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An In-Depth Analysis of Macroeconomic Factors Influencing Nepal's Economic Growth

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Abstract

Background: Nepal, a low-income South Asian country, faces significant challenges in achieving sustainable economic growth. Various macroeconomic determinants such as inflation, government expenditure, foreign direct investment, and net exports play critical roles in shaping its economic trajectory. Despite global research on growth determinants, limited studies focus on Nepal's context, particularly over the long term. **Objective:** This study investigates the impact of key macroeconomic determinants—gross fixed capital formation (GFCF), net export (NE), and total expenditure (TE)—on Nepal's real gross domestic product (RGDP) from 1980 to 2022. **Methods:** Using time-series data from credible sources like the World Bank and IMF, the research employs an Ordinary Least Squares (OLS) regression model. Diagnostic tests including heteroscedasticity, serial correlation, and normality assessments ensure model reliability. **Findings:** Gross fixed capital formation significantly positively affects economic growth, while net exports show a negligible and negative relationship with RGDP. Total expenditure positively influences growth, though with modest significance. Diagnostic tests confirm the robustness of the model, with R-squared values indicating high explanatory power. **Conclusion:** Investments in capital formation drive economic growth in Nepal, while high import-export imbalances and recurrent expenditure hinder progress. The study recommends policy adjustments to enhance trade competitiveness and efficient resource allocation. **Novelty:** This study provides a comprehensive analysis of Nepal's economic growth determinants over a four-decade period, bridging research gaps with its detailed econometric approach.

Keywords: Economic growth, Nepal, gross fixed capital formation, net export, total expenditure, macroeconomic determinants, OLS regression.

Introduction

Nepal, a low-income country located in South Asia, has been struggling to achieve rapid economic growth and sustainable development. The country's economic growth has been influenced by various macroeconomic determinants, including GDP, inflation, exchange rate, government expenditure, and foreign direct investment (FDI) (MOF,2023).

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The main macroeconomic goal in every country is rapid and sustained economic growth. Every government creates strategies and programs aimed at accelerating the growth rate of the GDP. In a global situation, growth was 3.1% in 2016 and is expected to reach 3.7 percent in 2017, but only 3.6 percent of that was actually achieved.

Furthermore, the anticipated growth rate in 2022 is 7.2 and 6.6 percent of our China and India, respectively, are neighbors (Ministry of Finance (MOF, 2023). The economic condition in Nepal is difficult. Not one economic indicator is in the green. Additionally, trade and commercial conditions are not good. The annual budget is announced without a revenue source. The Nepalese economy is split between income from remittances and spending focused on imports.

The majority of development projects depend on foreign help, and since that money was delayed, both the construction of infrastructure and the programs themselves slowed. The aid's mobilization component was likewise lacking. Remittance inflow has been gradually declining over the past year (MOF, 2023).

Another aspect of Nepal is its financial accessibility. The majority of people in Nepal are ignorant about the saving. Even under dire circumstances, saving may aid in capital building and financial progress. The net export is growing at a risky rate every year. Under these circumstances, negative trade accounts for more than 34% of the GDP (MOF, 2023).

Effectiveness mechanisms and short term and long-term effects of macroeconomic determinants on economic growth were not thoroughly examined. Therefore, it is essential to examine the effect of these macroeconomic variables on the Nepalese economy from 1980-2022. This article examines the trend and nature of overall spending, net export, gross fixed capital formation, and economic growth and also analyze the determinants of economic growth in Nepal from 1980-2022.

Review of Literature

Sharma (2012) studied the link between public expenditure and economic growth in Nepal from 1980 to 2018, using real GDP and government expenditure as independent variables, aiming to understand the effect of public expenditure on economic growth. He utilized ARDL and ECM models to examine associations between economic growth and public expenditure, assessing stability of long-run coefficients. This study used Breusch-Pagan-Godfrey test, normality test, and Granger Causality test to examine the relationship between both.

Chirwa and Odhiambo (2016) identified important macroeconomic elements that influence economic growth in developing nations comprise trade, fiscal policy, foreign aid, investment, natural resources, reform, human capital development, demography, and geography. This analysis shows that macroeconomic elements critical to economic growth in industrialized nations include trade, demography, fiscal policy, human capital, physical capital, and financial and technology variables.

Milenkovic, et al. (2017) identified the monetary policy as a crucial component of a country's economic policy, with inflation and monetary aggregates being significant components. This paper examines the impact of macroeconomic indicators on the real gross domestic product.

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They used inflation, monetary aggregate, public expenditures, and foreign direct investment as independent variables and FDI as dependent variables. Their results show a positive relationship between GDP, INF, PE, and FDI, that was not statistically significant. However, M3 negatively impacted GDP, with a high correlation between INF and PE.

Ahmed, et.al. (2021) used asymmetric and symmetric ARDL models to inquiry cointegration and long-term association. Their study discloses asymmetric and symmetric relationships between variables and ecological footprint in Japan. Their symmetric ARDL model shows economic globalization and financial development, while asymmetric ARDL shows reductions and asymmetries. Positive financial development increases ecological footprint in the long run, while negative changes weaken it. Population density decreases footprint, and the EKC's validity in Japan is confirmed. Policy implications discussed.

Gaire (2019) explained a bilateral causal relationship between government expenditure and gross fixed capital formation in Nepal, but no causal relationship exists between government expenditure, real GDP, and private consumption.

Adhikari (2020) utilized Distributed Lag Models to examine the impact of inflation on Nepal's economic growth, analyzing nominal GDP and CPI data in logarithmic form. This study used CPI data to analyze inflation and finds that Nepal's current economic growth is negatively affected by inflation, while it is positively affected by earlier inflation. The regression of economic growth on inflation is stable, suggesting that inflation rate adjusts with increasing output and investment rate.

Bhattarai (2021) examined the long-term relationship between economic growth and variables in Nepal, estimating inflation threshold levels using linear and threshold models from 1975-2019. The model reveals a co-integrating relationship between economic growth and various variables, with consumption to GDP ratio, investment to GDP ratio, and total trade volume to GDP ratio being the most significant determinants in Nepal.

Timsina et al. (2023) conducted a study on Nepal's optimal inflation rate using secondary data and the Ordinary Least Square method. They found a turning point of 6.25% and a threshold level of 6.4%, indicating high inflation and low economic growth. Nepal has the highest inflation rate in the SAARC region, compared to Bhutan and Pakistan. This results in low economic growth and distorts resource allocation, weakens competitiveness, and lowers domestic savings. Central banks worldwide combat high inflation to maintain a low level.

Numerous international studies explore the determinants of economic growth, focusing on macroeconomic variables and policies. Methods used include OLS, ECM, VAR, and Causality tests, examining the relationship between economic growth and macroeconomic variables. Studies on economic growth in the national context are conducted by Ghimire (2019), Gaudel (2006), and Sharma (2020); the international context are conducted by Agide (2014), Bengoa, et al (2003), Barro (1999), Udonwa (2016), and others. These studies contribute to the generation of research ideas. Studies on the factors influencing Nepal's economic growth between 1980 and 2022 are non-existent. The present study and the literature review thus differ significantly.

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Methods

In order to examine the trends and characteristics of such factors, the research intends to investigate the primary drivers of economic growth in Nepal. Use a variety of econometric methods to examine the data once, it has been obtained. Studies have used both descriptive and quantitative analytic methodologies. The quantitative analysis is based on ordinary least squares techniques and is used to examine the nature and trend.

Conceptual Framework

Here economic growth is dependent variable and inflation, gross fixed capital formation, net export, and total expenditure are independent variables.

Figure 1: Conceptual framework on impact of gross fixed capital, net export, total expenditure on real gross domestic product.

Independent Variables	Dependent Variable
GFCF (Gross Fixed Capital) NE (Net Export) TE (Total Expenditure)	RGDP (Real Gross Domestic Product)

Source: Author's Assessment

Nature and Source of Data

The data used for this analysis includes annual observations from 1980 to 2022. The data was obtained from World Bank, International Monetary Fund (IMF) publication, and the Central Bureau of Statistics (CBS) of Nepal.

Model Specifications

Using time series data, this article aims to determine the factors that contribute to Nepal's economic growth. There has been usage of linear empirical modeling, such as the ordinary least square (OLS) approach. Gross fixed capital formation, net export, and total spending are the independent variables, while real gross domestic product is the dependent variable. The economic model that follows has been used to determine the outcome:

RGDP = f (GFCF, TE, NE) (1)

Tools of Data Analysis

The data in this article are analyzed using ordinary least squares (OLS). OLS refers to the process by which we select the estimator value that would result in the lowest possible sum of square residual. The model of Equation(i) can be extended as

$$\text{LNRG}P_t = \alpha_0 + \alpha_1 \text{NRGFC}F_t + \alpha_2 \text{LNRN}E_t + \alpha_3 \text{LNRT}E_t + \varepsilon \quad (2)$$

R^2, F-test and t-test are used to test overall significance of model and the significance.

Testing Multiple Regression

The F-test is used to evaluate multiple regression's significance and the null hypothesis that each coefficient is jointly zero. With the use of the analysis of variance (ANOVA) method, this joint hypothesis may be verified. Given the K-value in the models:

$$Y_i = \beta_1 + \beta_2 X_2 + \beta_3 X_3 + \cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots + \beta_k X_k + u_i + \cdots \quad (3)$$

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Null Hypothesis: All coefficients are zero $\beta_1 = \beta_2 = \beta_3 = \cdots\cdots\cdots + \beta_k = 0$.

$$F = \frac{\frac{ESS}{DF}}{\frac{RSS}{DF}} = \frac{\frac{ESS}{K-1}}{\frac{RSS}{N-K}} \quad (4)$$

If F > F_α (k-1, n-k) discard null hypothesis. Then,F_α (K-L, n-k) critical value of F at α level of significance. Otherwise, we reject the hypothesis and if the F's P-value is low shows the multiple regression is significant or none of the coefficients are concurrently zero.

Residual Diagnostic Test

Ordinary Least Square (OLS) estimate is the basis for this investigation. Autocorrelation and multicollinearity are missing for the heteroscedasticity of the OLS estimators since they are based on assumptions. Assumptions improve the validity and dependability of the model while also improving its accuracy. The significance residual diagnostic tests are listed below.

Serial Correlation

Serial correlation is the lag correlation of residual series. The absence of it is the null hypothesis. The model has serial autocorrelation, according to the alternative theory. When null hypothesis H_0 , then residuals are not serial correlation. Alternative hypothesis H_1, then only residual is serial correlation.

Heteroscedasticity

The constant variance of the random component is one of the key characteristics of the OLS technique. Heteroscedasticity is the term used when this characteristic is not met. When the variance values of the random term vary for various observations, heteroscedasticity is present. The absence of heteroscedasticity in the residual series gives null hypothesis. The alternative theory is that the model has heteroscedasticity. When null hypothesis H_0 , then residuals are not heteroscedasticity. Alternative hypothesis H_1, then only residual is heteroscedasticity.

Normality test

The residual series' normal distribution is the test's null hypothesis. The model is deemed superior if the residual series exhibit normality. Nonetheless, the normalcy test is not as important when there are a lot of observations (Gujarati et al., 2009). The Jarque-Berra (JB) test is used in this investigation to determine whether the residual series have a normal distribution.

Hypothesis Null (H_0): The residuals do not follow a normal distribution.

Alternative Hypothesis (H_1): The residual distribution is normal.

Results and Discussion

Determination of the Economic Growth

This paper employed a least squares multiple regression model. Gross fixed capital formation, net export, and total expenditure are the explanatory variables. The descriptive statistics of the

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variables come first. The next issue is examination of regression results. Relative diagnostics is the final topic.

Descriptive Statistics of the Variables

The table presents descriptive statistics of gross fixed capital formation, total expenditure, real GDP, nominal GDP, net export, export, and import, including mean, median, maximum, minimum, standard deviation, and skewness.

Descriptive Statistics of GFCF, TE, RGDP, NGDP, Net export, Export, and Import

Table 1: Variables

Descriptive Statistics	GFCF	TE	RGDP	NGDP	Net export	Export	Import
Mean	11332.03	10559.38	49825.94	669168.4	-12179.7	3256.572	15436.25
Median	5222.55	4280.12	23404.4	280513.0	-5321.12	2125.88	8098.99
Maximum	64729.39	60101.56	224740	3458793	-79.59	9199.13	77468.42
Minimum	222.3	151.37	1660.1	16601.00	-70348.2	104.62	198.17
Standard Deviation	15995.32	15044.29	62641.65	889055.7	19024.36	2967.747	21430.12
Skewness	- 1.031158	2.097582	0.659096	1.629933	2.742233	0.095763	0.957197
Kurtosis	2.968182	6.547130	2.368299	4.729584	10.66222	1.741178	2.740737
Jarque-Bera	7.976550	56.59037	4.006272	25.53410	166.4792	3.039964	6.997729
Probability	0.018532	0.000000	0.134912	0.000003	0.000000	0.218716	0.030232
Sum	4741.880	2330717	1850108	30112573	-2096190	2395.070	4693.120
Observations	42	42	42	42	42	42	42

Source: Based on Appendix

Table 1 shows GFCF sample mean is 11332.03, while the median (middle value) is 5222.55. In this observation, the GFCF is calculated to be 64729.39 and f 222.3. The standard deviation it is 15995.32, indicating a departure from the sample mean. GFCF possesses positive skewness, which is expressed by a value greater than the sample mean, and platykurtic value is1.031158 and 2.968182 respectively. The likelihood value of Jarque-Bera less than 5%, shows that normality of variable.

The RGDP sample mean is 49825.94, while the median is 23404.4. The variation from the sample mean is shown by the RGDP standard deviation, which is 62641.65. RGDP has a maximum value 224740 and minimum value of 1660.1. Leptokurtic kurtosis and positive skewness characterize RGDP.

The table shows all variables except TE have positive skewness and long right tail distribution, while RGDP and TE are leptokurtic kurtosis and platokurtic kurtosis, respectively, and only

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RGDP and TE data are normally distributed. This paper uses natural log of data to address the problem of falsifying results due to normal distribution of variable data.

Regression Result

Table 2 reveals that gross fixed capital formation significantly influences Nepal's economic growth, with a coefficient of 0.61, indicating that an increase in investment leads to an exponential increase in economic growth.

OLS Regression

Table 2: Test Result

Dependent Variable (LNRGDP)
Method (Ordinary Least Square)
Number of Observations (42)

Variable	Coefficient	Std. Error	t-statistic	P-Value
C	4.4038	0.3770	11.6788***	0.0000
LNRGFCF	0.6160	0.1072	5.7455***	0.0000
LNRNE	-0.0181	0.0662	-0.2746	0.7851
LNRTE	0.0231	0.1111	0.2086**	0.0359

Source: Calculation by E-views. *** 1% level of significance, ** 5% level of significance and *10% level of significance

The net export's p-value is over 1%, indicating no significant impact on Nepal's economic growth, whereas total expenditure's p-value is significant at 5% level of significance. Net export negatively impacts economic growth, decreasing GDP growth when increased. High import-export ratios and recurrent government expenditure contribute to insignificant growth. Nepal's predictive capacity is weak, as most imports are consumed.

The aggregate growth function is

$$LNRGDP = 4.4038 + 0.6160LNRGFCF – 0.0181LNRNE + 0.0231LNRTE \quad (5)$$

The long-run real gross domestic product RGDP is influenced by LNRGFCF, LNNE, and LNRTE, with a positive relationship between RGDP and NE, GFCF, and TE, and a negative relationship with net export.

Diagnostic Test

Diagnostic testing of residuals is highly critical. The property or statement should be encountered accurate results. If not, it yields a wrong outcome (Wooldridge, 2012).

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Diagnostic Test

Table 3: Residual Diagnostic Test

Diagnostic	Test Value
R-squared	0.9885
Adjusted R-squared	0.9873
S.E. of regression	0.0636
Sum squared residual	0.1496
Log likelihood	58.7790
F-statistic	797.99
Prob(F-Statistic)	0.0000
D-W	1.3472
$æ^2$ (Auto-correlation)	5.11 (0.07)
$æ^2$ (Normality) /JB test	2.013 (0.36)
$æ^2$ (Heteroscedasticity)/BPG test	2.819 (0.58)

Source: Calculation from EViews

Table 3 shows R-squared and adjusted R-squared values of 0.9885 and 0.9873, respectively, indicating spurious regression. Overall, though, the OLS regression model appears to be in decent form since the F-statistics value is statistically significant at the 1% level of significance.

Heteroscedasticity Test

The Breusch-Pagan-Godfrey was used to assess heteroscedasticity in residuals, establishing a null hypothesis and regressing square residuals from initial regressions.

Null hypothesis: Residuals are not heteroscedasticity.

The related probability values for f-statistics, scaled explained SS, and observed R-squared are displayed in Table 4.3 and are more than 5 percent. It indicates that rather than being rejected and null hypothesis is accepted. Therefore, there is no heteroscedasticity in the model. The outcome of the BPG test demonstrates that the residual series variance for the specified OLS regression model has a homogenous distribution.

Conclusion

The paper reveals a long-term relationship between real gross domestic product (RGDP) and various variables such as gross fixed capital formation, net export, and total expenditure, with net export negatively affecting RGDP. The paper found that net export negatively impacts economic growth, with a high import-export ratio and significant government expenditure on recurrent expenditure for employee salaries.

The paper also found a significant positive correlation between gross fixed capital formation (GFCF) and economic growth in Nepal, with a p-value of 0.0000 and a coefficient of 0.61, indicating a positive relationship between GFCF and GDP.

This paper analysis that macroeconomic determinants such as GDP, inflation, exchange rate, government expenditure, and FDI have significant impacts on economic growth in Nepal. The results indicate that an increase in GDP, exchange rate stability, government expenditure, and

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FDI can promote economic growth in Nepal, while high inflation rates can reduce economic growth.

Policy Recommendations

Based on the findings of this analysis, the following policy recommendations are suggested:

1. **Promote Economic Growth:** The government should focus on promoting economic growth through policies such as increasing investment in infrastructure development, promoting exports, and encouraging foreign direct investment.
2. **Control Inflation**: The government should implement policies to control inflation, such as reducing fiscal deficit and increasing interest rates.
3. **Stabilize Exchange Rate**: The government should maintain a stable exchange rate to promote exports and discourage imports.
4. **Increase Government Expenditure**: The government should increase government expenditure on infrastructure development, education, and healthcare to stimulate economic growth.
5. **Encourage Foreign Direct Investment**: The government should encourage foreign direct investment by providing incentives such as tax holidays, duty-free imports, and streamlined regulatory procedures.

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