

## THE ROLE OF EXCHANGE RATE AND MONETARY POLICY IN SHAPING PAKISTAN'S ECONOMIC GROWTH AND INFLATION

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### Abstract

*Higher inflation or a state of a sustained general rise in prices is described by economists as inflation and is a monetary phenomenon as it can be explained clearly in terms of relationship in money supply. It is demonstrated in existing literature that there is means through which money growth continues to have a causal effect on inflation in the context of the different exchange rate regime and stability of the money supply function across various countries and periods. However, there is a trend in the literature of using monocycle as less important variable in monetary policy for maintaining price stability, particularly under IT regime. Since 1972, with the start of inflation targeting regime in Pakistan, such autonomy is as a policy which does not admit a link between money growth and inflation and with GDP. It is theoretically and in the practice of the best monetary policy for stabilizing price level that the idea that money does not matter with regard to inflation and GDP seems odd. This paper employs the data spanning the 1972-2022 fiscal year. In order to test this for Pakistan, this paper employs the auto regressive distributed lag (ARDL) counteraction technique to know whether money supply, exchange rate, domestic investment, labor force and government expenditure can or not maintain its long-run relationship with money supply. The empirical results have also supported the theoretical money supply hypothesis of the long-run relationship between the exchange rate, Government expenditure, and domestic investment exchange rate for Pakistan. The result of the error-correction model supports the long run integrates among these variables; it further supports that, money supply growth causes inflation and GDP in the short run. By building on the theoretical propositions stemming from theoretical framework and empirical premises, the paper surmise that in relation to the form of monetary policy for price stability, the monetary aggregate and its growth rate still counts in terms of inflation and GDP.*

**Keywords:** GDP, Cointegration, Inflation, ARDL, Monetary Policy

### INTRODUCTION

It is also fair to bring this into the notice that while money supply does not create economic growth, inflation does. According to Krugman's piece, money in the economies is one of the most significant drivers of inflation. The reason can be deduced from different econometric model and estimates in the process of preparing the paper that the country's inflation rate directly affects growth rates. The inflation in general was another bad effect to the growth of the financial industry because it also contributed to people becoming poorer. When consumers and business people make use of their decision by selling the products and services they demand of, then the price of the products or service that the products and the services provide should be stable (Arshad et al., 2016). Although the phenomenon is still being investigated, it is still being regarded as a modern day phenomenon. Thus, a nation's income per head is not going to grow at such an equal rate and poverty levels will rise resulting into stunted crime, health, education and eventually underwent development. The sociopolitical instability outcome is explained using the causes of GDP development (Khan, 2021).

In his work Ali, et al, (2020), there is an improvement in inspection that inflation is directly on growth. At low investment, it reduces the growth rate of the economy. Furthermore, Aman et al., (2017) also disclosed that empirically it has a negative impact on growth and development of an economy. This study also investigated the relationship between the two variables in the same way as Mallik and Raza' et al. (2017) found; which shows a positive correlation. According to Aslam & Awan (2018), the rate of return can be related to inflation and the economy development in the same quantity or in opposite quantity. When returns start to fall, there is a direct relationship between inflation, growth on the economy and rates of return. Mahmood, et al. (2017) carried out further research on the study.

As a result, economic growth has received much attention among scholars and academic, which means exchange rate is believed to be very influential in economic growth (Iqbal et al., 2022). Foreign exchange rate classifies the way a country ranks in the global economy as well as helps maintain the country's stability. This refers to under or over valuation of domestic yielding or money performance of their economies. It reveals position in where it is in the relation to other currencies (Vorlak, et al., 2019).

Since Bretton Woods collapse, exchange rates have been very influential but highly unstable. They have long attracted researchers' attention because of their universal significance and impact on economic growth, productivity, exports, imports, investments (Irshad, et al., 2022; Jamil, et al., 2023). Several researches have been attempted to try and predict what the outcome will be of a stable or an unstable exchange rate. It led to an increase in exports, foreign investment, and better trade balance of the country (Hussain, et al., 2019; Ahmad, et al., 2022). Increase in trade deficit, inflation, and decreased investment occur due to the fluctuations or volatility in the exchange rates. The previous studies about which indicators determine exchange rate disparity are based on distinctions in theories. In this case, an increase in the foreign exchange reserves means an expansion; according to BALASSA (1964); the home currency is strengthened. For the country to qualify or be described as a prosperous country there is a need to improve on the home production and at the same time expand the economy. In this respect, the nation is on the right track in a bid to achieve the expected revenues as production rise shows. Thus, the increase in the demand of currency brings about the increase in income as did the appreciation of currency. From the view base to literature review, it is seen that open value can be explaining growth in the same respect of explaining exchange rates. For instance, the trade openness has been found to affect the exchange rate of the country in question adversely and also beneficially (Drine & Rault, 2006; Hau, 2002; Lartey et al., 2008; Xiaopu, 2002). This gave a rationale for a comparatively smaller contribution of exports than imports (Hsieh 1982) with negative sign on the trade openness to import. This lead to a depreciation of the domestic currency as well as an increase in the demand for the foreign currency (MacDonald & Ricci, 2005).

### **Monetary Policy as a Tool for Economic Growth**

The buyers' monetary authorities will fully intervene and regulate the price of the volume and the frequency of the money credit (Ahmad, 2022). It involves either pumping into the economy or withdrawing money from the economy or the monetary policy undertaken with the view of controlling the supply of money to the economy via the interest rates. As a result, international communities have fronted the steering of the economy through the usage of the monetary policy to supply the economy with economic development. Saying this it should be noted that Adam Smith was the first who defined this relationship then it has been done for aggregates and finally in the theory of monetary economics.

This rate is actually defined as the extent to which the products and services within a certain country are produced at a specific time. Based on this fact, there is no doubt that this means that a nation has achieved economic development where the real per capita income is greater than the previous period. These must be the production of goods and/or services at various time intervals in an economy in progress and reflects the ability of the economy in terms of production and is therefore regarded as a developing one. In general, economic growth entails a rise in the average living standard and a decrease in income distribution disparities (Arshad & Ali, 2016).

This is so because the topic is very general and hence there is little information which has been written on how money supply impacts on the GDP per capita of the South Africa economy. To the best of knowledge most of the available research undertaken on this topic has been conducted in other countries. However, it is equally pertinent to come to a conclusion regarding the effects of their money supply In South Africa based on the discussion made by Ijaz, (2021) before as an introduction to how it can shape the poles of economic growth and policies.

### **1.1.Overview of monetary policy in Pakistan**

Inflation was not a concern for policy makers and performance during the most of the period of Pakistan's history was OK. The country has a moderate inflation, which is not so high apart from the mid-seventies and the recent one. However, an important characteristic of the SBP's policies was the fact that they were made on the assumption that there is a direct correspondence between money growth and growth of aggregate demand. There was no doctrine as to how much money could be safely created, for there was only the doctrine of what are the safe limits of issuing it. Recently, the trend of fiscal policy has been proportionate to GDP and inflation rate of the economy, which has also influenced the SBP to take a certain position. In the case of monetary policy it goes without saying that it has never been an issue in Pakistan which explains why this factor has not been the center of attention for the experts. The reform of agricultural system in India began in mid-1990s with IMF helping. Measures like independence of central bank, liberalisation of trade as elements of restructuring of the economy were included. In this context, the role of monetary policy was also increasing because it was itself. In 2008, Pakistan was very actively using the reserve requirement in pursuit of the objective of macroeconomic stability. This cost was implicit in the bank's income; since the public sector was being funded at a rate below the market rate of interest. Meo et al. (2018) state, monetary policy contraction reduces the inflation and the total demand in an economy. Regarding the asset price channel, they support the exchange rate channel. Scholars then preferred the use of the interest rate as a transmission mechanism.

Other authors, including Ellahi (2017) and Hayat et al., (2021) continued to study further on where they found a very small relationship between money supply and interest rate. However, some people still think that the exchange rate channel is more effective to achieve price stability, because there are not enough reserves to meet the imports that are highly imported in energy matters. Results obtained by Hamid & Mir (2017) confirmed that domestic pricing was linked to exchange rate. Also contrary to Karahan (2020) the data above Kumar et al. (2019) investigated of the influence of monetary policy of Pakistan on sectoral output.

### **1.2.OBJECTIVES OF THE STUDY: -**

The goals of this study are as follows.

1. It is aimed to monitor the effect of the money supply on inflation of Pakistan
2. An attempt to find out how the allocation of Govt expenditure is influencing the inflation of Pakistan.

3. To analyze the impact of exchange rate on the inflation of Pakistan.
4. For discovering the effect of Labor Force on the economic growth of Pakistan.
5. It is used to investigate the effect of domestic investment on economic growth of Pakistan.
6. Due to which the impact of money supply on economic growth of Pakistan was observed.
7. This research is done to view the impact of exchange rate on the economic growth of Pakistan.

#### 1.4. RESEARCH QUESTIONS:

2. In what way does increase in money supply impact inflation of Pakistan?
3. What is the impact of Govt. Expenditure on Pakistan's inflation?
4. As for effecting exchange rate on inflation of Pakistan?
5. How does labor force influence in Pakistan's economic growth?
6. What is the causal relationship between domestic investment and economic growth of Pakistan?
7. How the money supply affects the economic growth of Pakistan?
8. What is the effect of exchange rate on economic growth of Pakistan?

#### LITERATURE REVIEW

Therefore, the purpose of the given paper is to reconsider the other aspects of the correlation between the wide money supply ( $m_3$ ) and dynamic variations made during the 1980-2016 period. This paper also examines the topic of the GDP per capita in particular as it relates to South Africa. In a bid to perform the study, the authors adopted the autoregressive distributed lag bounds testing method. As for the effects of  $m_3$  on GDP per person, the cointegration as well as the Error correction model was used in this work. This research also revealed that money supply in the long and short run meets the test for stationarity and co integration, where the coefficients estimated were statistically significant on economic plosion (Dingela & Khobai, 2017).

The objective of this paper is to evaluate how money and fiscal policy has impacted the development of the African continent between the years 1995 to 2016 using St. Louis equation and general method of moments (GMM). It is thus revealing a very large negative sign for the interest rates while asserting equally a very large positive relationship with the money supply on the GDP per capita. Accordingly, Keynesian advocates of good macro-monetary management - as well as monetarists - will agree to the fact that money supply, interest rate, public expenditures and taxation can influence output. Beside, from the analysis it has been concluded that the government spending and taxation as a policy tool less or more effectiveness compared to monetary policy and interest rate (Evans, et al., 2018).

Chude and Chude, (2016) have found out that money supply branched to the GDP in this study therefore, the ordinary least square (OLS) has been employed to find the relationship between money supply and economic growth in Nigeria whose time cover is from 1987 to 2010 supply by the central bank of Nigeria. To support the previous findings, other causally deployed quantitatively included; ADF, KPSS, VAR Granger causality and co-integration. That is why it can be concluded that there is a very strong and positive correlation between on one hand, and money supply on the other hand in the Nigerian economy. Hence, this has good potential as far as output and prices in relative to the money supply ( $M_2$ ) are concerned.

Net domestic credit and interest rate spread is also used as an alternative threshold variable to divide the sample period into ease and tight credit regime in Pakistan between 2001m12 to 2018m5. In respect to the recent research on the incidence of increase in broad money is considered to exhibit a favorable and a volume effect on the process of production in time within the time



period of one to two years spanning the period under discussion, if the interest rate spread is above the threshold values. Yet counter intuitively, though in an easy money regime, an increase in reverse repo rates serves to keep inflation for a longer period of time yet a decrease in reverse repo rates positively affect production growth in the short run (Shaheen, 2020).

The economists and scholars have used different theories and methodologies to determine foreign exchange rates. Each model alone would not be the perfect parameter to forecast on How this fiat would be in all scenario, but they all in all are good in the sense that they help and minimize on this volatility by explaining the qualitative factors that the forex is affected with various scenario. One area of literature studied widely is the one that has to do with trade and exchange rates (Zahra et al., 2023).

The Applied cointegration Diagnostic Tests to investigate the currency rate from Pakistan for the period 1960 and 1994 were performed by degong et al.(2020). Based on the theoretical conclusion of this paper, it suggests why trade openness leads to the exchange rate appreciation. As aforementioned, the real exchange rate in Malaysia was governed by the variables indicated above; nonetheless, terms of trade seemed to have no impact on the real exchange rate in Malaysia. Gaps in knowledge and literature For the purpose of this research, Khan et al., (2018) have considered data period of 1960-1994 to analyze the impact of the macroeconomic determinants on the real exchange rates of seven emerging countries. It therefore uses the error correction model and the co integration technique to the error based on actual exchange rates and takes depreciated exchange rates to higher level in terms of trade openness. The study also demonstrates this that it devalues (when the interest rates rise). Using these nations, the study draws correlation between the terms of trade and the on the exchange rates on the following parameters; positive and/or negative.

In other words, Hau (2002) finds from his sample of 48 countries that the more open structure of the country results in reduced volatility of the exchange rate. Hence, it can be concluded that the real exchange rate and trade openness are inversely related. The findings of the model are implemented as well as the economies categorized as traded and non-traded sectors before establishing that way more open economies will have the capacity to handle changes in the price levels leading to a reduction in quantity of unpleasant money supply that in turn, leads to less exchange rate volatility. Nevertheless, some testing executed for the indices of these sectors for the tradable goods were more accurate than that of the non-tradable goods (Khan, 2021).

## DATA AND METHODOLOGY

### 3.1. Description of Variables

Variables used in present study, their abbreviation and their measures are shown in Table below: Dependent and independent variables based upon variables GDP and INF are dependent variables and LF, MS, ER, DI and GE are independent variables in the study classic.

**Table : Instant of Variables**

Variables	Explanation
GDP	Gross Domestic Product
INF	Inflation

LF	Labor Force
MS	Money Supply
ER	Exchange Rate
DI	Domestic Investment
GE	Government Expenditure

In this study, the definition of these variables is given below:

### 3.1.1. Gross Domestic Product (GDP)

Gross domestic product is the money value of all the products produced in a particular country within a given period of time which could be a quarter or a fiscal year. In the contemporary literature, it is well accepted as a sign of health and business vitality of the economy of a country (Ahmad, 2022).

### 3.1.2. Inflation (INF)

Inflation is commonly defined as the rate at which the average general price level for activities (purchases) and, therefore, the purchasing power of money is being eroded over time. This is an implication that consumer's availability of a limited number of products and services will suffice at the given amount of cash in their disposal (Arshad & Ali, 2016).

### 3.1.3. Labor Force (LF),

These are those people whose offer means of a labor for a specified period of time and for which they are willing to receive these goods as well of these services. It includes the employed currently and not employed, but do not work and are searching for work or are newly looking for work. Nobody who works is included. There are countries that do not count members of the armed forces and family workers, students and sometimes members of the armed forces are taken out. There is a change in the number of workers during the year, some seasonal workers joining and other seasonal workers leaving (Ijaz 2021).

### 3.1.4. Money Supply (MS)

Other forms of broad money consists of currency circulation outside banks (IFS line 35L..ZK), demand deposits of all Sectors, except central government(IFS line 35A..), saving deposit, non- resident currency deposit, other deposits in KShs from banking sectors, foreign currency deposit and travelers cheques and all other securities like commercial papers and certificates of deposit (99K..) in Kenya as noted by Filahi (2017).

### 3.1.5. Exchange Rate (ER)

In such events, the rate agreed by national authorities or the rate in the legally approved exchange market is official. This is oil is indicated as annual average (local currency unit per unit of U.S. dollar) (Hayat et al., 2021) yet, it is in monthly.

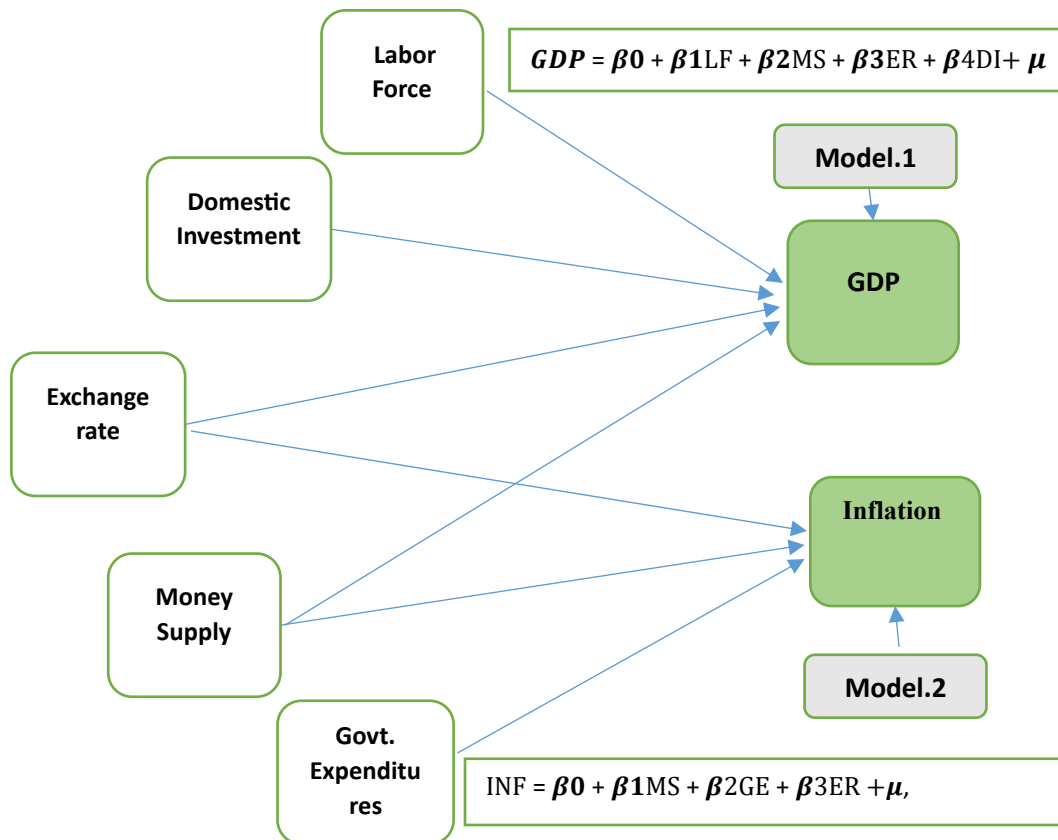
### 3.1.6. Domestic Investment (DI),

Apart from the net changes in the level of inventories which is also referred to as adding to the fixed assets of the economy, the gross domestic investment outlays.

### 3.1.7. Government Expenditure (GE)

General government final consumption expenditure (general government consumption) is defined as the total of all current final consumption expenditure (including compensation of employees) undertaken by the general government sector for goods as well as services [except financial intermediation services to the extent that the main purpose of the activity was preparatory work and other activities involving transport]. Besides, it is derived from capital which fails to include the actual government expenses on defence to the nation and major-country security.

### 3.2. Theoretical background



In recent years, monetary policy has concentrated on maintaining the currency rate stability and the increase in the foreign exchange reserves (SVENSSON, 2018). It helps promoting economic growth through a sound and stable monetary policy. Twinoburyo and Odhiambo (2018) explain that the system affects a lot in country economic growth. The value of one currency with respect to the other This is done through two types of currency rates, fixed exchange rate and variable exchange rate (Aslam, 2016).

Finally, the government fixes the rate and the market the flexible rate in order to stabilize flow of money. As the high rate of high economic growth brought about appropriate high export growth and the high demand for the national currency raised its rate of exchange rate (Chaudhry et al., 2021). However, these allow economic growth to occur at an optimum rate, but capital markets are required to be liquid.

In fact, academic literature mostly used an indirect relationship among such, which is between the exchange rate and economic growth through export, investment, and internal trade, something which is more suitable to be investigated with simultaneous equation, since the direct relationship (precise) between the exchange rate and economic growth cannot be explained with evidence by the existing economic theories, which is surprisingly the interest of academic literature. A simultaneous equation is an equilibrium model in which a dependent variable and one or more explanatory variable enter simultaneously. This study uses secondary data that covers the span of 1976 to 2010.

### 3.3 Model specification

The econometric model was estimated as:

Model #1:

$$GDP = \beta_0 + \beta_1 LF + \beta_2 MS + \beta_3 ER + \beta_4 DI + \mu,$$

Here,

GDP = Gross Domestic Product

LF = Labor force

MS = Money Supply

ER = Exchange Rate

DI = Domestic Investment

$\epsilon$  = Error Term Model #1.

**Inflation, money supply, govt expenditures,**

**Exchange rate**

$$INF = \beta_0 + \beta_1 MS + \beta_2 GE + \beta_3 ER + \mu,$$

Here,

INF = Inflation

MS = Money Supply

GE = Government Expenditure

ER = Exchange Rate

$\epsilon$  = Error Term Model #1.

**Domestic Investment** The other channel through which energy prices affect economic growth is through price which energy prices have. Investment is affected negatively by higher energy prices. Energy price hike will increase the production cost and decrease investment [11]. This is done through using energy prices, increasing the level of inflation, lowering real saving, and lowering the value of returns on investments, thus lowering on investment. Under the condition of high energy prices, high interest rate means high inflation and low prices for bonds. The forecast indicates that there will be capitals loss hence reducing investment through the prices of bonds. These alterations in energy price level also bring about other effects like volatilities of the future energy price that result into problems affecting the ability of the firms to undertake permanent investments [27] and [28]. This results to the moderation of the energy price rise, hence lowering the energy and also capital consumption. Marginal product of labor decreases with which wage rate and supply of labor also decreases. In particular, a proponent of the theory decreases future marginal product of capital and less current and future investment, as well as capital stock. Due to that, we believe that investment will bear an inverse relationship with energy prices.

**Exchange rate**

One of the channels through which energy prices and English economy's growth can be transmitted is exchange rate. This can be an indication that any hike in the energy price, the more this excess



will lead to the depreciation of the country exchange rate. If the domestic country is importing the energy resource, then depreciation of the domestic currency is present. Hence, if the price of energy is high, an energy importing country will be compelled by the foreign investor pressures to let its domestic currency be appreciated and thus the trade balance will be affected. This is the reason why it was expected that an influence of energy prices on the exchange rate is expected to be positive. Therefore, it can be said that like the classical models have postulated, conventional devaluation of the exchange rate fosters output when the Marshall-Lerner Condition holds true. It helps affect the proportionate sales of the national product and disseminates wheeling's of the national product. It is highly developed in terms of effective demand and employment and able to have an open capital account even. It also implies changes in increments and beginning of efforts to reduce expenditure due to the shaky currency. This is because; the level of output is not increase thus leading into reduction of government spending and taxes. However, exchange rate devaluations also have a contractionary side as it leads to a contraction of the economic activity. Therefore, it has paid for inflation as equivalent to the cycle of inflation caused by the nominal exchange rate depreciation, Thus, the import of non-traded items value of goods manufactured at domestic currency. In supply side shocks, the good also affects the economic growth. Currency devaluation situation increases the outside debt due to an increase in the amount of foreign exchange liability of domestic firms and households. As a result of such measures, firms are injured and as a result, output growth is slowed down. Therefore, it can be affirmed that a real depreciation that persists in having the same magnitude may not only have an ambiguous effect, but indeed may be numerically indeterminable on the rate of growth of output.

## **Results and Discussions**

### **4.1. Introduction**

In this section, the data will be thoroughly investigated. For this reason, an overview of some important features of dependant and free factors is necessary. In the summary insights, we will be familiar with such terms as mean, middle, mode, skewness, kurtosis, least, and most extreme, and more, and we will receive some critical facts. In this case the effects of after the expansion of change component will also be included to find out the strength of two behind components.

Similarly to the use of panel data, this part also contains the exact after results of the study " Role of money and exchange rate on inflation and economic growth of Pakistan." Finally, the data are checked for data autocorrelation and heteroskedasticity. It can be used with autoregressive distributed lag (ARDL). Further analysis is opened by these results.

### **4.2. Descriptive statistics:**

Descriptive statistics are used to explain how the fundamental features of the dataset are defined in particular (Gujarati 2004). The measures of central tendency for a random variable are defined in the form of mean, median and mode. It differs from other publications in that it doesn't focus on individual cases but on the quantitative characteristics of an issue presented in a form that can be managed, i.e. a table. So, all the variables of the model are taken into consideration and descriptive statistics are calculated for all of them.

The Descriptive Statistics shows that a total number of 120 observations in the research model. The variables used here are Money Supply (MS), Exchange Rate (ER), Govt. Expenditure (GE) Domestic Investment (DI) and Labors Force (LF), while the dependent variables are Gross Domestic product (GDP) and Inflation (INF). The Return on Assets (GDP) average (mean), median, maximum and minimum values are (4.692669), (4.731147), (10.2157), (-1.27409) respectively. The spread out used data will be higher and the standard deviation will be higher for

that. We also value the standard deviation of GDP itself as 2.184016. The skewness is the measure of the tendency of the data to be symmetrical. (-0.12214) makes the skewness of GDP negative which would mean that it was negatively skewed. Standard value of Kurtosis is 3. Since the value of GDP is more than 3 (3.216836), data has the Platykurtic distribution of data so the value of GDP is greater than 3. Jarque- bera test for GDP gives 0.226713 value which less than 0.5 and forecast obtains normal distribution of GDP. Probability of data smaller than 0.05 implies Rejected null hypothesis. The probability P is statistically significant as GDP.

The next variable in the results table is Inflation (INF). Heir Inflation mean (INF), median (INF), maximum (INF), minimum (INF) and standard deviation (INF) values are (9.246616), (8.267047), (26.66303), (2.529328), (5.27288) respectively. The value of skewness for INF is (1.395921), which is a positive skewed (skew positive). Inflation has Leptokurtic distribution and the Kurtosis value of Inflation is 4.948691. Jarque-Bera is 24.63254. This demonstrates that inflation is statistical significance with the p value of the probability of its significance is 0.000004.

The table has its results with the next variable Domestique Investment (DI). The 15.61955 , 16.12224 , 19.11229 , 11.33023 , and 1.871695 are respectively the DI mean, DI median, the DI maximum, the DI minimum, and the DI standard deviation. DI is negatively skewed because its skewness value equals (-0.39523). From the Kurtosis value of DI in the above case, the Kurtosis value of the data distribution is 2.179219 and therefore the distribution of the data is Leptokurtic distribution. Jarque-Bera is 2.759328. Therefore, a probability value of 0.101101 means that DI is not significant at the 5% AS level.

As seen in the table of Descriptive Statistics, ER has no correlation with MT and AF, and, therefore, it can be referred as the third variable. The mean, median, maximum, minimum and standard deviation of the scores in the TOF domain of ER are 54.19867, 41.11153, 204.8672, 8.681383 and 47.60349 respectively. This confirms that the distribution is positively skewed since skewness equals to ER = 1.200374. Kurtosis of ER is 3.928223 which signifies that the data is Platykurtic in nature thereby causes a reduction in more variability compared to the mean. Jarque-Bera is 14.07853. This makes it possible to conclude that the observed ER is significant at 0.000877 hence it is a measure of statistical significance.

The table results present information with the fourth variable of Govt. expenditure which is abbreviated as GE. From table 2, Moving average, median average, largest value and smallest value of GE are 1,027,778, 1,037,454, 16,789, 734,670 and 1,888,666 respectively and standard deviation is 188,866. In terms of skewness, the value is positive which is equal to (0.572951) for GE. The distribution of GE is Leptokurtic, and the value of kurtosis is significant at 4.189065. Jarque-Bera is 5.794809. This means that the value of GE has a statistical significance of 0.055166. There is only one column in the Table of Descriptive Statistics with the heading renamed and this is the Labor Force (LF) column and it is located at the fifth column in the table. According to the above measures, the mean, median, the maximum, the minimum, and the standard deviations of the LF are 59.82224, 67.58783, 78.90946, 32.04592, and 14.30324, respectively. Nevertheless, the sample skewness of LF is (- 0.67502), a negative sign indicates that the LF is having negative skewness. In this case, the LF Kurtosis will be platykurtic with the value of 1.97652. Jarque-Bera is 6.09898. Therefore if we compare the probability value of 0.047383 with 0.05, it can be resolved that that LF is statistically significant.

Concerning the Table of Descriptive Statistics, the sixth variable is Money Supply abbreviated as MS. The MS values of the mean, median, maximum, minimum and standard deviation are equal to 15.30513; 15.63271; 42.90887; (-1.20366); 7.08545. Therefore, the skewness value of MS is

equal to 1.109052, which indicates the fact that MS is skewed and; in specific it is positively skewed. In the given sentence, the Kurtosis of MS is 6.733245; thus, it is Leptokurtic. Jarque-Bera is 40.07135. The value of probability for the between groups is equal to 0.000 for the difference between the groups.

**Table: Descriptive Statistics.**

	DI	ER	GDP	GE	INF	LF	MS
Mean	15.61955	54.19867	4.692669	11.07778	9.246616	59.82224	15.30513
Median	16.12224	41.11153	4.731147	10.93754	8.267047	67.58783	15.63271
Maximum	19.11229	204.8672	10.2157	16.78491	26.66303	78.90946	42.90887
Minimum	11.33023	8.681383	-1.27409	7.346709	2.529328	32.04592	-1.20366
Std. Dev.	1.871695	47.60349	2.184016	1.888666	5.27288	14.30324	7.08545
Skewness	-0.39523	1.200374	-0.12214	0.572951	1.395921	-0.67502	1.109052
Kurtosis	2.179219	3.928223	3.216836	4.189065	4.948691	1.97652	6.733245
Jarque-Bera	2.759328	14.07853	0.226713	5.794809	24.63254	6.09898	40.07135
Probability	0.251663	0.000877	0.892832	0.055166	0.000004	0.047383	0
Sum	796.5972	2764.132	239.3261	564.9668	471.5774	3050.934	780.5616
Sum Sq. Dev.	175.1622	113304.6	238.4962	178.353	1390.163	10229.14	2510.18
Observations	51	51	51	51	51	51	51

#### 4.3. The Results of Pair – Wise Correlation Matrix

##### Model #1

	GDP	LF	MS	ER	DI
GDP	1				
LF	-0.29358	1			
MS	0.161814	-0.1	1		
ER	-0.34364	0.722947	-0.22661	1	
DI	0.282132	-0.15186	0.406713	-0.49294	1

Source: Software E-views 9

##### Model # 2

	INF	MS	GE	ER
INF	1			
MS	-0.18411	1		
GE	0.037519	-0.05928	1	
ER	-0.00819	0.22661	0.24326	1

The table 5.3 below indicates the results of Pair – Wise Correlation Matrix. This reveals high level values and they depict high correlation between the mentioned variables. From this we can get overall conclusion that state that there is no problem of Multi colinearity in the data set.

### 3.4. Results Interpretation of Money Supply on GDP and Inflation

In the following section, empirical analysis of relationship between the Money supply and GDP in case of Pakistan shall be discussed.

#### 3.4.1 Analysis of Multicollinearity

Now, this means that in the case of regression model estimation, some or all of the exogenous elements of the model under consideration are perfect or exact correlation. But the presence of multicollinearity on some of the present variables can be found on Pair – Wise Correlation Matrix and Variance Inflation Factor (VIF).

##### 3.4.1.1 Pair – Wise Correlation Matrix

It is a way to compute how much of DV is associated with IVs. Once multicollinearity problems between variables are recognized, Pair – Wise Correlation coefficient should be used. High correlation among variables illustrates multicollinearity trouble.

##### 3.4.1.2 Variance Inflation Factors (VIF)

It is utilized as a check on the problem of Multicollinearity. Generally speaking, the variance inflation factor is the amount of the correlation of one independent variable with other independent variables that affects or inflates the behaviour of an independent variable. A VIF of 10 or above is said to be multicollinearity in data set and below is less than 10. Table 5.4 on the next page is the results of the Variance Inflation Factor.

**Table 5.4: Results of Variance Inflation Factor Model 1**

Variable	Centered VIF
LF	2.370809
MS	1.200356
ER	3.057397
DI	1.685813
C	NA

**Source: Software E-views 9**

And this is why in table 5.4 above, if all our variables value is less than 10 then it is not equal to 0bps, it is true to show that Multicollinearity is not present at all. All the values of the variables are between 1 to 5 except GDP, that is highly correlated to MS.

#### Results of Variance Inflation Factor Model 2

Variable	Centered VIF
MS	1.069819

GE	1.078717
ER	1.133115
C	NA

Source: Software E-views 9

This implies that if all the shown values of all values of all variables are less than 10, Multicollinearity does not exist. However, they are moderately correlated from one variable to another variable and all the variables' values are between 1 and 5, except INF, which is very correlated with MS.

### 3.4.2 Breusch – Godfrey Serial Correlation LM Test

An example of autocorrelation of error terms in a regression analysis is if two consecutive error terms are correlated. A Serial Correlation LM test is used to address autocorrelation problem. In this/test if the value is significant, the product has autocorrelation, if it is not significant then the product does not have autocorrelation. The table 5.5 below gives the results of Serial Correlation LM test.

#### Results of Breusch – Godfrey Serial Correlation Test

##### Breusch-Godfrey Serial Correlation LM Test:

F-statistic	2.340394	Prob. F(2,27)	0.1155
Obs*R-squared	6.944178	Prob. Chi-Square(2)	0.0311

Serial Correlation LM probability values come out to be insignificant (0.1155) greater (than 5 percent) thus, we accept Nu (Null hypothesis) i.e No Serial Correlation and reject ANu (Alternative hypothesis).

### 3.4.3 Heteroskedasticity Test

And heteroskedastic can be defined, therefore, as a term where the disturbance term is not under control; it is variable nature of all values ( $X_i$ ) of all observations, and specifically the variance of  $e_i$  is different with the values of all descriptive variables. Nevertheless, the problem of Heteroskedasticity can be addressed by rest through Breusch – Pagan – Godfrey test. There will be Heteroskedasticity if the significant value means Heteroskedasticity and insignificant value means Heteroskedasticity is not. Below are the results of Breusch – Pagan – Godfrey Test for the table 5.6.

#### Results of Breusch – Godfrey Test

##### Heteroskedasticity Test: Breusch-Pagan-Godfrey

	0.78612	Prob. F(17,29)	0.6938
Obs*R-squared	14.82649	Prob. Chi-Square(17)	0.608
Scaled explained SS	6.531535	Prob. Chi-Square(17)	0.9888

Source: Software E-views 9



In terms of the Heteroskedasticity test, the probability values from the above test results shows that the Heteroskedasticity test is not significant (0.78612) and also greater than 5%; so we decided to reject Alternative Hypothesis (H1) and accept Null Hypothesis (H0): No Heteroskedasticity.

### 3.4.4 General Equation of ARDL of Model 1<sup>st</sup>

The Short Run and Long Run General Equation of ARDL can be estimated as:

#### 3.4.4.1 Short Run Equation of ARDL

$$\Delta(LGDP)_t = \alpha_0 + \sum_{i=1}^a \alpha_1 i \Delta(LGDP)_{t-i} + \sum_{i=1}^b \alpha_2 i \Delta(LF)_{t-i} + \sum_{i=0}^c \alpha_3 i \Delta(DI)_{t-i} + \sum_{i=0}^d \alpha_4 i \Delta(ER)_{t-i} + \sum_{i=0}^e \alpha_5 i \Delta(MS)_{t-i} \dots (5.1)$$

#### 3.4.4.2 Long Run Equation of ARDL

$$\alpha_8(LGDP)_{t-1} + \alpha_9(LF)_{t-1} + \alpha_{10}(DI)_{t-1} + \alpha_{11}(ER)_{t-1} + \alpha_{12}(MS)_{t-1} \dots (5.2)$$

### General Equation of ARDL of Model 2<sup>nd</sup>

The Short Run and Long Run General Equation of ARDL can be estimated as:

#### 3.4.4.1 Short Run Equation of ARDL

$$\Delta(LINF)_t = \alpha_0 + \sum_{i=1}^a \alpha_1 i \Delta(LER)_{t-i} + \sum_{i=1}^b \alpha_2 i \Delta(MS)_{t-i} + \sum_{i=0}^c \alpha_3 i \Delta(GE)_{t-i} \dots (5.1)$$

#### 3.4.4.2 Long Run Equation of ARDL

$$\alpha_8(LINF)_{t-1} + \alpha_9(ER)_{t-1} + \alpha_{10}(MS)_{t-1} + \alpha_{11}(GR)_{t-1} \dots (5.2)$$

### 3.4.5 Empirical Results of Autoregressive Distributed Lag Method of Model 1

The table 5.7 below presents the Long Run empirical Results of Autoregressive Distributed Lag (ARDL) Approach.

**Table: Results of Autoregressive Distributed Lag (ARDL) Approach**

<b>Dependent Variable: Log of Poverty (LGDP)</b>				
<b>Method: ARDL Co-integrating and Long Run Form</b>				
<b>Selected Model: ARDL (3, 5, 2, ,4, 3)</b>				
<b>Observations after adjustment 46 (1972 – 2022)</b>				
<b>Long Run Coefficients</b>				
<b>Variable</b>	<b>Coefficient</b>	<b>Std. Error</b>	<b>t-Statistic</b>	<b>Prob.</b>
<b>LF</b>	-0.12652	0.032529	-3.8895	0.0007
<b>MS</b>	0.126712	0.091007	1.39233	0.0766

<b>ER</b>	0.044414	0.02101	2.113958	0.0451
<b>DI</b>	-0.52641	0.455663	-1.15526	0.0594
<b>C</b>	17.45191	6.925959	2.519782	0.0188
<b>R<sup>2</sup>:</b>	0.746464	<b>Adjusted R<sup>2</sup>:</b>	0.52462	
<b>F-Statistic</b>	3.364819	<b>Prob(F-Statistic):</b>	0.002521	
<b>Durbin Watson Stat:</b>	2.27253			

The value of the coefficient of LF in table 5.7 above explains the positive significant (0.0007) impact on GDP. This empirical result also shows that there will be a percentage decrease in GDP of (-0.12652) per additional unit of LF.

The value of coefficient of MS also turns out to be positive on GDP at (0.0766). Based on empirical result, it is found that for one unit increase in MS GDP, will increase by (0.126712) percent.

GDP has positively significant (0.0451) impact on Coefficients of ER. EMPIRICAL YIELD, increase 1 unit of ER leads to GDP it (0.044414) in percentage.

This is because the ER value could represent the very (0.0594) positive impact on GDP. (1 unit increase in ER will cause (-0.52641) percentage increase in GDP) this is the empirical result.

### 3.4.5 Empirical Consequences of Autoregressive Distributed Lag Method of Model 2

The table 5.7 below presents the Long Run empirical Results of Autoregressive Distributed Lag (ARDL) Approach.

**Table: Outcomes of Autoregressive Distributed Lag (ARDL) Approach**

**Dependent Variable: Log of Poverty (LGDP)**

**Method: ARDL Co-integrating and Long Run Form**

**Selected Model: ARDL (3, 5, 2, ,4, 3)**

**Observations after adjustment 46 (1972 – 2022)**

<b>Long Run Coefficients</b>				
<b>Variable</b>	<b>Coefficient</b>	<b>Std. Error</b>	<b>t-Statistic</b>	<b>Prob.</b>
<b>MS</b>	0.537623	0.084087	6.393641	0
<b>GE</b>	0.335203	0.151337	2.214942	0.0338
<b>ER</b>	0.004309	0.01271	0.338991	0.0368
<b>C</b>	-4.97121	2.531388	-1.96383	0.058
<b>R<sup>2</sup>:</b>	0.771935	<b>Adjusted R<sup>2</sup>:</b>	0.682091	
<b>F-Statistic</b>	8.591956	<b>Prob(F-Statistic):</b>	0	

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**Durbin Watson Stat:** 1.879332

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**Source: Software E-views 9**

The value of coefficient of MS as shown in table 5.7 above has explained the positively significant (0.537623) impact of coefficient of MS on INF. An empirical result is provided for suggesting that an increase of 1 unit of MS will increase (0.537623) p units in INF.

From the coefficients of GE, there is a positively significant (0.335203) impact on INF. Empirical result indicates that an increase of 1 unit in GE causes (0.335203) percentage increase in INF.

INF also get a significantly (0.004309) positive impact from ER. Consequently, this empirical result implies that there is a (0.032142) percentage increase in INF for every 1 unit increase for ER.

### 3.4.6 ARDL Bound Test

For instance, these F Statistics shall be computed and tabulated from ARDL equation and then compared to each other. The results of the Bound test demonstrate that the variables are long run cointegrated. One suggests that any variables are integrated and there is long run relationship if the computed F statistics are generally found to be larger than specified in the upper bound. The table 5.8 below shows the results of Bound Test.

**Table: Results of ARDL Bound Test**

#### ARDL Bound Test

**Null Hypothesis: No Long Run Relationship Exist**

Test Statistic:	Value	K
F-Statistic:	5.678845	4

#### Critical Value Bounds

Significance	I0 Bound	I1 Bound
10%	2.45	3.52
5%	2.86	4.01
2.50%	3.25	4.49
1%	3.74	5.06

**Source: Software E-Views 9**

Table 5.8 provides results of the F statistic. The F statistic computed value is 5.678 845 that are more than the upper bound value i.e., 3.52, 4.01, 4.49 and 5.06 at 10%, 5%, 2.5% and 1% level of significance. Consequently, there is co integration (so long run relationship). The F statistic value is also greater than the upper bound value for the probability of 10%, 5%, 2.5%, and 1% of significance. Thus, a long run relation is an expected result.

**Conclusion:**

For Pakistan, time series of yearly data which having from 1972 to 2022 are used in this paper. For this question, this paper has used ARDL cointegration approach. The empirical findings of the series in Pakistan conform to the classical long run relationship of GDP, INF, MS. These variables are cointegrable in the error correction model of inflation and a short run causal relationship is established between them.

Although Pakistan had experienced moderately high and unstable inflation and quite high GDP during the early 1970s through 1980s, it entered on low inflation regime in 1990s. Therefore, it is still the policy challenge for Pakistan to achieve low and stable inflation in an environment of high and rising inflation expectations resulting from the excess liquidity that is being everywhere in the world in the aftermath of the late 2000s global financial crisis. First and foremost, the purpose of this paper was to show the presence of money in the case of Pakistan's monetary policy in a stream of literature (King, 2002; Leeper & Roush, 2003; McCallum & Nelson, 1999).

& Nelson, 2011). The view it did not take was into preferring a narrower or a broader money measure in Pakistan. The implementation of one of them — a rule based monetary policy like monetary targeting — often requires to embed the proper monetary aggregate measure, for instance a Divisia monetary aggregate measure, that has been suggested in the literature.

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