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Relative Effectiveness of Monetary and Fiscal Policy Measures on the Economic Growth of Nepal

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Abstract: This study assess the long run and causal relationship of various monetary and fiscal policy measures with the economic growth of Nepal. Annual time series data from the fiscal year 1976/77 to 2021/22 are used and analyzed employing econometric method of cointegration and Vector Error Correction Model (VECM) for the assessment and draw inferences applying r programming. All the variables exhibit stationarity at first order difference and are co-integrated. In the long run, monetary policy measures, broad money supply has the negative relation but interest rate and exchange rate have the positive relation with the economic growth. Fiscal policy measures under consideration total revenue, total expenditure and total trade are negatively related with the long-run economic growth. However, neither the fiscal nor the monetary policy measures indicate the significant relationship with the economic growth in short run. The negative and significant coefficient of Error Correction Term (ECT) suggests the convergence of variables towards long term equilibrium. The cumulative sum (CUSUM) tests indicate the stability of the coefficients in the model, and the diagnostic tests reveal the absence of serial correlation and heteroscedasticity in the model. Finally, Granger causality test shows the existence of causal relationship between the independent and dependent variables. This study concludes the existence of long run relationship of monetary and fiscal policy measures with the economic growth in Nepal and monetary policy measures appear to be relatively effective than that of fiscal policy measures in stimulating the economic growth of Nepal.

Keywords: Cointegration, convergence, economic growth, stability

Introduction

Monetary and fiscal policies are the major policy measures adopted to address the macroeconomic challenges and attain the predetermined targets of economic growth. Both the policies adopt the common goal of fostering the economic growth but through distinct instruments. Monetary policy employs the measures like money supply, interest rate, exchange rate, whereas fiscal policy relies on revenue, expenditures, and trade measures.

During the periods of economic crisis expansionary fiscal and monetary policies are proven to be very effective in encouraging economic growth (Simorangkir & Adamanti, 2010). The dispute over which policy is effective either monetary or fiscal for the attainment of the appropriate economic growth is a debatable issue. In this regard, it is pertinent to present the perspectives of the Keynesian and Monetarist economists on the effectiveness of the policies in promoting the economic growth. Keynesian economists advocate on the effectiveness of fiscal policy, while the Monetarists assert the significance of monetary policy, in achieving the substantial level of economic

growth compared to fiscal policy (Tan et al. 2020).

The comparative effectiveness of monetary and fiscal policies is a highly debated and unresolved matter among the Keynesian and Monetarist economists since 1960s. Keynesians strongly favor fiscal policy as the effective measure to boost the economic growth whereas monetarists' campion the monetary policy as an effective measure to promote the economic growth and the debate is still engaging the economists and policy makers (Sen & Kaya, 2015).

The concept of monetarists regarding the measurement of the effectiveness of monetary and fiscal policy on the economic growth is expressed with reference to the quantity theory of money

$$MV=Y \quad (1.1)$$

Where M represents the money stock, V stands for the velocity of money, P indicates the price level and Y denotes the income level. Considering V and P as constant, the equation can be presented as

$$M=kPY \quad (1.2)$$

An increase in the money stock leads to the increase in the income level, highlighting the effectiveness of monetary policy in stimulating the economic growth.

On the other hand, the concept of Keynesians regarding the policy effectiveness on the economic growth is expressed with reference to the Keynesian approach to aggregate expenditure

$$Y=C+I.+G \quad (1.3)$$

The modified Keynesian approach to aggregate expenditure including trade is given by

$$Y=C+I+G+(X-M) \quad (1.4)$$

Where, Y represents gross domestic product, C is consumption, I denotes the investment, G stands for government expenditure and (X-M) is the net export. The change in the government expenditure and trade directly influences the economic growth.

Therefore, considering the theoretical aspect, monetarists advocate on the effectiveness of monetary measures, whereas Keynesians emphasize on the fiscal policy measures in stimulating the economic growth.

Significant number of empirical studies have been conducted regarding the comparative effectiveness of monetary and fiscal policy. Monetary policy is comparatively effective than that of fiscal policy in the stimulation of the economic growth (Tan et al., 2020; Idris, 2019; Saqib & Aggarwal, 2017; Hasan et al., 2016; Sen & Kaya, 2015; Yunanto & Medyawati, 2015; Biljana & Tamara, 2013; Jawaid et al., 2010). On the other hand, some empirical studies have distinct conclusion. Both the monetary as well as fiscal policy are equally effective in stimulating the economic growth (Chowdhury & Afzal, 2015; Mahmood &Sial, 2011). However, some studies regarding the policy issues found that policy uncertainties in both the monetary as well as fiscal policy ultimately may reduce the economic growth of an economy (Aye, 2020).

In the Nepalese context, monetary and fiscal policy has been considered as the complementary measures in attaining the aspired rate of economic growth. Existing studies have predominantly focused on the impact of either monetary or fiscal policy measures on the economic growth. This study, however aims in assessing the relative effectiveness of both the monetary and fiscal policies simultaneously in stimulating the economic growth of Nepal, drawing recent data and insights from international literature.

Data and Methods

This study relies on the secondary data from the Ministry of Finance and Nepal Rastra Bank. The data covers the fiscal years from 1974/75 to 2021/22 and includes

the variables Gross Domestic Product at constant price (GDPC), broad money supply, interest rate, exchange rate, total government revenues, total government expenditures and total trade.

This study is based upon the modular framework established by Andersen and Jordan (1968) which assess the relative effectiveness of the monetary and fiscal policy measures on the economic growth of an economy with a specific reference to the United States. Senbet (2011) also investigated on the effectiveness of both the monetary and fiscal policies in the similar context confirming the findings of the initial model.

Mathematically, Yt=f (MPt, FPt) ……..2.1)

Where, MPt indicates the monetary policy and FPt indicates the fiscal policy.

GDPC=f (BMS, INT, EXCH, TR, TE, TRADE) …….. (2.2)

Where, GDPC is gross domestic product at constant price, BMS is broad money supply, INT is interest rate, EXCH is exchange rate, TR is total government revenue, TE is total government expenditure, TRADE is the sum export and import. Presenting the functional form in the modular equation form:

GDPC=β0+ β1BMS+ β2INT+ β3EXCH+ β4TR+ β5TE+ β6TRADE+εt…….. (2.3)

The vector error correction model (VECM) under this study comprises gross domestic product at constant price (GDPC) as the dependent variable. Whereas, monetary policy indicators, broad money supply (BMS), interest rate (INT) and exchange rate (EXCH), and fiscal policy indicators government revenue (TR), total government expenditure (TE), sum of export and import (TRADE) form the explanatory variables.

The model specified in the log form

Log (GDPC) =f (log BMS, log INT, log EXCH, log TR, log TE, log TRADE)…….. (2.4)

Results and Discussion

Results of Unit-Root Test

In order to examine the stationarity of the variables, Phillips-Perron Unit Root Test

Table 1

Results of Phillips –Perron Unit Root Test

Panel		Variable	Dickey-Fuller Results	Probability Value	Remarks
Level	Intercept	ln GDPC	-2.0183	0.5667	p-value>0.05
		ln BMS	-1.9198	0.6059	Non-Stationary
		ln INT	-2.1033	0.5329	
		ln EXCH	-0.9097	0.9417	
		ln TR	-2.1010	0.5338	
		ln TE	-2.0577	0.5510	
		ln TRADE	-1.4546	0.7908	
First Difference	Intercept	ln GDPC	-6.6535	0.0100	p-value<0.05
		ln BMS	-4.6284	0.0100	Stationary
		ln INT	-4.8075	0.0100	
		ln EXCH	-5.3361	0.0100	
		ln TR	-5.6822	0.0100	
		ln TE	-4.7701	0.0100	
		ln TRADE	-6.2353	0.0100	

Source: Calculation using r

was conducted. The results indicated that though the variables were non-stationary at level, all the variables were stationary at the first difference after applying logarithmic transformations.

Table 1 shows that all the variables under consideration lnGDPC, lnBMS, lnINT, lnEXCH, lnTR, lnTE, lnTRADE were non stationary at their level as the p-values were greater than 5 percent but were stationary at first difference since the p-values were less than 5 percent.

Optimum Lag Selection

A modern approach with the annual time series data, usually small number of lags 1 or 2 lags is suitable in order not to lose the degree of freedom and 1 to 8 lags is appropriate for the quarterly data and 6, 12 or 24 lags for the monthly data (Wooldridge, 2002). Therefore, this study since is based upon the time series data analysis, 2 lags has been considered in order to maintain the degree of freedom.

Results of Co integration Test

The Johansen co-integration test was conducted to examine the existence of co-integrating relationship among the variables. The results indicated that at least one co-integrating relationship exists among the tested variables, implying that these variables are related in the long run despite the short-run fluctuations.

Table 2

Results of Co-Integration Test

Maximum Rank	Test Statistics (Trace Statistics)	Critical Values at 5 Percent	Result	Remarks
0	208.8800	131.7000	Test Statistics> Critical Value at 5 Percent	Co-Integration
At Most 1	151.3800	102.1400	Test Statistics> Critical Value at 5 Percent	
At Most 2	106.6400	76.0700	Test Statistics> Critical Value at 5 Percent	
At Most 3	67.8200	53.1200	Test Statistics> Critical Value at 5 Percent	
At Most 4	38.2900	34.9100	Test Statistics> Critical Value at 5 Percent	
At Most 5	18.6600	19.9600	Test Statistics< Critical Value at 5 Percent	
At Most 6	3.5900	9.2400	Test Statistics< Critical Value at 5 Percent	

Source: Calculation using r

In the table 2, the test statistics for the maximum rank of 0 at 5 % level of significance is 208.8800, which is greater than the critical value of 131.7000. This indicates that there is strong evidence of at least one co-integrating relationship among the variables. In addition, in case of the rank 1, 2, 3, 4 also the test statistics are greater

than the critical value which also indicates the co-integration relationship in the model. However, fewer co-integration relation is preferred for the simplicity sake, as such maximum rank of 0 is chosen. Moreover, for the higher rank 5 and 6, the test statistics are smaller than the critical values which indicates that there is not enough evidence to reject the null hypothesis of no co-integration as such maximum rank of 0 is appropriate choice.

Vector Error Correction Model (VECM) Test and Results

VECM analysis was carried out to analyze both the long-run relationships and short run dynamics among the multiple variables and which also provides insights regarding the direction and speed of the adjustment process towards the long run equilibrium.

Table 3

Results of Vector Error Correction Model

Variables	DLGDPC	DLBMS	DLINT	DLEXCH	DLTR	DLTE	DLTRADE
r1	1	-0.0754	0.0273	0.3104	-0.2104	-0.1858	-0.0106

Source: *Calculation using r*

DLGDPC = -0.0754DLBMS + 0.0273DLINT + 0.3104DLEXCH - 0.2104DLTR - 0.1858DLTE - 0.0106DLTRADE…… (3.1)

Table 3 shows that in the long run, broad money supply is negatively related with the GDP but interest rate and exchange rate have positive relation with the GDP. On the other hand, all the variables representing fiscal policy, total revenue, total expenditure and total trade are negatively related with the GDP. This indicates that monetary policy is relatively effective in stimulating the economic growth in case of Nepal as two out of three variables representing monetary policy have positive relation with GDP.

The first co-integrating relationship is driven by DLGDPC and DLEXCH as have relatively large weights. However, other variables DLINT, DLTRADE, DLBMS, DLTE and DLTR have smaller weights respectively and therefore have relatively weaker relationship with DLGDPC.

Table 4

Vector Error Correction Short Run and Long Run Causal Relation

Variables		ECT Value	Value at First Lag	Value at Second Lag
Dependent	DLGDPC	-1.0380(0.3438)**	0.1076(0.2950)	0.2212(0.1725)
Independent	DLBMS		0.0154(0.6248)	0.6423(0.7304)
	DLINT		0.0055(0.1851)	0.1241(0.1734)
	DLEXCH		-0.1911(0.4052)	0.7831(0.4591)
	DLTR		-0.2310(0.3797)	0.1770(0.3499)
	DLTE		-0.5452(0.3766)	-0.1172(0.3484)
	DLTRADE		0.2194(0.2547)	-0.0015(0.2418)

Significant Codes: "***" 0.001, "**" 0.01, "*" 0.05 "." 0.1

Source: *Calculation using r*

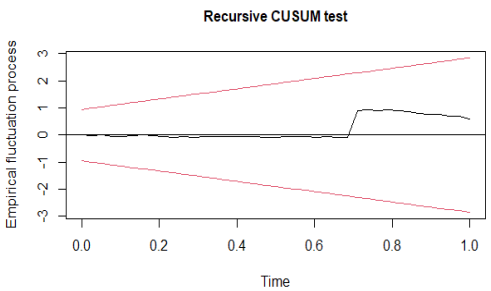
In the Table 4, the coefficient of GDP error correction term (ECT) is negative and significant therefore indicates that the variables will converge towards long term equilibrium relationship rapidly specifying that there is long term causal relationship among the dependent and independent variables. However, none of the variables at their lags were significant indicating no short run causal relationship of its own lag as well as lags of other variables.

Stability Test

Cumulative Sum(CUSUM) test is conducted in order to examine the structural changes and stability of the model which helps to identify the systematic changes in the coefficients of the regression (Brown et al. 1975). The results of the CUSUM test is presented in the figure.

Figure 1

Result of Cumulative Sum Test



Source: *Calculation using r*

In the figure 1, the plots of CUSUM statistics indicate the deviations of each sample value from the target value. Since the plots of statistics lie in between the critical band of 5 percent, ensures the stability of the coefficients in the model.

Diagnostic Test Result of the Variables

Breusch Godfrey serial correlation LM test and Breusch Pagan Godfrey heteroscedasticity test were conducted to ensure the correctness of model specifications, reliability of parameter estimates and statistical inferences.

Table 5

Results of Breusch-Godfrey Serial Correlation LM Test

LM test (Test Statistics)	Degree of Freedom	p-value
0.2889	3	0.9621

Data: DlnGDPC ~ DlnBMS + DlnINT + DlnEXCH + DlnTR + DlnTE + DlnTRADE

Source: *Calculation using r*

Table 5 shows a test statistics of 0.2889 with 3 degree of freedom and a corresponding p-value is 0.9621. Since, the p-value exceeds 0.05, indicates that there does not exist the autocorrelation among the residuals at the order less than or equal to 3.

Table 6

Results of Breusch-Pagan Godfrey Heteroscedasticity Test

BP (Test Statistics)	Degree of Freedom	p-value
2.7587	6	0.8385

Data: DlnGDPC ~ DlnBMS + DlnINT + DlnEXCH + DlnTR + DlnTE + DlnTRADE

Source: *Calculation using r*

Table 6 shows a test statistic of 2.7587 with the p-value 0.8385. Since the p-value exceeds 0.05, indicates the absence of heteroscedasticity in the model.

Result of Multivariate Granger Causality Test

Multivariate granger causality test was used to ascertain the causal relationships between multiple time series variables and create more accuracy of forecasting model.

Table 7
Result of Multivariate Granger Causality Test

Granger causality test	F-Test statistics	Degree of freedom	p-value
H0: DlnBMSDlnINTDlnEXCHDlnTRDlnTEDln-TRADE do not Granger cause DlnGDPC	2.3334	12, 196	0.0082
H0: No instantaneous causality between: Dl-nBMSDlnINTDlnEXCHDlnTRDlnTEDlnTRADE do not Granger cause DlnGDPC	8.4675	6	0.2058

Source: *Calculation using r*

The result of the Granger causality test in Table 7 reveal that the past values of the independent variables, namely DlnBMS, DlnINT, DlnEXCH, DlnTR, DlnTE and DlnTRADE, have no significant effect on the current value of the dependent variable DlnGDPC. The F-test statistic is 2.3334 with a corresponding p-value of 0.0082, which is less than 5 percent level of significance. This indicates the existence of Granger causality, implying that the past values of independent variables have a statistically significant effect on the current value of the dependent variable.

However, the results of the instantaneous causality test shows no instantaneous causal relationship between the independent and dependent variables. The test statistic is a chi-squared value of 8.4675 with a corresponding value is 0.2058, which exceeds the 5 percent level of significance. Consequently, it can be concluded that there is no instantaneous causality, and the independent variables do not have an immediate effect on the dependent variable.

Conclusion

This study attempts to assess the relative effectiveness of monetary and fiscal policy based on their relationship with the economic growth, employing the vector error correction model. The findings indicate the long run relationship of monetary and fiscal policy with the GDP. Monetary policy measureswere found to be comparatively effective than the fiscal policy measures, signifying monetary policy relatively effective than the fiscal policy in case of Nepal which is in consistent with the conclusion of most of the literatures under consideration and monetarist approach as well. In addition, the coefficients of the model were found to be stable with no serial correlation and heteroscedasticity. Finally, the results of multivariate granger causality test indicate the existence of granger causality but no instantaneous causal relationship between the independent and dependent variables. Therefore as a policy implication, these findings suggest that monetary measures could be comparatively effective for the attainment of the higher level of economic growth in Nepal.

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