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Determining Effectiveness of Monetary Transmission through Commercial Banks of Pakistan

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Abstract: This study oversee the role of commercial banks of Pakistan whether effectively playing their significant role in monetary transmission. This study explores long and short-run relationships between monetary policy rate and commercial bank's related variables and between commercial banks' related variables and macroeconomic variables. This study used quarterly data from 1998 to 2018 for the variables include central bank policy rate, Industry level data of bank deposits, bank loans and bank investments and gross domestic product. Data are collected from the official websites of the State Bank of Pakistan and tested by econometric techniques. Outcomes of this study reveal that monetary decisions influence commercial banks to some extent. However, these could not influence the economic aggregates significantly in Pakistan.

Keywords: Central Bank Policy Rate; Bank Deposits; Bank Loans; Bank Investments; Gross Domestic Product

JEL Classification: E50, E52

1. Introduction

Central banks use various channels in various economies; e.g. in a trade-based economy; central banks prefer exchange rate channels to influence the real economy. Mainly, these channels are classified into two categories: the money view holds the exchange rate and the interest rate channel. Another one is called the credit view, which consists of a balance sheet and bank lending channel (Taylor, 1995). Both

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points of view require financial intermediaries to operate; therefore, the role of the banks entails greater significance. Monetary transmission refers to a process; wherein the central bank's monetary policy decisions are passed through financial markets that later penetrate at business and household levels. It can also be said that the process of absorbing shocks of monetary policy into macro-economic variables such as price level and output and the time consumed by these shocks to improve overall economic health (Grant, 2000).

The theoretical aspect of banking portfolios is based on some basic assumptions. Firstly, the economy of any country should be bank dependent, which implies that the majority of the borrowers depend on banks for their shortage of funds and are incapable of creating such funds from other sources. Secondly, there should be a similar direction of the changes in the interest rate and open market operations (OMO). Thirdly, a positive association between interest rate and non-performing loans (NPL) must reinforce the perception that a higher interest rate brings more defaults. The above assumptions have been tested across the Euro area, the USA, and in some developing economies at an aggregate level (Ehrmann, Gambacorta, Martínez-Pagés, Sevestre, & Worms, 2001) (Al-Mashat, 2003) (Bernanke & Blinder, 1992; Chatelain, Generale, Hernando, von Kalckreuth & Vermeulen, 2003).

The latter phase of the interest rate affects monetary aggregates, bringing change in real activity. This change in real actions tested for both in the long and short-run while monetary policy influences real activity, at least in the short run, is becoming more popular with time. Historically contradictory views are prevailing am economists supporting the idea that monetary policy has real effects.

This idea has been tested by some researchers in Pakistan too. However, as financial markets are not fully developed in Pakistan, the studies conducted so far bring mixed results, e.g. a recent study explores bank loans and deposits are not vital to monetary policy or economic variables (Khan, Ahmad & Gee, 2016). Similarly, the findings of another study do not support the idea of the effectiveness of the banking channels because bank loans and deposits do not play a significant role during monetary transmission (A. K. Khan & Khanna, 2010).

Contrarily banks played an important role in monetary transmission, as concluded by a group of researchers in Pakistan (Agha, Ahmed, Mubarik & Shah, 2005). Moreover, the development of the financial market is positively correlated with economic growth in Pakistan, as concluded by another study (N. Badar & Badar).

Some studies conducted outside of Pakistan also concluded mixed results, e.g. In Nepal, local financial markets are underdeveloped and poorly integrated with international financial markets, causing hindrance in interest rate, assets price or exchange rate channels to operate. However, the credit view of monetary transmission is more effective than other channels if lending resources are well utilized in Nepal (Budha, 2013). Money supply plays an essential role in monetary

transmission, as concluded by another study conducted in China (Sun, 2013). Likewise, some studies advocate the idea of credit supply in favor of economic variables, i.e. GDP and inflation (Ping, 2004). Another study also supports that monetary decision contributes significantly to output and inflation in G-7 countries (Canova & De Nicolo, 2002). Outcomes of the studies referred above necessitate overseeing the role of monetary transmission in Pakistan.

Due to varying effects, the literature is widely divided on whether bank lending channels influence monetary transmission. Researchers, academicians, and policymakers are currently skeptical and suspicious about the effectiveness of bank lending channels. There is no clear verdict as if bank lending channels in Pakistan are effectively playing their role or what impediments bank lending channels may confront to work effectively. Arguments both favor and against are presented in several studies conducted in different economies. Nevertheless, there has been no definitive answer to whether bank lending channels are always effectively pursuing monetary objectives. Hence, this research intends to expand the existing literature in the field, to resolve this dilemma through fresh empirical evidence in Pakistan.

The proportion of the banking sector in total financial assets stands at 74 per cent by the end of 2014. In contrast, the rest of the share is held by the Central Directorate of National Savings (CDNS) at 17 per cent and Non-banking financial corporations (NBFC) at 5 per cent (Sources State bank of Pakistan web www.sbp.org.pk). The capital market in Pakistan is not fully developed; therefore, most of the borrowing from the private sector is made through banks. Banks in Pakistan rely heavily on public deposits to generate their loans while raising funds externally is considered costly therefore not preferred.

A few studies have been conducted to assess the role of commercial bank's lending in economic development through monetary transmission at aggregate and disaggregate level. After reviewing the literature, most of the research is either conducted by the State Bank of Pakistan (SBP) or the Pakistan Institute of Development Economics (PIDE). Despite assuming that utmost objectivity will be observed in all such studies, there is still the element of unconscious biases that might have affected the outcomes of these studies. Therefore, independent research is still required to encompass the role of commercial banks' lending in the monetary transmission of Pakistan.

In Pakistan, the monetary transmission starts with a change in the central bank's monetary stance, this study will unveil if policy shocks are absorbed in banking portfolios (i.e. bank deposits, bank loans and bank investments). Here the question arises what will be the impact of the monetary policy rate on bank loans, investments and deposits? And what will be the impact of bank loans, investments and deposits on real activity? Hence, to examine the impact of monetary policy rate on bank loans, investments and deposits and thereafter to examine the impact of bank loans,

investments and deposits on output are the objectives of this study. We state our research hypotheses as follows

H1. An increase in monetary policy rate leads to a decrease in banks loans / Advances, Deposits and Government Securities (Negative)

I. An increase in monetary policy rate is negatively associated with Advances

II. An increase in monetary policy rate is negatively associated with Deposits

III. An increase in monetary policy rate is negatively associated with Government Securities

H2. An increase in banks' portfolios leads to an increase in real activity. (Positive)

I. An increase in Advances is positively associated with Gross Domestic Product

II. An increase in Deposits is positively associated with Gross Domestic Product

III. An increase in Government Securities is positively associated with Gross Domestic Product.

2. Review of Literature

As discussed earlier, two channels are commonly used in most economies for achieving monetary goals where the choice of each channel is based on the dynamics of a specific economy, e.g. in a trade-based economy; central banks prefer exchange rate channels to influence the real economy. In contrast, bank dependent economy prefers banking channels as part of the money supply with the help of interest rates to operate.

The exchange rate channel can be an effective tool to implement monetary policy. For example, several studies, e.g. an investigation, referred to inflation as a monetary phenomenon and an exchange rate and government spending phenomenon. Compared to the money supply, the exchange rate takes more time to penetrate the economy to curb inflation than the money supply. The exchange rate take an extra year to exert inflationary pressures than broad money M2. A study confirms that inflation is responded by the money market more speedily than the exchange rate and government spending. This study used a data set from1964 from 2007 by using impulse response functions (K. Hussain, 2009). It is commonly observed that the money supply for those countries that fall under underdeveloped status is significantly more than those still developing. If we go through the contents in **Table 1,** we shall find a positive correlation between those countries with greater GDP supported by a more significant supply of money. Therefore we can deduce that degree of the money supply is an essential factor in the growth of GDP. Whereas the

world's GDP to the money supply is concerned, it is around 120 %, as shown in **Figure 1**.

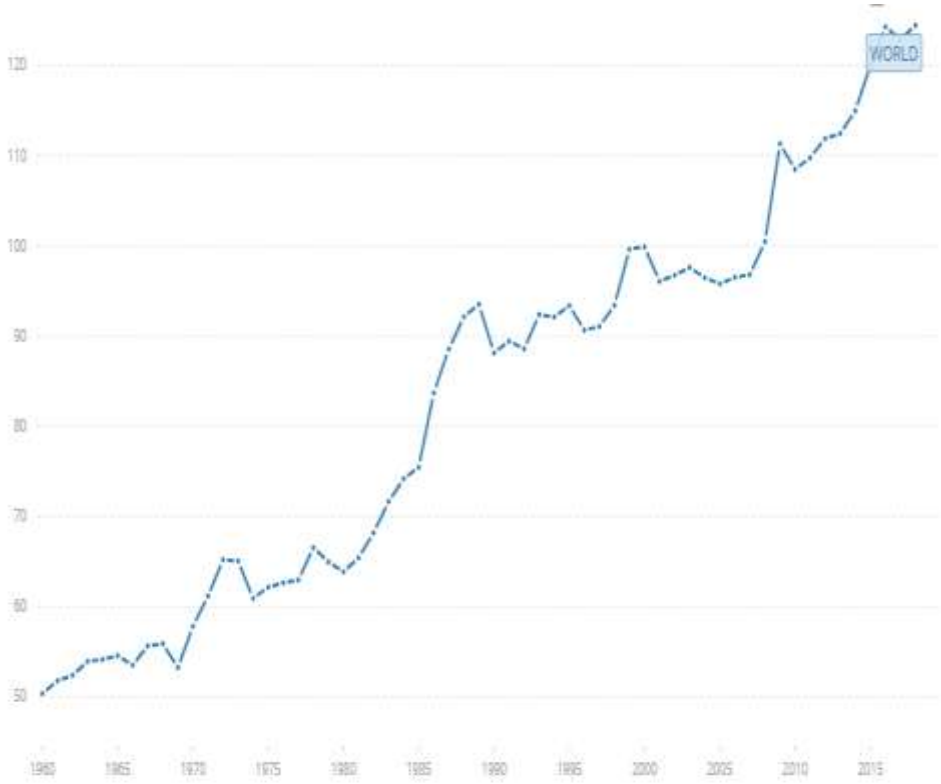

Figure 1. Broad Money as % GDP since 1960 till 2018 (Source World bank Statistics)

Table 1 Broad money Vs GDP till 2018 (Source World bank Statistics)

Country	Most Recent Year	Money as % of GDP
Bangladesh	2018	64.3
China	2018	199.1
India	2018	73.7
Indonesia	2018	38.8
Japan	2018	252.1
Pakistan	2018	58
UK	2018	148.9
USA	2018	89.3
Latin America & Caribbean	2018	67.2
Least developed countries:	2018	57.8

The Middle East & North Africa (MENA)	2017	86.9
North America	2018	89.3
OECD members	2018	115.9
South Asia	2018	71.5

Another factor is the currency notes to money supply ratio, which entails greater significance to gauge bank lending channels. In Pakistan, it further weakens the importance of money supply M2, an essential ingredient of economic growth. It is pretty high if compared to developed and emerging economies, as shown in **Figure 2** (Data Source Haver Analytics). It reduces the scope of bank lending channels because it falls beyond the control of banks and cannot be used in the credit creation process. This form of money does not absorb the effects of monetary shocks. It represents that business transactions of that particular economy are preferably made in cash form over banking instruments. It also indicates a substantial volume of the parallel economy and a lack of financial literacy in that economy. Likewise, **Figure 3** shows that Pakistan's currency ratio to GDP is on the higher side.

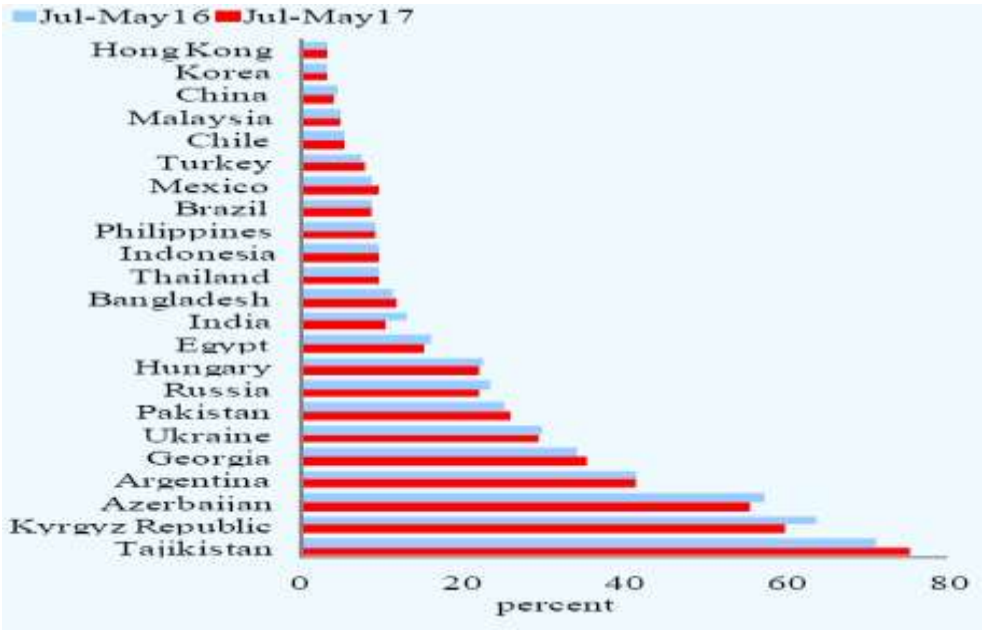

Figure 2, Ratio of currency in circulation to the money supply

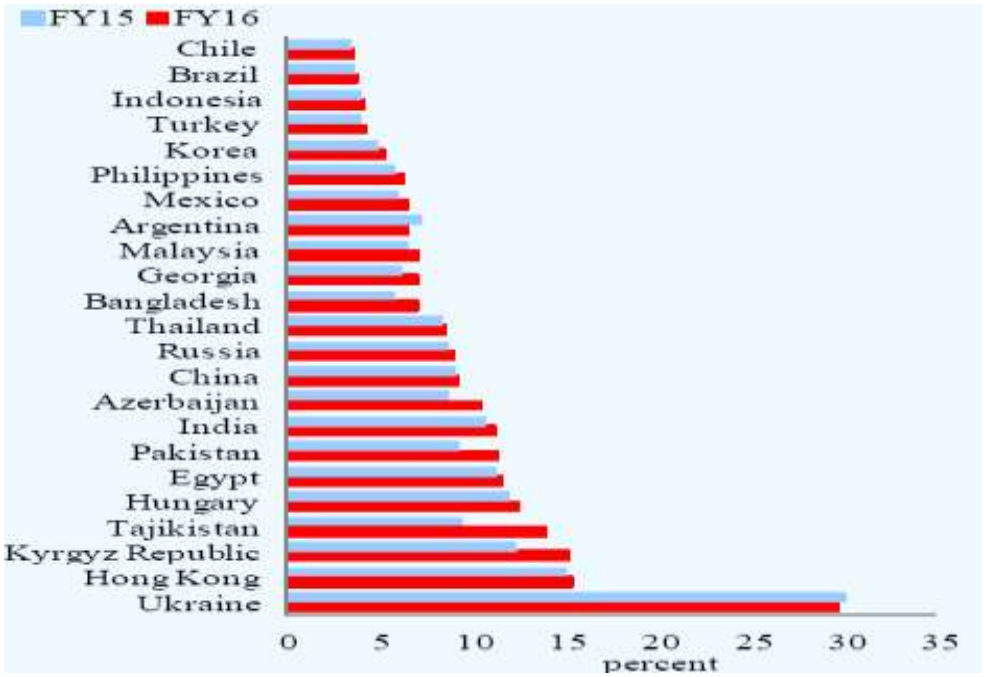

Figure 3. Ratio of Currency in Circulation to GDP

Various studies endorse money supply as an important channel of monetary transmission. For instance, a study evaluated the performance of SAARC economies on data collected from 1974 to 1998, which also endorses the causality between money supply, interest rate, prices and output represented by M2, Treasury bill rate, CPI and GDP, respectively. Results reveal that interest rate actively participates while driving better results in Bangladesh and Pakistan, whereas money supply is a good policy variable in India. Bi-directional causality exists between money supply and prices in Bangladesh and Pakistan. However, interest rate and money supply cause output and prices, while output and prices do not cause interest rate and money supply in Bangladesh. It means monetary policy plays an active role in Bangladesh than in India and Pakistan (Ahmed, 2002).

Some studies prefer an appropriate mix of money supply and exchange rate to achieve monetary goals, e.g. a study measuring the effectiveness of monetary policy in Pakistan for a data set gathered from 1972 to 2002 using the vector error correction model (VECM) d Johansson's multivariate co-integration technique. Results derived from the study showed that exchange rate and money supply jointly measure prices, interest rate and real activity. In the short-run, money supply alone, with the help of interest rate, could not cause prices and output to reach the desired level, which confirms an insignificant impact of the money supply to achieve monetary goals (Tahir, 2012).

On the same footprints, another study exposes the time-varying aspect of monetary transmission conducted for G-7 countries that monetary shock significantly contributes to output and inflation but with different time-varying responses to affect output and inflation cycles (Canova & De Nicolo, 2002). Likewise, a study also endorsed co-integration relations among variables, i.e. money supply, prices, industrial production index (IPI) and Treasury bill rate conducted in Malaysia. This study used the Treasury bill rate as a proxy of monetary policy shock for a data set collected from 1995. Engle-Granger causality test was used to derive results that confirmed bidirectional causality exists between money supply and output. However, monetary policy could not achieve the desired monetary goals in Malaysia (Ibrahim, 2005).

Contrarily, Results derived by using the VAR technique on monthly data for the period started from 1964 to 2007 revealed that the money market interest rate is not an effective tool for the monetary transmission in Pakistan. Results indicated that money supplies M1 and M2 in monetary transmission do not possess a significant role; however, the exchange rate plays a significant and effective role in monetary transmission (Hussain, Berg, & Aiyar, 2009).

Some studies favors the endogeneity theory of money supply, which means money supply in any economy is determined endogenously as an outcome of the interactions of economic variables instead of the exogeneity of any external force exerted by the central bank. Banks respond to loan demand at a prevailing interest rate which generates a further volume of the money supply. The flow of money supply can be germinated naturally by the requirements of real activity rather than an exertion of any external shock of policy (Algan & Ragot, 2010; Sukmana & Kassim, 2010) (Arestis & Sawyer, 2006). The idea to control inflation with the help of the money supply does not work effectively sometimes. Contraction in money supply leads to a decline in real activity instead of inflation.

The contractionary stance of monetary policy is used to curtail inflation by increasing interest rates so that lending and deposit rates may be increased, which will add to the cost of capital and resultantly, aggregate demand will be declined. On the other hand, the contractionary monetary stance crowd out private lending due to the high cost of capital from high-interest rates. High-interest rates enable banks to invest their lending part of funds in government securities, which further adds to the demand for money in the short run. Depositors postpone their consumption decisions to earn high profits by retaining their deposits with banks, reducing aggregate demand to a certain extent with the primary purpose to curb demand-pull inflation (Mishkin, 1996).

A study used annual data from 1993 to 2003 and utilized Johansen and Juselius's (JJ) co-integration technique in the long run and ECM in the short run to analyze

data. The money supply is found to be positively associated with GDP and does not cause inflation (Mehmood & Arby, 2005).

Due to increased interest expense, a tight monetary stance directly weakened the borrower's financial position and cash flows. Further, it causes asset prices to fall; Deposits of the banks increase by a fall in consumption which ultimately reduces the value of the collateral and the firm's revenues. Banks prefer to lend during this phase to larger firms because of the low credit risk that larger firms inherit. The above results were confirmed by using quarterly data for a period starting from 1965 to 1994 extracted from the US housing market with the help of Vector Autoregression (VAR) (Bernanke & Gertler, 1995).

The above discussion advocates interest rate as an effective tool to control the money supply, especially in those countries dependent on banking loans and keep their savings on high-interest rates. However, interest rate as a tool is used directionally according to the choice of a particular monetary stance that benefits a specific situation.

2.1. Effectiveness of Bank Lending Channels in Monetary Transmission

The positive association between bank lending and real activity is called the lending channel that emerges when the monetary transmission will affect the real activity with the help of a change in loan supply. Loan supply is a more significant component of money supply where banks being financial intermediates, acts like pumping device to expand or contract the money supply by the directives of monetary authorities.

Several researchers confirm a strong relationship between banking portfolios and economic variables. A study conducted by Bernanke et al. validated a positive correlation between bank loans and other macroeconomic indicators, i.e. unemployment and Gross National Product (GNP) in the US market (Bernanke & Blinder, 1992).

The lending channel can be observed in several ways, e.g. monetary tightening raises the opportunity cost of deposits, which reduces further avenues for a bank to grant loans. However, two main assumptions are needed to be fulfilled for an effective bank lending channel to prevail in any economy, i.e., banks could not fully protect their loan portfolios from the changes in monetary policy means that banking portfolios would have been affected by the changes of monetary policy. Secondly, borrowers in a firm or individual capacity should rely on bank credit and cannot detach their spending habits completely from bank credit (Bernanke & Gertler, 1995).

Another study revealed the idea of effective bank lending channels where minor effects were highlighted on economic activity after a decline in credit supply. This study highlighted two opinions; firstly, the credit channel of the banks does not appear to be a direct monetary stance in the entire transmission mechanism. Secondly, the banking channel could not be entirely ignored because some borrowers directly rely on the bank's lending. A change in monetary stance alters their spending habits and consequently affects economic activity. Data is collected in this study from 1987 to 1994 for banking institutions operating in the USA (Morris & Sellon, 1995).

Similarly, studies supported this idea by describing three conditions for an effective bank lending channel. Firstly prices should be adjusted instantaneously in response to a change in the money supply. Secondly, open market operations must change the volume of bank loans. Thirdly loans and bonds must not be substituted as a source of credit for a few borrowers (Bernanke & Blinder, 1988) (Kashyap & Stein, 1994).

The concept of bank lending channels was also endorsed by other researchers who validated the theoretical underpinning of monetary tightening reduces bank loans and deposits. The decline in bank lending eventually attracts a correspondent decline in economic activity. This decline in core deposits encourages banks to issue time deposits at a better rate to stabilise their deposits. The asset side banks maintain their lending positions by selling government securities. These studies confirmed a cause and effect relation between the variables with a time lag of two to three quarters (Romer, Romer, Goldfeld & Friedman, 1990) (Bernanke & Blinder, 1992).

It is difficult to identify whether monetary transmission directly affects loan supply or demand. For example, a study revealed that monetary tightening affects bank loans which responded after six months and could not entirely settle for two years. Results of this study concluded at an aggregate level for the banks operating in the USA from 1959 to 1978 (Bernanke & Blinder, 1992).

Contrarily some studies validated contradictory results, e.g. a survey conducted in China witnessed a negative association between credit supply and economic variables such as GDP and inflation. However, the same study revealed a positive correlation between monetary aggregates and real activity (Ping, 2004). Another study also witnessed the same idea that the money supply plays a more prominent role than the credit channel in China during monetary transmission (Sun, 2013). On the same line, a study conducted in the Euro area concluded no significant evidence of the existence of lending channels in four European countries, i.e. Germany, France, Italy and Spain (Favero, Giavazzi & Flabbi, 1999).

In Pakistan, mixed results are witnessed; for instance, a study emphasized the role of bank lending channels during a contractionary monetary stance, which dwindled off domestic loan demand of the companies. Secondly, a gradual reduction in banks' lending portfolios was seen, followed by a decrease in overall price level with a

significant lag. This study validated the effective role of commercial banks in the monetary transmission of Pakistan. This study used Vector auto regression (VAR) for data from 1996 to 2004 (Agha et al., 2005). Contrarily, a study witnessed a weak association between monetary aggregates and economic variables by compiling banks' lending growth after monetary shocks. Results of this study validated that banks loans and deposits are not key linked with monetary variables and therefore do not bring any significant change in output and prices in Pakistan (H. H. Khan et al., 2016). The above review of literature underscores the significance of bank lending channels, whether playing an effective role in the monetary transmission of Pakistani.

3. Research Methodology

The scope of this study is to find whether changes in policy rates enforced by a central bank are effectively absorbed in banking portfolios so that the desired change may affect respective portfolios held by banks. Afterwards, the study unfolds the impact of banking portfolios on economic activity. Our study prefers the three-month Treasury bill rate because monetary policy had started to be issued bi-monthly after 2010. This rate auction on a fortnightly basis and absorb all the related information and variations of the policy rate. Although the monetary policy rate can also be used directly as an indicator of monetary shock, but it is neither priced directly nor incorporates any variation of prices charged on the Treasury bill auction market. It remains unchanged until monetary authorities change their monetary stance.

Further, our study shows the effects of monetary transmission on real activity represented by Gross Domestic Product (GDP) in our study. Most studies use GDP as a proxy of real output as GDP is considered the most accurate indicator of economic growth worldwide. However, quarterly data on GDP is not published in Pakistan. GDP in Pakistan is recorded in two different ways: the constant price that indicates economic growth to measure the economy's performance over time, whereas the other method is to record GDP at the current price, which is the market value of goods and services produced during one year usually known as nominal GDP. In our study, constant price based on quarterly data is used, which was available yearly but converted quarterly with the help of the work conducted by Hanif et al. (Hanif, Iqbal, & Malik, 2013). Quarterly data ranging from 1998 to 2018 is used for the abovementioned variables.

Table 2. Conceptual/Theoretical Framework

EFFECTIVENESS OF MONETARY TRANSMISSION THROUGH COMMERCIAL BANK OF PAKISTAN	**Dependent Variables**	**Relationship**	**Code**	**Independent Variables**	**Sources**	**Econometric Model used by various Authors**
	Advances	-	ADV	Treasury Bill Rate	(B. S. Bernanke & A. S. Blinder, 1992), (Ahmed, 2002), (Canova & De Nicolo, 2002), (Mishkin, 1996), (Morris & Sellon, 1995), (Bernanke & Blinder, 1988) (Kashyap & Stein, 1994), (Romer et al., 1990)	IRF, VAR, JJ Co-Integration (K. Hussain, 2009) (VECM) and Johansson's multivariate co integration technique (Tahir, 2012) Engle Granger causality test (Ibrahim, 2005) VAR (M. Hussain et al., 2009) JJ co integration technique (Mehmood & Arby, 2005), VAR (Bernanke & Gertler, 1995) VAR (Agha et al., 2005)
	Deposits	-	DEP			
	Government Securities	-	GSEC			
		+	TBR			
	Gross Domestic Product	+	GDP			
		+	ADV	Advances		
		+	DEP	Deposits		
		+	GSEC	Government Securities		

The data for this research is collected from the published sources of the State Bank of Pakistan (www.sbp.org.pk); therefore, no permissions will be required to collect data other than the respondents' informed consent. The researcher declares that the study belongs to his work and that all contributions from other persons or sources are duly and adequately cited.

The Cumulative sum control chart CUSUM test is employed to check data stability or seasonal effects of the data, which improves the ability to detect small shifts by incorporating values derived from current and previous data. It plots the cumulative sum of the deviation of the sample values that will vary randomly around a zero mean. This test checks the structural break or model stability (Brown, Durbin, & Evans, 1975).Unit root tests are employed whether a variable is not stationary and possesses a unit root where the null hypothesis identifies the presence of a unit root and the alternative hypothesis shows stationarity. The Augmented Dickey-Fuller (ADF) test will be employed to check Unit roots. The T statistics of ADF results are more significant than the values at a 5 or 10 % significance level at the first difference. The lag length determination test is beneficial to avoid autocorrelation (Fuller, 1976).

The data gathered from designated sources will then be analyzed and evaluated to investigate the effectiveness of various banking channels in monetary transmission by using statistical software like Microsoft Excel and E-views. The research intends to exploit Regression throug ARDL, VAR, VECM, IRF and VDA. A model in equational form defines every hypothesis in our analysis. In addition, impact variables were compared to examine and evaluate cross-sectional differences.

Out of various techniques analyzing dynamics of policy rate on retail market rates, Autoregressive distributed lag (ARDL) is preferred in this study because this technique has an advantage over other techniques such as Vector Autoregressive VAR unrestricted or structural and other single equation approaches of co integration. Additionally, it allows estimation of short or long run association even if the underlying variables have a small sample size and if not integrated in the same order. Various ARDL models will be evaluated in our study to gauge various associations. Akaike's Information Criterion (AIC) and Schwartz Bayesian Criterion (SBC) are used to find the appropriate lag structures. Once the optimal lag structure is identified, the specification is tested for the existence of the long-run association by using an equation known as the "bounds test". 'F' statistics are computed under lower and upper bounds of critical values so that the Null Hypothesis may be accepted or rejected (Pesaran, Shin, & Smith, 2001). If co-integration is found, the ARDL will be employed to obtain a long-run equation by assuming that all derivatives have zero value.

We employ the Vector Autoregression VAR methodology to extract Impulse responses developed by Sims in 1980, which assumed that all variables in the model are endogenous therefore called a non-theoretical model. This study examines the effects of monetary shocks on real output and prices. Prominent empirical literature witnesses the utilization of the VAR approach based on variance decomposition analysis and impulse response functions to examine the effect of credit channel on critical economic variables, i.e. output and inflation (Agha et al., 2005; Baig; B. S. Bernanke & A. S. Blinder, 1992; M. Hussain et al., 2009). The impulse response function indicates how the economy reacts with time's passage to exogenous impulses, also called shocks used in a VAR system. Impulses taken in the exogenous form include policy shocks in the shape of change in monetary tools, e.g. policy rate or interest rate. The impulse response function detects the reaction of endogenous macroeconomic variables, e.g., output and prices, at the time of shock, and subsequently, the shock is passed. Since our focus in this study is to interpret the monetary shock on real output, we drive an impulse response function that traces real output's reaction at one standard deviation shock to the interest rate. To know the proportion of fluctuations of given variables passed through different shocks in the VAR system can be examined through variance decomposition. First, it reveals the fraction of forecast variance error of the variables caused by their shocks versus

shocks of endogenous variables. Various impulse responses are shown in graphical form, and variance decomposition tables are computed in tabular form.

VECM is estimated if co-integration exists, and if co-integration does not exist, then imposing co-integration may not be an appropriate estimation strategy. Imposing inappropriate co-integration relationships can lead to biased estimates and result in a biased impulse response derived from the reduced form of VAR. Consequently, unrestricted VAR with a difference will be estimated if no co-integration exists and variables are stationary at first. ECM and VECM techniques will be employed to detect short term dynamics and speed of adjustment (Sims, 1980). VECM is the preferred specification since it can generate efficient estimates without losing information for the long-run relationship among the variables. However, many researchers suggested against simply looking at the statistical properties of the data to decide on appropriate specifications (Ramaswamy & Slok, 1998).

In our study, the conditional ARDL model is used to measure the impact of the policy rate, i.e. Treasury bill rate (TBR), upon banking portfolios. After that, detecting the response of bank balance sheet items on Macro economy which GDP denotes, is as follows (Pesaran et al., 2001).

Equation 1

$$\Delta ADV_t = \beta_o + \beta_1 TBR_{t-1} + \beta_2 ADV_{t-1} + \beta_3 \Delta ADV_{t-1} + \beta_4 \Delta\, TBR_t + \beta_5 \Delta TBR_{t-1} + u_t$$

The above equation shows that the Bank Advances (ADV) is obtained in log form, Treasury bill rate (TBR) is used as a proxy of the policy rate, Δ represents the change whereas u_t is the error term and t represents the time period.

Equation 2

$$\Delta DEP_t = \beta_o + \beta_1 TBR_{t-1} + \beta_2 DEP_{t-1} + \beta_3 \Delta DEP_{t-1} + \beta_4 \Delta\, TBR_t + \beta_5 \Delta TBR_{t-1} + u_t$$

The above equation shows that the Bank Deposits (DEP) is obtained in log form, Treasury bill rate (TBR) is used as a proxy of the policy rate, Δ represents the change whereas u_t is the error term and t represents the time period.

Equation 3

$$\Delta GSEC_t = \beta_o + \beta_1 TBR_{t-1} + \beta_2 GSEC_{t-1} + \beta_3 \Delta GSCE_{t-1} + \beta_4 \Delta\, TBR_t + \beta_5 \Delta TBR_{t-1} + u_t$$

The above equation shows that the Government Securities (GSEC) is obtained in log form, Treasury bill rate TBR is used as a proxy of the policy rate, Δ represents the change whereas u_t is the error term, and t represents the time period.

Equation 4

$$\Delta GDP_t = \beta_o + \beta_1 ADV_{t-1} + \beta_2 GDP_{t-1} + \beta_3 \Delta GDP_{t-1} + \beta_4 \Delta ADV_t + \beta_5 \Delta ADV_{t-1} + u_t$$

The above equation shows that the output is taken in the form of Gross Domestic Product (GDP) in log form, Treasury bill rate (TBR) is used as a proxy of policy rat Bank Advances (ADV) are taken in log form, Δ represents the change whereas u_t is the error term, and t represents the time period.

Equation 5

$$\Delta GDP_t = \beta_o + \beta_1 DEP_{t-1} + \beta_2 GDP_{t-1} + \beta_3 \Delta GDP_{t-1} + \beta_4 \Delta DEP_t + \beta_5 \Delta DEP_{t-1} + u_t$$

The above equation shows that the Gross Domestic Product (GDP) obtained in log form, Deposit rate (DEP) is also taken in log form, Δ represents the change whereas u_t is the error term and t represents the time period.

Equation 6

$$\Delta GDP_t = \beta_o + \beta_1 GSEC_{t-1} + \beta_2 GDP_{t-1} + \beta_3 \Delta GDP_{t-1} + \beta_4 \Delta GSEC_t + \beta_5 \Delta GSEC_{t-1} + u_t$$

The above equation shows that the Gross Domestic Product is obtained in log form. Likewise, the Government Securities (GSEC) Δ represents the change whereas u_t is the error term, and t represents the time period.

4. Estimation and Inferences

The Cumulative sum control (CUSUM) test is employed to check data stability or seasonal effects of the data, which improves the ability to detect small shifts by incorporating values derived from current and previous data. It plots the cumulative sum of the deviation of the sample values that will vary randomly around a mean zero; this test detects the structural break or model stability (Brown et al., 1975).

CUSUM plots are shown in **Figures 4, 5 and 6**, providing structural stability of data within critical bounds of a 5 per cent level of significance. All three graphs derived from CUSUM shown in Figures 20, 21 and 22 provide structural stability whereby the inner line remains under the critical bounds between time series of advances and Treasury bill rate, Deposits and Treasury bill rate and between government securities and Treasury bill rate.

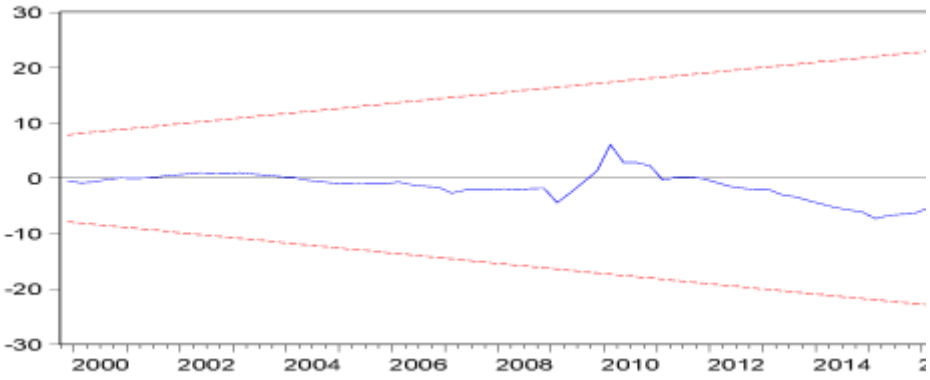

Figure 4.1 CUSUM Plot of Advances Vs TBR

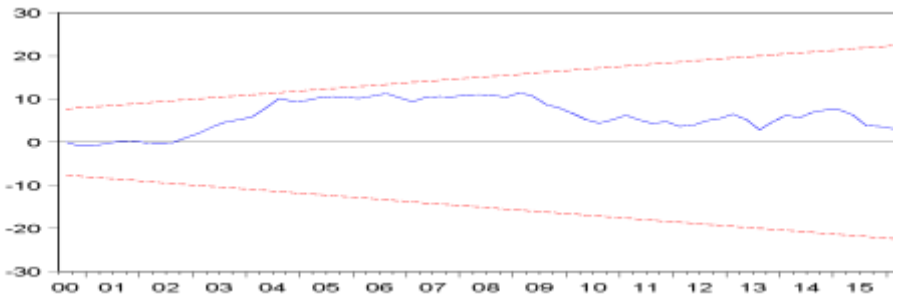

Figure 5 CUSUM Plot of Deposits Vs TBR

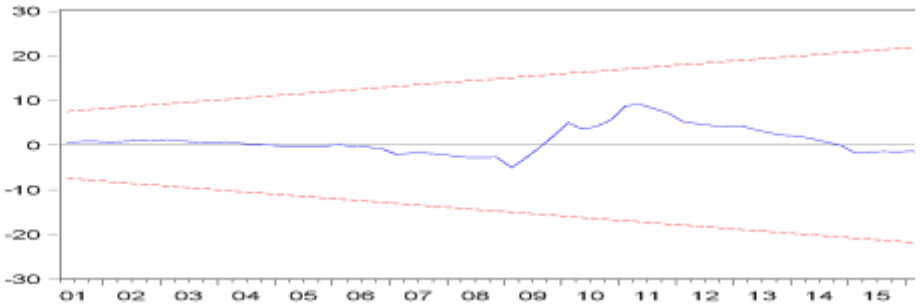

Figure 6 CUSUM Plot of Govt Securities Vs TBR

The Augmented Dickey-Fuller (ADF) test is employed to check Unit roots. The "T" statistics of ADF results are more significant than the values at a 5 or 10 % level of significance at first difference. The lag length determination test is instrumental in avoiding autocorrelation in the ARDL system.

It is considered that after the employment of lag optimum, there would not be any existence of autocorrelation. The results in **Table 3** show that equation models have lag optimum at various levels. ADF results in **Table 3** show that no other variable is found stationary at the first difference except for the Treasury bill rate, whereas no variable is found stationary at a level.

Table 3. Augmented Dickey-Fuller test statistic and Lag Length Criteria

Augmented Dickey-Fuller test statistic	**Level**	**First Difference**
	t-Statistic	**t-Statistic**
Advances	-2.233776	-2.297161
Deposits	-3.223644	-2.057582
GDP	-1.938983	-2.60782
Government Securities	-1.013957	-3.70865
TBR	-2.564954	-5.266854
Test critical values: 1 % level of Confidence	-4.086877	-4.086877
5 % level of Confidence	-3.471693	-3.471693
10 % level of Confidence	-3.162948	-3.162948

Endogenous variables: ADV GDP TB3						
Lag	**Log L**	**LR**	**FPE**	**AIC**	**SC**	**HQ**
0	-82.03328	NA	0.00236	2.464733	2.561868	2.50327
1	376.7084	864.296	5.15E-09	-10.57126	-10.18272	-10.41711
2	402.6245	46.57383	3.16E-09	-11.06158	-10.38163*	-10.79182
3	420.9534	31.34511	2.42E-09	-11.33198	-10.36063	-10.94662
4	433.162	19.81683	2.22E-09	-11.42499	-10.16223	-10.92401
5	446.2806	20.15316	2.00E-09	-11.54436	-9.990203	-10.92778
6	460.7924	21.03171*	1.73e-09*	-11.70413*	-9.858562	-10.97193*
Endogenous variables: GDP TB3 DEP						
Lag	**Log L**	**LR**	**FPE**	**AIC**	SC	HQ
0	-57.76446	`	0.001168	1.761289	1.858424	1.799825
1	380.1733	825.1001	4.66E-09	-10.67169	-10.28315	-10.51754
2	407.3454	48.83103	2.75E-09	-11.19842	-10.51847	-10.92866

3	427.6132	34.66093	2.00E-09	-11.52502	-10.55367	-11.13965
4	443.5743	25.90788	1.64E-09	-11.72679	-10.46404	-11.22581
5	467.0854	36.11841	1.09E-09	-12.1474	-10.59324*	-11.53081*
6	479.7343	18.33181*	1.00e-09*	-12.25317*	-10.4076	-11.52097
Endogenous variables: TB3 GDP GSEC						
Lag	**Log L**	**LR**	**FPE**	**AIC**	**SC**	**HQ**
0	-122.7235	NA	0.007677	3.644159	3.741294	3.682696
1	269.9606	739.8397	1.14E-07	-7.47712	-7.08858	-7.322973
2	293.263	41.87671	7.52E-08	-7.891681	-7.211736*	-7.621924*
3	302.8838	16.45292	7.42E-08	-7.909675	-6.938324	-7.524308
4	310.6375	12.58577	7.75E-08	-7.873551	-6.610795	-7.372574
5	323.2375	19.35657*	7.06e-08*	-7.9779	-6.423739	-7.361312
6	332.6157	13.59157	7.11E-08	-7.988862*	-6.143295	-7.256664

The long-run association is checked using "bound tests", i.e. Wald test reported in the table provides a magnitude of long-run association between interest rate and other Bank balance sheet variables, i.e. Bank Advances, Deposits, and Government securities. In such a way association between the bank variables and GDP is derived with the help of F statistics. Hence, greater 'F' statistics than the critical value of the upper bound represent a long-run association between the variables.

Advances in **Table 4** show a long-run association or co-integration with the policy rate indicated by the three-month Treasury bill rate. However, no significant long-run association is found in results produced between GDP and advances, Deposit and policy rate (TBR), deposit and GDP, Government securities and policy rate (TBR) and Government securities and GDP.

Table 4. ARDL Bounds F-Statistic Value

ARDL Bounds Test		F-statistic Value
Advances and TBR		6.121514
GDP and Advances		1.219989
Deposit Vs TBR		0.886809
Deposit Vs GDP		0.462224
Govt Sec Vs TBR		1.059362
Govt Sec Vs GDP		3.510048
Critical Value Bounds		
Significance	**I0 Bound**	**I1 Bound**

10%	4.04	4.78
5.00%	4.94	5.73
3%	5.77	6.68
1%	6.84	7.84

We determined long and short-run associations using the AIC criterion in the next step. First, coefficients are determined for variables using AIC criteria, also known as the parsimonious model uses the smallest possible lag length to minimise the loss of a degree of freedom. Then, the long-run association is represented in **Table 5** estimates coefficients whether statistically significant and have correct signs supported by theory. Results show that probability values are not significant except for the association between government securities and GDP at a 1 % level of significance.

Table 5. ARDL Co- Integration Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ADV VS TBR	-1.248461	5.261383	-0.237288	0.8132
ADV VS GDP	2.456213	10.224089	0.240238	0.8108
DEP VS TBR	0.387186	1.298763	0.298119	0.7665
DEP VS GDP	-2.520585	43.712175	-0.057663	0.9542
G SEC VS TBR	-0.165881	0.226199	-0.73334	0.4659
GSEC VS GDP	3.77358	1.301053	2.900404	0.0051

The error correction term in **Table 6** extracted through the ARDL model explores short-run dynamics. For example, coefficients of the advances represent that a ten per cent increase in policy rate brought a negligible increase in advances in the short run, so the advances brought no significant effect on GDP. On the other hand, the short-run association between the Treasury bill rate changes brought a slight change in the size of deposits and government securities. Therefore, the negative sign of the error correction term emphasized the possibility of a long-run relationship among the variables. Further, the speed of adjustment from the previous year's disequilibrium to the current year's equilibrium is insignificant in the short run.

Table 6. Coefficient, T Statistics and Probability Values

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CointEq(-1) ADV VS TBR	-0.001006	0.004127	-0.243845	0.8081
CointEq(-1) ADV VS GDP	-0.001631	0.008625	-0.189057	0.8506
CointEq(-1) DEP VS TBR	0.000933	0.003303	0.282399	0.7785
CointEq(-1) DEP VS GDP	-0.001344	0.013486	-0.099691	0.9209
CointEq(-1) G SEC VS TBR	0.012504	0.015358	0.814181	0.4185
CointEq(-1) GSEC VS GDP	-0.043575	0.02563	-1.700138	0.0938

It is analyzed as shown in **Figure 7**; advances are diminished below the baseline after a one standard deviation positive shock of monetary policy rate from the first quarter and remained on declining trend till the sixteenth quarter confirmed the existence of the lending channels. However, a less significant change is witnessed on output represented by GDP through advances.

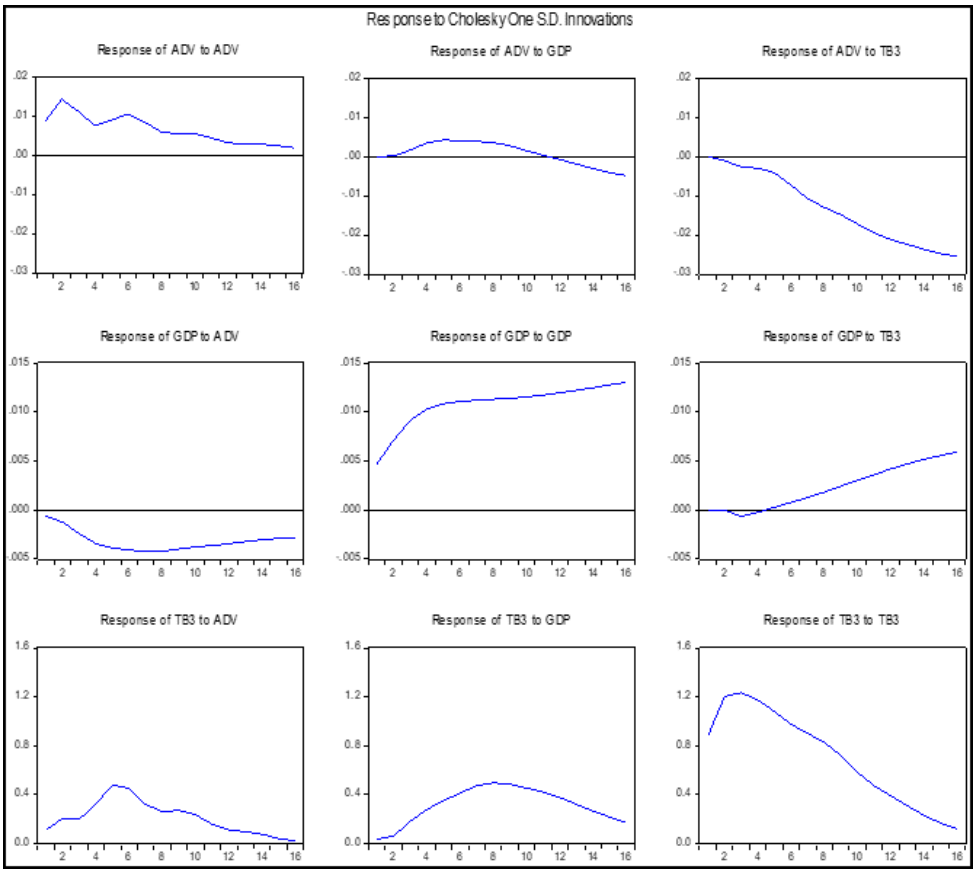

Figure 7. Impulse Response Functions of Advances, Policy rate and Economic Aggregate

Figure 2. Impulse Response Functions of Advances, Policy rate and Economic Aggregate

As shown in **Figure 24**, the response of deposits is seen with a diminishing trend; however, it affected significantly below the baseline after one standard deviation or 100 basis points positive shock of policy rate (TB3). The deposits reduced significantly right after the shock from the first quarter and remained on a declining trend till the sixteenth quarter; however, change in bank deposits could not contribute effectively to the output like advances.

As shown in **Figure 8**, the response of deposits is seen with a diminishing trend; however, it affected significantly below the baseline after one standard deviation or 100 basis points positive shock of policy rate (TB3). The deposits reduced significantly right after the shock from the first quarter and remained on a declining trend till the sixteenth quarter; however, change in bank deposits could not contribute effectively to the output like advances.

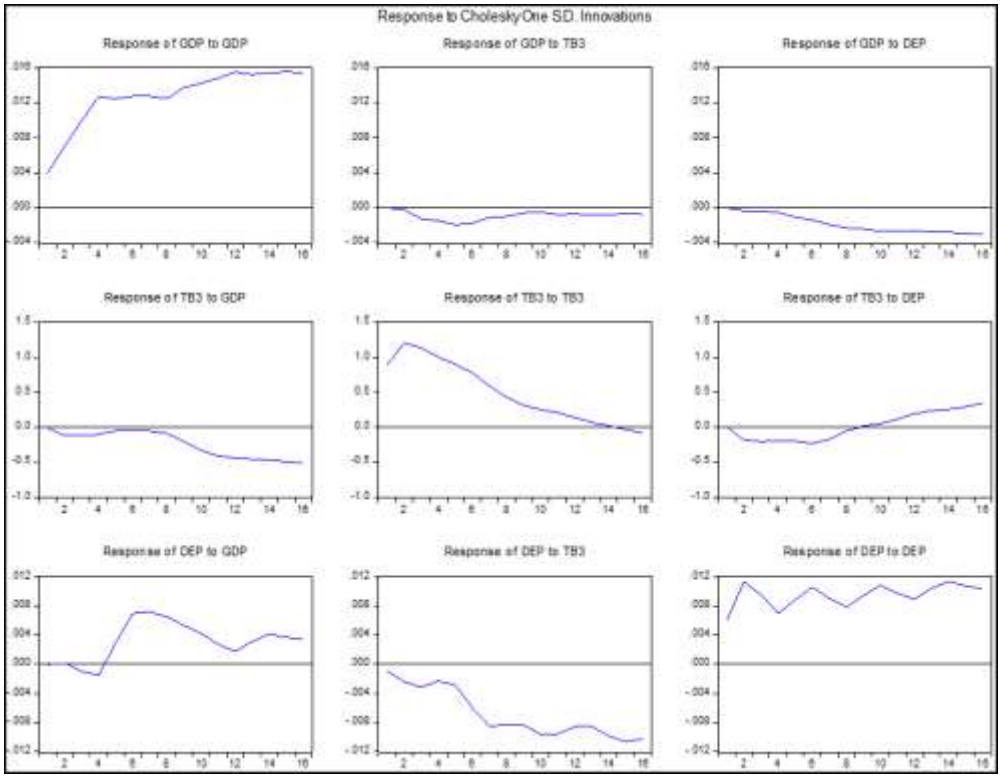

Figure 8. Impulse Response Functions of Deposits, Policy rate and Economic Aggregate

As shown in **Figure 9**, Government securities reduced below the baseline after a one standard deviation positive shock of interest rate (TB3) from the first quarter and remained on a declining trend till the sixteenth quarter; however, no significant response is witnessed by government securities on output.

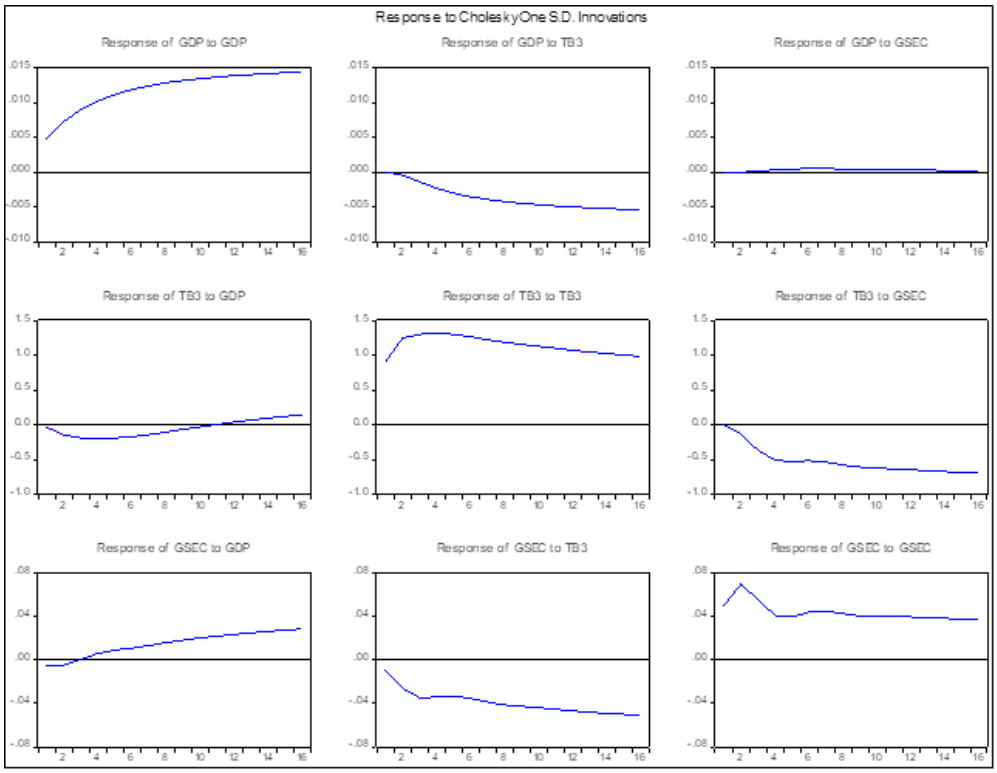

Figure 9. Impulse Response Functions of Government Securities, Policy rate and Economic aggregate

Results derived from variance decomposition as shown in **Table 6** where policy rate contributed more effectively for advances as 30 per cent than deposits as 20 per cent. Government securities are contributed by monetary policy rate as 29 per cent until the end of the eighth quarter. Output is not responded by either deposits or government securities, however, mildly affected by advances

Table 6. Variance Decomposition Analysis

Variance Decomposition of ADV:					**Variance Decomposition of GDP:**					**Variance Decomposition of GDP:**				
Period	**S.E.**	**ADV**	**GDP**	**TB3**	**Period**	**S.E.**	**GDP**	**TB3**	**DEP**	**Period**	**S.E.**	**GDP**	**TB3**	**GSEC**
1.00	0.01	1000	0.00	0.00	1.00	0.00	100	0.00	0.00	1.00	0.00	100	0.00	0.00
2.00	0.02	99.59	0.01	0.40	2.00	0.01	99.69	0.08	0.23	2.00	0.01	99.74	0.26	0.00

3.00	0.02	97.36	0.70	1.94	3.00	0.01	98.85	0.97	0.18	3.00	0.01	98.58	1.41	0.01
4.00	0.02	93.45	3.15	3.41	4.00	0.02	98.66	1.17	0.17	4.00	0.02	97.09	2.87	0.04
5.00	0.02	88.95	5.51	5.54	5.00	0.02	98.09	1.55	0.35	5.00	0.02	95.73	4.20	0.08
6.00	0.03	82.61	6.35	11.05	6.00	0.03	97.80	1.64	0.56	6.00	0.02	94.60	5.31	0.10
7.00	0.03	72.98	6.58	20.44	7.00	0.03	97.64	1.45	0.90	7.00	0.03	93.69	6.21	0.10
8.00	0.03	62.81	6.47	30.72	8.00	0.03	97.40	1.31	1.29	8.00	0.03	92.95	6.94	0.10
Variance Decomposition of GDP:					**Variance Decomposition of TB3:**					**Variance Decomposition of TB3:**				
Period	**S.E.**	**ADV**	**GDP**	**TB3**	**Period**	**S.E.**	**GDP**	**TB3**	**DEP**	**Period**	**S.E.**	**GDP**	**TB3**	**GSEC**
1.00	0.00	1.86	98.14	0.00	1.00	0.89	0.01	99.99	0.00	1.00	0.90	0.16	99.84	0.00
2.00	0.01	2.69	97.31	0.00	2.00	1.52	0.65	97.98	1.37	2.00	1.55	0.94	98.32	0.74
3.00	0.01	4.81	94.93	0.26	3.00	1.91	0.81	97.16	2.03	3.00	2.07	1.38	95.04	3.57
4.00	0.02	7.03	92.79	0.17	4.00	2.17	0.85	96.77	2.38	4.00	2.51	1.56	91.87	6.58
5.00	0.02	8.40	91.46	0.14	5.00	2.36	0.77	96.48	2.75	5.00	2.88	1.62	90.02	8.36
6.00	0.02	9.29	90.50	0.21	6.00	2.49	0.72	95.97	3.31	6.00	3.19	1.61	88.95	9.44
7.00	0.03	9.94	89.67	0.40	7.00	2.57	0.73	95.70	3.58	7.00	3.47	1.54	88.01	10.45
8.00	0.03	10.29	88.99	0.72	8.00	2.60	0.82	95.66	3.52	8.00	3.71	1.42	87.01	11.57
Variance Decomposition of TB3:					**Variance Decomposition of DEP:**					**Variance Decomposition of GSEC:**				
Period	**S.E.**	**ADV**	**GDP**	**TB3**	**Period**	**S.E.**	**GDP**	**TB3**	**DEP**	**Period**	**S.E.**	**GDP**	**TB3**	**GSEC**
1.00	0.89	1.56	0.17	98.27	1.00	0.01	0.00	2.50	97.49	1.00	0.05	0.90	3.58	95.52
2.00	1.51	2.45	0.24	97.32	2.00	0.01	0.01	3.98	96.01	2.00	0.09	0.55	9.39	90.06
3.00	1.97	2.47	1.00	96.53	3.00	0.02	0.35	6.11	93.53	3.00	0.11	0.37	15.69	83.94

4.00	2.34	3.72	2.16	94.12	4.00	0.02	0.99	6.67	92.35	4.00	0.12	0.53	20.38	79.09
5.00	2.64	6.22	3.47	90.31	5.00	0.02	2.83	7.15	90.01	5.00	0.13	0.91	23.34	75.75
6.00	2.88	7.68	4.99	87.33	6.00	0.02	9.71	10.71	79.58	6.00	0.15	1.34	25.52	73.14
7.00	3.07	7.82	6.76	85.42	7.00	0.03	13.49	16.87	69.64	7.00	0.16	1.84	27.71	70.45
8.00	3.23	7.73	8.49	83.78	8.00	0.03	15.41	20.78	63.80	8.00	0.17	2.47	29.97	67.56

5. Concluding Remarks

In our study, advances are positively associated with policy rate in the long run. In contrast, the size of the deposit and government securities are found to be independent of policy action. Therefore, the impact of advances and deposits does not significantly affect aggregate demand in the long run. Fiscal deficit is fulfilled by issuing government securities, which are positively associated to a certain extent with growth in real activity. Hence, in Pakistan, bank lending channels are not effectively fulfilling the stable equilibrium conditions and playing a weaker role in monetary transmission. The possible reasons why bank portfolios are unable to play their effective role in effective monetary transmission of Pakistan are discussed in detail.

One is low level of financial inculsion. In developing countries like Pakistan, the level of inclusion is one of the most critical components taken into account for bridging gaps between savers and borrowers of funds for socio-economic development at a micro-level. Financial inclusion is generally presumed as provisions of financial services, i.e. transfer of payments, a platform to park excess money for saving purposes, provision of accessible and speedily loans, etc.The unbanked population in Pakistan is estimated as 100 million adults, and the majority of them are females. Those individuals who have access to the transactional banking system are only 23 per cent of the adult population (State Bank of Pakistan Access to Finance Survey 2015). Whereas World Bank findex database (**Figure 10**) further confirmed this number more conservatively as 21 per cent of the adult population by the end of 2017. Almost three-quarters of the adult population are deprived of banking facilities. It is on the lower side than the South Asian average i.e. 58 %, whereas it is 80 % in India.

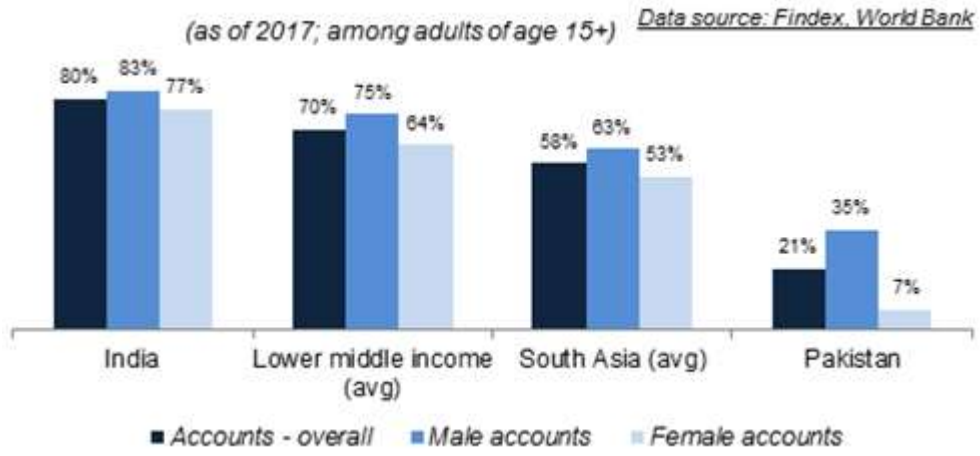

Figure 10. Pakistani Bank Accounts and under Gender Differences with Score of Peers Countries (State Bank of Pakistan Access to Finance Survey 2015)

Similarly, from a micro-level lending perspective, Pakistani figures are not encouraging; the provision of loans to entrepreneurs who can start and expand their business to chip in real activity and may also participate in their role in job creation to overcome unemployment. Limited borrowers per thousand of the population do not reflect a healthy picture. The data published by World Bank from 2006 to 2018 shows that out of 1000 adults in Pakistan, only 16 borrow from commercial banks.

Generally, other developing countries and specifically Bangladesh (Formerly known as eastern Pakistan), outperformed Pakistan with significantly higher numbers of 83 borrowers per 1000. This is also one of the reasons why Bangladesh has been able to reduce massive poverty, especially with the help of micro-lending compared to Pakistan. There are many other socio-economic and religious factors behind this phenomenon.

Among other reasons, heavy borrowing is one of the leading causes where government fulfills its fiscal deficit by obtaining loans from commercial banks, due to which hardly any money is left for private borrowers. Further, it is profitable and less risky for banks to advance money to the government than to the individuals because lending to individuals has more chances of default. Apart from this, Individuals do not have the assets to keep them as collateral with banks for borrowing. Likewise, in Pakistan, there is a parallel informal financial market operating in the form of local money lenders, which is very simple and easily accessible compared to commercial banks. However, this informal market is expensive and exploits the needy and illiterate people.

Let us go through **Table 7,** we can assess a positive correlation between developed countries and the number of borrowers, which means easy access to credit for all individuals helps in the prospering economy.

Table 7. Banks Borrowers (Per 1,000 Adults) IMF Financial Access Survey

Country	Year	Value
Afghanistan	2018	3.4
Bangladesh	2018	83.2
Belgium	2018	697.4
Brazil	2018	549.3
China	2018	469.5
Indonesia	2018	172.4
Pakistan	2018	16.7
Thailand	2018	363.1
Turkey	2018	777.9
UAE	2018	536
World	2018	152.4
Arab World	2018	187.5
Europe & Central Asia	2018	224.5

From another perspective, Penetration of private credit is another important indicator of sustainable economic development. As shown in **Figure 11** (Source State bank of Pakistan www.sbp.org.pk), where position of Pakistan is still prevailing on the lower side relative to other developing countries; drawing such comparisons is helpful as it drives private credit's potential contribution in moving a country.

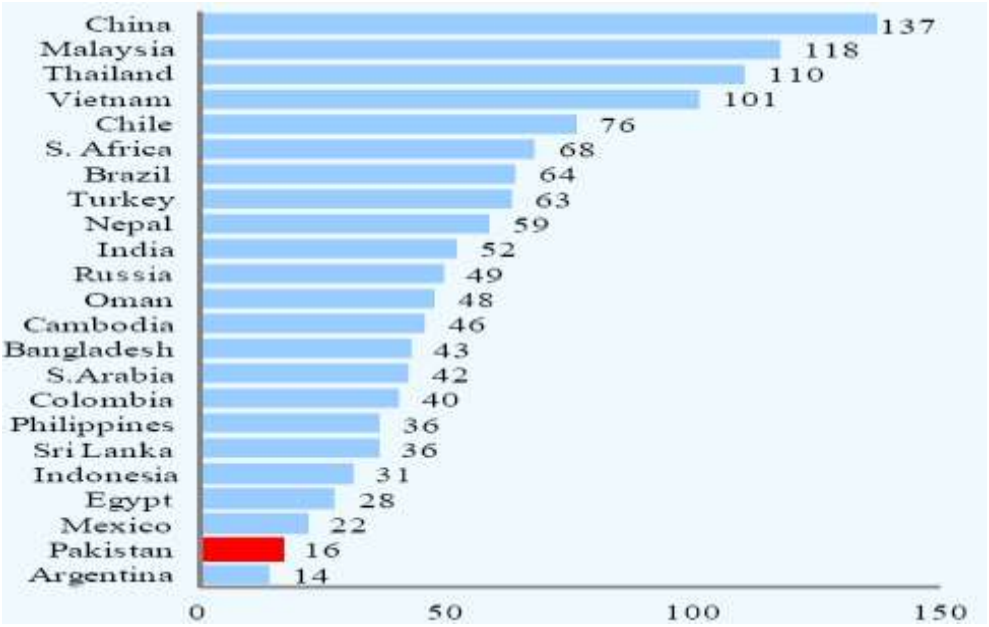

Figure 11. Pakistan Relative standing Private Credit to GDP ratio (From 2010-2016 Average State bank of Pakistan www.sbp.org.pk)

Significantly, the gap is widening over time in **Figure 12**. In the 1980s and 1990s, Credit to GDP ratio of Pakistan was very reasonable, with domestic banks contributing a relatively more profound support in economic growth. However, the ratio of private credit to GDP in Pakistan has shrunk considerably over the last 25 years. The overall environment for personal credit growth in Pakistan appears to have been deteriorating over time. Banks in the country are not effectively performing their core function, i.e. channeling depositors' savings into loans for creditworthy businesses and individuals.

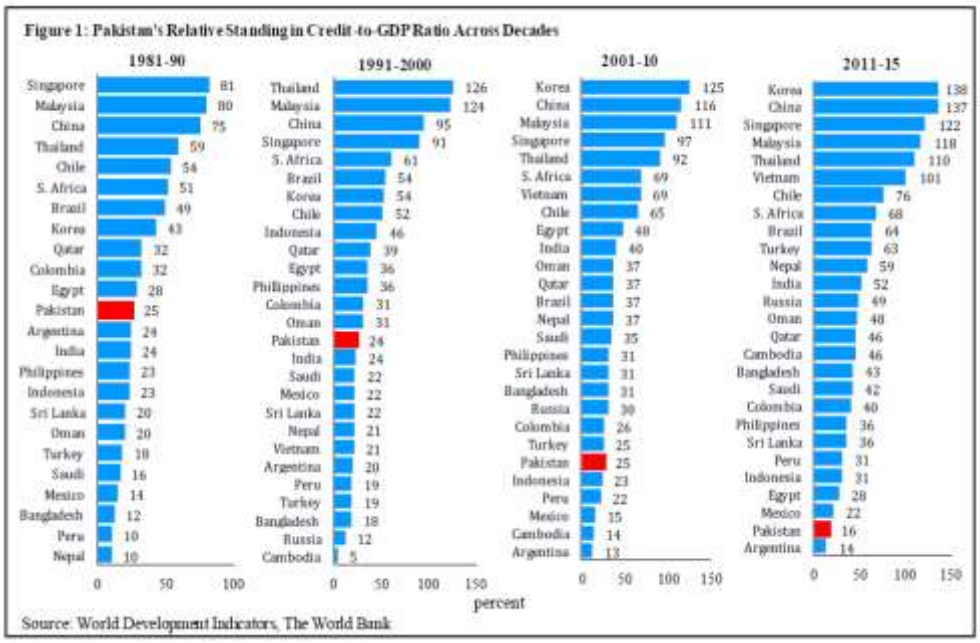

Figure 12. Pakistan Relative standing Private Credit to GDP ratio in the last 25 Years (State Bank of Pakistan www.sbp.org.pk)

Economies with higher credit-to-GDP ratios have shown more robust growth over time. The prime objective is to expand access to finance to avail credit on equitable terms for all deserving entrepreneurs and households. This would empower them to develop their businesses, improve their living standards, and simultaneously help the country progress against it.

On the same lines house finance to GDP ratio in Pakistan is very low among south Asian countries, i.e. 0.5 % by the end of 2017. However, in comparison to Bangladesh 3 %, Sri Lanka 7.5 %, while in the rest of the world, it is prevailing significantly high as 40.9 % and 63 % in Europe and USA respectively. By the end of 2008, total credit granted under mortgages reached 3 % of the entire portfolio of the private sector. Our study also endorses that loans supplied to consumer financing be scaled back in case of a default crisis, as pointed out by SBP. In Pakistan, psychologically, people want to inherit their own homes. At the same time, the business community did not use this money to expand their scope of business, and therefore housing finance is most of the time neglected by the people. Pakistan often uses a risk-avert approach because the average loan term for housing is only 13 years. The average loan to value ratio is just 48 per cent (source www.sbp.org.pk Infrastructure Housing & SME Finance Department report).

It is witnessed that Non-performing loans (NPL) increase with an increase in interest rate (M. Badar & Javid, 2013) because the expensive cost of capital weakens the effectiveness of bank lending channels and, ultimately, aggregate demand. Therefore, the central bank should consider NPL ratios to avoid a persistent and rapid contractionary stance. Investment in government securities accumulates almost half of the asset side of banks' balance sheets. It is also less affected by monetary policy rates because the government is bound to pay its deficits through the issuance of securities. Therefore asset side of the banks could not perform in consonance with policy changes which resulted in a weak bank lending channel in Pakistan. Moreover, banks that maintain sizeable non-remunerative accounts adhere to a less risky position by investing in government securities, and It enables them to earn high profits by investing in low-risk avenues.

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