**Determinants of Economic Growth in Pakistan**

**1. Introduction**

Economic growth has been considered as the most powerful engine pulling the people out of the clutches of poverty and raising their standard of life. What happens to the life standard and poverty depends upon what happens to the growth and distribution of national income and the factors promoting them. When we look at the development in the recent history, we see people in certain regions of the globe grew rapidly than the other regions. At the same time there are some regions in which counter development movements were obvious. In these circumstances it was natural on the part of the researchers and policy makers to see behind the above developments so ample literature came into being on the subject matter. The economic growth is a complex phenomenon, which involves several factors. One of the major areas of research in economics has been to identify these factors. These factors are both direct and indirect, and internal and external and they differ from country to country. Due to the different socioeconomic conditions the factors of economic growth may be different in the cases of developing and developed countries. The growth of developing countries is not stable. If these factors can be identified, it can help to accelerate growth by focusing on the major leading sources of growth.

Economy of Pakistan has registered a growth rate of 5.32%, 6.30%, 3.96%, and 3.34% during 1970-1980, 1981-1990, 1991-2000, and 2001-2003 respectively. Overall average for the said period is 5.03%[[1]](#footnote-2). This trend is both important and significant for Pakistan. It is because this almost five percent growth rate is accompanied by growth in the capital stock which approximates around 17 to 18 percent of the GDP[[2]](#footnote-3). This accumulation of resources shows a trend, that incremental capital-output ratio (COR) is low in Pakistan than a number of East Asian, South Asian and Latin American countries.[[3]](#footnote-4) Existence of this situation justifies a detailed study that could explore the factors of economic growth in Pakistan.

**I. Research Question**

How do the growth rate of gross capital formation, growth rate of exports of goods and services, inflation rate, exchange rate, and domestic credit to private sector as percentage of GDP, affect the GDP growth rate in Pakistan?

**II. Objective of the Study**

The objective of this study is to investigate the determinants of economic growth in Pakistan. After analyzing the effects of different factors on economic growth, relative importance may be given to those factors according to their contribution in the economic growth.

**2. Data and Methodology**

**I. Data**

A sample period of 45 years has been selected for this study for the period of 1961-2005 with annual frequency. Depending on the availability of data we have selected the longest possible sample period to avoid the small sample bias. Data on all the variables have been collected from *World Development Indicators[[4]](#footnote-5).* Six variables have been selected for this study. Growth rate of gross domestic product (GGDP) has been used as dependent variable to represent the economic growth. Whereas, growth rate of gross capital formation (GGCF), growth rate of exports of goods and services(GEX), inflation rate (INF), exchange rate (EXR), and domestic credit to private sector as percentage of GDP (DCPV) have been used as independent variables. The description of variables has been given below:

**Dependent Variable:**

Growth rate of gross domestic product (GGDP): This variable is used as economic growth rate. Market prices in the terms of local currency are used to measure annual percentage growth rate of GDP. Year 2000 is the base year to measure the aggregates in terms of U.S. dollars. GDP is measured as the sum of gross value added by all domestic producers of Pakistan economy including product taxes and excluding subsidies for the product.

**Independent Variables:**

1. Growth rate of gross capital formation (GGCF): Aggregates of this variable from which annual growth rate has been calculated are measured in the terms of U.S. dollars, using 2000 as the base year. Gross capital formation includes expenditures on increases in the fixed assets of Pakistan economy adding net changes in the inventories’ level.
2. Growth rate of exports of goods and services(GEX): Aggregates of this variable from which annual growth rate has been calculated are measured in the terms of U.S. dollars, using 2000 as the base year. Exports of goods and services include the value of merchandise, freight, insurance, transport, travel, royalties, license fees, and other services excluding the labor and property income and transfer payments.
3. Inflation rate (INF): This variable is measured by the consumer price index, which shows the annual percentage change in the value of a fixed basket of goods and services. The Laspeyres formula of consumer price index is used.
4. Exchange rate (EXR): Exchange rate is the units of local currency relative to the U.S. dollar. This variable is calculated as an annual average based on monthly averages.
5. Domestic credit to private sector as percentage of GDP (DCPV): This variable measures the financial resources such as loans, purchases of non-equity securities, and trade credit etc provided to the private sector.[[5]](#footnote-6)

**Quality of Data:**

It is really tough to comment on quality of the secondary data. However, the above definitions of the variables show that the variables measure the concepts which we intended to measure. Given that the data have been collected according to the above definitions of the variables, the data used in this study is valid for the purpose of analysis. It is important to note that the above definitions of the variables have been taken from the user guide of the *World development Indicators* which is the source of the data used in this study. No data values are missing from any series. Data on *World Development Indicators* are drawn from the sources thought to be most authoritative[[6]](#footnote-7).

**II. Methodology**

To present the overall picture of the variables the descriptive statistics are used. The scatter-plot matrix is used to view the relationships among the variables used in this study. This matrix shows all the possible two dimension plots of the variables. A table of correlations among variables is also a part of the study. This table provides the values and signs of the coefficients of correlations. This table also provides the *P-values* of the test of the null hypothesis which states that the said variables are not correlated to each other. This table is also helpful to check the problem of multi-collinearity. The large correlations between the predictor variables indicate the problem of multi-collinearity.

Since the objective of this study is to check the dependence of the economic growth on different factors as stated above, in this study ordinary least square (OLS) method of multiple-regression is used to estimate the effects of those factors on the economic growth. The objective of the regression in this study is to find such an equation which could be used to find the predicted value of the GDP growth for a given set of values of growth rate of gross capital formation (GGCF), growth rate of exports of goods and services(GEX), inflation rate (INF), exchange rate (EXR), and domestic credit to private sector as percentage of GDP (DCPV). The specified multiple regression equation takes the following form:

GGDPt = β0 + β1GGCFt + β2GEXt + β3INFt + β4EXRt + β5DCPVt + Ut (1)

As specified in the above equation GGDPt is the dependent variable and other five variables are independent. Since all the variables are time series’, subscript t denotes the time period. β0 is the constant term. β1,β2,β3,β4,and β5 are the partial regression coefficients of the independent variables. A partial regression coefficient represents the change in dependent variable, ceteris paribus, due to one unit change in independent variable. Ut is the error term. To test the significance of the individual coefficients t-test is also employed in this study. Overall goodness of fit of the model is checked through F-test and the adjusted coefficient of determination (adj. R2). To test the problem of autocorrelation Durbin Watson (DW) test is also conducted.

**Justification of the Method:**

This study has used the descriptive statistics to present the overall picture of the variables. For the initial look on the relationship between different variables the scatter-plot matrix is used. This matrix shows all the possible two dimension plots of the variables. Magnitudes and signs of the correlation coefficients are provided in the table of correlations. This table is used to view the strength and direction of the relationship between the variables. This table also provides the *P-values* of the test of the null hypothesis that states that there is no correlation between two variables. This table is used to indicate the problem of multi-collinearity as well.

The method of multiple-regression is used to estimate the effect of multiple predictors on the predicted. Considering the objective of this study the multiple-regression analysis is used in this study to estimate the partial regression coefficients of the independent variables and their statistical significance. We have used the method of multiple-regression because there are five independent variables in this study and all of them are scale variables.

1. **Empirical Findings**

In this part of the study empirical findings have been shown and interpreted. Table 3.1 presents the descriptive statistics which show the overall picture of the variables.

**Table 3.1**

**Descriptive Statistics**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | N | Minimum | Maximum | Mean | Std. Deviation |
| GDP growth (annual %) | 45 | .4684 | 11.3535 | 5.473433 | 2.4684316 |
| Exports of goods and services (annual % growth) | 45 | -17.5821 | 38.9665 | 6.941759 | 12.6909687 |
| Gross capital formation (annual % growth) | 45 | -24.0962 | 60.0319 | 5.489317 | 11.8540447 |
| Inflation, consumer prices (annual %) | 45 | -.5165 | 26.6630 | 7.719210 | 5.4259583 |
| Official exchange rate (LCU per US$, period average) | 45 | 4.7619 | 61.9272 | 21.361227 | 18.5739194 |
| Domestic credit to private sector (% of GDP) | 45 | 12.1996 | 29.7861 | 24.082181 | 3.3477669 |
| Valid N (listwise) | 45 |  |  |  |  |

In the above table the minimum values, maximum values, mean values and the values of standard deviation of all the six variables have been shown. Mean value provides the idea about the central tendency of the values of a variable. Number of observations of each variable is 45. Standard deviation and the extreme values (minimum in comparison to maximum value) give the idea about the dispersion of the values of a variable from its mean value. Since different units of measure have been used for different variables the dispersion of a variable using standard deviation can’t be compared to that of other variable unless both the variables have the same unit of measure. But still these statistics are helpful to have an idea about the central tendency and the dispersion of a variable in absolute terms rather than relative terms.

Figure 3.1 exhibits the scatter plot matrix. In this matrix we intend to have some idea about the relationship between economic growth and other variables. This matrix shows the positive relationship between the GDP growth rate and growth rate of gross capital formation and between the GDP growth rate and growth rate of exports of goods and services. There is no specific relationship between GDP growth and inflation and between GDP growth and domestic credit to private sector as percentage of GDP. The relationship between GDP growth and official exchange rate seems to be negative. These results have been confirmed by the table of correlations.

**Figure 3.1**

**Scatter-Plot Matrix**



Table 3.2 represents the table of correlations. This table reflects two variables – growth rate of gross capital formation and growth rate of exports of goods and services – are positively correlated to growth rate of GDP (r= .325, p = .029, and r= .361, p= .015, respectively). Official exchange rate is negatively correlated to the GDP growth (r= -.333, p = .026). The magnitudes of the above discussed correlations are greater than 0.3 in the absolute terms, which shows the moderate correlations between the said pairs of the variables. All the above correlations are statistically significant at less than five percent level of significant. Correlations between GDP growth and inflation rate and between GDP growth and domestic credit to private sectors as the percentage of GDP are not statistically significant. In the case of these correlations the null hypothesis of no correlation can’t be rejected as the *P-values* are much greater than 0.05. The table shows that the correlation between only one pair of independent variables – growth of gross capital formation and domestic credit to private sector as percentage of GDP– is statistically significant at less than one percent level of significance. The magnitude of this correlation also shows the moderate correlation (r= -.559, p = .000). The table does not show the large value of the correlation between any two predictor variables. This situation shows that the problem of multi-collinearity might not be present in the multiple regression analysis.

**Table 3.2**

**Correlations**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | GDP growth (annual %) | Gross capital formation (annual % growth) | Exports of goods and services (annual % growth) | Inflation, consumer prices (annual %) | Official exchange rate (LCU per US$, period average) | Domestic credit to private sector (% of GDP) |
| GDP growth (annual %) | Pearson Correlation | 1 | .325(\*) | .361(\*) | -.065 | -.333(\*) | .005 |
| Sig. (2-tailed) |  | .029 | .015 | .672 | .026 | .974 |
| N | 45 | 45 | 45 | 45 | 45 | 45 |
| Gross capital formation (annual % growth) | Pearson Correlation | .325(\*) | 1 | .074 | -.194 | -.241 | -.559(\*\*) |
| Sig. (2-tailed) | .029 |  | .631 | .201 | .111 | .000 |
| N | 45 | 45 | 45 | 45 | 45 | 45 |
| Exports of goods and services (annual % growth) | Pearson Correlation | .361(\*) | .074 | 1 | -.223 | .017 | -.084 |
| Sig. (2-tailed) | .015 | .631 |  | .140 | .910 | .582 |
| N | 45 | 45 | 45 | 45 | 45 | 45 |
| Inflation, consumer prices (annual %) | Pearson Correlation | -.065 | -.194 | -.223 | 1 | -.065 | .038 |
| Sig. (2-tailed) | .672 | .201 | .140 |  | .673 | .806 |
| N | 45 | 45 | 45 | 45 | 45 | 45 |
| Official exchange rate (LCU per US$, period average) | Pearson Correlation | -.333(\*) | -.241 | .017 | -.065 | 1 | .200 |
| Sig. (2-tailed) | .026 | .111 | .910 | .673 |  | .187 |
| N | 45 | 45 | 45 | 45 | 45 | 45 |
| Domestic credit to private sector (% of GDP) | Pearson Correlation | .005 | -.559(\*\*) | -.084 | .038 | .200 | 1 |
| Sig. (2-tailed) | .974 | .000 | .582 | .806 | .187 |  |
| N | 45 | 45 | 45 | 45 | 45 | 45 |

Table 3.3 presents the results of the regression analysis. The results show that all of the independent variables except inflation significantly affect the economic growth as shown by the values of the t-statistic and the corresponding *P-values*. t-test is used to test the significance of the individual partial regression coefficients. Null hypothesis in this test is set as the partial regression coefficient is zero. This test shows that the coefficients of all the predictors except inflation are statistically significant at less than five percent level of significance. All of the significant coefficients have the positive signs except exchange rate. The effect of the exchange rate on the economic growth is negative and it is statistically significant. The magnitude of the partial regression coefficient of the growth rate of gross capital formation is 0.088, which suggests that holding other factors constant an increase of one unit in this variable would raise the economic growth by 0.088 units. Other things equal, the value of the partial coefficient of the growth rate of exports of goods and services reflects the change of 0.074 units in GDP growth due to one unit change in the growth rate of exports. The partial regression coefficient of official exchange rate on GDP growth is negative which represents that, given no change in other factors, an increase of one unit in official exchange rate would reduce the GDP growth by 0.032 units. Given that other factors remain same, the magnitude of the partial regression coefficient of the domestic credit to private sector suggests that an increase of one unit in this variable would raise the GDP growth by 0.24 units. Though it is hard to interpret the value of the constant term in our regression analysis, its value is negative which shows that in the absence of all the predictors used in this study the economic growth would be negative.

**Table 3.3**

**Regression**

**Dependent variable: GDP Growth (Annual %)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Variables | Coefficients | Std. Error | t-test | Sig. Level |
|
| Constant | -.805 | 2.981 | -.270 | .789 |
| Gross capital formation (annual % growth) | .088 | .033 | 2.663 | .011 |
| Exports of goods and services (annual % growth) | .074 | .025 | 2.897 | .006 |
| Inflation, consumer prices (annual %) | .032 | .061 | .524 | .603 |
| Official exchange rate (LCU per US$, period average) | -.040 | .018 | -2.261 | .029 |
| Domestic credit to private sector (% of GDP) | .244 | .114 | 2.144 | .038 |

Necessary statistics have been shown in table 3.4. The value of the coefficient of determination (R2) is 0.371. This shows that the correlation between the observed values of GDP growth and the fitted values of the GDP growth is thirty seven percent. . The value of the adjusted coefficient of determination (adj. R2) is not affected by the inclusion of the irrelevant variables. The value of the adjusted coefficient of determination (adj. R2) is 0.29, which shows that twenty nine percent variations in economic growth are explained by the variations in independent variables[[7]](#footnote-8). The value of F-statistic is statistically significant at less than five percent which exhibits that in the estimated model at least one of the partial regression coefficients is different from zero. The value of Durbin-Watson statistic is 1.954 which is very much supportive (close to two) and reveals that there is no serial correlation in the error term.

**Table 3.4**

**Necessary Statistics**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Coefficient of Determination (R2) | Adjusted Coefficient of Determination (Adj. R2) | Durbin-Watson Statistic | F-Statistic | Sig. (F-Stat) |
| 0.371 | 0.29 | 1.954 | 4.602 | 0.002 |

**Figure 3.2**

**Plot of Residuals against Fitted Values for the Economic Growth Data**



Figure 3.2 represents the plot of the studentized residual against the unstandardized predicted values. This plot shows that the spread of the studentized residuals is constant. This shows that the evidence of heteroscedasticity does not exist. Only one residual is between -2 and -3. This shows that residuals are normally distributed.

**4. Summary and Conclusion**

This study has investigated the determinants of economic growth for the period 1961-2005 in the case of Pakistan. After observing the scatter plot matrix and the correlations ordinary least square method of multiple-regression has been used for this purpose. The growth rate of GDP has been used as dependent variable as the representative of economic growth. The study could not find any impact of inflation rate on economic growth. The impact of growth rate of gross capital formation, growth rate of exports and domestic credit to private sector as a percentage of GDP are found to be positive and statistically significant. Yet, the effect of exchange rate on economic growth is found to be negative and statistically significant. According to the definition of exchange rate used in this study any increase in exchange rate represents the local currency depreciation. In this regard our results support the findings of Dollar (1992) who also found the negative impact of exchange rate depreciations on the economic growth in the case of 95 countries. Khan and Aftab (1995) found that the Marshall-Lerner stability condition was absent for the period 1983-1993 in the case of Pakistan. The absence of this condition shows that the demand for imports and exports of Pakistan is less elastic. The less elastic demand for imports and exports of Pakistan might be the reason of this negative effect. This situation suggests that monetary authority of Pakistan should peg the exchange rate at the lower level.

The coefficients of all the other three statistically significant coefficients are positive as they were expected. The impact of inflation on economic growth of Pakistan is not statistically significant. This shows that on average inflation has been not a problem in Pakistan during the period under study.

Positive and significant impact of exports’ growth on economic growth suggests that Pakistan should focus on export-led growth. Partial regression coefficients of growth of gross fixed capital formation and domestic credit to private sector suggests that Pakistan should take some measures to enhance the levels of gross fixed capital formation and domestic credit to private sector to improve its economic growth rate.

Although this study has included many important determinants in the analysis on the basis of theoretical narrations, yet in future studies it would be useful to include some other variables in the analysis as well. Inclusion of other variables e.g. technical change and human capital growth etc may improve the value of the coefficient of determination.

**References**

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1. Calculated using the data from WDI mark 2007 [↑](#footnote-ref-2)
2. For further study see khan (2006) [↑](#footnote-ref-3)
3. For details see Limam and Miller (2004) [↑](#footnote-ref-4)
4. Data from World Development Indicators have been collected through the link: <http://www.esds.ac.uk/international> [↑](#footnote-ref-5)
5. The Definitions of last three independent variables correspond to the International Financial Statistics of International Monetary Fund. [↑](#footnote-ref-6)
6. User Guide, World Development Indicators mark 2007 [↑](#footnote-ref-7)
7. The value of the adjusted coefficient of determination is relatively low. Due to the institutional directions (selection of utmost six variables) we could not include some of the important variables e.g. technical change and human capital growth etc in our analysis which could be the reason of the small value of adj. R2. [↑](#footnote-ref-8)