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An Effect of Money Supply on Economic Growth: Evidence from Pakistan

Roeela Kausar [1] Muhammad Kamran Bhatti [2] Shehreen Gull [3]

1. Lecturer, Department of Economics, National College of Business Administration and Economics, Lahore, Pakistan. Corresponding Author (roeela_kausar@yahoo.com)
2. MPhil. Economics Scholar, National College of Business Administration and Economics, Lahore, Pakistan (thekamranbhatti@outlook.com)
3. MPhil. Economics Scholar, National College of Business Administration and Economics, Lahore, Pakistan (shereeull@gmail.com)

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Corresponding Author's email:
roeela_kausar@yahoo.com

ABSTRACT

Abstract: This paper focuses on effects of money supply on GDP of Pakistan. The macro variables comprise of GDP and money supply were tested by using secondary data, covering forty six yearly period from 1972 to 2018. The current study applied unit root test to test stationary of the given data. The Auto Regressive Distribution Lag (ARDL) approach was conducted to see the link between long run and short run relationship as a speed of adjustment to the long run equilibrium. The finding showed that money supply (MS), capital investment (CI), labour force (LF) and Gross Domestic product (GDP) were stationary with I(1) level and inflation (INF) was stationary with I(0) level. Positive effect on GDP has been observed in case of Pakistan. The finding suggests that policy makers should take into consideration the different monetary policy tools to control the excess money supply and to get the economic stability.

1. Introduction

Every nation on the face of earth dreams of economic development and passes on the impact economic development to achieve economic growth. Gross domestic product of a country gives a measure of economic development. If the country's GDP is in better condition and going to increase it means economic growth is increase. GDP of an economy is determined by many elements, inclusive of but not limited to money supply. The economy of a country is influenced by pivotal role of money supply. Either it is economy of a meagre and developing country or contrarily a giant and developed country; it is somehow impacted by supply of money. The impact may be in each case positive or negative. If the money supply changes and implemented effectively that the prices of goods and services can be control

There is lack of consensus among economists about money supply and economic growth as some economists firmly believe that money supply effect on GDP while the others believe that variations of money supply quantity is a significant factor of GDP. The connotation of balance of connection between supply of money and GDP will reflect on, how effective the monetary policy is, following the traditional IS-LM model. This link between supply of money and income, was

attempted to be explained by Friedman and Schwartz (1963), and future works by Friedman, (1968), which attempted to provide a theoretical and empirical evidences. Therefore, it can be said at ease that money has an active and pivotal role in generating income and changes in money stock bring changes in income.

Some researcher evidence found for developing and non-developing countries including Pakistan. According to Precious & Palesa, (2014), money policy along with its balancing role, are considered to have been important for the betterment of an economy. Opposite to it, there is no effect of monetary policy on GDP in South. According to Ahmad et al, (2016), GDP of Pakistan was positively affected by supply of money and exchange rate. Hameed (2010) defines monetary policy which is formulated and implemented by regulatory authorities, government and state bank of Pakistan to control inflation rate, money supply, interest rate and availability of money using different monetary channels and mechanisms for achieving a specific set of objectives which strengthen, stabilize and assist in economic growth.

The present study is designed to explore the money supply effect on GDP of Pakistan. For exploring this link between GDP which is dependent variable and independent variables including money supply, interest rate, inflation, capital investment and labour force. The present study used annual time series data spanning over the period of 1972 to 2018. This paper was tested with ADF test, ARDL approach and Bound test approach. The results establish that supply of money have positive and significant effect on GDP in Pakistan.

The present study explores the changes in the supply of money and how these changes have an effect on GDP of Pakistan. As far as Pakistan is concerned, inflation is the product of excess in supply of money. The topic under the study emphasizes on the direct link between supply of money and inflation. This policy shows its effects one way or the other irrespective of it being tight or a lose one. Overall growth takes impacts from other monetary phenomenon. Consequently, this research project will also determine how a variation in money supply, inflation rate and the interest rate will have an impression on GDP of Pakistan.

This study analyses the money supply and how it has an effect on GDP of Pakistan. Using this study, we easily examine how effective monetary policy improves the GDP of Pakistan. Examining the effect of money supply on GDP of Pakistan in the long time period and short time period makes it significant. Macro-economic indicators such as money supply, rate of inflation, capital investment and labour force are used in this study for aforementioned purpose.

2. Review of Literature

Omodero (2019), was interrogated the effect of money supply on GDP of Nigeria & Ghana. The data was used from 2009-2018 and methodology used in aforementioned study was OLS Regression Technique to examine the data. The findings differed in both the countries under study as the money supply had negative and insignificant effect on real GDP of Nigeria but effect on Ghana was opposite to Nigeria. Exactly same were the results for broad money (M3). Courtesy Private Sectors, there was insignificant and positive effect on Real GDP in both Nigeria and Ghana.

Aslam and Awan (2018) examined the effect of monetary policy of Pakistan on Pakistan's GDP. The time series data comprising of 31 years between 1972 and 2013 was utilized for their

study. For finding the relationship between macro-variables correlation technique was used and multiple regression technique was used to find results of data. Different macro-variables used in the study included real GDP as DV and IV included in the study were gross capital formation, foreign direct investments, employed labour force, broad money, exports and GDP deflator. They analysed and presented the link between Pakistan's monetary policy and macro-variables in the long term. The result reflected that this entire set of variables i.e money supply, employment, inflation rate, foreign direct investments, saving and other macro variables were expressively affected by monetary policy.

Ayodeji and Oluwole (2018) studied the effect of Nigerian monetary policy on Nigerian GDP. The time series data for the duration between 1981 and 2016 was used for the study. Different methodologies including ADF, VECM, ADF, Johansen Co-Integration test and Engle-Granger Co-Integration test were used in this paper. This paper was conducted on indicators such as exchange rate, rate of interest, supply of money, and liquidity ratio. The results of the study concluded to a positive and inconsequent effect of exchange rate (ER) and supply of money (MS) on GDP of Nigeria. On the other hand, GDP of Nigeria receives negative and consequent effect from interest rate (IR) and liquidity ratio (LR). The link between monetary policy and GDP of Nigeria exists in the long term.

Galadima and Ngada (2017) studied the supply of money effect on GDP of Nigeria using time series data for the period between1981 to 2015. The data was tested using different methodologies including VECM, Pair wise Granger causality test and Johansen Co-Integration approach. The found results showed that Nigerian GDP was affected positively and significantly by money supply but real rate of interest was concluded to have negative and significant impact on economic growth of Nigeria. Besides, the supply of money lagged value affected negatively and significantly but lagged value of real exchange rate had negative and significant while the lagged value of GDP and lagged value of RER have not any significant effect on the GDP of Nigeria in short run. Bi-directional causality was detected between gross domestic product and money supply when causality test was used. Unidirectional causality was detected from real foreign exchange rate to supply of money and rate of interest to supply of money. No causality was found among real rate of interest and GDP, rate of interest and GDP and rate of interest and real rate of interest.

Nyorekwa, and Odhiambo (2017) analysed the effect of monetary policy on Tanzania's GDP. For the study, time series data was used from 1975 to 2012. Autoregressive Distribution Lag model along with Bound-testing approach was used for the study. MS and IR were used as independent variables. The findings concluded a r/p between GDP and monetary policy when interest rate is used in the short run while in the long run no link found between monetary policy and GDP of Tanzania. While using money supply, there is negative link between monetary policy and GDP.

Ahmad et al (2016) examined the effect of monetary policy on GDP of Pakistan. The time series data observed from 1973 to 2012 was collected for this purpose. Autoregressive Distributive Lag (ARDL) model was used in the study. Different economic variables including GDP, MS, INF, IR and ER were used and were tested for long run and short run link. Positive supply of money and exchange rate effect on GDP of Pakistan was found in the study, whereas inflation had

positive and inconsequent effect on GDP of Pakistan. The rate of interest had negative effect on GDP of Pakistan.

Ayub and Shah (2015) studied the effect of monetary policy of Pakistan on economic growth of Pakistan. For the study purpose, time series data taken for the years 2005-2013. The relationship between the variables was identified using regression and correlation. The results indicated that the rate of interest, supply of money and inflation have strong effect on GDP of Pakistan. The study also revealed many unexplained factors which affect GDP.

Lut and Moolio (2015) explored the effect of monetary policy on Cambodian GDP. Quarterly based time series data was used for the period from 2000 to 2012. The supply of money and rate of interest effect on GDP of Cambodia was analysed using multiple regression model. The findings of the study represent positive but meagre supply of money effect on GDP of Cambodia and interest rate didn't have any impact on GDP of Cambodia.

3. Methodological Issues

To find the link between GDP and different Macroeconomic indicators (like money supply, rate of inflation, capital investment and labor force) in Pakistan, the present study involved annual and secondary, time series data from the time span of 1972 to 2018. It was taken from various sources as WDI, SBP, Pakistan Bureau of Statistics (PBS) and multiple Economic surveys of Pakistan. Transparency of data sources in present study is that data is obtained from those sources which are generally accepted or worldwide approved.

Model Specification

To interrogate the supply of money effect on GDP of Pakistan, the model can be written as:

GDP = f (MS, INF, CI, LF)

The econometric model can also be written as:

$$GDP = \beta_0 + \beta_1 MS + \beta_2 INF + \beta_3 CI + \beta_4 LF + \mu i$$

Here,

GDP = Gross Domestic Product

MS = Supply of Money

INF = Rate of Inflation

CI = Capital Investment

LF = Labour Force

μ_i = Disturbance Term

β_0 = Intercept

$\beta_1, \beta_2, \beta_3, \beta_4$ =Slope of Coefficients

The general equation of ARDL can be shown as:

$$\Delta(LGDP) = a_0 + \sum_{i=1}^{A} \alpha 1i\Delta(GDP)_{t-i} + \sum_{i=1}^{B} \alpha 2i\Delta(MS)_{t-i} + \sum_{i=0}^{c} \alpha 3i\Delta(INF)_{t-i} + \sum_{i=0}^{D} \alpha 4i\Delta(CI)_{t-i} + \sum_{i=0}^{E} \alpha 5i\Delta(LF)_{t-i} + \alpha 6(LGDP)_{t-1} + \alpha 7(MS)_{t-1} + \alpha 8(INF)_{t-1} + \alpha 9(CI)_{t-1} + \alpha 10(LF)_{t-1} + \mu i$$

The mentioned equation represents the general equation of ARDL:

Where,

α_o = Intercept

$\alpha 1, \alpha 2, \alpha 3, \alpha 4, \alpha 5$ = Short run co-efficient of variables

$\alpha 6, \alpha 7, \alpha 8, \alpha 9, \alpha 10$ = Long run co-efficient of variables

μ_i = Distrubance term

We are making null and alternative hypothesis to establish long run link between variables.

Null Hypothesis

$H_0 = \alpha 6 = \alpha 7 = \alpha 8 = \alpha 9 = \alpha 10 = 0$

(Long run r/p between variables does not exist)

Alternative Hypothesis

$H_1 = \alpha 6 \neq \alpha 7 \neq \alpha 8 \neq \alpha 9 \neq \alpha 10 \neq 0$

(Long run r/p between variables exists)

4. Data Analysis, Empirical Results and Interpretation

In this section, we examine estimation of various tests. Table 4.1 shows estimated descriptive statistics. ADF test estimation elaborated in Table 4.2. While estimation of ARDL Bound Testing F-statistics mentioned in Table 4.3. Table 4 points out the results of long time period co-integration and short-short time period co-integration estimation evaluated in Table 4.4 and 4.5.

Table 4.1

Descriptive Statistics

	LGDP	MS	INF	CI	LF
Mean	10.96314	37618.68	9.844681	15568.30	40.670099
Median	11.01264	24641.43	8.600000	10720.00	34.89044
Max	12.62791	14490.80	25.40000	50070.00	73.91702
Min	8.752247	2541.359	2.500000	820.0000	19.61000
Std. Dev	1.035202	37732.46	5.771361	13856.43	16.08231
Skewness	-0.114047	1.357852	1.246863	1.052328	0.579579
Kurtosis	2.225615	3.918959	3.940591	2.920395	2.093089

The Descriptive Statistics of selected indicators is given in Table 4.1. The first row shows the average of Log of GDP is (10.96314) respectively, in percentage. The mean value of MS, INF, CI and LF is (37618.68), (9.844681), (15568.30) and (40.670099) respectively in percentage.

Here we see that LGDP is negatively skewed. All independent indicators like MS, INF, CI and LF are positively skewed.

In statistics, kurtosis is used to measure flatness of data set relative to Normal distribution. Kurtosis general value is 3. If the value found greater than 3, this situation referred as Leptokurtic. If the value found less than 3, this situation referred as Platykurtic.

In the Descriptive Statistics LGDP, CI and LF value is less than 3, it means platykurtic and rest of indicators MS and INF are Leptokurtic.

Table 4.2

Results of ADF

Indicators	Level		1st Difference		
	Intercept	**Trend & Intercept**	**Intercept**	**Trend & Intercept**	
LGDP	- - - - - - -	- - - - - - - - -	-9.032844 (0.0000)	- - - - - - - -	I(1)
MS	- - - - - - -	- - - - - - - - -	- - - - - - -	-3.888497 0.0207	I(1)
INF	- - - - - - -	-4.922577 0.0012	- - - - - - -	- - - - - - - -	I(0)
CI	- - - - - - -	- - - - - - - - -	-5.249977 (0.0001)	- - - - - - - -	I(1)
LF	- - - - - - -	- - - - - - - - -	- - - - - - -	-6.558288 (0.0000)	I(1)

All above finding shows that all indicators are not stationary at same level. It is observed that GDP, MS, CI and LF are stationary at first difference and INF is stationary at level. According to ADF test, the ARDL technique will be applied to check the co-integration link. So, in our analysis, ARDL technique can be used to measure complex nature of indicators

Table 4.3

Bound Test

Lag	**F-statistics value**	
ARDL (1, 2, 4, 2, 0)	**12.62600**	
Significant	**Critical Values**	
Level	**Lower Bound**	**Upper Bound**
1 %	3.74	5.06
5 %	2.86	4.01
10 %	2.45	3.52

The table shows F-statistics was formulated by Pesaran et al. (2001), they formulate two critical bound values, upper bound value and lower bound value. There will be long time period exists or the existence of co-integration in indicators, the f-statistics value is greater than upper bound value its mean that long time period exists.

Table 4.4

ARDL Model Long-run Results

Indicators	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
MS	0.000039	0.000011	3.422173	0.0019
INF	0.044764	0.023599	1.896834	0.0678
CI	0.000068	0.000029	2.352570	0.0256
LF	0.055470	0.009667	5.737831	0.0000
C	8.719841	0.251564	34.662474	0.0000

In this table, the value of coefficient of money supply (MS) shows the positive and significant link with the dependent indicators (GDP). The empirical finding shows that one-unit increase in Money Supply will (0.000039%) unit increase in GDP. Omodero, (2019), Aslam and Awan, (2018), Ayodeji and Oluwole, (2018), Nyorekwa and Odhiambo, (2017), Ahmad el al, (2016), Ayub and Shah, (2015), Lut and Moolio, (2015), Precious and Palesa, (2014), Onyeiwu, (2012), Waliullah and Rabbi, (2011), Nouri and Samimi, (2011) and Hameed, (2010) also support our study. Study also shows the positive and significant link with GDP in long time period.

Inflation Rate is insignificance with the GDP. Ahmad et al, (2016), Ayyoub et al, (2011) and Hussain & Malik, (2011) are also support our study. Study also shows the positive and insignificant link with GDP in long time period.

The value of coefficient of Capital Investment (CI) is also shows positive and significant link with the dependent indicator GDP. If one-unit increase in capital investment, it will have (0.000068%)

increase in economic growth. Our study also supports the findings of Akinola & Adeleke, (2013) and Fatemah & Qayyum, (2018) that shows the positive effect of Capital Investment on the GDP.

The value of coefficient of Labour Force (LF) is also shows the positive and significant link with the DV (GDP). The results show that, if one-unit increase in labour force, it will bring (0.055470%) increase in GDP. This study hardly supports the findings of Jameel & Naeem, (2016) and Fatemah & Qayyum, (2018) that shows the positive and significant impact of Labour Force (LF) on GDP.

Table 4.5

ECM Results

Indicators	**Coefficient**	**St. Error**	**T-Ratio**	**Prob.**
d(MS)	0.000008	0.000003	2.720116	[0.0109]
d(MS(-1))	0.000015	0.000005	3.195292	[0.0034]
d(INF)	0.008492	0.001355	6.268634	[0.0000]
d(INF)	0.000892	0.001089	0.819046	[0.4194]
d(INF)	0.001891	0.001158	1.633199	[0.1132]
d(INF)	-0.001724	0.001069	-1.613268	[0.1175]
d(CI)	0.000007	0.000006	1.260937	[0.2174]
d(CI(-1))	-0.000011	0.000005	-2.132216	[0.0416]
d(LF)	0.009111	0.003064	2.973860	[0.0059]
Ecm(-1)	-0.164243	0.041278	-3.978963	[0.0004]

R-squared	0.999	F-statistics	2292.7
Adjusted R-squared	0.998	Schwarz criterion	-3.178
Akaike info criterion	-3.628	Durbin-Watson stat	2.168

The term ECM (-1) shows the speed of adjustment of the estimated mode which is significant (statistically) and it has negative sign. The coefficient of ECM (-1) shows that almost 16 % error will have corrected from short time period to long time period equilibrium per year. The findings show that all indicators are significant except CI in short time period.

5. Conclusion and Suggestions

The intent of the present paper is to explore the supply of money effect on GDP in Pakistan. The present study uses the data for time period of 1972 to 2018. The present study reviews various literatures which are related to supply of money and GDP. Through the previous literature reviews, the study investigated the positive link between supply of money and GDP. Firstly, we find the result of descriptive statistics. In the next step, the findings of ADF test shows that all indicators are stationary at level and 1st difference. The present study also applies Bound Test and ARDL technique to co-integration and to find the long time period and short time period link between dependent indicators and independent indicators. In long time period and short time period findings money

supply, capital investment and labour force changes put positive and significant impression on GDP of Pakistan and inflation has insignificant impression on GDP.

Monetary policy plays vital role in the economic development of Pakistan. Govt. of Pakistan and policy makers should make suitable policy. Most of the time, the Pakistan is facing the problem of excess money supply. So, the policy makers should take into consideration the different monetary policy tools like bank rate, open market operation to control the excess money supply and to get the economic stability. Labour Force (LF) has been added in the current research. In the next research, it is suggested that separate effect of male and female Labour Force (LF) can be observed. Government should make policies such as Government Expenditure on Investment and on the productive sectors to boost up economic growth and encourage FDI to boost DI. Policy makers should control the interest rate and providing loan on less markup for the investors.

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