EXAMINING THE DRIVERS OF ECONOMIC GROWTH IN NEPAL: A MACROSCOPIC ECONOMETRIC ANALYSIS

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Abstract

This article investigates the impact of macroeconomic variables on the economic growth of Nepal. The study focuses on the post-COVID-19 era, addressing the unique challenges faced by both advanced and developing economies. GDP is dependent variable, and independent variables are the consumer price index, exchange rate, gross capital formation, import, broad money supply, remittances, tourism income, and export. Data from 1974 to 2020 are derived from secondary sources, which include macroeconomic data published by Central Bureau of Statistics and Nepal Rastra Bank; a variety of economic surveys published by the Ministry of Finance. The econometric results reveal a robust model, with an R-squared value of 70.66%, indicating a good fit. The researchers employed the Augmented Dickey-Fuller Test to ascertain the stationarity of the variables, while Johansen's Co-integration Test revealed the presence of co-integration within the model. The negative and significant coefficient of VECM expresses the long run relationship and Granger Causality. The findings of the test indicate that there is a two-way causal relationship between gross capital formation and broad money supply with GDP. There is unidirectional causality between the Nepalese consumer price index and GDP, as well as between GDP and remittances, but no causality between the exchange rate, tourism income, exports, and GDP.

The findings confirm that the variables are determinants of economic growth in Nepal. As a result, policymakers should consider these variables for the country's economic growth.

Keywords: *Granger Causality test, Co-integration test, Time series analysis, VECM, Unit root test,*

1. Introduction

The country is said to be experiencing economic growth if its gross domestic product continues to rise over the long term. Economic advancement, economic welfare, and occasionally economic prosperity are other names for it. An abundantly resourced nation will trade with a nation that needs its exports and imports to be mutually beneficial in order to further economic development in both nations. Then, according to the idea of human capital, human capital is the primary capital to develop in order to maximize productivity from already-existing resources. The literacy rate, proficiency level and life expectancy at birth of a country provide an overview of the quality of its human resources. Because resources are required for processing, robust health and human resources are required to fully use the state's existing resources.

Increases in an economy's productive capability over a specific time period are referred to as economic growth. All other things being equal, this means that if land, labor, and capital are all used as effectively as possible, the economy should expand. The primary metric for measuring macroeconomic performance is this (Lewis, 2013). While the measurement of productive capacity poses challenges, economists often turn their attention to more accessible indicators of economic development, such as the percentage fluctuation in Gross Domestic Product (Lewis, 2013; McCombie & Thirlwall, 2016).

Economic development has historically been the best method for enabling countries to raise the standard of living for all of its citizens, including the poorest country. Economic growth can take three forms: positive, negative, or zero, according to Haller (2012). According to her, a country experiences good economic growth when the macro-indicators' yearly average rhythms are greater than the population's annual average rhythms of growth. On the other side, when population growth rhythms are faster than macroeconomic indicator rhythms, negative economic growth is observed.

According to her, the annual patterns of growth observed in macroeconomic indicators, specifically GDP, closely mirror the patterns of population growth, which is another definition of zero economic growth.

According to Bakari and Mabrouki (2017), the presence of the advantages of the nation's resources cause trade activity in the economy, and the output will strengthen the nation's economy. A country's increasing reliance on imports to provide its domestic needs might be brought on by a lack of processing resources for raw materials or by the poor quality of domestically produced items. The subpar quality of human resources employed in the manufacturing sector hinders the ability to meet the national expectations for goods and services produced. Human resources is foundation of prosperous nation (Todaro, 1995).

The examination of the variables that support or restrict economic growth has been

one of the primary foundations; however, there is still a lack of consensus on the matter. Two significant innovations have dominated most of the current discussion on economic development within the context of economic growth theory. The neoclassical and endogenous growth theories fall within this category. They have primarily emphasized the significance of state elements like the growth of human capital and the buildup of physical capital (Lucas 1988, Romer 1986).

Various studies have considered different variables using different statistical tools but the combination of the used variables are not done in the recent time. Mainly after the covid-19 the discussion about the economic growth is of the prime concern. Different between the advance economics and developing economies with regard to the concerned variables are different, hence the impacts of the same variables are considered for the purpose of the study is important. There aren't as many studies on the correlation between macroeconomic factors and economic growth and Nepal's economic growth as compared to other industrialized nations. However, it is impossible to disregard Nepal's economic development, thus this study aims to provide shed light on the relationship and implications between macroeconomic factors and Nepal's GDP growth.

2. Literature Review

When the drivers of economic growth are explored in diverse literatures, several distinct variables are identified to be the determinants of economic growth. Chen and Feng(2000) examined the relationships between commerce, state-owned firms, investment, inflation, enrolment in higher education, and economic development in China in their research. Using province panel data, the study found that commerce and university enrolment were significantly and positively related to GDP.

On the other side, economic growth was adversely and strongly correlated with inflation and state-owned businesses. Therefore, their analysis came to the conclusion that education, private businesses and international trade were significant factors in China's long-term economic success.

Using an expanded neoclassical growth model that encompassed the years 1964-1991, Freire-Seren (2002) examined the connection between the accumulation of human capital and economic growth in different regions of Spain. .According to the study, investing in and developing human capital are both significantly and positively related to economic growth. Using an enhanced neoclassical growth model, Anaman (2004) examined the factors influencing economic development in Brunei Darussalam over the years 1971–2001. The findings demonstrated a positive and substantial relationship between exports and investment share and real GDP growth. The findings of the study also revealed threshold effects in government size, with moderate size of government significantly and positively connected with economic growth and bigger size of

government significantly and negatively correlated with economic growth.

According to a study conducted by Haque and Kneller (2015) using panel data from 63 countries from 1980 to 2003, corruption reduces the returns on public investments and renders them unproductive for enhancing economic growth. In a distinct investigation carried out by Obamuyi and Olayiwola (2019) in Nigeria and India, it was found that corruption negatively affects economic growth by influencing investment and human resources in both nations. This negative impact occurs due to the transmission mechanism associated with corruption...By lowering the productivity of already-existing resources, corruption directly lowers the growth rate of per capita income and indirectly influences decreased investment. Based on Alfada's (2019) findings, it can be observed that in Indonesia, provinces that had corruption levels lower than the threshold value of 1,765 points encountered a decrease in growth. Additionally, the adverse effects of corruption appear to be more significant in provinces where corruption levels exceed the cutoff point.

Several empirical studies have found that a variety of factors impact economic growth in a given nation. These are as follows: According to Petrakos and Arvanitidis' 2008 study, political and institutional elements of a certain economy are critical for supporting growth. Elkomy et al. (2015) conducted a study to investigate how income affects the impact of foreign direct investment on economic growth in emerging and developing nations, whereas Ghazanchyan et al. (2015) investigated Asian development drivers. Upreti (2015) identified economic development drivers in underdeveloped nations. In a distinct study conducted by Bassanini and Scarpetta (2001), it was found that financial institutions play a crucial role in promoting economic growth by facilitating the accumulation of capital and assisting in the creation of new technologies

Ghimire et al. (2020) identified macroeconomic indicators such as FDI, export, currency rate and gross fixed capital creation as predictors of economic development. They employed trend analysis, multiple regressions, and Karl Pearson's correlation to calculate the results of this study. Through their analysis of institutional and cultural elements, Abrams and Lewis (1995) conclude that personal freedom, political, cultural and economic arrangements have a substantial connection with economic growth. Once again, they argue that, under similar conditions, countries with lower income levels experience greater economic expansion compared to countries with higher income levels. The study's goal will be to assess the influence of various economic factors on economic growth.

Various studies have considered different variables using different statistical tools but the combination of the used variables are not done in the recent time. Mainly, after the covid-19, the discussion about the economic growth is of the prime concern.

Different between the advance economics and developing economies with regard to the concerned variables are different, hence the impact of the same variables considered for the purpose of the study is important. There is little literature in the context of our country and they are not enough to describe the sources of economic growth of Nepal.

3. Research Methodology

3.1 Research Design

The descriptive and analytical method was used in this research, which was designed as a quantitative study. To quantify the effects of independent variables on the dependent variable, secondary data was employed to measure the variables. In order to interpret the data, the acquired data was analyzed using E-views statistical package version 10.

3.2 Model formulation and Variables

In that study, GDP was the dependent variable, and CPI, Exchange Rate, M_2, GCF, Export, Import, and Tourism income were taken as independent variables.

$LN\_GDP=\beta_0+ \beta_1 t + \beta_2\ LN\_CPI + \beta_3\ LN\_EXR + \beta_4\ LN\_GCF + \beta_5\ LN\_IMPORT + \beta_6\ LN\_M_2 + \beta_7\ LN\_REM + \beta_8\ LN\_TOURISM + \beta_9 LN\_EXPORT+ e_t$

This research incorporates two categories of variables, namely the independent variable and dependent variables. The variables, along with their descriptions and measurements, are as follows:

Table 3.1: Variables, their description and measurement

Name of the Variable	Description	Measurement
LN_GDP	Natural Log of Gross Domestic Product	Rupees in Million
LN_EXPORT	Natural Log of Money Value of Export of Goods and Services.	Rupees in Million
LN_IMPORT	Natural Log of Money Value of Import of Goods and Services.	Rupees in Million
LN_CPI	Natural Log of Amount of Consumer Price Index	Base Year :
	Natural Log of Amount of Exchange Rate(US$)	2014/15 = 100
LN_EXR	Natural Log of Amount of International Remittances	Rupees per US Dollar
		Rupees in Million
LN_REM	Natural Log of Amount of Tourism Income	Rupees in Million
LN_TOURISM		
LN_M_2	Natural Log of Amount of Broad Money	Rupees in Million
LN_GCF	Natural Log of Amount of Gross Capital Formation	Rupees in Million

3.3 Nature and Sources of Data

The data used in this analysis were secondary and time series data. The main sources of the data were Different Series of Economic Surveys published by the Ministry of Finance, Industrial Statistics published by the Department of Industry, Nepal Rastra Bank, Ministry of Commerce and Supply, Central Bureau of Statistics of Nepal, and FNCCI (Federation of Nepalese Chambers of Commerce and Industry).

3.4 Time Period

In order to analyze the relationship among GDP, CPI, Exchange Rate, M_2, GCF, Export, Import, and Tourism income, the researcher used 47 sets of time series data covering the period from 1974 to 2020.

3.5 Data Analysis

The major objectives of the study were to examine the linkage between GDP, CPI, Exchange Rate, M_2, GCF, Export, Import, and Tourism income in Nepal. To fulfill these research objectives, the time series data was analyzed using E-views.

3.6 Econometric Method

In the context of the study mentioned, the researcher employed econometric methods, specifically time series analysis, to analyze the data and examine the relationships between GDP, CPI, Exchange Rate, Remittances, M_2, GCF, Export, Import, and Tourism income in Nepal.

3.7 Econometric Results

3.7.1 Test of Unit Root

The unit root test is employed to examine the stationarity of the data. The ADF test is utilized as a unit root test, which helps determine if the variables satisfy the condition of stationarity (Poudel, 2023).

Table 3.2: Result of ADF Test on Level and First Difference Series

Series	On Level		On First Difference	
	t-Stat	Prob-Value	t-Stat	Prob-Value
LN_GDP	-1.2025	0.6654	-3.8762	0.0046*
LN_CPI	-1.9260	0.3178	-4.8944	0.0002*
LN_EXR	-1.6675	0.4407	-5.0302	0.0001*
LN_GCF	-0.7130	0.8332	-6.9900	0.0000*
LN_M	-1.1275	0.6971	-5.4444	0.0000*
LN_X	-1.3219	0.6115	-5.2318	0.0001*
LN_M_2	-1.4639	0.5428	-4.8771	0.0002*
LN_REM	-0.1608	0.9359	-9.5201	0.0000*

LN_TOURISM	-2.1981	0.2097	-3.1950	0.0268**

Source: Author's calculations performed using E-Views

* denotes significance at the 1% level, indicating that the result is highly significant,

while ** denotes significance at the 5% level, indicating a moderately significant result.

The outcomes of the augmented Dickey-Fuller (ADF) test, with a significance level of 5%, indicate the following: (i) The null hypothesis that the level series of all variables possess a unit root is accepted, but (ii) it is rejected for the first difference of the variables. This means that all the series become stationary when differenced once, indicating that they are integrated of order one. This suggests that the variables are co-integrated, indicating a long-term relationship between them (Poudel,2022).

3.7.2 VAR Lag Order Selection Criteria

Prior to conducting the co-integration test, it is necessary to determine the appropriate lag length. The table presented indicates that most of the criteria recommend selecting 1 lag. Therefore, we will proceed with further tests using a lag length of 1.

Table 3.3: Selection Criteria of VAR Lag Order

Lag	HQ	SC	AIC	FPE	LR	LogL
0	-3.701673	-3.475042	-3.836374	1.74e-13	NA	95.31842
1	-14.42524*	-12.15893*	-15.77226	1.22e-18*	543.7559*	444.8758
2	-13.47476	-9.168767	-16.03408*	1.46e-18	100.4075	531.7669

* denotes lag order selected by the criterion

3.7.3. Co-integration Result

Co-integration can occur when multiple time series variables of the same level of integration are combined. Since LN_GDP, LN_CPI, LN_EXR, LN_GCF, LN_IMPORT, LN_M_2, LN_REM, LN_TOURISM, and LN_EXPORT are co-integrated, it indicates that they are closely related in the long run, suggesting a long-term connection among them. Multiple co-integrating relationships may exist between these variables. The Johansen test is used to determine the number of co-integrating equations and provides test statistics and estimates. Table 3.4 presents the findings of the Johansen co-integration test.

Table 3.4: Result of the Johansen Co-integration Test:

Trace Test				
Hypothesized No. of CE(s)	Eigen-value	Trace Stat.	0.05 Critical Value	P-value##
None 1#	0.751885	227.0601	197.3709	0.0007

At most 1#	0.665096	164.3363	159.5297	0.0266
At most 2	0.568473	115.1103	125.6154	0.1825
At most 3	0.434020	77.29115	95.75366	0.4592
At most 4	0.360430	51.67732	69.81889	0.5637
At most 5	0.264500	31.56413	47.85613	0.6360
At most 6	0.231449	17.73992	29.79707	0.5853
At most 7	0.115663	5.893768	15.49471	0.7080
At most 8	0.008023	0.362483	3.841466	0.5471

At a significance level of 0.05, the Trace test reveals the existence of two co-integrating equations.

# indicates rejection of the hypothesis at the 0.05 level

p-values of MacKinnon-Haug-Michelis (1999)

3.7.4 Vector Error Correction Model

Given the presence of a long-term relationship between the variables, we can proceed to estimate and analyze the VECM. The calculations in the model are based on the level data, and the variables are automatically converted to their first differences. The estimated long-run relationship can be expressed as follows:

Table 3.5: Vector Error Correction Model:

D(LN_GDP) = C(1)*(LN_GDP(-1) + 3.1017*LN_EXR(-1) -1.3997*LN_TOURISM(-1) - 1.3777*LN_EXPORT(-1) - 6.7431*LN_GCF(-1) + 4.6178*LN_IMPORT(-1)+1.6871*LN_M2(-1)+ 0.7906*LN_REM(-1)) + C(2)*(LN_CPI(-1) - 2.3745*LN_EXR(-1) + 0.8106 LN_TOURISM(-1)+ 0.8319*LN_EXPORT(-1) +3.4351*LN_GCF(-1) - .4443*LN_IMPORT(-1) - 1.4167*LN_M2(-1) - 0.5104*LN_REM(-1)) + C(3) *D(LN_GDP(-1)) + (4)*D(LN_CPI(-1)) + C(5)*D(LN_EXR(-1)) + C(6) *D(LN_TOURISM(-1)) + (7)*D(LN_EXPORT(-1)) + C(8)*D(LN_GCF(-1)) + C(9)*D(LN_IMPORT(-1)) + (10)*D(LN_M2(-1)) + C(11) *D(LN_REM(-1)) +C(12)

	Coeff.	Standard Error	t-Stat	P-value.
C(1)	-0.296261	0.105615	-2.805104	0.0084
C(2)	-0.454613	0.183390	-2.478944	0.0185
C(3)	-0.374188	0.160126	-2.336835	0.0257
C(4)	2.231740	0.426186	5.236537	0.0000
C(5)	0.488381	0.142620	3.424341	0.0017
C(6)	-0.047004	0.038877	-1.209048	0.2352
C(7)	-0.061265	0.054750	-1.118995	0.2712
C(8)	0.254215	0.120133	2.116106	0.0420
C(9)	-0.212008	0.150755	-1.406305	0.1690

C(10)	-0.079642	0.153238	-0.519732	0.6067
C(11)	-0.019363	0.019950	-0.970572	0.3388
C(12)	0.033685	0.041855	0.804819	0.4267
R-squared	0.706606	Adjusted R-squared	0.608808	
F-statistic	7.225170	Prob(F-statistic)	0.000004	
Durbin-Watson stat	1.949601			

Table 3.5 displays the outcome of the Vector Error Correction Model, with R-squared values indicating variance in explanatory factors. It indicates the model's explanatory strength.The model exhibits a satisfactory R-square value of 0.7066 (70.66%), indicating that it is appropriate and does not suffer from spurious regression. The coefficient of the Vector Error Correction Model (VECM) is significant and negative, providing evidence of a long-term relationship between GDP and the independent factors.

3.7.5 Long Run Causality

The coefficient of ECM has the anticipated sign is negative, sits between zero and one, and is statistically significant at the 5% level. The importance of the error correction mechanism supports co-integration and shows that a long run steady-state equilibrium exists between the level of real output (GDP) and the explanatory variables. The ECM suggests a feedback of roughly 29.63% of the previous year's disequilibrium from the explanatory factors' long term elasticity. In other words, the error correction term's coefficient quantifies the rate at which the level of real output adjusts to changes in the explanatory variables in order to reach long run static equilibrium. As a result, the rate of adjustment might be described as rapid..

3.7.6 Short run causality

Table3. 6: Wald Test

Coefficient	Test Statistic	Value	df	Probability
C(3)	Chi-square	5.460798	1	0.0194*
C(4)	Chi-square	27.42132	1	0.0000*
C(5)	Chi-square	11.72611	1	0.0006*
C(6)	Chi-square	1.461796	1	0.2266
C(7)	Chi-square	1.252150	1	0.2631
C(8)	Chi-square	4.477906	1	0.0343*
C(9)	Chi-square	1.977695	1	0.1596
C(10)	Chi-square	0.270121	1	0.6033
C(11)	Chi-square	0.942011	1	0.3318

Source: Author's calculation through E-views

There is insufficient evidence to support the existence of short-term causation from lagged tourism income, export, import, wide money, and remittance to GDP, as indicated by the Chi-square probability values exceeding 5%. However, there is evidence of short-term causation from lagged GDP to consumer price index, exchange rate, and gross capital formation, as the Chi-square probability values are below 5%.

3.8 Model Diagnosis

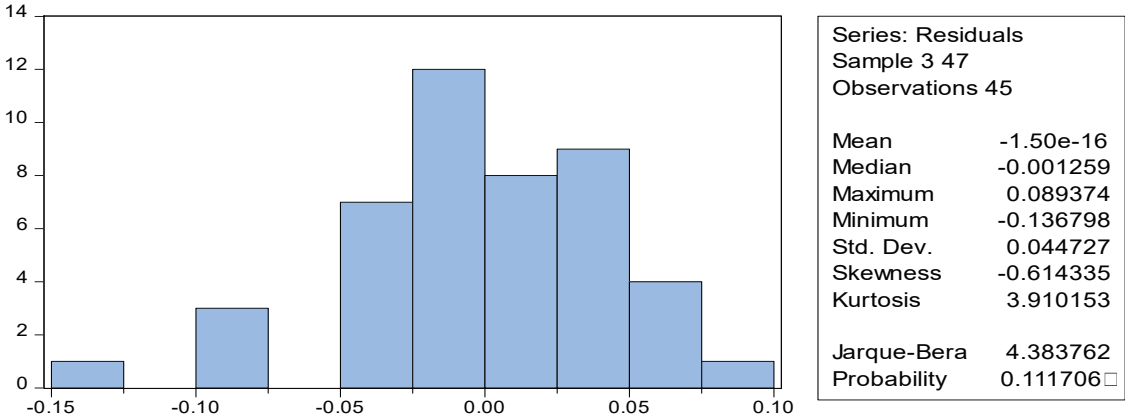
3.8.1 F-Test

The research model demonstrates a good fit, supported by an R-squared value of 70.66 percent. Additionally, the probability-value of the F-statistic is <1%, indicating statistical significance.

3.8.2Normality Test

The JB test is employed to evaluate whether the distribution of the variables in the model conforms to the assumption of normality. The statistical significance of this test indicates that the variables exhibit a normal distribution. The findings of the JB normality test are depicted in following figure.

Figure 1: Jarque-Bera Normality Test



The JB test was conducted to examine the normality of the residuals in the model. Given that the p-value of the test (0.1117) exceeds the 5% significance level, the results indicate that the null hypothesis is accepted, This suggests that the residuals in the model follow a normal distribution.

3.8.3 Test of Heteroskedasticity

Below is the table presenting the results of the Bruesch-Pagan-Godfrey test, which is used to detect heteroskedasticity:

Table 3.7: Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.843181	Probability F(18,26)	0.6406
Observed R-squared	16.58626	Probability Chi-Square(18)	0.5517
Scaled explained SS	12.97887	Probability Chi-Square(18)	0.7928

Source: Author's calculation through E-views

Table 3.7 presents the findings of the Breusch-Pagan-Godfrey test, which examines the presence of heteroskedasticity in the data. If the p-value of the observed R-squared is greater than 5%, it suggests that the null hypothesis of homoscedasticity is not rejected at a significance level of 5%. This implies that the data exhibits homoscedasticity, meaning that the variability of the residuals is constant across all levels of the independent variables.

3.8.4 Serial Correlation Test

To examine whether there is serial correlation within the model, the Breusch-Godfrey LM test was performed. The results of the test are presented in Table 3.8, which displays the findings of the Breusch-Godfrey Serial Correlation LM Test.

Table3. 8: Breusch-Godfrey Serial Correlation LM Test

F-stat	0.041496	Probability F(1,32)	0.8399
Observed R^2	0.058278	Probability Chi-Square(1)	0.8092

Source: Author's calculation through E-views

H_0 : There is no serial correlation in the residuals. Table 3.8 shows results of the Breusch-Godfrey Serial Correlation LM Test. Based on the F-statistic and the probability of the observed R^2, both exceeding the 5% significance level; the null hypothesis of no serial correlation is accepted.

3.8.5 Test of Granger Causality

The test of Granger Causality is employed to examine the causal association between the dependent and independent variables. It is conducted to identify the direction of influence, which is crucial for informing policy decisions. The test result is displayed in part in the table below:

Table 3.9: Test of Pairwise Granger Causality

H0:	Observed	F-Stat	P-value
LN_GCF does not Granger Cause LN_GDP	46	9.96198	0.0029*
LN_GDP does not Granger Cause LN_GCF		2.89801	0.0959
LN_EXR does not Granger Cause LN_GDP	46	0.00395	0.9502
LN_GDP does not Granger Cause LN_EXR		0.28190	0.5982
LN_CPI does not Granger Cause LN_GDP	46	3.85205	0.0562

LN_GDP does not Granger Cause LN_CPI		0.00672	0.9351
LN_IMPORT does not Granger Cause LN_GDP	46	1.98468	0.1661
LN_GDP does not Granger Cause LN_IMPORT		1.26295	0.2673
LN_M2 does not Granger Cause LN_GDP	46	6.97385	0.0115**
LN_GDP does not Granger Cause LN_M2		4.10656	0.3306
LN_REM does not Granger Cause LN_GDP	46	0.11393	0.7374
LN_GDP does not Granger Cause LN_REM		5.16990	0.0280**
LN_TOURISM does not Granger Cause LN_GDP	46	3.10362	0.0852
LN_GDP does not Granger Cause LN_TOURISM		0.16237	0.6890
LN_X does not Granger Cause LN_GDP	46	0.14533	0.7049
LN_GDP does not Granger Cause LN_X		1.05367	0.3104

Source: Author's calculation through E-views

Table 3.9 depicts the model's pairwise granger causality amongst independent and dependent variables. The findings indicate that there is two way causation between gross capital formation and broad money. GDP, consumer price index, export, import, gross capital formation, broad money, and tourist income all have unidirectional causation to remittances. Similarly, GDP is derived from gross capital formation and broad money. Unidirectional causation has also been discovered from the consumer price index to gross capital formation, import to the consumer price index, and the exchange rate to export.

3.9 Conclusion and Discussion

The study utilizes the test of Johansen Co-integration to find the association between economic growth and its macroeconomic factors in Nepal. The research utilized a quantitative approach, employing a Vector Error Correction Model (VECM) and various econometric tests to analyze the data spanning from 1974 to 2020. The primary variables considered were Consumer Price Index (CPI), Exchange Rate (EXR), Gross Capital Formation (GCF), Import, Export, Broad Money (M2), Remittances (REM), and Tourism Income. The VECM results indicate a significant long-term relationship between GDP and the selected macroeconomic factors. The model's explanatory power, as reflected by the R-squared value of 70.66%, suggests that the chosen variables effectively account for variations in GDP. The co-integration test further confirms the existence of a stable long-term equilibrium among the variables. The Granger Causality Test reveals that there is a one way causation running from the Consumer Price Index (CPI) to GDP in the short term. Additionally, there is two- way causation between GDP, Gross Capital Formation (GCF) and Money Supply (M_2). However, there is no significant causality found amongst exchange rate, imports, tourism income, exports, and GDP. This study lays the groundwork for further exploration into Nepal's economic dynamics. Policymakers and researchers can use these findings as a basis for formulating targeted strategies to foster sustainable

economic growth in the country.

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Appendix-1: Research Variables (Rupees in Million) in Nominal Form (all variables are Rs. in million except EXR and CPI)

Year	GDP	gross capital formation	export	import	EXR US$	CPI	remittance	tourist income	M_2
1974/75	16601	2402	889.6	1814.6	12.18	4.17	90.7	120.7	2064.4
1975/76	17394	2632	1185.8	1981.7	12.50	4.14	97.7	189	2524
1976/77	17280	2768	1164.7	2008	12.33	4.26	125.4	244.1	3223
1977/78	19727	3506	1046.2	2469.6	12.00	4.73	120	342.5	3772.1
1978/79	26128	4133	1296.8	2884.7	12.00	4.89	146.3	406.8	4511.4
1979/80	23351	4270	1150.5	3480.1	12.00	5.37	150.3	518.7	5285.3
1980/81	27307	4808	1608.7	4428.2	13.00	6.09	216.8	616.8	6307.7

1981/82	30988	5314	1491.5	4930.3	13.88	6.73	205.5	493.8	7458
1982/83	33821	6639.8	1132	6314	15.50	7.68	292.5	491.1	9222.4
1983/84	39290	7332.3	1703.9	6514.3	17.93	8.16	280	585.8	10455.2
1984/85	46587	10184	2740.6	7742.1	19.95	8.50	275.4	724.9	12296.6
1985/86	55734	10599	3078	9341.2	21.69	9.84	346.7	863.6	15159
1986/87	63864	12898	2991.4	10905.2	22.21	11.15	478.7	1208.1	17498.2
1987/88	76906	15237	4114.5	13869.6	25.63	12.35	589.8	1415.1	21422.6
1988/89	89270	19415	4195.3	16263.7	28.64	13.38	602.1	1856.5	26605.1
1989/90	103416	19076	5156.2	18324.9	31.95	14.68	676.8	1541.7	31552.4
1990/91	120370	25074	7387.5	23226.5	42.69	16.12	549.7	1993.8	37712.5
1991/92	149487	31619	13706.5	31940	45.65	19.51	423.6	3090.7	45670.5
1992/93	171474	39653	17266.5	39205.6	49.25	21.24	549.7	2615.1	58322.5
1993/94	199272	44644	19293.4	51570.8	49.94	23.14	223	4819.7	69777.1
1994/95	219175	55231	17639.2	63679.5	55.21	24.92	2906.7	5506.7	80984.7
1995/96	248913	68017	19881.1	74454.5	57.02	26.94	2660.2	6605.9	92652.2
1996/97	280513	71084	22636.5	93553.4	61.95	29.12	2938	6158.8	103720.6
1997/98	300845	74728	27513.5	89002	67.95	31.55	4084.2	7850.9	126462.6
1998/99	342036	70061	35676.3	87525.3	69.07	35.14	6520.6	11584.2	152800.2
1999/00	379488	92272	49822.7	108504.9	73.83	36.33	6031.4	11691	186120.8
2000/01	441519	98648.69	55654.1	115687.2	76.88	37.21	9797.6	11969.2	214454.2
2001/02	459442.6	93019.46	46944.8	107389	77.79	38.29	14859.8	7798.4	208130.1
2002/03	492230.8	105383.2	49930.6	124352.1	73.79	40.11	41630	10369.4	229669
2003/04	536749.1	131670.5	53910.7	136277.1	72.06	41.70	56629.8	12337.4	262057
2004/05	589411.7	155906.7	58705.7	149473.6	72.32	43.59	61784.81	11814.95	283202.3
2005/06	654084.1	175632.8	60234.1	173780.3	70.49	47.06	92748.65	11710.83	328159.2
2006/07	727827	208778.5	59383.1	194694.6	65.02	49.84	107417.4	12645.78	317180
2007/08	815658.2	247272	59266.5	221937.7	76.88	53.18	139421.5	20339.89	435818.9
2008/09	988271.5	313028.7	67697.5	284469.6	74.54	59.87	194215.6	34589.82	533400.1
2009/10	1192774	456489.3	60824	374335.2	72.27	65.60	213998.9	29385.88	703761
2010/11	1562681	433624.7	64338.5	396175.5	81.02	71.87	225909.4	25408.87	820986.8
2011/12	1758379	502944	74261	461667.7	87.96	77.85	333366.8	31801.4	921320.7
2012/13	1949295	578484.6	76917.06	556740.3	98.25	85.51	394348.7	34205.13	1130302
2013/14	2232525	691772.3	91991.4	714365.8	99.49	93.27	490302.5	46114.68	1315376
2014/15	2423638	758051.9	85319.12	774684.2	106.35	100.00	540053.2	77299.01	1565967
2015/16	2608184	736577.3	70117.17	773599.1	106.21	109.94	594588.3	41115.29	1877802
2016/17	3077145	1148546	73049.07	990113.2	104.37	114.83	602497.4	51977.38	2244579
2017/18	3455950	1365100	81359.8	1245103	112.88	119.60	654003.1	65659.74	2591702
2018/19	3858930	1597597	97109.52	1418535	116.31	125.14	750690	74202.33	3094467
2019/20	3888700	1182165	97709.11	1196799	117.87	132.84	754470.8	60536.15	3582138
2020/21	4277300	1531273	141124.1	1539837	120.84	137.62	841486.5	6391.291	4230970

Source: *MOF, Economic Survey (2010/11 and 2021/22) and NRB, QEB (2023)*

Appendix-2: Concerned Variables in Real Form (except EXR and CPI)

Year	EXR US	CPI	RGDP	RGCF	REXPORT	RIMPORT	R_REM	R_TOU	R_M_2
1974/75	12.18	4.2	69281	10024	3713	7573	379	504	8615
1975/76	12.50	4.1	72088	10908	4914	8213	405	783	10460
1976/77	12.33	4.3	73552	11782	4957	8547	534	1039	13719
1977/78	12.00	4.7	93344	16590	4950	11686	568	1621	17849
1978/79	12.00	4.9	127880	20228	6347	14119	716	1991	22080
1979/80	12.00	5.4	125468	22943	6182	18699	808	2787	28399
1980/81	13.00	6.1	166364	29292	9801	26978	1321	3758	38429
1981/82	13.88	6.7	208459	35748	10033	33167	1382	3322	50171
1982/83	15.50	7.7	259752	50995	8694	48493	2246	3772	70830
1983/84	17.93	8.2	320575	59826	13902	53151	2285	4780	85306

1984/85	19.95	8.5	395860	86536	23287	65786	2340	6160	104487
1985/86	21.69	9.8	548623	104332	30299	91951	3413	8501	149219
1986/87	22.21	11.2	712086	143813	33354	121593	5338	13470	195106
1987/88	25.63	12.4	950033	188225	50827	171334	7286	17481	264637
1988/89	28.64	13.4	1194456	259778	56134	217613	8056	24840	355983
1989/90	31.95	14.7	1517986	280006	75685	268981	9934	22630	463140
1990/91	42.69	16.1	1940212	404161	119077	374382	8860	32138	607878
1991/92	45.65	19.5	2916841	616961	267446	623224	8265	60307	891138
1992/93	49.25	21.2	3642408	842299	366771	832796	11677	55549	1238872
1993/94	49.94	23.1	4611725	1033190	446505	1193496	5161	111542	1614842
1994/95	55.21	24.9	5460765	1376085	439482	1586580	72421	137200	2017741
1995/96	57.02	26.9	6706167	1832501	535633	2005939	71671	177975	2496218
1996/97	61.95	29.1	8169007	2070085	659213	2724431	85559	179355	3020517
1997/98	67.95	31.5	9490526	2357387	867947	2807678	128841	247666	3989419
1998/99	69.07	35.1	12017753	2461658	1253520	3075283	229107	407022	5368777
1999/00	73.83	36.3	13786042	3352058	1809959	3941767	219109	424711	6761397
2000/01	76.88	37.2	16430035	3670967	2071029	4305012	364593	445404	7980381
2001/02	77.79	38.3	17591072	3561516	1797416	4111695	568950	298584	7968855
2002/03	73.79	40.1	19741545	4226528	2002531	4987300	1669624	415878	9211170
2003/04	72.06	41.7	22380135	5490096	2247845	5682171	2361220	514417	10926655
2004/05	72.32	43.6	25691405	6795697	2558877	6515288	2693090	514992	12344284
2005/06	70.49	47.1	30780501	8265094	2834552	8177915	4364652	551099	15442824
2006/07	65.02	49.8	36271555	10404564	2959381	9702685	5353189	630208	15806793
2007/08	76.88	53.2	43373925	13149084	3151591	11801891	7413960	1081606	23175364
2008/09	74.54	59.9	59165047	18740151	4052860	17030398	11627143	2070796	31933172
2009/10	72.27	65.6	78246128	29945769	3990064	24556446	14038358	1927718	46166829
2010/11	81.02	71.9	112311675	31165105	4624082	28473588	16236370	1826165	59005261
2011/12	87.96	77.8	136884965	39152803	5781014	35939556	25951687	2475651	71722277
2012/13	98.25	85.5	166676560	49463951	6576876	47604680	33719216	2924746	96647719
2013/14	99.49	93.3	208229430	64522155	8580112	66629474	45730911	4301153	122686204
2014/15	106.35	100.0	242364411	75805371	8531931	77468599	54005443	7729919	156597079
2015/16	106.21	109.9	286739450	80978086	7708565	85048200	65368042	4520146	206442371
2016/17	104.37	114.8	353348551	131887538	8388225	113694699	69184775	5968562	257744957
2017/18	112.88	119.6	413331620	163265990	9730632	148914345	78218767	7852905	309967559
2018/19	116.31	125.1	482906500	199923291	12152285	177515513	93941352	9285680	387241555
2019/20	117.87	132.8	516574908	157038772	12979678	158982787	100223901	8041623	475851166
2020/21	120.84	137.6	588642026	210733845	19421496	211912378	115805371	879569	582266062

Source: *Researcher's own calculation*

Appendix-3: Data after Taking Natural Log

YEAR	LN_EXR	LN_CPI	LN_GDP	LN_GCF	LN_EXP	LN_IMP	LN_REM	LN_TOU	LN_M_2
1974/75	2.50	1.43	11.15	9.21	8.22	8.93	5.94	6.22	9.06
1975/76	2.53	1.42	11.19	9.30	8.50	9.01	6.00	6.66	9.26
1976/77	2.51	1.45	11.21	9.37	8.51	9.05	6.28	6.95	9.53
1977/78	2.48	1.55	11.44	9.72	8.51	9.37	6.34	7.39	9.79
1978/79	2.48	1.59	11.76	9.91	8.76	9.56	6.57	7.60	10.00
1979/80	2.48	1.68	11.74	10.04	8.73	9.84	6.69	7.93	10.25
1980/81	2.56	1.81	12.02	10.29	9.19	10.20	7.19	8.23	10.56
1981/82	2.63	1.91	12.25	10.48	9.21	10.41	7.23	8.11	10.82
1982/83	2.74	2.04	12.47	10.84	9.07	10.79	7.72	8.24	11.17
1983/84	2.89	2.10	12.68	11.00	9.54	10.88	7.73	8.47	11.35
1984/85	2.99	2.14	12.89	11.37	10.06	11.09	7.76	8.73	11.56
1985/86	3.08	2.29	13.22	11.56	10.32	11.43	8.14	9.05	11.91

1986/87	3.10	2.41	13.48	11.88	10.41	11.71	8.58	9.51	12.18
1987/88	3.24	2.51	13.76	12.15	10.84	12.05	8.89	9.77	12.49
1988/89	3.35	2.59	13.99	12.47	10.94	12.29	8.99	10.12	12.78
1989/90	3.46	2.69	14.23	12.54	11.23	12.50	9.20	10.03	13.05
1990/91	3.75	2.78	14.48	12.91	11.69	12.83	9.09	10.38	13.32
1991/92	3.82	2.97	14.89	13.33	12.50	13.34	9.02	11.01	13.70
1992/93	3.90	3.06	15.11	13.64	12.81	13.63	9.37	10.93	14.03
1993/94	3.91	3.14	15.34	13.85	13.01	13.99	8.55	11.62	14.29
1994/95	4.01	3.22	15.51	14.13	12.99	14.28	11.19	11.83	14.52
1995/96	4.04	3.29	15.72	14.42	13.19	14.51	11.18	12.09	14.73
1996/97	4.13	3.37	15.92	14.54	13.40	14.82	11.36	12.10	14.92
1997/98	4.22	3.45	16.07	14.67	13.67	14.85	11.77	12.42	15.20
1998/99	4.24	3.56	16.30	14.72	14.04	14.94	12.34	12.92	15.50
1999/00	4.30	3.59	16.44	15.03	14.41	15.19	12.30	12.96	15.73
2000/01	4.34	3.62	16.61	15.12	14.54	15.28	12.81	13.01	15.89
2001/02	4.35	3.65	16.68	15.09	14.40	15.23	13.25	12.61	15.89
2002/03	4.30	3.69	16.80	15.26	14.51	15.42	14.33	12.94	16.04
2003/04	4.28	3.73	16.92	15.52	14.63	15.55	14.67	13.15	16.21
2004/05	4.28	3.77	17.06	15.73	14.76	15.69	14.81	13.15	16.33
2005/06	4.26	3.85	17.24	15.93	14.86	15.92	15.29	13.22	16.55
2006/07	4.17	3.91	17.41	16.16	14.90	16.09	15.49	13.35	16.58
2007/08	4.34	3.97	17.59	16.39	14.96	16.28	15.82	13.89	16.96
2008/09	4.31	4.09	17.90	16.75	15.21	16.65	16.27	14.54	17.28
2009/10	4.28	4.18	18.18	17.21	15.20	17.02	16.46	14.47	17.65
2010/11	4.39	4.27	18.54	17.25	15.35	17.16	16.60	14.42	17.89
2011/12	4.48	4.35	18.73	17.48	15.57	17.40	17.07	14.72	18.09
2012/13	4.59	4.45	18.93	17.72	15.70	17.68	17.33	14.89	18.39
2013/14	4.60	4.54	19.15	17.98	15.96	18.01	17.64	15.27	18.63
2014/15	4.67	4.61	19.31	18.14	15.96	18.17	17.80	15.86	18.87
2015/16	4.67	4.70	19.47	18.21	15.86	18.26	18.00	15.32	19.15
2016/17	4.65	4.74	19.68	18.70	15.94	18.55	18.05	15.60	19.37
2017/18	4.73	4.78	19.84	18.91	16.09	18.82	18.18	15.88	19.55
2018/19	4.76	4.83	20.00	19.11	16.31	18.99	18.36	16.04	19.77
2019/20	4.77	4.89	20.06	18.87	16.38	18.88	18.42	15.90	19.98
2020/21	4.79	4.92	20.19	19.17	16.78	19.17	18.57	13.69	20.18

S**ource**: *Researcher's own calculation*