



Research Article

Determining nexus between monetary policy transmission channels and GDP of Pakistan

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ABSTRACT

The purpose of this research is to analyze long run and short run relationship of monetary policy transmission channels with GDP of Pakistan and research contains four channels that are mentioned in SBP and variables representing those channels are. Exchange rate, imports, interest rate, SBP advances and KSE 100 index which are independent variables and the GDP is taken for output as dependent variable and annual data from 1991-2017 is used. The results shows that there is co-integration among variables and therefore VECM was applied which shows significant long run relationship of independent variables with GDP as well as there is short run relationship with GDP, also exchange rate is very volatile with GDP. Further model specification is also used and results are meeting with assumptions of econometrics

Keywords: Exchange Rate; Balance Sheet; Asset Price & Interest Rate Channel

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1. INTRODUCTION

1.1. BACKGROUND OF STUDY

Monetary policy is an important tool to stabilize an economy and prices through monetary policy central banks influence the lending amount and interest rate in economy. Monetary policy is set of rules, regulations and actions taken by central bank to stable prices and to achieve objectives of economy. In most countries price stability is the major objective of monetary policy, apart from this central bank uses monetary policy for other objectives such as financial stability, employment and security and easiness of foreign payments. Monetary policy is categorized into two policies expansionary policy and contractionary policy. 1) Expansionary policy is to reduce interest rate on long-term basis, which leads to affect household and consumers' investment and expenditure on goods as well as business investments and expenditures, 2) Contractionary policy leads to increase interest rate to fight inflation and slow down the economic activities by reducing government expenditures. Monetary policy changes due to ups and downs of internal and external events of economy related with policy objectives, central banks changes policy by resetting



its instruments mostly by changing interest rate or credits of banks according to theory of (Loayza & Schmidt-Hebbel, 2002).

In every country monetary policy is used to ensure price stability and growth of income. Monetary policy changes the economic activities and prices with the help of transmission channels i.e “Interest rate channel, credit channel, exchange rate channel and assets price channel” (Asgar & Hussain, 2014). The transmission mechanism of monetary policy is labeled in the way that monetary policy rate can impact the demand and prices through using expenses and investment of the organizations, household and financial institutions. The transmission mechanisms are important factors of monetary policy to control the economy and future prices (Jiménez, Ongena et al., 2014). According to theory of Taylor (1995), monetary transmission channels are categorized into two categories: first is “Price View” which includes interest rate and exchange rate channels. The second category is credit view which includes balance sheet channel and bank lending channel.

Different channels of policy transmission mechanism are identified in literature, which includes interest rate, balance sheet, bank lending and other assets, each channel helps central banks to assess instruments` efficiency. These channels depend on the economic structure and financial sector`s depth in economy and each channel varies as among different countries as per shown in literature. In Pakistan, the effectiveness of monetary policy channels misleads because the financial sector of Pakistan has fiscal dominance yet the balance sheet channel is effective in case of Pakistan. Following the theory of who identified that balance sheet channel affects large, medium and small business in Pakistan and this channel quantifies monetary policy effects on those businesses.

1.2. POLICY TRANSMISSION

The set of monetary policy instruments affect the financial system of economy through transmission mechanisms which are made by uncertain time lags and variables. Changes in financial conditions and economic activities lead to determine specific policy variables which in regard develop prices, financial stability and flexibility. Under the transmission process, the infrastructure of financial markets links together with central bank and credit institutions to settle liquidity and security with central bank just to safeguard the financial transactions. Furthermore, the market agents are linked with infrastructure of financial markets to exchange financial assets in efficient and safe manner.

1.3. MONETARY POLICY TRANSMISSION

Monetary policy has established transmission channels as concept of monetary policy to smooth the transaction system for price stability and economic development, the transmission mechanism includes two measures, 1) Standard policy measures and 2) Non-standard measures. The standard transmission of monetary policy works with official interest rates which impacts the economic activities and price stability by influencing conditions of financial markets and banking sector. The non-standard monetary policy is to safeguard the channels of mechanisms to make it easy for financial transactions more than the standard transmission of policy rate. In non-standard measures the central bank

intervenes in market which can affect directly expectations and interest rates and favors the assets price or bank lending activities. Furthermore; for the non-bank credit those measures determine the bond market conditions; in addition, the purchases of central bank can support liquidity and market functioning which can avoid the consequences of market downfall.

1.3.1. Interest rate channel:

The policy interest rate affects directly to money market rate “MMR” and indirectly affects deposit rates and lending rates offered by banks to their customers. The short-term nominal rate can be continuing with an increase in interest rate which directly leads to increase the long-term interest rate. On the other hand, when nominal rate is low this directly changes to real interest rate. Because of this increase, firms slow down their investment expenditure as their borrowing costs increases. Likewise, households also face high cost of borrowing which affects their expenditure, this ultimately affects demand and supply of labor and goods which in result affects the inflation.

1.3.2. Money Channel:

The money channel of monetary policy is used for increasing deposits which leads to increase in loan creation that ultimately affects inflation and spending. Theory suggests that higher reserves of banks lead to more loan creations which in result increase the money supply with the help of money multiplier and reduce force on market interest rate thus it is reserves circulation. This credit provision affects spending and investment which leads to affect consumer price index and output and in result, purchases of securities from holders can be affected directly and indirectly it affects the liquidity used from purchased linked with portfolio rebalance.

1.3.3. Exchange Rate Channel:

In economies, when nominal interest rate of domestic currency increases against its foreign currency, the domestic currency appreciates against foreign exchange rates and because of that it gains attractiveness for the investment point of view. When it is slow to adjust prices and it makes domestic products more expensive compared to foreign products and due to this, exports decrease which in result it affects output and employment of domestic country whereas inflation also decreases.

1.3.4. Asset price and wealth Channel:

The concept of this channel is that when nominal interest increases, it increases attractiveness for debt instruments for investors compared to stocks and existing debt. Because of this increase in interest rate stock market may re-established and prices of assets may fall as it tightens the policy, due to this, affected firms may slow down the investment expenditure. Furthermore; when asset prices change it impacts the aggregate demand by changing in value of collateral, also it affects the borrowing amount for borrowers, whereas an increase in prices of assets can decrease risk that lenders ask from borrowers. In addition, when assets price change, it affects investment and consumption via wealth effects and collateral value. For example, when prices of assets increase, it

increases financial wealth of households “share owning households” and owners become richer and they increase their consumption.

1.3.5. Balance Sheet and Profitability Channel:

The concept of balance sheet channel is that the borrowers net worth decrease with the increase in interest rate because their debt burden becomes higher as well as higher interest decreases value of lenders` assets and because of this, loan demand and supply can be decrease, this can also change asset prices by financial accelerator mechanism. When firms value declines, it reduces the collateral value used by firms to borrow, which in result tightens credit conditions, which ultimately leads to reduce economic and investment activity which affects the firm net worth and profitability. This leads lenders to tight financial conditions by increasing contractionary impact to interest rate increase and secondary effect by tightening monetary policy can increase credit as well as financial stability risk.

1.3.6. Bank Funding and Lending Channel:

The concept of this channel is that due to monetary policy, supply of loans is available to banks and loans are created by banks, banks play important role for economy as it issues liabilities and get deposits which aggregates the broad monetary, as well as it holds and creates assets in the form of loan. A tighter bank loan supply or credit conditions decrease spending as well as investment, whereas the liquidity of central bank helps in crises of banks by funding them, which can be crucial to sustain origination of loan to private sector. This channel is linked closely with (i) money channel for deposits and availability of money for funding as well as it is linked with (ii) balance sheet channel for loan activity valuation.

1.3.7. Expectation Channel:

This channel is about future expectations of changes in official interest rates that affect long-term as well as medium interest rates, mostly long-term interest rates depend on expectations of market concerning short-term future rates. Economic agents are guided with communications and measures by central bank regarding future expectations of inflation which trigger price development through indicating future monetary policy course. Expectations regarding future interest rates are important because they influence economic decisions like investment, durable consumption as well as production, price-setting and employment.

1.4. GROSS DOMESTIC PRODUCT

The Gross Domestic Product “GDP” is measure of country`s income and output of economy in given time. The GDP is defined as total products and services market value that are produced in country at given time that is mostly one year. The evaluation process of GDP contains the sum of value from intermediate to finishing stage of products and services produced within an economy in given time period.

1.5. RESEARCH OBJECTIVES:

The aim of this research is to analyze long run and short run relationship of monetary policy transmission channel (interest rate channel “interest rate”, exchange rate channel “exchange rate & imports”, asset price channel “KSE 100” and balance sheet channel “advances”) with Gross Domestic Product of Pakistan.

1.6. RESEARCH QUESTIONS:

1. Is there any long-run relationship of monetary policy transmission channels with GDP of Pakistan?
2. Is there any short-run relationship of monetary policy transmission channels with GDP of Pakistan?

1.7. SIGNIFICANCE OF STUDY:

Monetary policy is an important tool that is used to stabilize the price and economic development therefore it is important to know what is relationship of monetary policy transmission channels with GDP of Pakistan by considering all four channels that are used by State bank of Pakistan because mostly two channels are considered before to check any impact or relationship but in this study all channels are considered to get information. Moreover, it has been suggested that efficient and effective economic policies resists financial markets from getting crashed, even during the pandemic and crises times .

1.8. LIMITATIONS

This research is done within Pakistan and only Pakistan`s data is used for completion of Master`s Degree and time period is fixed that is four months. Furthermore; this research is limited to monetary policy channels that are mentioned and used by State Bank of Pakistan, GDP of Pakistan from 1991-2017

2. LITERATURE REVIEW

2.1. EXCHANGE RATE CHANNEL AND GDP

Exchange rate channel determines relationship between monetary policy and private capital inflows. There are different regimes of exchange rate but mostly two categorized are discussed that is fixed and flexible regimes. Under flexible regime, monetary policy is tightened such as, by increasing interest rate to attract more deposits which leads to currency appreciation. Whenever currency appreciates, it gains value which makes domestic product expensive compare to foreign products and this creates negative impact on exports and aggregate output. Whereas under the regime fixed exchange rate having no control on capital and increase interest rates by tightening policy will affect capital inflows as higher interest rate attract foreign investors which create pressure on exchange rate. Because of this central bank have to increase its foreign exchange reserves to reduce interest rate to its original level.

To determine the impact of monetary policy on the Nigerian economic growth research was conducted by using VECM. The results of the research showed that there is long term relationship among inflation, exchange rate and external reserves and economic growth and these are significant tools that drives Nigerian economic growth.

Exchange rate impacts domestic prices in European economies. Author used VAR Model to find out changes in exchange rate through shocks in oil prices, and to find out impact of exchange rate changes on domestic price index. For rigorous results of exchange rate impact on domestic prices, author used two different set of periods 1st from 2000-2007 and 2nd from 2000-2012. His study suggested that exchange rate has different impact on domestic prices varies based upon different time period.

Exchange rate depreciation and its impact on inflation for the period of 1986-2008 in Nigeria, using ARDL "Auto Regressive Distributed Lag" and co-integration procedure. To find the impact, they regressed lagged value of exchange rate, inflation, broad money, government expenditure and gross domestic product, they found that depreciation of exchange rate, and money supply and GDP are main indicators of inflation in Nigeria. They concluded their study that exchange rate depreciation has positive and significant impact on inflation in long-run analysis (Keynes, 1936).

The relationship among imports, exports and GDP. Authors used Johansen (1988), co-integration, vector error correction model and granger causality test on data from 1960-2015, the results showed that there is no relationship among variables. Whereas the granger causality showed that there is bidirectional causality between imports to GDP and exports to GDP (Alex, 2013).

In Iran a study was conducted to determine impact of import and exports on gross domestic product, in which data from 1962-2011 was used. Johanson-co-integration, Impulse Response Function, Error Correction Model and Variance Decomposition was used in the study and study showed long-run relationship among imports, exports and GDP, where exports had positive and direct relation with GDP in long-run analysis and imports had negative relationship with GDP in long-run analysis (Khan, Kayani et al., 2023).

2.2. ASSET PRICE CHANNEL AND GDP

In every economy stock market plays important role to stabilize financial sector of economy through buying and selling of shares, stock market is used to increase opportunities for investment and to improve growth of economy. A study was conducted in Thailand to determine macroeconomic factors and stock market performance and he used VAR and Granger causality techniques to determine the association and he used monthly data from 2001-2010. His study showed that macroeconomic indicators predict stock returns less, but stock returns predict macroeconomic variables more, and study suggested that there is positive association of inflation, exchange rate, unemployment and premium rate, he conclude that stock market improves performance these indicators (Khan & Khan 2021).

A study was conducted in Pakistan to analyze stock market impact on economic growth, authors used quarterly data from 2002-2011 and applied OLS regression to analyze impact.

The study showed that there is positive and significant impact of stock price, stock returns and market capitalization on GDP of Pakistan (Khan & Jan, 2021).

The long run relationship was identified for G7 countries and authors used quarterly data from 1969 to 2014, authors applied co-integration and VECM test to analyze long-term relationship. The results showed that there is co-integration in data therefore VECM was applied and VECM results showed that there is strong relationship between GDP and Stock prices for countries that have different growth of GDP compared to whom they are having trade relations (Khan et al., 2023).

2.3. INTEREST RATE CHANNEL AND GDP

Interest rate is cost of credit in economy and more specifically it is yearly charge price from lender to borrower for a loan (Aslam et al., 2020). In Asian countries, research has been conducted to determine interest rate impact on economic development, the study includes 10 years data from 2006-2015 and regression analysis was used to determine the impact. The study suggested that interest rate has negative significant impact on GDP and Inflation, whereas it has negative insignificant impact on FDI (Aslam et al., 2023).

A study was conducted in Swaziland to determine relationship between interest and inflation, in study of years of data was used whereas study contains quantitative and confirmatory approached. The results of study showed that there is positive relationship of interest rate with inflation in Swaziland`s economy (Karamanou et al., 2010). To determine interest rate impact on real GDP in Jordan, research was conducted that contains data from 2000-2010 and GARCH technique was used to determine impact. The findings of research showed that there is significant negative impact of interest rate on GDP in Jordan (Fasanya & Onakoya 2013; Mirdala, 2014).

In Bulgaria, research was conducted to identify impact of interest and inflation rate on GDP. Authors used data from 2000-2014 and used Granger Causality and Co-integration techniques in study. The study reveals that interest rate and inflation rate has negative weak correlation with GDP in Bulgaria, whereas interest and inflation has also negative but significant moderate correlation with GDP in Romania and study showed non-existing correlation of inflation with GDP in FYROM as well as negative correlation of interest rate with GDP (Imimole & Enoma, 2011).

Research in Nigeria was done to determine interest rate impact on Nigerian economic growth. The study contains data of 1990-2013 and employed OLS technique to determine interest rate impact, the study suggested that interest rate has low but significant impact on economic growth, furthermore author concluded that growth can be increased by reducing interest rate which directly increase investment (Sayed & Mohamed, 2016).

2.4. BALANCE SHEET CHANNEL AND GDP

A study was conducted to analyze casualty bank`s major activity and economic growth in Pakistan. Author used data from 1961-2013 and applied co-integration test to find relationship. The result of study showed that there is long run as well as short run causal

relationship of bank lending and growth of Pakistan, whereas no co-integration was found between bank deposits and GDP (Mehdi et al., 2012).

In Nigeria, research has been conducted to determine bank lending impact on economic growth. Authors used time series data from 1987-2012 and applied multiple regression to determine impact, their study reveals that in Nigeria bank lending has insignificant negative impact on growth of economy "GDP" that is "-0.17" which shows 1 unit increase in loans will have negative impact on growth. Furthermore, study concludes that in Nigeria performance of economy is influenced by bank lending and authors recommend that banking sector of Nigeria must be strengthened by its central bank "CBN" to improve banks credit for increasing economic growth (Tangjitprom, 2012).

According to a study in Nepal to find out bank lending effects on Nepal's inflation, authors took twenty-four commercial banks of Nepal and applied correlation and regression techniques on panel data ranging from 1996-2015. The study showed that there is significant positive effect of bank lending on Nepal's inflation, whereas interest rate showed negative but significant effect on Nepal's inflation. Authors concluded that when bank lending increase, it increases the consumption which directly increase prices, whereas higher interest reduces consumption patterns which in result reduces prices (Arshian & Sahar 2016). To examine bank's role in economic growth and capital formation in Nigeria and he used data from 1980-2009 and OLS model was applied in research, his study found that commercial banks play significant role in economic growth and formation of capital in an economy. The study implies that through bank activities of commercial banks the capital formation of nation can be increased. Further research showed that deposits have impact only on capital formation but not on growth and findings support that commercial banks are subject to economic growth and capital formation (Annika & Daniel, 2018).

In Pakistan, research was conducted to analyze banking sector contribution in Pakistan's economic growth. The research implies granger causality test to find bidirectional relationship and multiple regression was used to determine impact, further research contains ten bank data from 2001-2010. The results showed that investments, deposits, loans, profitability and interest earnings have positive and significant impact on Pakistan's economic growth (Finan, 2016).

A study to examine inflation rate with deposit mobilization in Nigeria was done where study contains multiple regression model and annual time series data is used ranging from 1985-2016. The results reveal that there is significant but negative relationship of savings, time deposits and demand deposits with inflation (Sahibzada & Muhammad, 2017). On the other hand, a study was conducted to find out bank credit "investments" impact on economic growth and inflation, study contains annual data from 2006-2012 and panel data analysis was applied on data of ten European countries as well as study contains real sector. The findings showed that credit provided to real sector does not impact the inflation whereas it impacts the economic growth (Khumalo et al., 2017).

3. RESEARCH METHODOLOGY

This research is casual and time series data is used, whereas Quantitative Methods are applied in this research, further in this research secondary data is used from time period of 1991 to 2017 for the monetary policy transmission channels and GDP. Data is taken from SBP and Bloomberg software. Further in this research I have used Unit Root to check stationarity of data, Johansen (1988), co-integration to check co-integration among variables based on that VECM model is selected, Lag Criteria, Vector Error Correction Model and Wald Test. For model specification I have used Normality test, Auto-correlation, Multicollinearity and Heteroscedasticity techniques.

4. DATA ANALYSIS

4.1. UNIT ROOT TEST

The Unit Root Test adopted for time series data to make data stationary by Augmented Dicky and Fuller (1979), "ADF". This test is used to check whether estimations "mean and variance" are equal to zero or not (Abdul Aziz & Orabi 2013). This test provides collective statistics of ADF and makes variables stationary, when the value of probability is less than critical value.

$$\Delta Y_t = \alpha_0 + \alpha_1 Y_{t-1} + \sum_{j=1}^k \alpha_j \Delta Y_{t-j} + \epsilon_t$$

Where in this model Δ indicates 1st operator difference, whereas ϵ_t indicates residual term and α_0 represents constant value, whereas number of lag criterion is represented by k and time series is represented by Y_t .

Table 1. Unit Root Table

Variables	ADF-T-Statistics	Orders	Prob-Values
GDP	-3.534	D1	0.0154
Advances	-5.389	D1	0.0002
Exchange Rate	-3.577	D1	0.0142
Imports	-4.095	D1	0.0042
Interest Rate	-4.937	D1	0.0006
KSE-100 Index	-5.722	D1	0.0001

Interpretation: The stationarity of data is analyzed through Unit Root Test of ADF as shown in above table of unit root, it shows that all dependent and independent variables are stationary at 1st difference. As ADF critical values are greater ± 1.96 and prob values are less than 0.05 that suggest that we reject null hypothesis that is variable has unit root. Further Lag 1 is selected based on results.

Ho: Variable has unit root.

H1: Variable has no unit root.

4.2. LAG SELECTION CRITERIA

The selection of lag criteria is used to select a lag order that is optimal on the basis of Akaike Information Criterion "AIC", Schwarz Information Criteria "SIC" and Final Prediction Error

“FPE”. According to Abdul Aziz and Orabi (2013), the AIC and FPE are more favorable to select lags in time series data

Table 2. Lag Selection Criteria Table

Lag Criteria	AIC	FPE	SIC
0	139.3387	7.71e+51	139.6774
1	131.0879*	2.32e+48*	133.7977*

Interpretation: I have used AIC, FPE and SIC to find which order is minimum to select for analysis as shown in above table of lag selection criteria, and according to result of AIC, FPE and SIC 1st order is minimum for analysis that is auto selected by E-views as (*) indicates minimum lag order in data.

4.3. CO-INTEGRATION TEST

To determine co-integration among variables that whether variables have common stochastic trend to grow in same direction, I have used Johansen (1988), Co-integration Test “1990”(Davcev & Hourvoulides, 2015). The indicators of co-integration test are unrestricted λ trace and λ max.

Ho: there is no co-integration among variables.

Unrestricted Co-integration Rank Test (Trace).

Table 3. Co-integration Table Trace

Hypothesized No: of CE(s)	Eigenvalue	Trace Statistics	Critical Value 0.05	Prob-Value
None*	0.834054	139.3037	95.75366	0.0000
At most 1*	0.796189	94.40144	69.81889	0.0002
At most 2*	0.661741	54.63733	47.85613	0.0101
At most 3*	0.516530	27.53877	29.79709	0.0891
At most 4*	0.232243	9.369615	15.49471	0.3323
At most 5*	0.104615	2.762551	3.3841466	0.0965

Unrestricted Co-integration Rank Test (Maximum Eigenvalue)

Table 4. Co-integration Table Max-Eigen

Hypothesized No: of CE(s)	Eigenvalue	Max-Eigen Statistics	Critical Value 0.05	Prob-Value
None*	0.834054	44.90227	40.07757	0.0133
At most 1*	0.796189	39.76411	33.87687	0.0088
At most 2*	0.661741	27.09856	27.58434	0.0576
At most 3*	0.516530	18.16915	21.13162	0.1236
At most 4*	0.232243	6.607064	14.26460	0.5366
At most 5*	0.104615	2.76255	3.841466	0.0965

Interpretation: I have applied Johansen (1988), Co-integration test and used Trace and Max Eigen as shown in above tables number 3 and 4 Statistics to determine co-integration among variables. The result of co-integration shows that there is co-integration among variables as at most 5* suggest co-integration as prob-value is greater than 0.05 and we cannot reject null hypothesis. Therefore, Johansen (1988), co-integration test indicates co-integration among variables.

4.4. VECTOR ERROR CORRECTION MODEL (VECM)

After confirmation of co-integration among variables than we have to use Vector Error Correction Model for long run relationship. The VECM estimate the speed of variable “dependent variable” returns to equilibrium when there is any change in independent variable (Jelilov, 2016).

Table 5. Vector Error Correction Model

Variables	Coefficient	Standard Error	T-statistics	Prob-values
C(1) GDP	-0.092852	0.029138	-3.186606	0.0054
C(2) GDP-1	-0.054793	0.1691565	-0.323919	0.7500
C(3) Advances	-5.77E-05	5.89E-05	-0.979745	0.3410
C(4) Exchange Rate	-1.598882	0.529425	-3.020037	0.0077
C(5) Imports	7.23E-10	5.84E-10	1.217905	0.2399
C(6) Interest	0.332646	0.806991	0.412205	0.6853
C(7) KSE 100	0.001139	0.000372	3.061217	0.0071
C(8)	14.20354	3.553172	3.997425	0.0009

Interpretation: The VECM analysis shows that independent variables which are advances, exchange rate, imports, interest rate and KSE-100 causes GDP in long run and GDP moves toward equilibrium in long run as sign of C(1) is negative and significant as critical value is greater than ± 1.96 and prob-value is less than 0.05 as shown in above table number 5 of Vector Error Correction Model (Aliyu & Yusuf, 2014; Saba 2016; Neelam & Radhe, 2017; Alex 2012; Aurangzeb, 2012). It is also considered that convergence speed is very low that can be to yearly data is selected with these indicators works on daily basis. The model is:

$$D(\text{GDP}) = C(1) * (\text{GDP}(-1) - 0.00197499617925 * \text{ADVANCE}(-1) + 1.07202742013 * \text{EXCHANGE}(-1) + 2.99278047888e-09 * \text{IMPORTS}(-1) - 9.2552496666 * \text{INTEREST}(-1) + 0.000116404187786 * \text{KSE}(-1) + 259.200532934) + C(2) * D(\text{GDP}(-1)) + C(3) * D(\text{ADVANCE}(-1)) + C(4) * D(\text{EXCHANGE}(-1)) + C(5) * D(\text{IMPORTS}(-1)) + C(6) * D(\text{INTEREST}(-1)) + C(7) * D(\text{KSE}(-1)) + C(8)$$

4.5. WALD TEST

The Wald Test is used to analysis short-run causality with chi-square method of Wald test. Wald test suggests that if coefficients influence the dependent variable jointly then it suggests that there is short run causality (Orok et al., 2018). The Wald test model is:

$$H_0: C(1)=C(2)=C(3)=C(4)=C(5)=C(6)=C(7)=C(8)=0$$

Table 6. Wald Test Table

Dependent Variable:	Test- Statistics	Value	df	Prob-Value
DGDP	F-statistics	12.34312	(8,17)	0.0000
	Chi-square	98.74498	8	0.0000

Interpretation: The chi-square of Wald test suggest that independent variables also cause Gross Domestic Product “GDP” in short-run as prob value is less than 0.05 and we reject null hypothesis that the independent variables do not cause GDP in short-run and the joint influence of independent variables on dependent variable is zero as shown in table number 6 of Wald Test.

4.6. MODEL SPECIFICATION

Table 7. Normality Test

Mean	Minimum	Maximum	Std. Deviation	Skewness	Kurtosis	Jarque-Bera	Probability
-2.59e-14	-14.53621	10.56553	5.628190	-0.189747	3.473811	0.383868	0.825362

Interpretation: The normality test shown in table number 7, is used to determine whether data is normally distributed or not. The normality test shows that residuals are normally distributed as all four important points of normality test meet with their criteria, Skewness -0.189747 which is almost close to zero, Kurtosis is also close to three that is 3.473811, Jarque-Bera is also close to zero that is 0.383868 and most important that probability value is greater than 0.05 that is 0.825362 which means I am failed to reject null hypothesis that is data "residuals" are normally distributed.

Ho: Data is normally distributed.

H1: Data is not normally distributed.

4.7. AUTO-CORRELATION TEST

Breusch-Godfrey Serial Correlation LM Test

Table 8. Breusch-Godfrey Serial Correlation LM

F-statistics	Obs*R-squared	Prob. F (1,16)	Prob. Chi-square(1)
0.0322388	0.050504	0.8594	0.8222

Interpretation: The Breusch-Godfrey Serial Correlation test in table number 8, is used to detect serial correlation among the residuals of OLS and it is two-sided likelihood-based LM Test. The auto-correlation test shows that there is no auto-correlation among residuals as Probability of Chi-square is greater than 0.05 that is 0.8222 therefore, I am failed to reject null hypothesis that is there is no serial correlation.

Ho: There is no serial correlation.

H1: There is serial correlation.

4.8. HETEROSCEDASTICITY TEST

Table 9. Heteroscedasticity Table

F-statistic	Obs*R-squared	Scaled explained SS	Prob. F(12,12)	Prob. Chi-Square(12)	Prob. Chi-Square(12)
0.809666	11.18529	6.397376	0.6398	0.5131	0.8947

Interpretation: The heteroscedasticity test in above table number 9, is used measure the deviation from homoscedasticity; it suggests that if residuals are heteroscedastic then residuals have different standard deviations which suggests variance of residuals sum of square are greater than the residuals of homoscedastic. The heteroscedasticity test shows that the residuals are homoscedastic as probability value of Chi-square is greater than 0.05 that is 0.5131 therefore, I am failed to reject null hypothesis that is data is homoscedastic and it shows that data is authentic for analysis.

Ho: Data is homoscedastic.

H1: Data is hetroscedastic.

4.9. MULTICOLLINEARITY TEST

Table 10. Multicollinearity Table

Variable	Coefficient Variance	Centered VIF
C(1)	0.000849	2.331919
C(2)	0.028614	1.484022
C(3)	3.46E-09	1.354350
C(4)	0.280290	1.811268
C(5)	3.53E-19	1.980862
C(6)	0.651234	1.645422
C(7)	1.38E-07	1.27972
C(8)	12.62503	NA

Interpretation: The multicollinearity table 10 is used for statistical phenomena that show whether two or more than two independent variables are correlated in regression model. The variance inflation factors VIF is tool to detect and quantify amount of variance inflated. The variance inflation factors of multicollinearity shows that there is no multicollinearity in data as all values of centered VIF are less than 5 that show the null hypothesis is reject that there is multicollinearity.

Ho: There is multicollinearity.

H1: There is no multicollinearity.

5. RESULTS & CONCLUSION

The study is conducted to determine the long run and short run relationship of monetary policy transmission channels with GDP. The study contains 4 channels of monetary policy according to State Bank of Pakistan that are, exchange rate channel, interest rate channel, balance sheet channel and asset price channel, and variable that represents these channels are, exchange rate, imports, interest rate, SBP advances and KSE 100 as well as these are independent variables, whereas the GDP is considered as dependent variable and data is used from 1991-2017. The results shows that variables are co-integrated that was identified by Johansen (1988), co-integration test table number 3 & 4 and then VECM was applied to check long run relationship which shows that these independent variables are having significant long run relationship with GDP in table number 5. The short run relationship was found through Wald test and also results show that there is short run relationship as well in table number 6 and these results are also supported by literature. Furthermore, in this study model specification is also applied to check that is there any error in data or not and results of model specification showed that there is not any error and data is normal to use for analysis. After conducting this research, I came to know that Pakistan`s Gross Domestic Product is having Long and Short run relationship with State Bank of Pakistan`s advances, Interest rate, KSE-100 index, Exchange rate and imports. The GDP of Pakistan is highly impacted with exchange rate as Pakistan is importing country and the more Pakistan imports the more, she is reducing its reserves which create negative impact on GDP as well as our currency is depreciating which leads to pay more on imports. Therefore, it is

recommended that if Pakistan wants to improve its GDP it should reduce imports and increase exports which is only possible when Pakistan motivates its exporter to export more by depreciating its currency which ultimately will motivate exports as they will get more money and it will also demotivate importers because they will need to pay more when domestic currency is depreciating. Pakistan will have another benefit if imports are reduced than those countries from which we import; they will now come to Pakistan to produce those goods here in Pakistan, with this Pakistan will get Foreign Direct investment, Employment will be increase, Competition will be increase in domestic market and current account will be moving to surplus side which is in negative figure since long.

Author Contributions:

In this research paper Muneer Hussain has contributed in Research Introduction, Data Analysis. Mr. Shoaib Shah has contributed in research methodology. Mr. Zohair Durrani has contributed in Literature review and Mr. Mir Hassan has contributed in abstract, results and conclusion.

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All data is available that is used in this research paper

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None

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