especially in the initial expansionary shock of monetary policy that starts from 2002, considerable changes are seen in output and asset prices.

Error Correction Model followed by Cointegration analysis (Bound testing Approach) will be estimated after examine time series properties of variables and convert the variables in stationary form. Specifically, controlling for other determinants, following an approach related to Hendry's general to specific method we calculate the lag impact of policy rate on bank credit. General model for testing cointegration through ARDL or bound testing approach is given in Equation (1).

$$\Delta Lcr_t = \alpha_0 + \alpha_1 Lcr_{t-1} + \alpha_2 Er_{t-1} + \alpha_3 Inf_{t-1} + \alpha_4 Lds_{t-1} + \alpha_5 Rip_{t-1} + \alpha_6 Rksi_{t-1} + \alpha_7 Tb_{t-1} + \sum_{i=0}^{12} \beta\, \Delta Er_{t-i} + \sum_{i=0}^{12} \gamma\, \Delta Infl_{t-i} + \sum_{i=0}^{12} \delta\, \Delta Lds_{t-i} + \sum_{i=0}^{12} \theta\, \Delta Rip_{t-i} + \sum_{i=0}^{12} \vartheta\, \Delta Ksi_{t-i} + \sum_{i=0}^{12} \rho\, \Delta Tb_{t-i} \ldots\ldots\ldots\ldots\ldots Eq(1)$$

Long run dynamics ($\sqcup_{t-1}$) are captured in ECM Model that is a lag of residuals. These residuals are represented in the long run relationship equation given below equation (2).

$$Lcr_t = \alpha + \beta_1 Er_t + \beta_2 Infl_t + \beta_3 Lds_t + \beta_4 Rip_t + \beta_5 Rksi_t + \beta_6 Tb_t + \epsilon_t \ldots\ldots Eq(2)$$

Long run dynamics represents that what is the speed of adjustment of errors in long run or how quickly model is going towards equilibrium. Its value must be negative and fall between zero (0)

and minus one (-1). General model of error correction mechanism is written in equation (3) that represents the both short term relationship and long term relationship.

$$\Delta Lcr_t = \varphi + \sum_{i=1}^{12} \alpha\, \Delta Lcr_{t-i} + \sum_{i=0}^{12} \beta\, \Delta Er_{t-i} + \sum_{i=0}^{12} \gamma\, \Delta Infl_{t-i} + \sum_{i=0}^{12} \delta\, \Delta Lds_{t-i} + \sum_{i=0}^{12} \theta\, \Delta Rip_{t-i} + \sum_{i=0}^{12} \vartheta\, \Delta Ksi_{t-i} + \sum_{i=0}^{12} \rho\, \Delta Tb_{t-i} + \omega \epsilon_{t-1} + \mu_t \ldots\ldots Eq(3)$$

The consistency and stability of the Model is estimated by applying CUSUM Test and Serial Correlation. It is assumed that bank credit demand is positively influenced by the real economic activity while the policy interest rate has a negative on bank credit. It is also assumed that the relationship between credit and interest rate is independent of bank size. Consumer price index (inflation) can have either positive or negative influence on bank credit demand. If a company use both bank credit and money for financing of working capital then money holding penalizes in case of high inflation and the businesses go for bank loans preferably (Cuikerman and Hercowitz, 1989). On the other hand, high inflation due to decreasing productivity and falling demand for labor reduces the demand for credit by businesses (De Gregorio and sturzenegger, 1997).

An easing monetary policy can improve the equity prices in two dimensions, first is to make the equity more attractive as compare of bond when interest rate fall and secondly earnings of the firms improve due to more spending of the households. Higher stock prices increase the net value of the firms and higher financial wealth of household which improve their access for funds, this effect shows the credit channel of monetary policy

(Hashtam et al,2005). Similarly exchange rate influences the bank credit either positively or negatively.

3.3 Model Discussion

Monetary policy changes alter the bank transactions deposits or core deposits, which after some lags lead to decline in bank loans (Romer and Romer, 1990; and Bernanke and Blinder, 1992). Inflation can either have a positive or a negative impact on credit demand. When firms make use of both money and bank loans for working capital finance, high inflation penalizes money holding and makes bank loans more attractive (Cukierman and Hercowitz, 1989). On the other hand, high inflation by reducing productivity and reducing demand for labor lowers the demand for bank credit by firms (De Gregorio and Sturzenegger, 1997).

Credit demand could increase due to exchange appreciation to finance acquisition of the more attractive external financial assets (Vera, 2003). According to IMF working paper 2012, expansionary monetary policy lowers the interest rate and credit expansion then fuels the demand for assets and pushes asset prices (stock prices) up.

In tight monetary policy, according to Elixir Securities Analyst Faisal Bilwani, the stock market is likely to react negatively to the hike in the discount rate especially for highly leveraged companies due to an increase in the cost of borrowing. The growth within the economy or increase in GDP results, increase in the demand for financial services or demand for bank credit and this subsequently motivates financial development

(Mckinnon 1988). Several scholars (McKinnon 1973, Shaw 1973, Fry 1988, King & Levine 1993) have supported the significance of banks to the growth of the economy.

It is assumed that information of credit aggregates is an addition to information of monetary aggregates and interest rate for the determination of prices and output. Friedman (1983) recommended that macroeconomic analysis credit market can be used in addition to money market and income. There are two main parts of credit market one is demand of credit and the second is supply of credit. Behavior of lenders and behavior of borrowers are discussed in this study. It is assumed that interest rate is set by the banks and all the requirements of borrowers are fulfilled. Therefore theories affirmed that bank lending is demand which is determined at the going interest rates and it is not important to know that how the interest rate is derived, it can be set by the market forces or it can be fixed by the banks (cuthbertson, 1985)

Monetary policy theories for transmission mechanism mentioned the following channels for monetary transmission that affect the output. Such as exchange rate channel, interest rate channel, asset price channel and credit channel. Among these channels credit is the most important variable in the transmission from financial sector to real sector and price level (Bernanke and gertler, 1995;Mishkin, 1995; Cuthbertson,1985).

From the money supply side portfolio approach is very significant approach for determination. The reason of its importance is that it considered both the liability and asset side of the economy. The flow of fund approach explains opposite side of the money supply. This approach states that variations or differences in money supply are actually due to the bank lending to the various groups such as public sector organizations, personal sector and business sector.

Therefore, from the supply side the variables that determine the demand for money include the determinants of currency demand, demand for government loan and the demand for bank advances to personal sector and business sector.

For any business organization finances play a vital role. A new business establishment or for the successful running of a business an adequate finances are required. The reason is that for the production process a time period is required and the time is money. There is a time period gap between producing of products and sale of products. The production cost has to be paid before the receipts of sales in most of the businesses. Therefore an adequate working capital is required by the business.Business sector have two options for financing, one is internal source and the other is external source. Internal sources normally consist of family members, relatives, friends, retained earnings, revenue from sale and sale proceeds of liquid assets. The external sources can be equity market, debentures, bonds and bank lending. The most cheaper and easy external source for most of the businesses in Pakistan is the bank lending. This working capital is used for payment of wages, direct material, rent and tax payment.

The theories of demand for assets (portfolio model, precautionary and transactional model) can also be applied on the model of demand for bank lending to business segment. Demand for bank credit by the business sector depends on many variables. Bank advances are good alternate for money transactions balances. Therefore, theory of transaction demand for money may also be applicable on the credit demand, it explain that the business sector demand credit due to the sales of the sector or output/income of the sector, that varies with economic environment. Therefore, in a case of prosperity in the economy, business men want to expand their businesses and consumers want to spend more in anticipation of increasing income. In this situation there is

more demand for bank loans by the business sector and as a result there is high level of business turnover.

Cost of bank loan is an important determinant of bank credit to businesses. But if the stocks and financial assets are close alternatives or substitutes then real cost of bank loans have inverse relation with bank lending.Inflation impact on borrower is another significant variable which influence the demand for bank credit. If it is estimated that rise in inflation rate is more than rise in interest rate then the demand of credit rise by offsetting the impact of rise in interest rate. It is involved that bank credit demand is openly associated to the inflation rate. Another side is also important to show the influence of inflation on bank credit demand by private sector. If high level of inflation is related with elevated variable inflation rate. Then risk on investment return may be increased. This thing show the negative impact of inflation rate on bank credit demand.

Chapter NO.4

Result and Discussion

4.1 *Descriptive statistics of all variables*

Table1 shows the basic statistics of all variables. Skewness for normal distribution is zero and any equilibrium or symmetric data must have the zero skewness. Negative values of skewness such as LCR, LDS, RKS and Tb indicate that data is skewed left and positive values of skewness such as INF, ER and RIP indicate that data is skewed right. Left skewed means left tail is long relative to right tail. Likewise, right skewed show that right tail is longer than left tail.

Table1

Date: 10/22/14
Time: 10:29
Sample: 2002M02 2012M12

	LCR	INF	ER	LDS	RKS	RIP	TB
Mean	14.52598	0.785200	101.2636	14.94576	1.432188	0.269365	8.716719
Median	14.63652	0.759017	101.1080	15.04022	0.131377	0.022676	8.900000
Maximum	15.03209	3.282418	112.0080	15.71502	56.58952	28.31508	14.01000
Minimum	13.66070	-0.882422	93.37840	14.09144	-89.67301	-22.05822	1.211600
Std. Dev.	0.443745	0.821369	3.924343	0.457983	14.37405	8.086947	3.892594
Skewness	-0.622505	0.415067	0.289997	-0.196399	-0.764752	0.418479	-0.553247
Kurtosis	1.972866	3.249213	2.579614	1.891056	17.20595	4.181286	2.145922
Jarque-Bera	14.21925	4.100461	2.800763	7.554582	1114.310	11.44032	10.66437
Probability	0.000817	0.128705	0.246503	0.022885	0.000000	0.003279	0.004833
Sum	1902.904	102.8612	13265.53	1957.894	187.6166	35.28678	1141.890
Sum Sq. Dev.	25.59825	87.70407	2002.060	27.26731	26859.72	8501.833	1969.797
Observations	131	131	131	131	131	131	131

Kurtosis for a normal distribution as a standard is 3. High kurtosis such as RKS means data set is peaked distribution relative to the standard normal distribution and low kurtosis such as LCR and LDS means data sets are flat distributed relative to normal distribution. Standard deviation means

deviation from mean value. Higher the value of standard deviation means that data sets of a variable are very scattered. Highest value of standard deviation in this study is 14.374 of RKS variable.

4.2 Unit Root testing:

Table 2: Results of Unit Root Tests

Variable	ADF				PP				Decision
	Level		First Difference		Level		First Difference		
	Intrcpt	Intrcpt & trend	Intrcpt	Intrcpt & trend	intrcpt	Intrcpt & Trend	intrcpt	Intrcpt & Trend	
Lcr	-2.0603	-0.2031	-9.774*	-10.087*	-2.0603	-0.2031	-9.757*	-10.099*	I(1)
Er	-2.2712	-3.2839	-9.364*	-9.3551*	-2.0859	-2.9569	-9.364*	-9.355*	I(1)
Infl	-8.546*	-8.758*			-8.813*	-8.936*			I(0)
Lds	-1.6324	-2.1192	-4.480*	-4.6396*	-3.0216	-2.7126	-17.35*	-36.489*	I(1)
Rip	-3.839*	-4.963*			-15.201*	-15.35*			I(0)
Rksi	-11.95*	-12.06*			-12.231*	-12.81*			I(0)
Tb	-0.9664	-1.1464	-8.720*	-8.7040*	-1.1045	-1.4892	-9.152*	-9.1383*	I(1)

*indicates 5% level of significance.

The stationarity properties of all variables are established by using ADF and Phillips Perron Unit root test. This test is widely used in the literature to check the stationarity of the variables. This test allows for a wide class of mildly heterogeneous and auto correlated series.

The results of Unit root test (ADF and PP) with level and first differences of all variables are documented in Table 2. The results of ADF and PP are also mentioned with intercept and trend in table 2. 5% significance level is used to reject the null hypothesis of unit root in case of INF, RIP and RKS. The result of these three variables are indicated as I(0) that means these variables stationary at level and there is no unit root exist in INF, RIP and RKS. Unit roots are found in LCR, LDS,ER and TB, it means time series data of these variables is non stationary. Therefore,

first difference is applied on these four variables (LCR,LDS,ER and TB) and they become stationary as results mentioned I(1) in table2.

4.3 Testing of ARDL Co integration Analysis

Co integration analysis is performed by using the bound testing approach or ARDL approach with General to Specific methodology to check the long term relationship between dependent variable (LCR) and independent variables (Er, Infl, Lds, Rip, Rksi and Tb). General model for testing cointegration is given in Equation (1).

$$\Delta Lcr_t = \alpha_0 + \alpha_1 Lcr_{t-1} + \alpha_2 Er_{t-1} + \alpha_3 Inf_{t-1} + \alpha_4 Lds_{t-1} + \alpha_5 Rip_{t-1} + \alpha_6 Rksi_{t-1} + \alpha_7 Tb_{t-1} + \sum_{i=0}^{12} \beta\, \Delta Er_{t-i} + \sum_{i=0}^{12} \gamma\, \Delta Infl_{t-i} + \sum_{i=0}^{12} \delta\, \Delta Lds_{t-i} + \sum_{i=0}^{12} \theta\, \Delta Rip_{t-i} + \sum_{i=0}^{12} \vartheta\, \Delta Ksi_{t-i} + \sum_{i=0}^{12} \rho\, \Delta Tb_{t-i} \ldots\ldots\ldots\ldots\ldots Eq(1)$$

Equation (1) represent the general form of cointegration analysis in which all variables included initially with one lag value and in level form, then all variables are included in first difference form and with twelve lag values of each variable. Restriction is put on first seven variables that are included with one lag value and in level form.

Long run relationship is estimated by General to Specific methodology in which unrestricted model is started with Lag length value 12 because monthly data is used in the analysis. According to the General to specific (G to S) methodology lag values are tested down by using Wald test to get the parsimonious model. G to S approach in Co integration analysis shows that 2nd, 4th and 7th lags are significant as shown in equation (2).

DLCR = 0.0834 + 0.0021*LCR(-1) + 0.0003*ER(-1) + 0.0058*INF(-1) - 0.0079*LDS(-1) + 0.0008*RIP(-1) - 0.0003*RKS(-1) - 0.0019*TB(-1) + 0.0127*DLCR(-2) - 0.1536*DLCR(-4) - 0.2934*DLCR(-7) + 0.0007*DER + 0.00005*DER(-2) - 0.0005*DER(-4) - 0.0010*DER(-7) - 0.0007*DINF - 0.0004*DINF(-2) - 0.0004*DINF(-4) + 0.0018*DINF(-7) + 0.2281*DLDS - 0.1462*DLDS(-2) + 0.0629*DLDS(-4) + 0.2225*DLDS(-7) +0.0007*DRIP +0.00002*DRIP(-2) – 0.00008*DRIP(-4) + 0.00009*DRIP(-7) - 0.0003*DRKS -0.00004*DRKS(-2) - 0.00017*DRKS(-4) - 0.0001*DRKS(-7) + 0.0020*DTB + 0.0049*DTB(-2) - 0.0049*DTB(-4) + 0.0063*DTB(-7).....Eq(2)

Coefficients of restricted part of equation (1) are tested by applying Wald Test as mentioned below. It represents the null hypothesis of no Cointegration.

H_0: c(1)=c(2)=c(3)=c(4)=c(5)=c(6)=c(7)=c(8)=0 .....Eq(3).

Null hypothesis of no cointegration can be rejected/accepted on the basis of comparing the value of F statistics with the value of Hashim Pesaran table (Annexure 3), value of F statistics is derived from results as mentioned in annexure 2. If the value of F statistics is greater than Pesaran upper value it means that there is cointegration (reject null hypothesis), if value of F statistics is less than Pesaran lower value it means there is no cointegration (accept null hypothesis) and if value of F statistics fall in between Pesaran upper and lower value then results cannot defined. Hashim Pesaarn table upper value (FUV) is 3.24 and lower value (FLV) is 2.04. These upper and lower values of Pesaran table are located with six regressors (independent variables) at 0.05 level of significance.

F statistics value as shown in annexure (2) is 3.693 that is greater than FUV which means that co integration exists. Therefore the Null hypothesis of no Co integration is rejected. In simple words it can be explained that bank credits are influenced by inflation, GDP, Exchange rate, stock prices, interest rate and bank deposits in long term.

Simple regression is run with dependent variable bank credit and independent variables are bank deposits, inflation, GDP, Exchange rate, asset prices and interest rate. Result of regression is attached at annexure 4 and the residuals generated in this regression captured the long run dynamics, these residuals are saved and use them with lag value in ECM model. If bound testing cointegration analysis concluded that there is no long run relationship then ARDL model is preferable to investigate the short run relation only.

4.4 Error Correction Model

ECM model is a category of multiple time series models that directly estimate the speed of adjustment of dependent variable towards the equilibrium due to the change in independent variables. The Error correction Mechanism has important properties, first is that it helps to estimate the short run dynamics without ignoring the long run dynamics of the data, and the second is that ECM nests the specifications of all types of popular model such as linear, partial adjustment mechanism and adaptive expectation (Hendry et al, 1984; Engle and Granger, 1987).

Error correction model (ECM) with General to Specific methodology is used in this study for the estimation of bank credit channel of monetary policy transmission. General model of ECM include short run dynamics and long run dynamics as well. In short run dynamics all variables are regressed with dependent variable with twelve lag values. In this model ΔLcr represent the first difference of bank credits to private sector that is a dependent variable in this study as used by Jeevan kumar (2013) and Abdul Qayum (2002). In bank credit channel inflation (Infl), bank depostis (ΔLds)/money supply, GDP(Rip) and Interest rate(ΔTb) are investigated in Pakistan context by Abdul Qayyum (2002), Hashtam et al,(2005) and Safia Shabir (2012). In this study

exchange rate (ΔEr) and KSE index (Ksi) is first time regressed with bank credit to private sector in credit channel of monetary policy transmission.

Long run dynamics (ϵ_{t-1}) are also captured in ECM Model that is a lag of residuals. These residuals are represented in equation (3).

$$Lcr_t = \alpha + \beta_1 Er_t + \beta_2 Infl_t + \beta_3 Lds_t + \beta_4 Rip_t + \beta_5 Rksi_t + \beta_6 Tb_t + \epsilon_t \ldots\ldots Eq(3)$$

Long run dynamics represents that what is the speed of adjustment of errors in long run or how quickly model is going towards equilibrium. Its value must be negative and fall between zero (0) and minus one (-1). General model of error correction mechanism is written in equation (4).

$$\Delta Lcr_t = \varphi + \sum_{i=1}^{12} \alpha\, \Delta Lcr_{t-i} + \sum_{i=0}^{12} \beta\, \Delta Er_{t-i} + \sum_{i=0}^{12} \gamma\, \Delta Infl_{t-i} + \sum_{i=0}^{12} \delta\, \Delta Lds_{t-i} + \sum_{i=0}^{12} \theta\, \Delta Rip_{t-i} + \sum_{i=0}^{12} \vartheta\, \Delta Ksi_{t-i} + \sum_{i=0}^{12} \rho\, \Delta Tb_{t-i} + \omega \epsilon_{t-1} + \mu_t \ldots\ldots Eq(4)$$

Final Parsimonious ECM model after the application of General to specific methodology is represented in equation (5) with 1st, 5th, 6th and 7th lag values that are found significant. The original values of coefficients are also mentioned in equation (5) and the significance of lag values are shown in annexure (5).

DLCR = 0.0079 + 0.1544*DLCR(-1) + 0.0922*DLCR(-5) + 0.2075*DLCR(-6) - 0.2753*DLCR(-7) + 0.0007*DER - 0.0016*DER(-1) - 0.0034*DER(-5) + 0.0013*DER(-6) - 0.0018*DER(-7) – 0.00001*INF + 0.0038*INF(-1) - 0.0008*INF(-5) - 0.0035*INF(-6) - 0.0058*INF(-7) + 0.1503*DLDS - 0.1987*DLDS(-1) + 0.0731*DLDS(-5) + 0.0841*DLDS(-6) + 0.3083*DLDS(-7) + 0.0007*RIP + 0.00007*RIP(-1) - 0.0002*RIP(-5) - 0.0002*RIP(-6) -

0.0003*RIP(-7) - 0.0002*RKS + 0.0001*RKS(-1) + 0.0003*RKS(-5) + 0.00005*RKS(-6) +0.00003*RKS(-7) + 0.0004*DTB + 0.0025*DTB(-1) + 0.0046*DTB(-5) + 0.0002*DTB(-6) + 0.0065*DTB(-7) - 0.0142*RES(-1).....Eq (5)

Results of final model explains that sixth lag of DLCR is significant, which means 1% increase in bank credits today due to monetary policy shock will increase the bank credits 20.75 % after six months. Significant fifth lag of exchange rate show that 1% change in exchange rate because of monetary policy will inversely influence 0.34% to the bank credits after five months. It means that 1% increase in exchange rates/depreciation of Pak rupees will cause 0.34% decrease bank credit in private sector of Pakistan for the next five months. Similarly appreciation of Pak rupees/decrease in exchange rate will increase the demand for bank credit. The affect of monetary policy tightening on exchange rate is explained by Hashtam et al, (2005) in the context of Pakistan and found that in the result of monetary policy tightening exchange rate appreciates in the first two months then depreciates in the next seven months and consequently adjust after 24 months with appreciation. Hence it is also seen in graphical presentation of Interest rate that there is tight monetary policy from 2003 to 2011, in the result exchange rate appreciate and bank credits increased. This result is consistent with Hashtam et al, (2005).

Money supply/ bank deposits (DLDS) and inflation (INF) both has significant impact on bank credit at seventh lag. It demonstrate that 1% rise in current inflation rate will decrease 0.58% bank credit to private sector after seven months, this negative relationship of inflation and bank credits indicate that when there is high inflation with variable rate then the risk of return on investment will also increase and consequently it leads to the negative impact of inflation rate on the demand for bank credit (Cukierman and hercowitz,1989; Abdul Qayyum,2002). On other

hand results of this study regarding inflation are contradict with results of Mishkin (1995) in which it is concluded that tight monetary policy means low rate of inflation and high real interest rate. It will push the economy into the recession. So high interest rate will increase the cost of borrowing from banks, as a result bank credits demand by the private business sector will decrease. Therefore inflation has positive and direct relationship with bank credits Mishkin (1995).

There is significant positive impact of bank deposits on bank credits. In other words, banks adjust their credit portfolios accordingly when there is any expansion or contraction in money supply/bank deposits (Jeevan, 2013). Results of this study also show that 1% increase in bank deposits or money supply due to monetary policy shocks will increase 30.83% Bank credits (ΔLcr) in the coming seven months.

Results of RIP(Proxy of GDP) represent that it influence the bank credits positively in the same period of time but its effect on demand for bank credits is very light. As per results, 1% change in Return of industrial production will cause 0.07% bank credits positively. In the period of prosperity,businesses are interested to expand their businesses on the basis of higher expected turnover/putput and consumers also spend more on the basis of higher expected income. Therefore, in these circumstances it is likely to increase the demand for bank credits.

Karachi stock index is converted into returns (RKSI) that represent as a proxy for all asset prices (including real estate) and included in the model of bank credit channel similar to exchange rate, both are found to have significant impact on bank credits that is an important contribution of this study in Pakistan context. RKSI has positive influence on ΔLcr after five months. 1% positive change in RKSI will increase 0.03% demand for bank credits after the lag of five months. Value of collaterals and credit worthiness of borrowers rises when the asset prices/stock prices

increases, it expands the bank credits. This expansion of bank credit fuels the demand for assets and pushes the prices of assets up (Pauvelle, 2012).

The final and important relationship is present between interest rate and bank credits that show the existence of bank credit channel for the transmission of monetary policy shocks. Results regarding lag impact of interest rate on bank credits is consistent with the result of Jeevan (2013) in which it is found that change in interest rate will take seven months to influence the bank credits demand. But the positive sign of coefficient of interest rate that indicates the positive relationship between interest rate and bank credits to private business sector is consistent with the findings of Yong et al (2007); Tee and Goh (2006).

Their research indicates that when there is unexpected change in interest rate is positive, Banks push for credit expansions due to higher profit margins. On the other hand when there is negative interest rate shocks in which monetary authorities try to boost the economic activities, profit margin of commercial banks is very low and high risk of lending, therefore this thing discourage the willingness of banking sector to expand credits.

Long run dynamics of this study are also captured by the ECM model, lag value of residual represented the long run relationship that is 1.4%. This value of 1.4% must be negative which means that in long run our model is moving toward equilibrium position at the speed of 1.4% per period of time or per month. In other words, errors are corrected at the speed of 1.4% per month.

4.5 Residual Diagnostics and Stability Diagnostics

a. Corrologram

Date: 11/29/14 Time: 18:33
Sample: 2002M02 2012M12
Included observations: 123
Q-statistic probabilities adjusted for 4 dynamic repressors

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob*
.|. |	.|. |	1	-0.023	-0.023	0.0655	0.798
.|. |	.|. |	2	0.046	0.045	0.3312	0.847
.|. |	.|. |	3	-0.044	-0.042	0.5765	0.902
.|. |	.|. |	4	-0.041	-0.045	0.7954	0.939
.|. |	.|. |	5	-0.056	-0.055	1.2084	0.944
*|. |	*|. |	6	-0.151	-0.153	4.2000	0.650
.|. |	.|. |	7	-0.021	-0.029	4.2563	0.750
*|. |	*|. |	8	-0.109	-0.109	5.8541	0.664
.|. |	*|. |	9	-0.041	-0.069	6.0822	0.732
.|. |	.|. |	10	-0.043	-0.064	6.3396	0.786
.|. |	.|. |	11	0.054	0.021	6.7389	0.820
.|* |	.|. |	12	0.106	0.073	8.3085	0.761

*Probabilities may not be valid for this equation specification.
All Probability values are more than 0.05; it means that there is no autocorrelation.

b. Serial Correlation

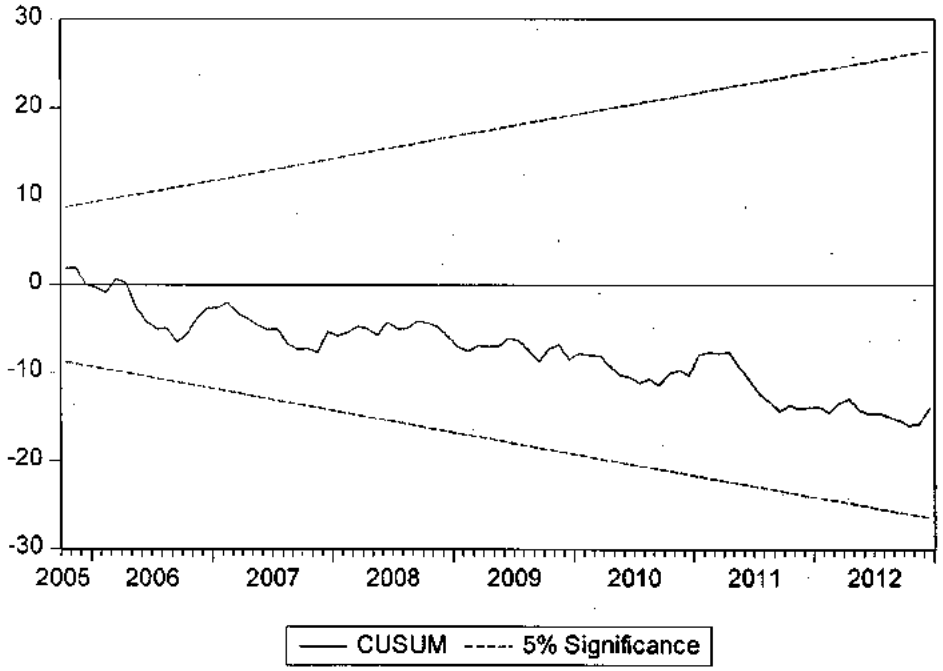
Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.809878	Prob. F(12,75)	0.6394
Obs*R-squared	14.11002	Prob. Chi-Square(12)	0.2937

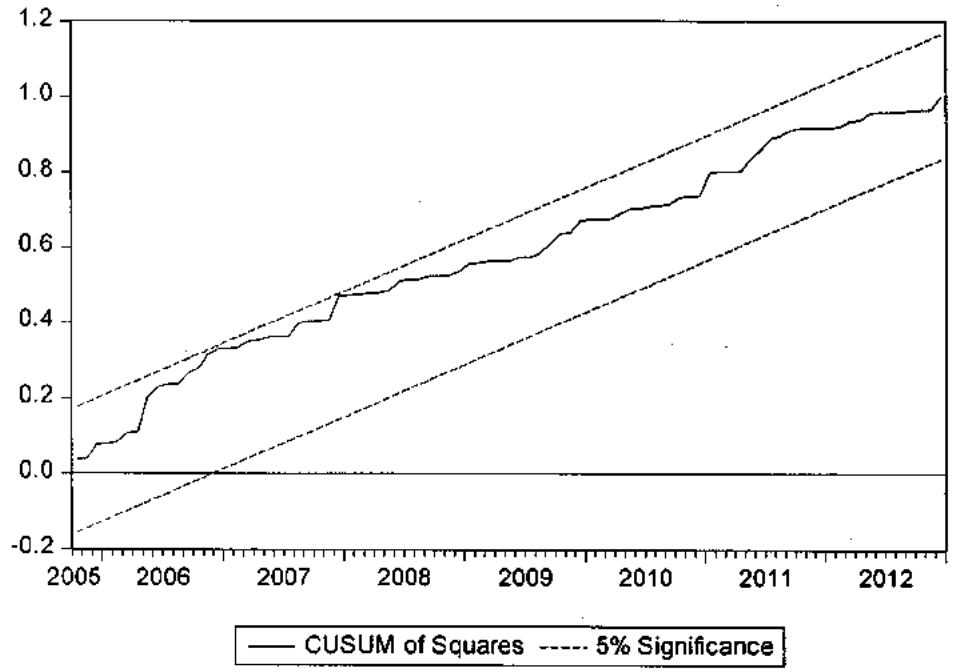
P value greater than 0.05 that's mean no serial correlation exist.

4.6Stability Diagnostics

a. CUSUM Test



b. CUSUM Square Test



Chapter No.5
CONCLUSION

5.1 Conclusion

This study estimates the bank credit channel of monetary policy transmission in the context of Pakistan. For this intention we used multi step methodology, that is, initially unit root test is conduct to check the stationarity of the variables, Cointegration analysis by using bound testing approach is applied to check the long run relationship and consequently ECM (Error Correction Mechanism) is used to incorporate the short run relationship and the significance of long run relationship.

Unit Root testing authenticate that individual variables series are not stationary at their level. Inflation, industrial production index and asset prices are stationary at level while the other four variables bank credit, bank deposits, interest rate and exchange rate are stationary at first difference.

It is also revealed by cointegeration analysis that there is long run cointegrating relationship between bank credit to private business sector and inflation, interest rate, bank deposits, exchange rate, industrial production index and asset prices. Moreover, the preferred Error correction model, estimated by the General to Specific approach, is found to be stable throughout the study period.

Results of this study appear that bank credit channel does not provide additional leverage to authorities for the conduct of monetary policy. Restrictive monetary policy stance in which real interest rate increased by the monetary authorities, decrease in bank credits is estimated kashyap and stein(1997); Hulsewig et al (2001), but the results show that bank credits are positive related with interest rate. It means that increase in

interest rate does not decrease the bank credits because banks make adjustment against monetary policy shocks by using their liquid financial instruments. With the latest developments in financial sector, banks have many newly growing sources of funds that permit them to offset the monetary policy shocks.

So Bank credit channel is not found to be effective in the transmission of monetary policy in the context of Pakistan. This result is found to be consistent with the findings of Yong et al (2007); Romer and Romer (1990).Garretsen and Swank (2003) found that banks are reluctant to reduce bank credits in the result of monetary policy shocks in order to development long term and good relationships with their corporate clients. By making adjustments in liquid financial instruments, banks can avoid the effects of monetary policy shocks at least in short term.

Significant inverse relationship between exchange rate and bank credits with lag value of five show that 1% increase in exchange rates/depreciation of Pak rupees will cause 0.34% decrease bank credit in private sector of Pakistan after the next five months. Similarly decrease in exchange rate/ appreciation of Pak rupees will increase the demand for bank credit.

Inflation (INF) has significant impact on bank credit at seventh lag. It demonstrate that 1% rise in current inflation rate will decrease 0.58% bank credit to private sector after seven months, this negative relationship of inflation and bank credits indicate that when there is high inflation with variable rate then the risk of return on investment will also increase and consequently it leads to the negative impact of inflation rate on the demand for bank credit (Cukierman and hercowitz,1989; Abdul Qayyum,2002).

Money supply/ bank deposits (DLDS) have a significant positive impact on bank credits. In other words, banks adjust their credit portfolios accordingly when there is any expansion or contraction in money supply/bank deposits (Jeevan, 2013). Results of this study also show that 1% increase in bank deposits or money supply due to monetary policy shocks will increase 30.83% Bank credits (ΔLcr) in the coming seven months.

Results of RIP(Proxy of GDP) represent that it influence the bank credits positively in the same period of time but its effect on demand for bank credits is very light. As per results, 1% change in Return of industrial production will cause 0.07% bank credits positively. In the period of prosperity, businesses are interested to expand their businesses on the basis of higher expected turnover/output and consumers also spend more on the basis of higher expected income. Therefore, in these circumstances it is likely to increase the demand for bank credits.

Karachi stock index is converted into returns (RKSI) that represent as a proxy for all asset prices (including real estate) and included in the model of bank credit channel similar to exchange rate, both are found to have significant impact on bank credits that is an important contribution of this study in Pakistan context. RKSI has positive influence on ΔLcr after five months. 1% positive change in RKSI will increase 0.03% demand for bank credits after the lag of five months. Value of collaterals and credit worthiness of borrowers rises when the asset prices/stock prices increases, it expands the bank credits. This expansion of bank credit fuels the demand for assets and pushes the prices of assets up (Pauvelle, 2012).

5.2 Academic and Practical Implications

The study helps the researchers to recognize the relevant financial variables that increase their understanding of the relationship between the financial and real sector of the economy, it also provide a deep and better understanding of transmission mechanism that

would help the policy makers to understand the movements in financial variables more accurately. Monetary authorities depend on comprehensive information about the transmission mechanism; therefore they should not depend on credit channel because it is not a significant part of monetary transmission system.

Policy makers can find out the lag impact of credit channel, how quickly in terms of months or years the monetary policy decisions transmitted in the economy of Pakistan, and Policy makers with adequate knowledge of this channel of transmission able to create favorable credit environment for businesses to contribute positively in the economic development of Pakistan.

Small and medium businesses that rely on bank credits rather than equity financing understand all those factors that influence the supply and demand of bank credits and set the future directions for their businesses.

5.3 *Limitations*

This study includes the time period of eleven years from 2002 to 2012 that is very short period. Past data before 2002 is not easily available for all variables that's why short period of time is selected. Short period of time created problem in defining significant relationship among variables. Results regarding long term relationship that are represented by lag of residuals in this study should be negative and significant, but the desired significant level is not achieved with the available data. Therefore, large data period might be solved this issue.

Another limitation of this study is that very small research publications are available on this area of research in Pakistan context. Therefore, it creates difficulty to form the basis of literature review and lays a foundation for understanding of research problem.

5.4 Future direction

In future perspective, a detail study that not only include a long period of time as mentioned in the limitations of this research but also a comparative study of all transmission channels of monetary policy can be conducted. There is vast opportunity for future researchers to investigate this line of study and find out the most effective channel of monetary policy transmission.

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Annexure 1 (ARDL Cointegration Table)

Dependent Variable: DLCR
Method: Least Squares
Date: 11/29/14 Time: 18:20
Sample (adjusted): 2002M10 2012M12
Included observations: 123 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.083427	0.184468	0.452255	0.6522
LCR(-1)	0.002131	0.032858	0.064852	0.9484
ER(-1)	0.000264	0.000786	0.336049	0.7376
INF(-1)	0.005750	0.003276	1.755107	0.0827
LDS(-1)	-0.007901	0.027587	-0.286402	0.7752
RIP(-1)	0.000796	0.000386	2.060403	0.0423
RKS(-1)	-0.000286	0.000219	-1.304938	0.1953
TB(-1)	-0.001901	0.001474	-1.289454	0.2006
DLCR(-2)	0.012672	0.114510	0.110667	0.9121
DLCR(-4)	-0.153641	0.105545	-1.455699	0.1490
DLCR(-7)	-0.293476	0.101532	-2.890470	0.0048
DER	0.000716	0.001477	0.484591	0.6292
DER(-2)	5.85E-05	0.001557	0.037570	0.9701
DER(-4)	-0.000503	0.001534	-0.328099	0.7436
DER(-7)	-0.001014	0.001522	-0.666334	0.5069
DINF	-0.000778	0.002618	-0.297048	0.7671
DINF(-2)	-0.000440	0.002144	-0.205317	0.8378
DINF(-4)	-0.000473	0.002264	-0.208885	0.8350
DINF(-7)	0.001843	0.002312	0.797381	0.4274
DLDS	0.228172	0.103300	2.208820	0.0298
DLDS(-2)	-0.146208	0.099105	-1.475276	0.1437
DLDS(-4)	0.062915	0.101064	0.622524	0.5352
DLDS(-7)	0.222398	0.119449	1.861864	0.0660
DRIP	0.000738	0.000249	2.965995	0.0039
DRIP(-2)	2.34E-05	0.000168	0.139064	0.8897
DRIP(-4)	-8.63E-05	0.000183	-0.470600	0.6391
DRIP(-7)	9.26E-05	0.000161	0.574211	0.5673
DRKS	-0.000266	0.000155	-1.714112	0.0900
DRKS(-2)	-4.75E-05	9.45E-05	-0.502448	0.6166
DRKS(-4)	-0.000175	9.06E-05	-1.925341	0.0574
DRKS(-7)	-0.000134	8.90E-05	-1.500624	0.1370
DTB	0.002025	0.004716	0.429435	0.6687
DTB(-2)	0.004953	0.004180	1.184830	0.2393
DTB(-4)	-0.004969	0.004216	-1.178606	0.2417
DTB(-7)	0.006315	0.004535	1.392507	0.1673

R-squared	0.491075	Mean dependent var	0.011111
Adjusted R-squared	0.294444	S.D. dependent var	0.021263
S.E. of regression	0.017860	Akaike info criterion	-4.978213
Sum squared resid	0.028071	Schwarz criterion	-4.177998
Log likelihood	341.1601	Hannan-Quinn criter.	-4.653168
F-statistic	2.497452	Durbin-Watson stat	1.989630
Prob(F-statistic)	0.000328		

Annexure 2

Wald Test:
Equation: LAG7

Test Statistic	Value	df	Probability
F-statistic	3.692727	(7, 88)	0.0015
Chi-square	25.84909	7	0.0005

Null Hypothesis: C(2)=C(3)=C(4)=C(5)=C(6)=C(7)=C(8)=0
Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
C(2)	0.002131	0.032858
C(3)	0.000264	0.000786
C(4)	0.005750	0.003276
C(5)	-0.007901	0.027587
C(6)	0.000796	0.000386
C(7)	-0.000286	0.000219
C(8)	-0.001901	0.001474

Restrictions are linear in coefficients.

Annexure 3

M.Hashim Pesaran Table

	0.1		0.05		0.025		0.01		Mean		Variance	
k	I0	I1	I0	I1	I0	I1	I0	I1	I0	I1	I0	I1
0	3	3	4.2	4.2	5.47	5.47	7.17	7.17	1.16	1.16	2.32	2.32
1	2.4	3.28	3.15	4.11	3.88	4.92	4.81	6.02	1.08	1.54	1.08	1.73
2	2.2	3.19	2.72	3.83	3.22	4.5	3.88	5.3	1.05	1.69	0.7	1.27
3	2	3.1	2.45	3.63	2.87	4.16	3.42	4.84	1.04	1.77	0.52	0.99
4	1.9	3.01	2.26	3.48	2.62	3.9	3.07	4.44	1.03	1.81	0.41	0.8
5	1.8	2.93	2.14	3.34	2.44	3.71	2.82	4.21	1.02	1.84	0.34	0.67
6	1.8	2.87	2.04	3.24	2.32	3.59	2.66	4.05	1.02	1.86	0.29	0.58
7	1.7	2.83	1.97	3.18	2.22	3.49	2.54	3.91	1.02	1.88	0.26	0.51
8	1.7	2.79	1.91	3.11	2.15	3.4	2.45	3.79	1.02	1.89	0.23	0.46
9	1.6	2.75	1.86	3.05	2.08	3.33	2.34	3.68	1.02	1.9	0.2	0.41
10	1.6	2.7	1.8	2.9	2	3.2	2.2	3.6	1	1.9	0.1	0.37

Annexure 4 (Long Run Table)

Dependent Variable: LCR
Method: Least Squares
Date: 11/15/14 Time: 18:24
Sample: 2002M02 2012M12
Included observations: 131

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.267354	0.383250	8.525387	0.0000
ER	-0.015173	0.002057	-7.376660	0.0000
INF	0.015693	0.008515	1.843014	0.0677
LDS	0.841724	0.028813	29.21382	0.0000
RIP	0.001056	0.000837	1.261988	0.2093
RKS	-0.000231	0.000465	-0.498172	0.6192
TB	0.023249	0.003184	7.302085	0.0000

R-squared	0.973483	Mean dependent var	14.52598
Adjusted R-squared	0.972200	S.D. dependent var	0.443745
S.E. of regression	0.073987	Akaike info criterion	-2.317900
Sum squared resid	0.678786	Schwarz criterion	-2.164263
Log likelihood	158.8224	Hannan-Quinn criter.	-2.255470
F-statistic	758.7111	Durbin-Watson stat	0.224304
Prob(F-statistic)	0.000000		

Annexure 5 (ECM Table)

Dependent Variable: DLCR
Method: Least Squares
Date: 11/26/14 Time: 08:33
Sample (adjusted): 2002M10 2012M12
Included observations: 123 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.007908	0.006174	1.280764	0.2037
DLCR(-1)	0.154393	0.104877	1.472133	0.1446
DLCR(-5)	0.092225	0.094670	0.974172	0.3327
DLCR(-6)	0.207468	0.098496	2.106359	0.0381
DLCR(-7)	-0.275322	0.106953	-2.574232	0.0117
DER	0.000683	0.001428	0.477965	0.6339
DER(-1)	-0.001643	0.001360	-1.208218	0.2302
DER(-5)	-0.003351	0.001481	-2.262323	0.0262
DER(-6)	0.001297	0.001506	0.861363	0.3914
DER(-7)	-0.001866	0.001432	-1.302327	0.1962
INF	-1.34E-05	0.002428	-0.005534	0.9956
INF(-1)	0.003765	0.002672	1.409188	0.1623
INF(-5)	-0.000763	0.002262	-0.337209	0.7368
INF(-6)	-0.003450	0.002593	-1.330387	0.1869
INF(-7)	-0.005775	0.002687	-2.149521	0.0344
DLDS	0.150283	0.111117	1.352468	0.1797

DLDS(-1)	-0.198715	0.111712	-1.778818	0.0788
DLDS(-5)	0.073103	0.101886	0.717497	0.4750
DLDS(-6)	0.084143	0.111814	0.752521	0.4538
DLDS(-7)	0.308338	0.113151	2.725009	0.0078
RIP	0.000733	0.000258	2.841446	0.0056
RIP(-1)	7.47E-05	0.000285	0.261574	0.7943
RIP(-5)	-0.000207	0.000257	-0.804724	0.4232
RIP(-6)	-0.000169	0.000262	-0.644198	0.5211
RIP(-7)	-0.000284	0.000256	-1.110608	0.2698
RKS	-0.000207	0.000158	-1.311185	0.1932
RKS(-1)	0.000105	0.000124	0.848558	0.3985
RKS(-5)	0.000333	0.000136	2.449855	0.0163
RKS(-6)	5.01E-05	0.000128	0.390371	0.6972
RKS(-7)	3.73E-05	0.000120	0.309689	0.7575
DTB	0.000419	0.004398	0.095296	0.9243
DTB(-1)	0.002491	0.003984	0.625173	0.5335
DTB(-5)	0.004556	0.004343	1.049176	0.2970
DTB(-6)	0.000168	0.004069	0.041349	0.9671
DTB(-7)	0.006486	0.004155	1.561142	0.1221
RES(-1)	-0.014185	0.031672	-0.447884	0.6554

R-squared	0.545743	Mean dependent var	0.011111
Adjusted R-squared	0.362995	S.D. dependent var	0.021263
S.E. of regression	0.016971	Akaike info criterion	-5.075590
Sum squared resid	0.025056	Schwarz criterion	-4.252512
Log likelihood	348.1488	Hannan-Quinn criter.	-4.741258
F-statistic	2.986325	Durbin-Watson stat	2.019611
Prob(F-statistic)	0.000020		