Effects of Macroeconomic Factors on Gross Domestic Product in Nepal

Sita Khatiwada

Lecturer (Economics), Mahendra Multiple Campus, Dharan, Tribhuvan University, Nepal.
Email: *sitakhatiwada111@gmail.com*

Abstract

The main aim of this paper has tried to find the effect of macroeconomic factors like trade, population growth rate, domestic credit to private sector, and consumer price index on GDP growth using time series data of the last four decades (1975-2018) of Nepal which has been retrieved from a legitimate source of World Bank. This study has used descriptive analysis and multiple linear regression model to access the relationship between predictors and predictand variables. It has been found that there was no significant relationship between GDP growth and macroeconomic factors. This implies that change in any of the variables did not change GDP growth. The finding of the study has suggested the need for more researches with reliable data to find out the causes of economic growth in Nepal.

Keywords: CPI, domestic credit to the private sector, GDP, population growth, trade

Background Information

The economy of Nepal has transformed the policies of trade, industries, agriculture, and finance significantly over the previous few decades (Khadka, 1991). Despite the transformations, the GDP growth in the context of our country is unsatisfactory. According to Jain et al. (2015), GDP is a very strong measure to determine the economic health of a country. It is the sum of the total production of a country which consists of all purchases of goods and services produced by a country and services used by individuals, foreigners, companies, and the governing bodies. The issues accountable for this unsatisfactory GDP growth is inadequate production of domestic goods production, fewer exports, more imports, a rise in the population of dependent individuals, increased consumer price level, less domestic credit to private sectors, political instability, and natural calamities (Liu, 2018).

In this study, the macroeconomic variables affecting GDP growth are trade, domestic credit to the private sector, and the consumer index number has been studied. The role of foreign trade is extremely important for developing the economy of a country. It disseminates the advantages of industrialization and modern technology from developed to undeveloped countries. Trade openness is a very important component to develop foreign trade (Naveed & Shabbir, 2006). But, Nepal being a landlocked country is far from major trade-related networks and opportunities. As per Malthus (1798), population growth hampers the

economic process as growth is increasing at a higher rate than food production. The opposite reasons are: rapid increment dilutes the per capita capital stock because the constant capital should be adjusted among the increasingly dependent population.

Domestic credit to the private sector is additionally associated with GDP growth. Schumpeter (1912) has proposed that the origin of the economic process, namely, investment, has been financed by the degree of domestic credit within the private sector. because the domestic credit to the private sector manages capital, adds in output and employment, increases consumption and saving which affects GDP growth directly or indirectly (Perera & Paudel, 2009; Shrestha, 2005). The financial development helps to expand the economy, raise income, reduce poverty, and enhance the economic process.

The consumer index number is a median change in price over time that buyers purchase goods or services. It is also called inflation. In keeping with Thirwal and Barton (1971), there's a positive relationship between inflation of below 8 percent once a year and economic process with unadjusted for population change. Likewise, Barro (1995) has uncovered the adverse relationship between growth and rate significantly with the assistance of other helping variables, i.e. education, fertility, etc.

Literature showed that there is a change in GDP growth due to the change in trade, CPI, population growth, domestic credit to the private sector. Most of the studies have found a positive relationship between GDP growth and trade, population growth, domestic credit to the private sector but a negative relationship with the consumer price index. Thus, this study is more interested to analyze the relationship between these variables empirically in the context of Nepal. Since GDP is the most vital indicator of the dimensions and growth of the economy of a country or region; analyzing the relationship between GDP growth and macroeconomic variables is very helpful to policymakers and economists to improve the economy of our country. This paper focuses on macroeconomic factors like trade, population growth rate, domestic credit to private sector, and consumer price index affecting gross domestic product growth in Nepal using statistic data obtained from the database of World Development Indicators till 2018.

Objectives

General Objective:

To describe the condition of Gross Domestic Product growth, trade, population growth, domestic credit to the private sector, and consumer price index.

Specific Objectives:

1. To identify the average value of variables.

2. To identify the consistency of variables.

3. To examine the normality of variables

4. To examine the relationship between Gross Domestic Product and macro-economic variables.

Hypothesis:

H_0: There is no significant relationship between Gross Domestic Product growth and macro-economic variables.

H_1: There is a significant relationship between Gross Domestic Product growth and macro-economic variables.

Research questions

1. Which variable is normal?

2. What is the average value of variables?

3. Which variable is consistent?

4. What is the relationship between Gross Domestic Product and macro-economic variables?

Literature review

Several studies explained the link between GDP growth and macroeconomic variables. Volatility and fluctuation of GDP harm long-run economic growth in developing countries. Ramey and Ramey (1995) have shown that the dichotomy in macroeconomics between the volatility of economic fluctuations and growth is not supported by the data. Other factors causing fluctuations in GDP like political instability. Research on trade and economic growth in Nepal is limited. Sharma and Bhandari (2005) have reported a positive impact of export on per capita income growth in Nepal. Openness to foreign trade accelerates economic development. Grossman and Helpman (1991, 1992) and Barro and Sala-i-Martin (1995) have argued that countries that are open to foreign trade have a greater ability to absorb technological advances generated in leading nations. Paudel (2014) has shown that Nepal is a landlocked country that is far from major trade-related networks and opportunities which hampers economic growth.

The annual population growth rate is also one of the macroeconomic factors which affect GDP growth. According to Onishi and Kanae (2016), whether or not a country incorporates large-population, if it does not have enough capital, its industrial economy cannot

be large. In keeping with Malthus (1798), population growth hampers the economic process as it is increasing at a higher rate than food production. The opposite reasons are: rapid increment dilutes the per capita capital stock because the constant capital should be adjusted among the increasingly dependent population. Bucci (2015) has argued that an increase or decrease in population growth rate has a neutral impact on economic growth when the specialization gains of variety expansion are smaller than the corresponding losses because of higher production complexity. Timsina (2014) has reported that the bank credit to the private sector has a long term positive effect on the economic growth in Nepal. According to Paudel and Acharya (2020), financial development indicators like domestic credit to the private sector, domestic credit from the banking sector significantly contribute to economic growth. In keeping with Thirwal and Barton (1971), there's a positive relationship between inflation of below eight percent each year and economic process with unadjusted for population change. Paudyal (2014) has found that variables such as budget deficits, Indian prices, broad money supply, exchange rate, and real GDP influence inflation in Nepal.

Chaudhary and Xiumin (2018) have suggested that rates in Nepal are highly dependent on Indian rates because of weaker domestic production and increased imported goods from India. Inflation control is a difficult task for a country like Nepal which shares an open border with bigger countries and is heavily dependent on imported products for daily consumption and developmental purposes.

Methodology

Research design

The descriptive study was done to analyze the condition of macroeconomic factors and Gross Domestic Product growth in Nepal.

Variables

Dependent variable:

Gross Domestic Product growth

Independent variables:

Trade,

Population growth,

Domestic credit to the private sector, and

Consumer price index.

This study has used descriptive analysis and multiple linear regression model to access the relationship between predictors and predictand variables.

Data

Secondary data were used in this study. The data were retrieved from the database of World Development Indicators from 1975 to 2018 (World Bank, 2020).

Statistical Software

IBM SPSS version 26 was used to analyze the data.

Descriptive Statistics

Mean, standard deviation, covariance, Skewness, kurtosis, and Pearson's correlation were used to describe the data.

Econometric Model

The literature review showed that Gross Domestic Product is affected by Trade, Population growth, Domestic credit to the private sector, and consumer price index. Hence, the GDP is a dependent variable, and the remaining are independent variables. As the dependent variable (GDP growth) is a continuous, linear functional relationship with the explanatory variables could be assumed (Muiijs, 2004). The econometric model might be:

$$Y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \varepsilon$$

Where,

Y= Dependent variable (GDP),

β_0 = Intercept,

β_1= Elasticity of coefficient of trade,

β_2 = Elasticity of coefficient of population growth,

β_3 = Elasticity of coefficient of domestic credit to the private sector,

β_4 = Elasticity of coefficient of the consumer price index,

x_1 = trade,

x_2 = population growth ,

x_3 = domestic credit to the private sector,

x_4 = consumer price index respectively and

ε = error term.

To perform multiple linear regression following assumptions must be satisfied:

1. Linearity: There must be a linear relationship between the dependent variable and the independent variable.

2. Normality: The residuals are normally distributed.

3. No multicollinearity: The independent variables are not highly correlated with each other.

4. Homoscedasticity: The variance of error terms is homogeneous.

5. No autocorrelation: There is any correlation between error terms.

Analysis and Presentation of Ideas

Data analysis is represented in two sections. The first section presents the descriptive statistics and the second section presents the review of the econometric model.

Descriptive Statistics

Longitudinal data were used in the study. Data on Gross Domestic Product, Trade, Population growth, domestic credit to the private sector, and consumer price index distributed yearly from 1975 to 2018 was used.

Table 1

Descriptive Statistics

							Coeff. of Variation	**Skewness**		**Kurtosis**	
	N	Range	Min.	Max.	Mean	Std. D.	(%)	Statistic	Std. Error	Statistic	Std. Error
GDP growth (%)	44	12.66	-2.98	9.68	4.26	2.50	58.68	-0.62	0.36	1.64	0.70
Trade (% of GDP)	44	41.77	22.27	64.04	42.22	10.94	25.91	-0.04	0.36	-1.09	0.70
Population growth (annual %)	44	3	-0.27	2.73	1.73	0.83	47.98	-1.02	0.36	0.05	0.70
Domestic credit to private sector (% of GDP)	44	83	3.63	86.63	28.74	23.11	80.41	1.01	0.36	-0.02	0.70
Consumer price index (2010 = 100)-inflation	44	172.35	6.42	178.77	57.47	49.95	86.91	1.04	0.36	0.14	0.70

Table 1 shows the means and standard deviation of GDP growth, trade, consumer price index, domestic credit to the private sector, and population growth of Nepal in 44 years from 1975 to 2018. The mean values of GDP growth, trade, population growth rate, domestic credit to the private sector, and consumer price index were 4.26, 42.22, 1.73, 28.74, and 57.47 respectively. This indicates that the average consumer price index is highest and the average population growth rate is lowest.

Similarly, the standard deviation of GDP growth, trade, population growth rate, domestic credit to the private sector, and consumer price index are 2.50, 10.94, 0.83, 23.11, and 49.95 respectively. The standard deviation of the consumer price index is the highest and the standard deviation of the population growth rate is the lowest. Also, the coefficient of variation of GDP growth, trade, population growth rate, domestic credit to the private sector, and consumer price index is 58.68%, 25.91%, 47.98%, 80.41%, and 86.91%. This indicates that the trade is more consistent as it has the lowest coefficient of variation. The consumer price index is less consistent as it has the highest coefficient of variation.

Similarly, the standard deviation of GDP growth, trade, population growth rate, domestic credit to the private sector, and consumer price index are 2.50, 10.94, 0.83, 23.11, and 49.95 respectively. Thus the standard deviation of the consumer price index is the highest and the standard deviation of the population growth rate is the lowest. This indicates that the population growth rate is more consistent as it has the lowest standard deviation, hence, less deviated from the mean value. The consumer price index is less consistent as it has the highest standard deviation, hence, more deviated from the mean value.

The value of Skewness for GDP growth is found to be -0.62, which indicates that the distribution is not symmetrical, that is, it is negatively skewed. The value of Skewness for trade is -0.037 which indicates that the distribution of data is not symmetrical, that is, it is negatively skewed. The value of Skewness for annual population growth rate is -1.02 which indicates that the distribution of data is not symmetrical, that is, it is negatively skewed. The value of Skewness for domestic credit to the private sector is 1.01 which indicates that the distribution of data is not symmetrical, that is, it is positively skewed. The value of Skewness for the consumer price index is 1.04 which indicates that the distribution of data is not symmetrical, that is, it is positively skewed.

The value of kurtosis for GDP growth is found to be 1.64 which indicates distribution is leptokurtic. The value of kurtosis for trade is found to be 1.09 which indicates the

distribution is platykurtic. Similarly, the value of kurtosis for population growth rate is .054 which indicates the distribution is leptokurtic. Likewise, the value of kurtosis for domestic credit to the private sector is found to be -.02 which indicates the distribution is platykurtic. And the value of kurtosis for the consumer price index is found to be .14 which indicates the distribution is leptokurtic. Among all variables, the population growth rate is normally distributed.

The maximum value of GDP growth is found to be 9.68 and the minimum value is found to be -2.98. The maximum value of trade is found to be 64.04 and the minimum value is found to be 22.27. Similarly, the maximum value of population growth, domestic credit to private investment, and consumer price index are found to be 2.73, 86.63, and 178.77 respectively. Likewise, the minimum value of population growth, domestic credit to private investment, and consumer price index are found to be -0.27, 3.63, and 6.42 respectively.

Bivariate analysis

Pearson's correlation of zero-order is used to identify the relationship between the bivariate variables.

Table 2

Correlations

		GDP growth (%)	Trade (% of GDP)	Population growth (annual %)	Domestic credit to private sector (% of GDP)	Consumer price index (2010 = 100)-inflation
Pearson Correlation	GDP growth (%)	1	.18	.02	.14	.12
	Trade (% of GDP)	.18	1	-.34	.61	.61
	Population growth (annual %)	.02	-.34	1	-.78	-.79
	Domestic credit to private sector (% of GDP)	.14	.61	-.78	1	.99
	Consumer price index (2010 = 100)-inflation	.12	.61	-.79	.99	1

Table 2 shows that trade and GDP growth were positively correlated (.18), that is, there is a low degree of the positive correlation between trade and GDP growth. Population growth

and GDP growth were found to be positively correlated (.02), that is, there is a low degree of the positive correlation between population growth and GDP growth. It was found that there is a low degree of the positive correlation between domestic credit to private sector and GDP growth, that is, .14. Also, the consumer price index and GDP have a low degree of positive correlation, that is, .12.

There was a low degree of negative correlation between population growth rate and trade (-.34). There was a moderate positive correlation between domestic credit to the private sector and trade (.61). There was a high degree of negative correlation between domestic credit to the private sector and population growth (-.78). There was a moderate positive correlation between the consumer price index and trade (.61). There was a high degree of negative correlation between the consumer price index and population growth (-.79). There was a high degree positive correlation between the consumer price index and domestic credit to the private sector (0.99).
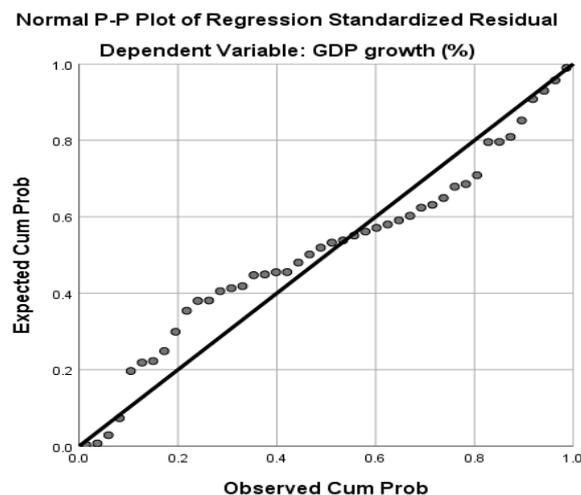
Analysis of the econometric model

The assumption of multiple linear was analyzed before performing a multiple linear regression model.

It was found that most of the assumptions were not met. It was found that all the independent variables were not linearly related to dependent variables, violating the assumption of linearity.

P-P plot of regression standardized residual showed that the residuals were slightly deviated from the linear regression line, violating the assumption of normality.

Figure 1

It was found that there was no autocorrelation, that is, Durbin-Watson statistics lies between 1 and 3.

Table 3

Model Summary

Model	R	R Square	Adjusted R Square	Standard Error of the Estimate	Durbin-Watson
	.26[a]	.07	-.03	2.53	2.58

Note. a. Predictors: (Constant), Consumer price index (2010 = 100)-inflation, Trade (% of GDP), Population growth (annual %), Domestic credit to private sector (% of GDP)

b. Dependent Variable: GDP growth (%)

Table 3 shows that the variance of the error term was not homogenous; the assumption of homoscedasticity was not satisfied. It was found that the independent variables were highly correlated. Likewise, the variance inflation factor for domestic credit to the private sector and consumer price index was found to be greater than 10, indicating the presence of multicollinearity. There is a tendency of the economic variable to move together over time which causes multicollinearity.

Table 4

VIF Table

	Coefficients[a]		
Model		Collinearity Statistics	
		Tolerance	VIF
Independent variable	Trade (% of GDP)	.57	1.75
	Population growth (annual %)	.35	2.87
	Domestic credit to the private sector (% of GDP)	.03	32.77
	Consumer price index (2010 = 100)-inflation	.03	34.58

Note.

a. Dependent Variable: GDP growth (%)

Due to multicollinearity, there may be

1. A wider confidence interval for the regression coefficient

2. Insignificant t ratio

3. R^2 is very high

Since most of the assumptions of linear regression were violated. Multiple linear regression analysis cannot be performed. Moreover, if multiple linear regression was carried out in presence of multicollinearity, the predictor variables may not be able to explain the variation in the predictand variable. So, the hypothesis using correlation was tested.

Hypothesis testing:

Testing the Significance of a Correlation

Let α =0.05 be the level of significance.

Table 5

Correlation between GDP growth and Trade

Variables		Trade (% of GDP)
GDP growth (%)	Pearson Correlation	.18
	Sig. (2-tailed)	.23
	N	44

Table 5 shows that p-value (.23) > .05, the null hypothesis is accepted. We have sufficient evidence to conclude that there is no significant relationship between GDP growth and trade.

Table 6

Correlation between GDP growth and population growth

Variables		Population growth (annual %)
GDP growth (%)	Pearson Correlation	.02
	Sig. (2-tailed)	.92
	N	44

Table 6 shows that p-value (.92)>.05, the null hypothesis is accepted. We have sufficient evidence to conclude that there is no significant relationship between GDP growth and population growth.

Table 7

Correlation between GDP growth and domestic credit to the private sector

Variables		Domestic credit to the private sector (% of GDP)
GDP growth (%)	Pearson Correlation	.14
	Sig. (2-tailed)	.36
	N	44
	Sig. (2-tailed)	
	N	44

Table 7 shows that p-value (.36)>.05, the null hypothesis is accepted. We have sufficient evidence to conclude that there is no significant relationship between GDP growth and domestic credit to the private sector.

Table 8

Correlation between GDP growth and Consumer price index

Variables		Consumer price index (2010 = 100)-inflation
GDP growth (%)	Pearson Correlation	.12
	Sig. (2-tailed)	.42
	N	44

Table 8 shows that p-value (.42)>.05, the null hypothesis is accepted. We have sufficient evidence to conclude that there is no significant relationship between GDP growth and consumer price index.

Conclusion

In nutshell, the study found that the consumer price index had the highest average and the population growth rate had the lowest average. It also found that the population growth rate was more consistent and the consumer price index was less consistent. Most of the variables were not normally distributed. There was no significant relationship between GDP growth and trade, GDP growth, and population growth rate, GDP growth, and domestic credit to the private sector and GDP growth and consumer price index. Since there was a low degree positive correlation between the GDP growth and above mentioned macroeconomic variables, correlation is almost equal to zero. Most of the reviewed literature showed that there was a link between GDP growth and trade, population growth rate, domestic credit to the private sector, and consumer price index. But, this study found that there was no relationship between GDP

growth and trade, population growth rate, domestic credit to the private sector, and consumer price index. It might be due to the data which was presented in a long duration of time. In this regard, the researchers should analyze the data within a short period to study the relationship between the GDP growth and macroeconomic variables. This study was limited to secondary data spanning from 1975 to 2018 which was retrieved from the database of World Development Indicators. As the sample data was only from Nepal, the findings of the study can not be generalized. Also, the study analyzed the relationship of GDP growth and only four macroeconomic variables such as trade, domestic credit to the private section, population growth, and CPI, which might not be enough to correlate GDP growth and other variables. Therefore, researchers should increase the number of macroeconomic variables to find the link between them and GDP growth. The scope of existing research is limited in the context of Nepal which may be due to the lack of reliable data. Hence, more researches should be done to distinguish the causes of economic growth in developing countries like Nepal.

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