Lucrative Role of Macroeconomic Variables on Economic Growth of Pakistan

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Abstract

This study is an addition to the research that examines how macro variables contribute to Pakistan's economic growth. The research showed the influence of the exchange rate, inflation, expenditure by the government, unemployment, and population growth on Pakistan's economic growth data (1985 to 2020) collected from the World Data Bank. The inflation rate, government expenditure, economic development, exchange rate, and unemployment are stationary on the first difference. In contrast, according to unit root ADF, population growth is fixed on both levels and 1st difference. ARDL explored the long/short-run relationship among variables. All independent variables have a significant impact on economic growth. Government expenditure positively correlates with Pakistan's economic growth, but Inflation and unemployment have a negative relationship with that growth. Policymakers, regulators, stakeholders, and fund managers may enjoy a safer flight in investment decisions. They can take positive guidance from macroeconomic variables' impact on Pakistan's economic upturn.

Keywords: Economic Growth, Exchange Rate, Inflation Rate, Govt. Expenditure, Unemployment Rate, Population Growth.

Introduction

Economic growth explores the country's progress by effectively aligning macroeconomic variables on GDP upturn. According to Pakistan, the effect of inflation, exchange rate, population growth, unemployment, and government expenditure on the country's GDP growth is a significant issue. Furthermore, it is essential to elucidate whether it equally stimulates or harms economic growth or whether it behaves differently at different levels. The main goal of macroeconomic policymakers is to achieve high and sustainable economic growth with minimum Inflation. The same study was conducted by (Khan et al., 2020). As a result, Inflation has been a big issue in macroeconomics for many years (Jilani et al., 2013). In 2000, according to the World Bank, Pakistan's inflation rate was 4.4%, and its GDP growth rate was 4.3%. Inflation was low then, and GDP growth is much better than it is now. If research discusses the current health of our economy, then it stands at a terrible stage. In 2020, the inflation rate was 9.7%, and the GDP growth of Pakistan fell, and it was at a negative rate of GDP growth -0.9%. So, inflation hurts GDP growth (Inflation, CPI Annual %) (GDP Growth Annual %). Cecchetti (2000) in their respective study concluded that inflation negatively correlates with GDP. While Levy and Sturzenegger (2003-

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2002) and Jilani et al. (2013) found that the exchange rate system affects growth. According to the scientific method, "inflation arises when the government prints too much money" (Mankiw, 2006). In the 1970s, The Organization of the Petroleum Exporting Countries (OPEC) decided to increase global oil prices to increase revenue. The study increased oil prices from 1973 to 1974, adjusted gross inflation, and increased inflation by more than 50%. (Mankiw, 2006). Unemployment is another issue in Pakistan, and it found a detrimental encouragement on GDP growth, indicating an economic upturn. That the Gross Domestic Product (GDP) is negatively related to unemployment. (Shahid, 2014)

On the other hand, economic growth and exchange rates have always been important topics in economics. One definition of the exchange rate is the element that controls the rate at which currencies are exchanged. Actual and notional exchange rates are the two (Ahmad et al., 2013). According to Parui (2020) studies, both types of government spending, investment, and consumption positively affect GDP in the long run. According to the research, aggregate demand and economic growth rise sporadically when government expenditure shifts from consumption to investment. Sometimes, a government raises its investment spending, which can reduce aggregate demand and growth in a wage-driven demand system once the speculative notion of a balanced budget is gone. However, a profit-led demand system increases both total demand and growth.

Given above, the research explores the estimation of macroeconomic indicators of government expenditure on Pakistan's economic upturn. Many studies are available to examine the impression of macro variables on economic growth. However, most researchers exposed a few macroeconomic variables and asymmetric volatility to analyze economic growth (Khan et al., 2020). Another explored the influence of population on Pakistan's GDP. However, all the studies are incomplete without examining how government expenditure affects economic growth. The sustainability of a firm's value has become a challenge (Khan et al., 2021). This research adds additional literature on economic development & macroeconomic variables. Now, Pakistan faces a financial crisis. It would be a significant contribution to the study to check the government's contribution to the economy because Government spending is a tool of fiscal policy to create economic stability (Khan et al., 2023). Government expenditure in Pakistan has always been challenging due to its direct and indirect impact on the country's macroeconomic performance. The rational decisions may be enhanced (Khan et al., 2011). The adjustment of financial policy is less cost-effective in an unstable environment (Akash et al., 2023).

Moreover, the returns and volatile behavior may predict the volatility (Hussain et al., 2011). A study recommended incremental change in government expenditure, economic upturn, development of education, and research in the country (Rehman et al., 2020). The cash flow, employment, and economic growth can be upturned with good governance and less asymmetric behavior of returns (Akash et al., 2023).

In light of the above discussion, the objective of this study is to explore the impact of macroeconomic variables, which include inflation rate, government expenditure, exchange rate, population growth, and unemployment. The GDP growth is taken to measure the economic upturn in Pakistan from 1985 to 2020. The economic upturn in Pakistan is an essential contributing factor that can help in exports and expose exchange rate volatility, and it may decrease it with the decrease in trade. Inflation, government expenditure, population growth, and unemployment are the primary factors of Pakistan's economic upturn. In this context, these macroeconomic factors explore the impact on economic upturn. The economy's direction is a crucial concern in setting the magnitude and tendency to expose the economic upturn in a particular economy of Pakistan. This study should observe the influence of inflation, government expenditure, exchange rate, population growth, and unemployment on Pakistan's economic upturn from 1985 to 2020.

Literature Review

Much research has been done at the national and international levels to measure the influence of macroeconomic variables on economic growth. This section contains some literary reviews of the study. To understand how government expenditure, unemployment, inflation rate, exchange rate, and population growth affect economic growth (GDP growth). Ayyoub et al. (2011) documented the association between Pakistan's inflation and economic development. The research examined how inflation drives GDP growth, whether positive or negative (Akash et al., 2023). The research used the OLS technique to evaluate the results from 1972-1973 to 2009-2010. The study examined that inflation below 7% has positively affected Pakistan's GDP growth. But above 7%, it severely damages the growth of Pakistan's economy. Shahid (2014) analyzed the impact of unemployment and inflation to elucidate Pakistan's economic growth from 1980 to 2010. The result of Gross Domestic Product (GDP) is negatively related to unemployment. And a positive correlation with inflation. The function used in this study was the Cobb-Douglas production function (Akash et al., 2023). The influence of significant economic changes, such as exchange rates, inflation, and interest rates, on Pakistan's economic growth was studied by (Chughtai et al., 2015). The collected data were analyzed using multiple linear regression models from 1981 to 2013.

Economic growth was the dependent variable, but inflation, interest rate, and exchange rate were the independent factors. The results show that two independent variables, interest rates, and inflation, negatively relate to Pakistan's economic upturn. It is elucidated that all these variables are less from political dissatisfaction on Pakistan's economic upturn. Hussain and Malik (2011) examined the relationship between Pakistan's inflation and GDP growth. The study collects data over 46 years, from 1960 to 2006. The Error Correction Model is necessary to evaluate if an economy is moving toward stability in the short run. A similar study was conducted on brand enhancement and firm value (Khan et al., 2023). According to the estimated threshold model, the study predicted that the structural breakpoint is 9%. According to their estimation, Pakistan's economic growth will slow if the inflation rate stays above 9%. The result is Pakistan needs inflation but in one digit for economic growth or below this level of 9 percent. As far as this study is concerned, the fact disclosed that policy effectively exposes better returns and economic upturn (Amir et al., 2023), and the firms should become more socially responsible (Ahmad et al., 2022). Ramzan (2021) examined how unemployment and inflation affect Pakistan's economic growth. The significant ideas explored for lowering unemployment and inflation in Pakistan's economic growth. The association between these independent factors and the dependent variable was determined using the "Ordinary Least Square (OLS)" model. The time-series data was collected from 1980 to 2018 in this study. According to econometric findings, if the t-test value was bigger than the t-tab, then the p-value was significant. The time series was also stationary, according to the econometric results. In Pakistan, Chaudhry et al. (2012) found an association between monetary policy, inflation, and economic growth. According to them, developing countries face a serious problem with real GDP, and Pakistan is one of them. Large-scale imports and oversupply of money are driving up inflation. Ahmad et al. (2013) examined the impact of rising prices, foreign direct investment, capital stock, and nominal exchange rate on economic growth. The outcomes showed that exchange and inflation rates harm economic growth (GDP). The study said the government should formulate policies to increase the quality of exports of goods so that the trade balance is maintained; otherwise, the financial institutions may become willful defaulters (Khan et al., 2023).

The economy of Pakistan is well investigated from 1985 to 2013. The influence of inflation rate, foreign direct investment (FDI), unemployment, exchange rate, etc., has been established regarding the economic upturn in Pakistan. The results explored that the inflation rate, interest rate, and exchange rate was found to be negatively and significantly associated with GDP, and foreign direct investment (FDI) was correlated considerably (Kibria et al., 2014).

The inflationary trend was observed and investigated about the GDP of Pakistan. The negative trend regarding the inflationary trend on sustainable growth in Pakistan was also exposed (Idris & Baker, 2017). Another study was conducted to observe the economic upturn in Ghana from 1980 to 2010 and found the impact of interest and inflation on GDP. A strong and positive relation was observed regarding interest rate, inflation rate, and GDP growth (Agalega & Antwi, 2013). Hayat et al. (2021) determined the interest and inflation rate role in Pakistan's economic evolution. The influence of interest rates and inflation on production was examined using monthly time series data from 1991 to 2020. Using a multi-scale Granger-causality test, the co-movement and structure of the connection between growth and inflation, as well as the rate of interest and development, were explored. According to this test, there is no similar connection between these variables. According to these tests, inflation, interest rate, and growing relationships are neither simply unidirectional nor bidirectional across the board. The study also said the COVID-19 outbreak has had a global economic impact, especially in light of state measures such as enforced lockdowns and social isolation. Ahmed and Ahmad (2016) investigated the effect of overpopulation on a country's economic progress. The rapid population growth analyzed Pakistan's actual problem. It hurts economic growth as well as economic development.

The formation of government expenditure has always been a challenging problem in Pakistan, as in other developing nations, because it affects the nation's macroeconomic performance directly and indirectly. It explores how different aspects of government expenditure have impacted economic growth throughout Pakistan between 1973 and 2018. The results of the data analysis using ARDL were based on the ADF unit root test. The analysis's findings demonstrated that government expenditure in general, investments in research & development activities, subsidies and other payments, education, and employee compensation all continued to benefit and significantly affect per capita GDP. According to this study, the government should increase spending on employment, education, and research and development to hasten the nation's economic growth. The above discussion is a crucial concern in related literature; it can be exposed that the macroeconomic variables and economic upturn both have received much attention. The relation among these variables conclusively explores the ongoing gap to observe the policy settings within the country and the investors' decisions in Pakistan. In this regard, ample opportunities and openings exist to expose the relationship comprehensively. This study is an effort to tell the options for the investors in their choices about checking the impact of macroeconomic variables on economic upturn in Pakistan.

Data and Methodology

This part of the study describes the model to evaluate the behavior of variables. Sample selection, data source, and model description are brief descriptions. This research data on time series from 1985 to 2020 of dependent and independent variables. To find out how macroeconomic variables affect economic growth. Data on inflation, unemployment, exchange rate, government expenditure, and population growth are collected from the World Bank. In 2020, inflation was 9.7% in Pakistan, according to the World Bank (World development indicator, 2020). Secondary data from 1985 to 2020 is derived from the World Bank, Pakistan's Handbook of Statistics, and Pakistan's Economic Survey. Data on inflation, unemployment, exchange rate, GDP growth, government expenditure, and population growth are taken from the World Bank. However, data on the exchange rate are taken from the Pakistan Handbook of Statistics. The study used 36 years of data (World Development Indicator, 2020).

Table 1: Data Description

S. No.	Variables	Time	Type	Source	Measures
1	GDP Growth	1985-2020	Time Series	World Data Bank	Annual %
2	Exchange Rate	1985-2020	Time Series	World Data Bank	LCU per US$, period average (Official EXR)
3	Inflation Rate	1985-2020	Time Series	World Data Bank	Annual %
4	Government Expenditure	1985-2020	Time Series	World Data Bank	% of GDP
5	Unemployment Rate	1985-2020	Time Series	World Data Bank	% of the total labor force
6	Population Growth	1985-2020	Time Series	World Data Bank	Annual %

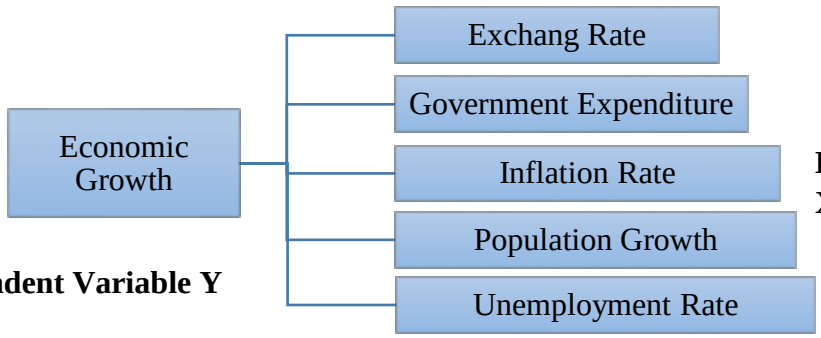
GDP growth is a dependent variable in this research model and serves as a proxy for economic growth. Inflation, unemployment, exchange rate, government expenditure, and population growth are explanatory variables.

$Y = f\ (X1, X2, X3, X4, X5)$

Y = GDP growth is a proxy variable of Economic Growth
X1 = Exchange Rate
X2 = Government Expenditure
X3 = Inflation Rate
X4 = Population growth
X5 = Unemployment Rate

Whereas, the economic growth is a dependent variable in this research. The research uses GDP growth as a proxy variable for economic growth. It is represented by the Capital Y alphabet. X1, X2, X3, X4, and X5, exchange rate, inflation, government expenditure, unemployment, and population growth are represented explanatory variables. According to these variables, this model was developed to evaluate the relationship between the explanatory and dependent variables.

Figure 2



i. Economic Model:
Economic Growth = f(exchange rate, inflation, government expenditure, unemployment, population growth)

ii. Econometric Model:
GDP Growth = $\beta_o + \beta_1 EXR + \beta_2 GEX + \beta_3 INF + \beta_4 PG + \beta_5 UM + u_o$.....(1)
Following hypothesis are expressed as under.

H.1 = Exchange rate has a detrimental influence on the economy of Pakistan.
H.2 = Inflation has a detrimental influence on the economy of Pakistan.
H.3 = Government Expenditure has a detrimental influence on the economy of Pakistan.
H.4 = Unemployment has a detrimental effect on the economy of Pakistan.
H.5 = Rapid population growth has a detrimental influence on the economy of Pakistan.
This research uses descriptive analysis to select the variables and a Unit root test to check the stationarity, and then runs the regression to measure the probability values of all variables and R-square through the Auto-regression Distributive League (ARDL) model. After that study used ARDL Long Run Form and Bounds Test to check the F-statistic.

Results and Discussion

The economic analysis is conducted after a thorough statistical analysis. Summary or descriptive statistics are used to explain a data set's characteristics. Two significant categories of measures in descriptive statistics are measures of central tendency and measures of data set diversity (Trochim, n.d.).

Table 2: Descriptive Analysis for Selected the Variables

	GDP	EXR	GEX	INF	PG	UM
Mean	4.340565	62.76312	11.15991	8.125517	2.518446	3.936389
Median	4.566647	58.88617	10.86777	7.882675	2.379464	4.025000
Maximum	7.705898	161.8385	16.78491	20.28612	3.283328	7.830000
Minimum	-1.329520	15.92839	7.346709	2.529328	1.978320	0.400000
Std. Dev.	2.042531	38.29483	2.212233	3.875396	0.398859	2.236948
Skewness	-0.423654	0.748406	0.408244	0.698341	0.342336	-0.026107
Kurtosis	3.175611	2.921391	3.126843	3.812186	1.760393	2.013675
Jarque-Bera	1.123156	3.369939	1.024111	3.915551	3.008102	1.463345
Probability	0.570309	0.185450	0.599263	0.141172	0.222228	0.481104

Table 2 explored the description of the variables. Here the average GDP growth is 4.340565 with a standard deviation is 2.042531, the average EXR is 62.76312 with a standard deviation of 38.29483, and the average INF is 8.125517 with a standard deviation of 3.875396, the average value of GEX, UM, and PG are 11.15991, 3.936389, and 2.518446 with the standard deviation 2.212233, 2.236948, and 0.398859. The results of the Jarque-Bera test show that the residual for all variables were normally distributed. These findings are normal because the probability value is higher than 0.05.

Table 3: Unit Root Test

	At level			**At 1st difference**		
Variables	**Intercept**	**Trend and intercept**	**None**	**Intercept**	**Trend and intercept**	**None**
GDP Growth	-2.724983 (0.0803)	-3.060493 (0.1317)	-1.766935 (0.0735)	-6.633073 (0.0000)	-6.568646 (0.0000)	-6.665151 (0.0000)
Exchange Rate	2.122778 (0.9999)	-0.305646 (0.9871)	3.842663 (0.9999)	-3.961016 (0.0045)	-4.746923 (0.0030)	-2.190413 (0.0293)
Inflation	-2.725761 (0.0799)	-2.684964 (0.2485)	-0.899815 (0.3194)	-7.003196 (0.0000)	-6.901706 (0.0000)	-7.086681 (0.0000)

Government Expenditure	-1.269743 (0.6325)	-1.041747 (0.9246)	-0.128678 (0.6322)	-4.738057 (0.0005)	-4.765296 (0.0028)	-4.812029 (0.0000)
Unemployment	-1.980478 (0.2936)	-1.808926 (0.6789)	-1.153691 (0.0000)	-6.474939 (0.0000)	-5.012607 (0.0020)	-6.576000 (0.0000)
Population Growth	-1.940285 (0.3101)	0.337374 (0.9979)	-4.181577 (0.0002)	-1.531650 (0.5027)	-4.445144 (0.0076)	-0.380386 (0.5377)

Table 3 explored unit root to check the stationary or non-stationary variability of a variable through the unit root test. The results show that the GDP growth is stationary at the 1st difference. Exchange rates, inflation, government expenditure, and unemployment are stationary as the first differences. On the other hand, population growth is stationary at ADF levels and 1st difference. Not all variables are stationary at the same level, so the Auto-regression Distributive League (ARDL) model technique is used in this study. Except for population growth, which is stationary at both the level and the first difference of the unit root test, all dependent and explanatory variables are stationary at the first difference. The probability values of these variables are less than (p) 0.05 (5%). According to this, the variables are stationary at the first difference and reject the null hypothesis (Ho) while accepting the alternative hypothesis (H1). But in the case of population growth, the null hypothesis is rejected at both levels as well as the first difference. The results show that the data are in favor of an alternative hypothesis that affects Pakistan's economic growth.

Auto-regression Distributive League (ARDL) Model

Since so many years back, single equation time series data sets have been modeled using autoregressive distributed lag models to represent the relationship between (economic) variables. ARDL and ECM model is used for forecasting (Kripfganz & Schneider, 2018) The model is developed to check the government expenditure's impact and macroeconomic indicators on the economic growth of Pakistan includes (including inflation rate, exchange rate, government expenditure, unemployment rate, and population growth) by using ARDL Regression Long Run and short run.

GDP Growth = $\beta_o + \beta_1 EXR + \beta_2 GEX + \beta_3 INF + \beta_4 PG + \beta_5 UM + u_o$

The value of the F-statistic should be larger than the values of the upper and lower bounds, according to the ARDL bounds test. If its value is greater than co-integration, the model exits. When all of the series are integrated of the same order, and are also cointegrated: In this case, there are two types of regression models that can be estimated: (i) An OLS regression model using the levels of the data. This will provide the long run equilibrium relationships between the variables. (ii) An Error Correction Model (ECM), estimated by OLS. Model will represent the short-run dynamics of the relationship between the variables. Finally, is a more complicated situation where some of the variables in question are stationary in levels i.e. I(0), and some are I(1) or even fractionally integrated leading to no clear-cut order such as in the three situations noted above: This situation is particular to the series employed in this study and forms the basis for the adoption of the advanced methodology of Chudik and Pesaran (2013) P-ARDL model.

Table 4: F-bound test estimation

f-bound tests		**Null hypothesis; No level of relationship**		
Test statistic	Value	Sig.	I(0)	I(1)
			Asymptotic: n = 1000	
F-stat.	5.935143	10%	2.08	3
K	5	5%	2.39	3.38
		2.5%	2.7	3.73
		1%	3.06	4.15

The fact that the F-statistic value of 5.935143 exceeds the lower and upper bound values of 3.38 and 2.39 indicates that co-integration is present in this model. As a result, co-integration between variables occurs, and it explored that the variables have a long-term relationship.

Table 5: Estimated Long Run Results of ARDL (3, 1, 3, 3, 3, 1)

Variable	Coefficient	Std. Err.	t-Stat.	Prob.
EXR	-0.041174	0.014069	-2.926488	0.0118
GEX	0.346821	0.109288	3.173472	0.0073
INF	-0.325236	0.053668	-6.060201	0.0000
PG	-3.758532	1.709609	-2.198474	0.0466
UM	-0.249645	0.129410	-1.929107	0.0758
C	15.67178	3.760803	4.167137	0.0011

Results are shown in Table 5, according to Long Run ARDL method, all independent variables have a significant impact on the economic growth (GDP Growth) of Pakistan. The Explanatory variable exchange rate (EXR) is significant at a probability value of 0.0118 with a negatively related to the GDP growth of Pakistan. The coefficient of exchange rate -0.041174, shows a negative relationship with economic growth. Also, it shows the exchange rate is depreciating and the economic growth of Pakistan is raised. If the 1% exchange rate depreciates then GDP growth will be increased by 0.04%. In the long run, analysis shows inflation (INF) and population growth (PG) are also negatively related to GDP growth. At the probability value of 0.0000 and 0.0466. According to the results, Government expenditure and unemployment have a positive impact on GDP growth. At the significance 0.0073 and 0.0758 probability. The coefficient (-0.325236) of inflation (INF) indicates a 1 % increase in inflation then GDP growth will be decreased by 0.32%. And the coefficient (-3.758532) of population growth (PG) indicates a 1 % increase in population growth GDP growth will be decreased by 3.75%. Now here is the coefficient value of government expenditures (GEX) and unemployment (UNEM) is 0.346821 and -0.249645. GEX shows a positive relationship with GDP growth. It shows a 1% change in GEX then GDP growth will be increased by 0.34%. But unemployment is negatively related to GDP growth that shows if a 1% change in unemployment, then GDP growth will be decreased by 0.24%. In this case, intercepts significantly and favorably affect economic growth. B_o=15.67178, it has a positive relationship between the dependent and independent variables. In this case, the value of intercept increases and also increase the Y. 1% change in β_o will bring 15.67178 changes in the Y variable.

ECM Regression

Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D (GDP (-1))	0.277297	0.221579	5.764517	0.0001
D (GDP (-2))	0.603453	0.179264	3.366273	0.0051
D(EXR)	-0.007133	0.030901	-0.230833	0.8210
D(GEX)	-0.363611	0.223589	-1.626249	0.1279
D (GEX (-1))	-0.490128	0.212349	-2.308124	0.0381
D (GEX (-2))	-0.646566	0.233059	-2.774257	0.0158
D(INF)	-0.056815	0.071862	-0.790617	0.4434
D (INF (-1))	0.570476	0.103751	5.498513	0.0001
D (INF (-2))	0.200347	0.087892	2.279469	0.0402

D(PG)	-0.9071	23.89483	-4.808868	0.0003
D (PG (-1))	0.7590	41.66950	5.249859	0.0002
D (PG (-2))	-0.1827	22.53933	-5.775802	0.0001
D(UM)	-0.873613	0.175159	-4.987534	0.0002
CointEq (-1) *	-0.539227	0.325861	-7.792373	0.0000

Table 6 Estimated Short Run Results of ARDL (3, 1, 3, 3, 3, 1)

Table 7 Estimation of Goodness of Fitness of Model

R-squared.	0.864749	Mean dependent var	-0.235814
Adjusted R-squared	0.772208	S.D. dependent var	2.090223
S.E. of regression	0.997612	Akaike info criterion	3.129512
Sum squared resid	18.90937	Schwarz criterion	3.764394
Log-likelihood	-37.63695	Hannan-Quinn criteria.	3.343131
Durbin-Watson stat	2.733313		

Short-run ARDL shows the results in table 6 & 7. Here some explanatory variables are significant at 0.05 % significance and some are highly significant. EXR, INF, UM, and GEX have a negative relationship with GDP growth. But the INF has positively related to GDP growth in the short run. The explained results are shown in the table. The range of coefficient of determination (R^2) is 0 to 1, if the R square's value is near 1 it means our model is good. According to this regression statistical analysis, the R square value is 0.864749. (0.86) this value is close to 1 means the model is good and 86% of the dependent variable Y depends on independent variables intercept, X1, X2, X3 X4, and X5. Another 14% depend on u_o. We know that our independent variables (EXR, INF, GEX, UM, and PG) are relevant to the dependent variable (GDP growth). R square adds all variables whether they are relevant or not. Adjusted R square adds only relevant variables, according to this model the R^{-2} is 0.772208. The estimated value of the adjusted R square is less than the R square. The R^{-2} is 77% less than 86%.

CUSUM Test

The cumulative Sum of Recursive Residuals applies for the stability of the model. Figures 3 and 4 show the results, which show that the lines fall within the critical bound. It shows that the model is stable statistically. The model is safe for use in making forecasts and has no structural breaks. If the blue line crosses these red lines, the model is not stable. If the blue line is in between these red dashed lines, the model is stable. In figure 3 and figure 4 both CUSUM and CUSUMSQ represent the model's stability. Red lines show the critical bound at a 5% significant level.

Figure 3: Model Stability CUSUM

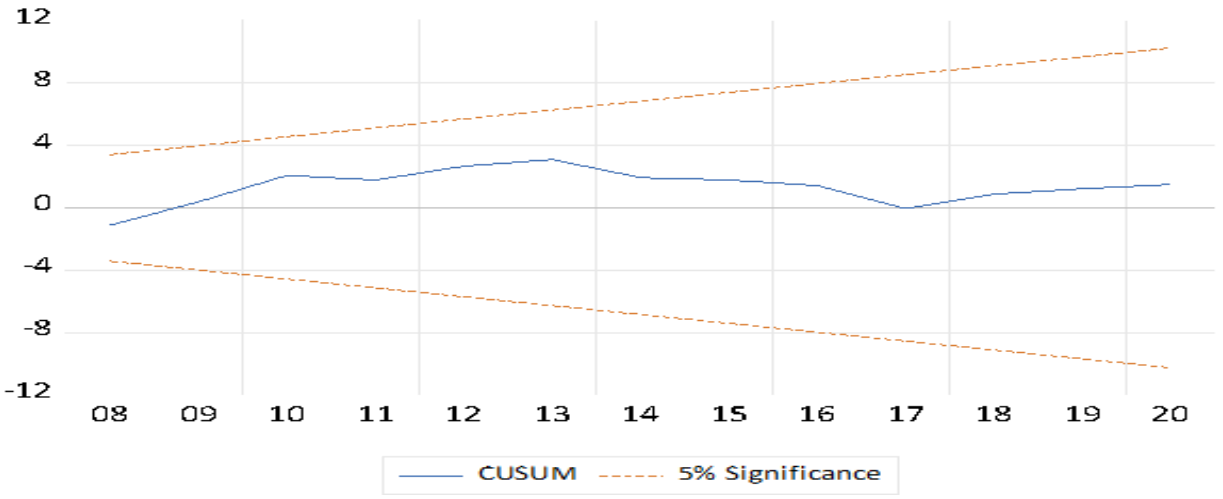
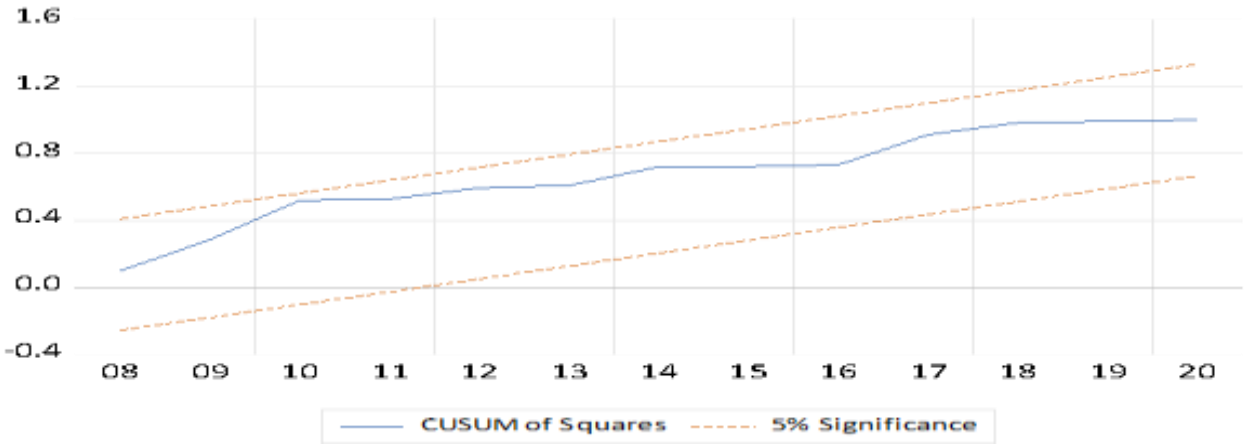


Figure 4: Model Stability CUSUMSQ



When the variance of the residuals is unequal throughout a range of observed values, this is known as heteroscedasticity. When the error component, or random disturbance, in the connection between the independent variables and the dependent variable is the same at all independent variable values, the condition is referred to as homoscedastic. Assume that the null hypothesis in this situation has no heteroscedasticity. As evidenced by the findings in table 4.8.1 Prob. As long as the Chi-square value (0.3701) is higher than 0.05, the null hypothesis is accepted.

Table 8: Estimation Heteroskedasticity

Heteroskedasticity Test: Bruesch Pagan Godfrey			
Null hypothesis: homoskedasticity			
F-static	1.109577	Prob. F (19,13)	0.4332
Observed R square	20.41270	Prob. Chi-Square (19)	0.3701
Scaled explained SS	2.773152	Prob. Chi-Square (19)	1.0000

Above in table 8, the Durbin-Watson stat value is 2.733313. It means here negative autocorrelation exists in the model we more to check the severity of autocorrelation with the serial correlation LM test.

Table 9: Estimation of Serial Correlation

Breusch-Godfrey Serial Correlation LM Test:			
Null hypothesis: No serial correlation at up to 1 lag			
F-statistic	0.651322	Prob. F (1,29)	0.4262
Obs*R-squared	0.790777	Prob. Chi-Square (1)	0.3739

Table 9, Serial correlation's null hypothesis states that autocorrelation is not present. If the significant P value is greater than 0.05 accept the hypothesis that the result shows there is no autocorrelation in this model. If the P value is equal to 0.05 or less than 0.05 then we reject the hypothesis that's here is autocorrelation exists. The findings of this study's model are presented in the following table. As stated above, there is no autocorrelation in this model because the F-statistical probability value is higher than 0.4262. Accept the null hypothesis.

Table 10: Estimation of Granger Causality

Pairwise Granger Causality Tests			
Lags: 1			
Null Hypothesis:	**Obs.**	**F-Statistic**	**Prob.**
EXR does not Granger Cause GDP	35	2.88858	0.0989
GDP does not Granger Cause EXR	35	0.10434	0.7488
GEX does not Granger Cause GDP	35	0.00160	0.9684
GDP does not Granger Cause GEX	35	3.74884	0.0617
INF does not Granger Cause GDP	35	2.25640	0.1429
GDP does not Granger Cause INF	35	1.24359	0.2731
PG does not Granger Cause GDP	35	0.98046	0.3295
GDP does not Granger Cause PG	35	0.42906	0.5171
UM does not Granger Cause GDP	35	1.16428	0.2886
GDP does not Granger Cause UM	35	1.59456	0.2158

Granger causality always exists when there is a time difference between the variables; for example, something happened first, but the effect is shown in the next period. In Granger causality, only two variables will be considered at a time. In this study, the dependent variable is GDP. Research checks the causality between GDP and independent variables separately. According to these results, the table shows all the independent variables with the dependent variable GDP have a greater cause between them. The null hypothesis of this test is no causality; if the Probability value is less than 0.05, accepting the premise means no basis. If the probability value is more significant, the cause exists and rejects the null hypothesis. Results show EXR and GDP have unidirectional causality at Prob. 0.0989 and 0.7488. Other independent variables, GEX, INF, PG, and UM, also have unidirectional causality with the dependent variable GDP because all those variables' probability values are more significant than 0.05.

Concluding Remarks

This research predicts a negative relationship between the exchange rate and economic growth. The exchange rate has an unfavorable impact on Pakistan's economic growth. The number of exports and the value of the currency are inversely correlated. Exports will rise, and domestic

producers will become more competitive due to a weak currency. Economic growth is inversely correlated with positive exchange rate shocks. Studies have found that exchange rates hurt economic growth (Ali et al., 2020). In the long run, results show EXR depreciated, and economic growth increased. This study shows EXR is significant with a 0.0118 Probability value at the Long Run ARDL regression.

Additionally, it demonstrates a negative connection with economic growth. The 2nd independent variable, inflation (INF), is also significant at (0.0000) ARDL in the long run and shows an inverse relationship with economic growth. Previous research has found a negative relationship between inflation and economic development (Ayyoub et al., 2011). Here, the result showed a negative relation between inflation and GDP growth at a coefficient of -0.480389. As CPI inflation increases, GDP growth is negatively impacted, as the theories indicate. When the regression coefficients are separately examined, the findings show that the CPI inflation coefficient is negative and significant at the 5% level. This proves that a 1% increase in CPI inflation will result in a 0.48 percentage point reduction in GDP growth (Ayyoub et al., 2011).

According to the findings, the third independent variable is government expenditure (GEX), which has a positive relationship with economic growth. It is significant at a 0.0073 probability value with a coefficient of 0.346821 at long-run ARDL. According to Sheikh et al. (2010) Government expenditure contributes to the GDP growth rate. Keynes claimed that to increase demand and pull the global economy out of the Great Depression; the government should spend more and tax less. According to Keynesian economics, a rise in government expenditure increases collective demand and consumption, which leads to higher output or economic growth. Chandio et al. (2016) examined in their research that government expenditure on agriculture increased economic growth. The unemployment rate (UM) is another crucial variable that shows significance at a 0.0758 probability value ARDL long run, with a coefficient of -0.249645. It also shows the negative impact on economic growth. A rise in unemployment relates negatively to GDP. The unemployment rate is significantly impacted by economic growth. Ali et al. (2010) found the effect of the unemployment rate to be negative and significant. Both positive and negative relationships between population increase and economic progress exist. According to the findings of our calculation, there is a negative correlation between population increase and economic growth. Easterlin, (1967) found that Population growth hurts economic growth. A high population increase puts more strain on the planet's limited natural resources. This study shows the exchange rate, population growth, unemployment, inflation, and economic growth are inversely related. Government expenditure has a favorable effect on economic growth. Study fund there is no Heteroscedasticity and autocorrelation. The Autoregressive Distributive Lag (ARDL) Model approach was also used in this examination. According to the ARDL results, co-integration exists between the explanatory and dependent variables, indicating a long-run relationship between them. Data usually is distributive, and the model is stable, as shown above.

According to this study, it is implied that the exchange rate, inflation, government expenditure, unemployment, and population growth influence Pakistan's economic development. The time-series data is taken from the World Bank, downloadable, and limited to those available from 1985 to 2020. Investors, policymakers, fund managers, and other stakeholders may hold this study to explore the ideas further in the context of future economic growth for other countries.

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