Nexus of Monetary Policy Transmission and Macroeconomic Indicators: An evidence from Emerging Economy

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Abstract

The research ascertains the influence of monetary policy on the macroeconomic indicators such as inflation rate, GDP growth, stock price, exchange rate, and balance of payment before and during the COVID-19. The monetary sector is a crucial component of the economic system, which has always been uncertain. The research estimations are based on 20 years of secondary data collected from authentic sources. The research would help government departments to contemplate on the implications of the monetary policy at the unprecedented time where there is a need to figure out the relevant issues and related solutions. The data collection is for a period before the Covid-19 and is be analyzed using different statistical techniques such as unit root, Vector Auto Regressive (VAR), and Engle granger. The results would be helpful to measure the relationships between inflation and monetary policy, GDP and monetary policy, balance of payment to the monetary policy, exchange rate and monetary policy and the coherence of stock market and monetary policy. All the independent variables have significant impact on money supply and GDP. The research is going to help government to make wise decision about implementing the monetary policy to combat the adverse impacts of macroeconomic indicators especially during unprecedented time.

Keyword: *Inflation, Unemployment, GDP, Economic, Growth, Stock Market*

Introduction

Monetary policy shares a vital platform in improving economic acceleration in the state or country. Central bank is the only organization who implements monetary policy in the country. Monetary Policy has three impactful tools, the first is discount rate, the second is reserve requirement ratio (RRR) and the third is discount rate in addition to open market operations (Monorith Sean, 2019). Endogenous growth theory argues that fixed capital accumulation is the basis of economic growth (Barro, 1991). Fixed capital accumulation stimulates productivity and ultimately promotes competent financial system. A financial system is only resilient and perfectly organized when it is capable to hold on asset price fluctuations that is the outcome from extensive rise in uncertainty and demand and supply conditions (Vera Ogeh LAssey Fiador, 2015). In managing the financial systems, monetary policy is the key policy tool. Mishkin (2007) argues about the monetary policy importance for the firmness of financial condition and strength of an economy.

The monetary policy is used to combat economic shocks as a general policy instrument but on the one side, it is well prominent that Contractionary monetary policy could be the product of undesirable outcomes which are totally opposite of nation's prospects, such as depreciation of currency, high rate of unemployment and economic stagnation. The other way around, an expansionary monetary policy is having lower interest rates, results in lower inflation level that is incompetent to boost aggregate demand which creates the danger of financial insecurity because it makes cash saving and holding more eye-catching than interest containing bank deposits. (Stein, 1998; Chiesa, 2001; van den Heuvel, 2002; Herrero and Lopez, 2003; Diamond and Rajan 2006). Monetary policy uses interest rate fluctuations as a tool to stabilize economy. The global crisis of 2008/09 started the trend towards lower interest rates. The decline in long term interest rate is globally recognized into three categories: (1) amplification in the propensity to save, (2) propensity to invest decreases

and (3) demand and supply movement of different types of assets (Inayat U. MAngla and Kalim Hyder, 2017). The adverse balance of payment is the result of decreasing export and increasing imports. The declining demand for its exports is due to the developed world's recessions and the noncompetitive nature of exports, lack of technological services. Inflation and unemployment both impact socioeconomic overheads (Mankiw, 2013). According to bank of Indonesia (2018), inflation has a depressing impact on reducing real income of people, and thus creating ambiguity of making economic decisions (Septiatin et al., 2016), and ultimately putting stress on domestic currency to deflate against foreign currency. Unemployment is the major reason of sustainable poverty and women are the highest in the rank than men (Kiausiene, 2015). Criminal activities are also the major reason of unemployment in the society (Ha and Andresen, 2017). Furthermore, Goldman- Mellor (2016) reports a devastating impact of unemployment on mental health. This research explains the impact of monetary policy on macroeconomic indicators and also discusses the effectiveness of monetary policy on achieving macroeconomic objectives. Pakistan has been striving hard to combat the issues relating to the macroeconomic indicators such as inflation, balance of payment, economic growth and exchange rate. Instead, State Bank of Pakistan is also implementing the Monetary or Fiscal policy in order to find out the solution of these factors or top streamline these economic factors. However, the impact of these indicators may be slow or ineffective or may be any inefficiency in the various sector of the economy (Simon Akumbo Eugene Mbilla, 2021).

Monetary policy is used to stabilize the economy; it is used to figure out the problems of the country and the relevant solutions. The covid-19 shock has impacted the Pakistan economy and created the uncertainty in the Pakistan economy. A the Covid-19 shock the state bank of Pakistan had intervened into the market and tries to handle the aftereffects of these shocks. According to the Monetary Policy committee State bank of Pakistan quarterly

report dated September 20, 2021, the monetary policy management planned to uplift the policy rate by 25 basis point to 7.25. This research leads us to know how the SBP intervened in these crises time, what were the policy implementations, how unprecedented shock encountered or dealt with. The study also discussed the monetary policy transmission mechanism. In which the research discussed the impact of interest rate, exchange rate, assets prices and expectation channel on aggregate demand and inflation. Another problem related to the developing countries is the procedure of structural transformation (Siddiqui & Liaquat, 2022). Therefore, structural reformation is the main answer to increase the effectiveness of production level, which helps in decrease the inflation.

Significance of The Study

The study helped readers to identify the unprecedented shocks of Covid on macroeconomic indicators and for this purpose what monetary policy was doing. How it was managing the robustness of these indicators. This study also found that the comparative effectiveness of monetary policy in altering economic variables. Monetary policy was trying to make an effort to realize the country's economic prosperity in addition to balance of payment equilibrium by the help of money supply and money credit (Iyoha & Oriakhi, 2002). The common objectives of any monetary policy is to stabilize price level in the economy, maintaining balance of payments equilibrium, reducing unemployment, output enlargement, and sustainable development (Quartey & Afful-Mensah, 2014). The thesis found out how the monetary policy is affecting the inflation level in the country. Inflation is politically expensive for the government (Haque and Qayyum, 2006). Poor people are more affected by the high and persistent level of inflation as it acts as a regressive tax (Baily, 1956, and Fisher and Modigliani, 1978a, 1978b). Poor people usually have the cash savings they do not possess the Financial assets, inflation generally erodes the cash saving and solely protects

those having financial assets (Fisher and Modigliani, 1978). This study examines the effect of inflation during the Covid shock and what are the reasons to have high inflation during Covid. Private sector money expansion and the broad money (M2) improvements are the leading indicators of inflation in Pakistan (Khan and Schimmelpfennig, 2006). At the flip side, it was discussed that accommodative monetary policy is responsible for current surge in the price level. The study highlights the effectiveness of monetary policy by applying various models and theories which discussed in the second chapter. Ahmed, (2003); Ahmed, Ara & Hyder, (2006) the thesis estimated the effect of unanticipated outside shocks on macroeconomic variables, dependent on responsive impulses.

Literature Review

The improvement and outburst of economic activities could be seen from two interrelated sectors, which is the real sector, and another is the monetary sector. The two sectors are strongly linked and could not be divided though. Money is used as a means of exchange to gain goods and services. Therefore, money plays a vital role in boosting and facilitating economic activities (Amrial, Ahmad, Mikail and Tika Arundina, 2019). Monetary Policy is the key policy instrument in managing financial systems. The financial system efficiency and capital compilation are the result of monetary policy example and its implication within an economy (Vera Ogeh Lassey Fiador, 2015). For example, according to the classical economists First, monetary shocks are vital source of less span economic cycle's instability. Second, enlarged and distributed gaps in the economy are due to monetary changes. Third, in the long run, monetary changes are the mirror image of certain price level and infecting the level of output and unemployment (Irving Fisher theory of quantity theory of money). According to Fisher's theory, the importance of money supply regulations in controlling and stabilizing economic improvement by keeping eye on the rate of inflation. This arrangement is termed as monetary policy and is a vital part of macroeconomic policy.

Monetary policy has vital impact on country's real estate industry which would impact the real economy (Na Yan, 2019). Mishkin (2010) mentions five other aims of monetary policy apart from maintaining price stability, including: Increasing employment level, Sustainable economic prosperity, Stability of financial market, Interest rate stability and a sustainable exchange rate market. The classical economists' (Alfred Marshal, Edgeworth F.Y, and Arthur Pigour) says that the monetary policy is studied under quantity theory of money. According to quantity theory, quantity of money increment leads to boost in price level and vice versa. Another theory is The Phillips Curve which shows a negative relationship between the rate of inflation and the unemployment rate. Phillips curve can provide a picture for the monetary management to take right decision and to formulate right policy. From an alternate perspective, the rising unemployment increases stress and pressure on inflation (Salazar, 2015). The more inflexible the salary, the more continuous increment in the cumulative inflation movement. Furthermore, the effect of monetary policy on unemployment and inflation depends upon the market basics such as power bargain and in and out flow of labor.

In Cloyne et al. (2016), explores and explains the problem of whether pricing decisions are having any effect in the firms' expectations regarding inflation. The pricing decisions include the growth in 1. The price of output of industry 2. The wage rate expectations of the employees which would cause inflation. The research indicated the impact of interest rate on exchange rate. The uncovered interest parity (UIP) theory has been created the link between expected changes in the exchange rate to interest fluctuations; this is the chief to almost all international macroeconomic models. Application of different multiple linear regression models helps to analyze the dynamic relationship between the money supply, economic growth and inflation. Of course, they all have different results. It had been revealed by quantitative evidence that there exists the positive relationship between money

supply, capital formation and economic growth in Nigeria, which there exist negative relationship between inflation and growth (Yugang He, 2017).

In order to maintain the money supply level (broad money or M2) the Central bank took several monetary steps, and focuses in interest rate to gain the objectives of sustainable growth rate and achievement of high employment level. (Ihsan & Anjum, 2013).

(Hameed, 2010) studied the impacts of money supply, inflation and interest rate played a crucial role on GDP development in Pakistan. Moreover, research illustrated the positive significance of money supply and exchange rate on economic growth in Pakistan while interest rate shows negative rate of insignificance revealed that money supply shows that the monetary policy has appreciated effect on economic growth in the country. Exchange rate and inflation rate also impacting positively in economic growth in South Africa. (Agbonlahor, 2014) shows the positive influences of money supply on GDP growth in United Kingdom. (Bentum-Ennin, 2014) studied Africa economic growth and international reserve accumulation, indicated the direct correlation of foreign reserve with GDP development.

Apart from all these studies, there are several counter arguments about the effectiveness of the monetary policy are the identification of the old transmission mechanism of monetary policy is major and effective in a specific economic procedure without giving in-depth focus to the catalytic factors. Monetary policy is frequently being used to stabilize short-run changes in the economy. The monetary policy effectiveness in stabilizing short-run changes has long been the subject matter for many scholars. For the developed economies, the interest rate channel of monetary transmission is considered the most effective, whereas the bank-lending channel for developing economies (Egert et al., 2006).. It is argued that, the rapid economic growth creates the demand for credit. This consequently creates thrive for improvement in the financial sector. Aziakpono and Magdalene (2015) states that in order to make effective monetary policy, changes in monetary policy should be transmitted to other

interest rates and consequently the change would affect investment and consumption due to its larger magnitude. Kapetanios et al. (2012) estimate the large deviation of time-varying structural vector autoregression (SVAR) models on United Kingdom data and decides that purchased of assets by 200 billion pounds consequently increased inflation by 1.25 percent and real GDP by 1.5 percent. The related study done by Weale and Wieladek (2016) where they found out that the inflation was being effected three times more than the real GDP when assets were purchased. The main objective of monetary policy in Pakistan is to stabilize inflation. According to the state bank of Pakistan website it has been observed that during 1991 to 1997 the actual percentage of inflation was above the target mark. After 1997 till 2003 the actual percentage of inflation is down below the target position because it was under the monetary management control. It gradually started increasing from 2004 and remained at its peak till 2007 except 2006 where it is same as the target percentage. At the end of financial year 2008 actual inflation crossed over the target area of inflation set by the federal government (Egert et al., 2006).

Research Questions:

Following are the research questions,

1. What are the impacts of change in monetary policy on inflation?
2. What are the impacts of change in monetary policy on GDP growth?
3. What are the impacts of change in monetary policy on exchange rate?
4. What are the impacts of change in monetary policy on balance of payment?
5. What are the impacts of change in monetary policy on stock market?

Hypothesis

H1: There is a significant relationship between monetary policy and GDP growth.

H2: There is a significant relationship between monetary policy and Inflation rate.

H3: There is a significant relationship between monetary policy and Stock Market.

H4: There is a significant relationship between monetary policy and Balance of payment.

H5: There is a significant relationship between monetary policy and Exchange Rate

Research Framework

Table 1

Research Framework

DEPENDENT VARIABLES		INDEPENDENT VARIABLES	
MONETARY POLICY		• Inflation	Domestic View
		• Stock Market	
• Policy Rate	→	• Gross Domestic Product	
• Money Supply (M2)		• Balance of Payment	Foreign View
		• Exchange rate	

Research Methodology

This research applied quantitative analysis to test the relationship between the monetary policy and macroeconomic indicators in Pakistan. The research is an explanatory one where the data was answered in numeric or in percentage. Explanatory research is applied when a lot of data is already known. Thus, the data was collected from various authentic websites. The data of twenty-six years from 1974 till 2020 is selected including the Covid period. Yearly data extracted for analysis. The method used in the research is "Secondary" because all the data was extracted from the websites of the World Bank and State Bank of Pakistan. The research chose a retrospective study where the data is already available on the websites. The stock exchange data collected from the Karachi Stock

Exchange website. The unit root test attempted to find out the presence of lags in the collected data (Caner. and Hansen, 2001; Leon-Ledesma and McAdam, 2004; Camarero and Ordóñez, 2006; Ghosh and Dutt, 2008; Lin et al., 2008; Lee, 201). The co-integration was used first by Granger in 1981 to estimate the long-run relationships between economic variables (Johansen 1988). To establish the long-run relationship between monetary policy tools and other macroeconomic variables the Engle-granger co-integration test is applied (Babatunde Wasiu Adeoye, 2014). The multiple regression analysis model used to maintain the relationship between many monetary policy instruments and the GDP of the country (Akujuobi, Linus Eze, 2010). VECM was applicable to know the long-run relationship amongst all the variables of interest and its deviations in the short-run (Lorde et al, 2009). These all methods and calculations would help us to achieve the desired result. VAR model is used for data description, forecasting, and policy analysis. This research comprised of the relationship of the past data with the present, for this purpose VAR was used to relate current observations of a variable with the past and make these observations useful for future forecasting. Vector Autoregressive (VAR) model is a multi-variant time series model.

The statistical equation is as follows:

Policy rate = α + β1Stock market + β2GDP + β3Balance of payment + β4Inflation + β5Exchange rate + e

Discussion And Analysis

The data is based on two dependent variables: policy rate, broad money supply and five independent variables: Inflation, stock Market, Gross Domestic Product, Balance of Payment and Exchange rate. The data has been taken from the State bank website, IMF and World Bank website.

Table 2

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Inflation	26	.03	.20	.0819	.04216
BOP	26	10.27	8.93	9.62	9.74
GDP	26	-.94	7.55	3.8886	1.93495
Money Supply	26	4.31	42.91	15.0891	6.86723
KSE100	26	945.00	47807.00	15169.48	15426.17
Exchange Rate	26	30.83	160.08	79.17	34.95

The table 2, comprised of 26 years' data of dependent and independent variables. According to econometrics, descriptive statistics are the tool to measure the population structure of the data set. Inflation remains on an average of 0.0819 and standard deviation is at 0.04216 which is good and acceptable for an economy even in the unprecedented situation of Covid. The minimum value is less at 0.03 but the maximum value of 2.0 indicated that the inflation rises extremely high for the short time. BOP witnessed 8.93b USD on the highest side and 10.27b USD on the lowest side which is not the good sign; nevertheless, the mean value is at 9.62b USD, which is pretty impressive as we are having lowest side at 10.27b USD. GDP is the perfect variable to observe, as it is negative -0.94 at the minimum value and 7.55 at the maximum value. The mean is acceptable at 3.886 and also the deviation is not too much. There was steady growth in the GDP of the country. Money supply is showing too minimum value at 4.31 and maximum value at 42.91 and having mean of 15.08 and standard deviation of 6.87 which is not much fluctuation. KSE100 index depicts the minimum value at 945 and maximum value at 47807 and mean is 15169 and standard deviation is 15426 which are unpredictable. The KSE100 is showing unpredictable trend as the stock market is not reliable and safe for investment. The exchange rate is 30.83 with the minimum value and 160.08 at maximum value the mean is at 79.17 and standard deviation is at 34.95. The data is showing

huge deviation in the exchange rate, which shows that the Pak rupee is also affected by dollar changes. Inflation is one of the consistent variables that showed minimum deviation in the whole years. Country controlled inflation in a good manner and managed it properly.

Table 3

Correlations

		Inflation	BOP	GDP	Money Supply	KSE100	Exchange Rate
Inflation	Pearson Corr.	1	-.218	-.266	.014	-.140	-.016
	Sig. (2-tailed)		.150	.077	.927	.359	.914
	N	26	26	26	26	26	26
BOP	Pearson Corr.	-.218	1	.071	.177	.496**	-.463**
	Sig. (2-tailed)	.150		.641	.246	.001	.001
	N	26	26	26	26	26	26
GDP	Pearson Corr.	-.266	.071	1	.178	.490**	-.514**
	Sig. (2-tailed)	.077	.641		.242	.001	.000
	N	26	26	26	26	26	26
Money Supply	Pearson Corr.	.014	.177	.178	1	.105	-.198
	Sig. (2-tailed)	.927	.246	.242		.493	.192
	N	26	26	26	26	26	26
KSE100	Pearson Corr.	-.140	.496**	.490**	.105	1	-.859**
	Sig. (2-tailed)	.359	.001	.001	.493		.000
	N	26	26	26	26	26	26
Exchange Rate	Pearson Corr.	-.016	-.463**	-.514**	-.198	-.859**	1
	Sig. (2-tailed)	.914	.001	.000	.192	.000	
	N	26	26	26	26	26	26

***. Correlation is significant at the 0.01 level (2-tailed).*

In table 3, inflation shows positive correlation with money supply, as money supply increases inflation also increases and vice versa. Balance of Payment shows positive correlation with the GDP and Money supply. BOP has a strong correlation with GDP and Money Supply as the value is close to 1. Which indicates that the GDP and money supply are positively affecting the Balance of Payment. GDP is the annual country's production of goods and services, the table depicts the positive and starong correlation with BOP as the value is near 1. Money Supply is also positively correlated with the GDP and KSE100 and negative correlation with inflation and exchange rate. Money Supply, dependent variable is showing positive correlation with GDP, inflation, BOP, KSE100 but showing negative correlation with the Exchange rate.

Table 5

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.897a	.804	-.370	2.27694

a. Predictors: (Constant), Real Interest Rate, KSE100, BOP, Inflation, Exchange rate, GDP

Table 6

Anova

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	21.304	6	3.551	.685	.728b
	Residual	5.184	1	5.184		
	Total	26.489	7			

a. Dependent Variable: Money Supply
b. Predictors: (Constant), Real Interest Rate, KSE100, BOP, Inflation, Exchange rate, GDP

Table 7:

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	13.435	38.135		.352	.784
	Inflation	-3.425	59.906	-.051	-.057	.964
	BOP	1.901E-10	.000	.652	.375	.772
	GDP	-.489	3.689	-.613	-.133	.916
	KSE100	2.320E-5	.000	.082	.118	.925
	Exchange rate	.000	.236	.005	.002	.999
	Real Interest Rate	.316	1.124	.369	.281	.825

a. Dependent Variable: Money Supply

The findings are shown in the table 7, where relationship of each independent variable is measured with the dependent variable separately. Inflation: There is a significant relationship between Inflation and Money Supply. As shown in table the sig value is 0.964 which is greater than 0.05, means the hypothesis is rejected. BOP: There is a significant relationship between BOP and Money Supply here the value is 0.772 which is greater than 0.05, means the hypothesis is rejected. GDP: There is a significant relationship between GDP and Money Supply the value is 0.916. Which is greater than 0.05, means the hypothesis is rejected. KSE100: There is a significant relationship between KSE100 and Money Supply the value is 0.925. Which is greater than 0.05, means the hypothesis is rejected. GDP: There is a significant relationship between GDP and Money Supply the value is 0.916. Which is greater than 0.05, means the hypothesis is rejected. Exchange Rate: There is a significant relationship between Exchange Rate and Money Supply the value is 0.999. Which is greater than 0.05, means the hypothesis is rejected. Real Interest Rate: There is a significant relationship between Real Interest Rate and Money Supply the value is 0.825. Which is greater than 0.05, means the hypothesis is rejected

Validation of Model

Table 8:

Unit Root Test using Augmented Ducky - Fuller Test

Method	Statistic	Prob.**
ADF - Fisher Chi-square	25.9187	0.0110
ADF - Choi Z-stat	-0.92865	0.1765

Intermediate ADF test results UNTITLED

Series	Prob.	Lag	Max Lag	Obs
BOP	0.0403	1	5	25
ER	0.9984	0	5	26
GDP	0.0957	1	5	25
INF	0.1450	0	5	26
MS	0.0045	0	5	26
KSE100	0.9334	0	5	26

At level the unit root test of all variables is not less than 0.05, it means the data is non-stationery which is valid in order to calculate the time series analysis but we need data to be stationery in order to proceed further; we would try using 1st and 2nd difference

Intermediate ADF test results D(UNTITLED)

Series	Prob.	Lag	Max Lag	Obs
D(BOP)	0.0157	0	5	25
D(ER)	0.0095	0	5	25
D(GDP)	0.0020	0	5	25
D(INF)	0.0000	0	5	25
D(MS)	0.0000	1	5	24
D(KSE100)	0.0001	0	5	25

At 1st difference all the variables of the data have become less than 0.05, which shows that the data is stationery. It means all the variables are time dependent; we can easily apply time series analysis. As the data is showing stationery at changing lags then we apply Johansen co-integration test.

Johansen Co-Integration Test

Table 8

Test for Co-Integration

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.885574	162.0619	95.75366	0.0000
At most 1 *	0.802232	107.8662	69.81889	0.0000
At most 2 *	0.647483	67.34972	47.85613	0.0003
At most 3 *	0.593407	41.28335	29.79707	0.0016
At most 4 *	0.438785	18.78481	15.49471	0.0154
At most 5 *	0.159485	4.343510	3.841466	0.0371

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.885574	54.19572	40.07757	0.0007
At most 1 *	0.802232	40.51650	33.87687	0.0070
At most 2	0.647483	26.06638	27.58434	0.0772
At most 3 *	0.593407	22.49854	21.13162	0.0319
At most 4 *	0.438785	14.44130	14.26460	0.0469
At most 5 *	0.159485	4.343510	3.841466	0.0371

Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):

BOP	ER	GDP	INF	MS	KSE100
2.00E-10	0.005640	0.846048	29.23418	-0.212228	7.65E-06
8.99E-11	0.012622	0.861499	1.543301	0.066289	-1.08E-05
-2.43E-11	0.076328	0.084477	-0.213340	-0.000494	-7.63E-05
-5.10E-10	0.015641	0.140228	-16.14461	-0.134080	-0.000135
1.54E-10	-0.076967	-0.151460	26.31763	0.124403	0.000236
2.25E-10	-0.084859	-0.124571	-4.898065	-0.006987	0.000233

Unrestricted Adjustment Coefficients (alpha):

D(BOP)	4.15E+08	-8.29E+08	73313690	5.23E+08	-5.41E+08	-6.61E+08
D(ER)	-1.360494	0.180030	2.104236	2.551126	1.670167	0.923216
D(GDP)	-0.015963	-0.979829	0.201741	-0.671700	-0.224652	0.152692
D(INF)	-0.016484	0.023020	0.000611	0.003429	-0.000657	0.002742
D(MS)	5.951741	0.208744	0.538449	0.807408	-2.444025	0.846026
D(KSE100)	1363.702	79.02825	1100.989	-2469.003	-231.8112	418.9992

1

Cointegrating Equation(s): Log likelihood -904.9310

Normalized cointegrating coefficients (standard error in parentheses)

BOP	ER	GDP	INF	MS	KSE100
1.000000	0.000000	2.89E+09	1.79E+11	-1.52E+09	78269.81

		(7.2E+08)	(2.1E+10)	(1.7E+08)	(63624.9)
0.000000	1.000000	47.65570	-1152.677	16.05380	-0.001415
		(14.1129)	(409.925)	(3.41298)	(0.00124)

2

Cointegrating Equation(s): Log likelihood -891.8979

Normalized cointegrating coefficients (standard error in parentheses)

BOP	ER	GDP	INF	MS	KSE100
1.000000	0.000000	0.000000	2.55E+11	-2.57E+09	106144.7
			(4.1E+10)	(3.2E+08)	(130525.)
0.000000	1.000000	0.000000	107.7112	-1.223301	-0.000955
			(76.2831)	(0.60434)	(0.00024)
0.000000	0.000000	1.000000	-26.44778	0.362540	-9.64E-06
			(8.45827)	(0.06701)	(2.7E-05)

4 Cointegrating Equation(s): Log likelihood -880.6486

Normalized cointegrating coefficients (standard error in parentheses)

BOP	ER	GDP	INF	MS	KSE100
1.000000	0.000000	0.000000	0.000000	6.77E+08	249028.4
				(1.2E+08)	(45816.4)
0.000000	1.000000	0.000000	0.000000	0.143517	-0.000895
				(0.56474)	(0.00022)
0.000000	0.000000	1.000000	0.000000	0.026927	-2.44E-05
				(0.03366)	(1.3E-05)
0.000000	0.000000	0.000000	1.000000	-0.012690	-5.59E-07
				(0.00151)	(5.9E-07)

5 Cointegrating Equation(s): Log likelihood -873.4279

Normalized cointegrating coefficients (standard error in parentheses)

BOP	ER	GDP	INF	MS	KSE100
1.000000	0.000000	0.000000	0.000000	0.000000	-7447.531
					(63008.5)
0.000000	1.000000	0.000000	0.000000	0.000000	-0.000949
					(0.00020)
0.000000	0.000000	1.000000	0.000000	0.000000	-3.46E-05
					(1.2E-05)
0.000000	0.000000	0.000000	1.000000	0.000000	4.25E-06
					(9.9E-07)
0.000000	0.000000	0.000000	0.000000	1.000000	0.000379
					(8.1E-05)

Since the variables are co-integrated at atmost 2 hypothesized number of co-integration, then we need to apple VAR (Vector Autocorrelation model).

Hypothesis Testing:

Table 10

	BOP	ER	GDP	INF	MS	KSE100
BOP(-1)	0.701465	-8.32E-10	1.70E-11	2.64E-12	3.24E-10	6.52E-07
	(0.35002)	(7.8E-10)	(1.7E-10)	(2.9E-12)	(8.2E-10)	(4.9E-07)
	[2.00406]	[-1.06671]	[0.09780]	[0.90064]	[0.39743]	[1.32094]
BOP(-2)	-0.193810	-3.09E-10	2.29E-10	-5.10E-12	2.72E-10	7.29E-07
	(0.22453)	(5.0E-10)	(1.1E-10)	(1.9E-12)	(5.2E-10)	(3.2E-07)
	[-0.86318]	[-0.61749]	[2.05047]	[-2.71657]	[0.51994]	[2.30350]
ER(-1)	1.93E+08	0.643159	-0.078955	0.001422	-0.063893	552.8273
	(1.3E+08)	(0.29538)	(0.06590)	(0.00111)	(0.30896)	(186.845)
	[1.45848]	[2.17738]	[-1.19808]	[1.28198]	[-0.20680]	[2.95875]
ER(-2)	-89985870	0.345063	0.075723	-0.001307	0.270140	-445.3211
	(1.7E+08)	(0.37508)	(0.08368)	(0.00141)	(0.39232)	(237.258)
	[-0.53450]	[0.91997]	[0.90489]	[-0.92740]	[0.68856]	[-1.87695]
GDP(-1)	-3.96E+08	0.499188	0.457558	0.013096	1.752350	313.2379
	(5.1E+08)	(1.14398)	(0.25523)	(0.00430)	(1.19657)	(723.625)
	[-0.77055]	[0.43636]	[1.79276]	[3.04752]	[1.46448]	[0.43287]
GDP(-2)	2.76E+08	-1.327606	-0.377328	-0.006920	3.886429	742.6933
	(6.4E+08)	(1.42779)	(0.31855)	(0.00536)	(1.49343)	(903.154)
	[0.43120]	[-0.92983]	[-1.18454]	[-1.29022]	[2.60235]	[0.82233]
INF(-1)	1.17E+10	-42.21683	13.60570	0.582947	46.39638	-12511.51
	(2.7E+10)	(60.6887)	(13.5399)	(0.22798)	(63.4788)	(38388.8)
	[0.42972]	[-0.69563]	[1.00486]	[2.55704]	[0.73090]	[-0.32592]
INF(-2)	-2.03E+10	0.518745	-11.44345	-0.115507	46.30503	88077.95
	(2.6E+10)	(57.8437)	(12.9051)	(0.21729)	(60.5029)	(36589.2)
	[-0.78259]	[0.00897]	[-0.88674]	[-0.53158]	[0.76534]	[2.40721]
MS(-1)	-70364532	-0.114573	0.025395	0.000343	-0.324120	79.06523
	(1.0E+08)	(0.22430)	(0.05004)	(0.00084)	(0.23461)	(141.879)
	[-0.69892]	[-0.51082]	[0.50748]	[0.40748]	[-1.38155]	[0.55727]
MS(-2)	-2.06E+08	0.273470	-0.026012	0.004120	-0.343646	-58.65271
	(9.5E+07)	(0.21162)	(0.04721)	(0.00079)	(0.22134)	(133.858)
	[-2.16467]	[1.29229]	[-0.55096]	[5.18280]	[-1.55254]	[-0.43817]
KSE100(-1)	-333756.4	-0.000539	-3.18E-05	-7.85E-07	-0.000469	0.515613
	(161353.)	(0.00036)	(8.0E-05)	(1.4E-06)	(0.00038)	(0.22739)
	[-2.06849]	[-1.50010]	[-0.39654]	[-0.58137]	[-1.24823]	[2.26754]
KSE100(-2)	-12058.75	0.000630	0.000100	3.83E-07	-1.78E-05	0.591703
	(212051.)	(0.00047)	(0.00011)	(1.8E-06)	(0.00049)	(0.29884)
	[-0.05687]	[1.33448]	[0.95129]	[0.21561]	[-0.03595]	[1.98002]

C	-51958436	6.763812	4.209219	-0.069212	-10.77618	-14626.99
	(4.6E+09)	(10.1849)	(2.27228)	(0.03826)	(10.6531)	(6442.47)
	[-0.01137]	[0.66410]	[1.85242]	[-1.80901]	[-1.01155]	[-2.27040]
R-squared	0.903255	0.985982	0.803547	0.875117	0.659535	0.973788
Adj. R-squared	0.806511	0.971963	0.607093	0.750235	0.319071	0.947576
Sum sq. resids	7.64E+19	379.4223	18.88586	0.005354	415.1106	1.52E+08
S.E. equation	2.52E+09	5.623035	1.254521	0.021123	5.881543	3556.868
F-statistic	9.336496	70.33542	4.090268	7.007522	1.937163	37.15066
Log likelihood	-567.5258	-69.47064	-31.96769	70.13602	-70.59433	-230.7147
Akaike AIC	46.44207	6.597651	3.597415	-4.570882	6.687546	19.49718
Schwarz SC	47.07588	7.231467	4.231230	-3.937066	7.321362	20.13099
Mean dependent	-4.26E+09	82.90303	3.851718	0.078804	15.04901	16251.48
S.D. dependent	5.74E+09	33.58215	2.001396	0.042266	7.127550	15534.73

The VAR value indicates that the BOP has positive relationship with money supply (dependent variable), it means the BOP increases, the money supply also increases and vise versa. The Exchange rate has negative relationship with money supply in last year but positive relationship with money supply in the last 2 years. GDP on the other side has the positive relationship with money supply in both years. Inflation has positive relationship with money supply in both years. KSE100 has negative relationship with the money supply in both last years. From the data the research can conclude that the BOP is significant in relation with money supply at 2nd time lag because it has positive value 0.91587. Exchange rate is positively related with money supply at first year lag, which means there a statistical relationship of exchange rate with the money supply. The table also depicts the relationship between the money supply and the GDP, GDP has a negative relationship with the money supply at both the time lags, which means when money supply increases, GDP decreases and vice versa. Money supply and inflation has the positive relationship at 1st lag. Money supply and KSE have negative relationship at both time lags.

Limitations

The study carries some limitation due to availability of data and research methodology and sampling design. The data was taken from the websites such like World

Bank and KSE 100. The research is based on some statistical tests such as (Descriptive Statistics, Regression Analysis, Correlation, VAR, Unit Root, Engle Granger, Co-integration). These tests helped to analyze how monetary policy create impact on GDP growth and how it creates changes if monetary policy create impact on balance of payment and stock market.

Recommendations & Implications

Consider improvements to existing monetary policy tools or frameworks based on the identified relationships between monetary policy and macroeconomic indicators; Explore the potential benefits of adopting unconventional monetary policy measures or forward-looking policy approaches in the context of the emerging economy. Also, emphasize the importance of clear and transparent communication by the central bank regarding its monetary policy decisions and objectives. Encourage central banks to provide timely and accurate information to market participants and the public, fostering greater understanding and trust in monetary policy decisions. Furthermore, encourage policymakers to monitor and assess the impact of monetary policy on key financial indicators, such as credit growth, asset prices, and systemic risk. Also, consider the potential impact of monetary policy on long-term economic stability, such as inflation targeting regimes, exchange rate regimes, or financial market development.

Conclusion and Recommendation

The study includes some variables that are directly linked with Monetary Policy and their Macroeconomics Indicators including (Policy Rate, Money Supply, Inflation, Stock Market, GDP, Balance of Payment and Exchange Rate) and it tries to find how comparative effectiveness of monetary policy works on economy. The monetary policy tries to realize the country's economic prosperity in addition to balance of payment by the help of money supply. The main objective of this research is to find how monetary policy is maintaining and controlling the inflation and also maintaining long-term interest rates. All the independent

variables have significant impact with money supply and GDP with the highest. In addition, monetary policy also creates impact on financial income and households. Further the study also highlights the impact of inflation during Covid-19 and what are the reasons behind high inflation rate.

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