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STATISTICAL EVALUATION OF KEY DETERMINANTS FOR ECONOMIC GROWTH: A CASE STUDY IN PAKISTAN

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Abstract

Economic growth plays a vital role in shaping the overall development and stability of a nation. There are many factors that effects on the economic growth. In this study, various factors are taken for the analysis purpose to observe the significant factors for the economic growth. Secondary dataset is taken from 1991-2019 of Pakistan for various factors such as inflation rate, Gross Domestic Product (GDP), Gross National Product (GNP), Gross National Income (GNI), Unemployment rate, Population Growth Rate, Imports, Exports. Factor analysis is performed and the components are extracted. Three main components are extracted with 85.6% explained variation. The components are categorized as Economic Growth factor, Trade and Labor Market Dynamics and Price-import inflation pressure. The study provides the valuable insights for policy makers in designing targeted strategies for sustainable economic development.

INTRODUCTION

In entire economy, there are various factors that effects on the economic growth. For example, inflation, deflation, unemployment, and such other factors. Khan (2006) examined the forecasting related to the inflation factors. They found the economic factors played the main role in inflation. Later on, Malik (2011) explored the factors for inflation and economic growth for the Pakistan economy. Another study was of Khan and Qasim (1996), they estimated the key determinants for inflation in Pakistan (Javed et al., 2022). Different price indicators were found by the Khan and Gill (2010). They used various price indicators for the determinants of inflation. Relationship between economic growth and inflation had been examined by the Okuyan (2008). In 1998, Phillips found that the high inflation can be bad for the economic growth. Various economic growth and unemployment issues were found by the Soylu et al., (2018). They applied Pooled Panel Ordinary Least Square analysis for investigation of the relationship between the unemployment and economic growth in European countries. The impact of inflation and unemployment on the growth rate was analyzed by the Salam and Ilahi (2016). They found the positive relationship of inflation and unemployment on the economic growth. The linkage breakdown was investigated by the Qayyum (2006). A positive association was

found between inflation and money growth. Time series dataset was used by Shahid (2014) for the impact of unemployment and inflation on the economic growth. They used 1980 to 2010 dataset for economic growth. Relationship between the Gross Domestic Product and Inflation was found by the Joyia (2012) in Pakistan. They also found the positive relationship between the inflation and economic growth. The role of trade openness and other factors were observed by the Sadia et al., (2014) by finding the empirical analysis. By explaining the prevalence of poverty in Pakistan, Irfan et al., (2011) found the role of inflation and economic growth. Main determinants were found by the Abdullah et al., (2008) for the inflation in process of food.

Methodology

Factor Analysis

Factor Analysis considered as a statistical technique in a multivariate analysis. That is used for reduction of a large number of the observed variables into a smaller number of the unobserved latent factors. These latent factors are used to represent common variance that is shared among all the variables (Spearman; 1904).

Let there be p observed variables with m latent factors $F_1, F_2, \ldots, F_m$

The factor model can be written as :

$$X = \Lambda F + \varepsilon$$

Principle Component Analysis

PCA is considered as a procedure for identification of a smaller number of uncorrelated variables, called "principle components", that is from a large dataset. The objective of principle components analysis is the explanation of the variance that can be explained as maximum from the less number of principle components. Principle components analysis is used commonly in market research, social sciences and other industries that uses large number of dataset (Pearson; 1901).

Principle components analysis is commonly used as a one step analysis series. It can be used for reduction of number of variables to avoid the problem of multicollinearity, or when there are large number of predictors relative to the number of observations (Johnson & Wichern, 2014).

Statistical Analysis

For the extraction of factors that are related to the economic growth, secondary dataset is collected from 1991-2019 for various factors such as inflation rate, Gross Domestic Product (GDP), Gross National Product (GNP), Gross National Income (GNI), Unemployment rate, Population Growth Rate, Imports, Exports. Statistical Analysis is performed by using SPSS, in term of Principal component analysis and results are observed in Table 1- 3 as follows.

Table 1: Results for the Communalities

Communalities

	Initial	Extraction
GDP_Growth_rate	1.000	.895
GNP_GRowth_rate	1.000	.918
GNI_GRowth_rate	1.000	.757
Imports	1.000	.792
Exports	1.000	.924
Population_Growth_rate	1.000	.869
Unemployment_rate	1.000	.796
Inflation_rate	1.000	.894

Extraction Method: Principal Component Analysis

From Table 1, it is noted that the 89.5% variation is explained by the extracted factor of GDP Growth rate, 91.8% variation is explained by the GNP growth rate, 75.7% by the GNI growth rate, (that is acceptable), 79.2% through Imports, 92.4% through Exports, 86.9% through

Population growth , 79.6% and 89.4% through Unemployment rate and Inflation rate respectively. Since all the extracted values that are greater than 0.50, it means the all variables are providing well representation in the factor solution (Javaid and Atif; 2020)

Table 2: Results for the Total Variation Explained by the Components

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.143	39.291	39.291	3.143	39.291	39.291
2	2.392	29.901	69.192	2.392	29.901	69.192
3	1.309	16.364	85.55	1.309	16.364	85.555
4	.714	8.923	94.478			
5	.192	2.394	96.872			
6	.143	1.792	98.664			
7	.091	1.141	99.805			
8	.016	.195	100.000			

Extraction Method: Principal Component Analysis

From Table 2, according to the Kaiser Criterion, the first three components should be retained in PCA, as their eigen values are greater than 1. By cobining together, they are explaining 85.6% variation among the total variation, that is a very high explained variation which confirm them as strong factors for the economic growth. The eigen values for the remaining components are less than 1, showed the marginal contribution in explained variation. So, could not retained in the Final solution.

Table 3: Result for the Component Matrix

Component Matrix

	Component		
	1	2	3
GDP_Growth_rate	.756	.527	.214
GNP_GRowth_rate	.765	.541	.199
GNI_GRowth_rate	.621	.376	.480
Imports	-.543	-.233	.666
Exports	-.567	.774	-.060
Population_Growth_rate	-.554	.680	-.314
Unemployment_rate	.480	-.751	-.025
Inflation_rate	-.668	-.006	.669

Extraction Method: Principal Component Analysis

From Table 3, component matrix shows the each variable association with the three retained components. The values close to +1 or -1 shows the strong relationship with the component. While the values zero showed the weak association with the components. Based on the above scenario, GDP Growth Rate, GNP Growth strongest loadings for component 1 (Economic Growth Factor), while the Exports, Population Growth and Unemployment rate indicated the strongest loading for component 2 (Trade and Labor Market Dynamics). While the imports and

inflation rate indicated the strongest loading with the component three (Price-Import Inflation Pressure). The details can also be expressed in terms of graphical representation as in Figure 1 and Figure 2.

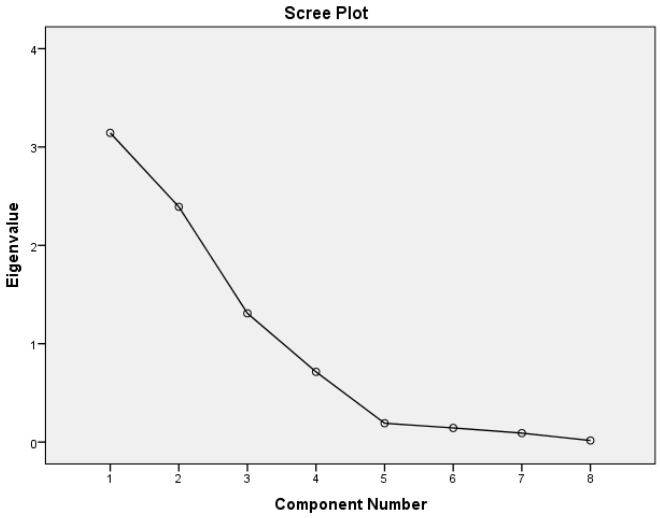

Figure 1: Scree plot

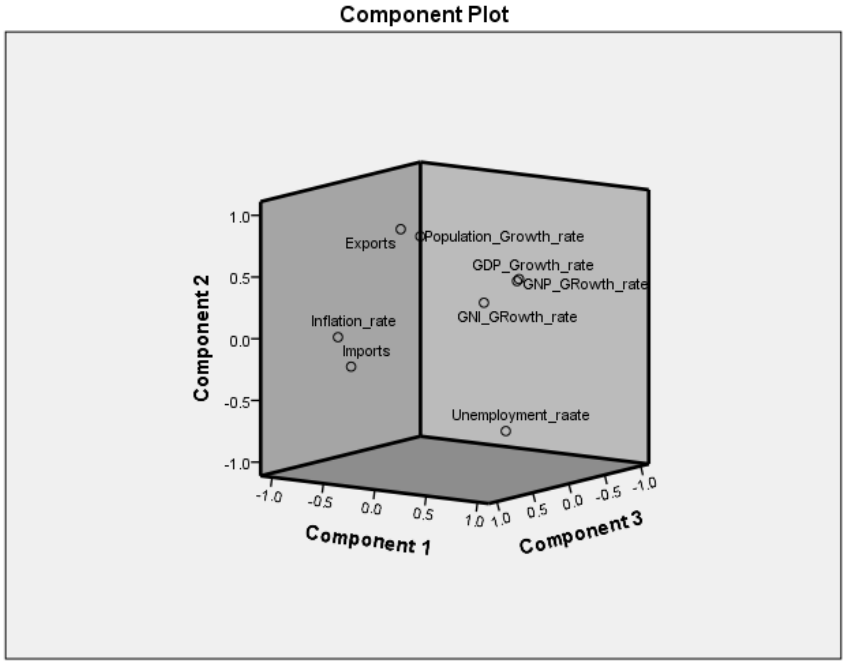

Figure 2: Component Plot

From Figure 1 and 2, various factors can be observed through the defined components as already defined in the Table 1-3.

Results and Discussion

From the statistical analysis, the various factors related to the economic growth are observed (Lodhi et al., 2023). The variables were found to

be the well representative for the economic growth by the extracted components(Lim et al., 2020). The three extracted components showed the higher explained variation as of 85.6%. that showed the strong data reduction. After rotation, the variables were found in groups with three meaningful factors as component 1, component 2 and component 3.

Thus overall, all the variables such as inflation rate, Gross Domestic Product (GDP), Gross National Product (GNP), Gross National Income (GNI), Unemployment rate, Population Growth Rate, Imports, Exports were found to be the most important for the economic growth. Therefore, Government should focus on well defined polices by focusing on the above factors for the economic growth.

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