



Impact of Foreign Direct Investment on Economic Growth

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Aabstract

Foreign direct investment (FDI) is a force of economic growth. FDI fills the gap between demand for capital and supply of capital that rise the productive investment and economic growth within the country. This paper aims to investigate the impact of FDI on economic growth of the country. Engel-Granger cointegration test is used by employing the time series data of 1995/96—2021/22 and error correction model. Neo-classical growth model is the main basis single equation model whereas real FDI is explanatory variable and GDP is the proxy for economic growth. Cointegration results confirms FDI makes the positive impact on economic growth in short-run as well as in long-run. The error correction term (0.67) indicates the disequilibria of GDP move towards the equilibrium at the speed of 65% in successive year. Therefore, this paper concludes to raise the FDI flows within the country. The Government should make the favorable environment — control money supply, direct remittance towards productive sector—for foreign investors which leads to rise economic growth within the country.

Keywords: spillover, endogenous, spurious, unfulfilling, foreign direct investment

Introduction

Investment is the main element of economic growth, either it is domestic or foreign direct investment (FDI). The main act of investment is to force the economic growth (Sarkodie & Strezov, 2019). However, developing countries have faced the scarcity of domestic capital for invest in different sectors to achieve the high economic growth. In this situation, FDI is one of the best sources of investment. On the one hand, FDI flows fill the gap of scarcity of capital in relation to demand for capital and on the other hand, it contributes to economic growth through new technology and managerial skill. Inflows of FDI in manufacturing sector and infrastructure sector that leads to rise the comparative advantage and creates the spillover effect in productive sectors (Findlay, 1978). Furthermore, foreign capital-based industries have used the advanced technology and high skill management. Domestic firms are able to follow the such technology and management in production process (Osei & Kim, 2020). Though, FDI flows into developing countries like Nepal have found to very slow pace due to the lack of infrastructure development, limited market size, limited capacity of human resources to utilize the advance technique and technology, and political instability within the country. However, the effects of limited flows of FDI on economic growth depends on the level of technology, availability of human capital, economic stability, degree of openness, state economic policy, and political stability of the host countries (Asongu & Odhiambo, 2020).

Inflows of FDI play important role in production sector, employment generation, trade balance, to correct balance of payment and make potential effect on domestic investment by competing in product and financial market. FDI rises economic growth through rise in total investment by attracting more amount of domestic investment and interaction of advance technology with host countries' human capital (Mah, 2010). Thus, FDI one the hand helps to mitigate demand for capital and on the other hand, it induces for domestic investors to make the investment in productive sectors (Ewe-Ghee, 2001). FDI rises the capital formation as well as it enhances quality of capital stock (Ajayi, 2006). Furthermore, FDI rises the export capacity as well it creates the job vacancy in the economy. FDI creates potential spillover skill to the domestic labour force as well as it helps to local firms to absorb the potential spillover benefits. Therefore, this paper has analyzed the impact of FDI on economic growth into Nepal.

Literature Review

Berthélemy and Démurger (2000) investigated the relationship between FDI and economic growth in China by employing time serious data from 1985 to 1996.

The simultaneous-equation system was used to analyze the data based on 24 Chinese provinces. This study found the significant and positive relationship between FDI flows and economic growth into China.

Kurtishi-Kastrati (2013) examined the relationship of FDI on economic growth and international trade through theoretical and empirical review of past scholars. This study used the descriptive method to explore the effects of FDI and testing the location theory of FDI and its impact on growth. The theoretical studies found that FDI makes the significant and positive impact on economic growth in host countries.

Almfraji and Imsafir (2014) stated that FDI was a strong power of economic growth during the previous years. FDI directly or indirectly bridges the gap between demand for and supply of capital that led to rise the production and productivity of the country. This study based on previous scholars' research works reviewed to examine the relationship between FDI and economic growth during the period of 1994 to 2012. The reviewed work showed that FDI directly effects on growth through rise in stock of capital, and use of new inputs and technology in the production function of domestic country. Furthermore, neoclassical growth models were used to test the effects of FDI on growth and found positive and statistically significant relationship.

Mehic, et al., (2014) explained the relationship between FDI flows and economic growth in southeast Europe by using time series data from 1998- 2007. Regression analysis was used with panel-corrected error to examined the connection between FDI and economic growth of southern Europe. The regression model found the positive and statistically significant relation between FDI and economic growth.

Bezic and Radic (2017) examined the relationship between FDI in tourism and tourism gross value added. Johansen, Granger cointegration and vector error correction models based on time series data of 2000-2012 confirmed the stable cointegration between the variables in the long run.

Quoc and Thi (2018) analyzed the relationship between FDI and economic growth in Vietnam based on time series data of 1986-2015. VAR model was used to examine the linkage between foreign investment and economic growth. Three variables (FDI, GDP, openness to trade) were used in VAR model. This study found that foreign capital was a significant source of capital for developing country like Vietnam. Furthermore, FDI significantly contribute the economic growth by rising production and productivity of the country.

Amin at el. (2020) analyzed the long run as well as short run effects of outward foreign direct investment flows in economic development in Romania with time series data of 1990—2019. Non-linear auto regressive distribution model of cointegration was used to explore the response of economic growth due to FDI flows. This study found

the positive and significant impact of FDI on economic growth in short run as well as long run. The non-linear auto regressive model concluded that increase in FDI flows led to rise the competitiveness in domestic as well as global level implying reduce the cost of product and selling price of product. The increase in competitiveness also rises the production and productivity and hence, FDI flows are the causes and consequences of domestic country's economic growth.

Odhiambo (2021) investigated the casual relationship between FDI and economic growth in Kenya by employing time serious data of 1980 – 2018. Autoregressive distributed lag model was used to investigate the role of FDI on economic growth. Furthermore, this study employed the multivariate Granger causality test by using money supply and trade as intermittent variable. Real GDP per capital as the dependent variable, FDI to GDP ratio was the explanatory variable and broad money supply and trade (export + import) were intermittent variables used in the model to avoid the problem of omission-of-variable bias. The ADRL model examined the positive and significant relationship between FDI and GDP growth in short run as well as in long run. This study concluded that FDI strongly driven the economic growth in Kenya.

Wang, et al. (2022) analyzed the relationship between foreign direct investment and economic growth based on systematic review on the core collection data base. In line with the study's theme, the term foreign direct investment is utilized in the title to establish the scope of the research, and economic growth must be included in either title, keyword, or abstract of the publication to ensure the relevance of this study. Hence, bibliometric analysis was used to established the relationship between FDI flows and economic growth. The bibliometric analysis was based on 105 documents by using bibliometric software. This study found that leading researcher 1995-2019 established the positive and significant relationship between FDI and economic growth in China. Similarly, conceptual structure analysis in Bibliometrix also found the positive and significant relationship based on reduction techniques, multidimensional scaling, and multiple correspondence analysis. Furthermore, the thematic analysis based on literature of 1992-2021 also concluded the positive and significant relationship between FDI and economic growth.

Sunde (2023) investigated the impact of FDI on economic growth of Namibia by using time series data of 1990-2020. The aim of the study was to explore the role of FDI on economic growth of Namibia. The autoregressive distributed lag model was used. Five explanatory variables (FDI, trade openness, government consumption expenditure, domestic investment, human capital) were used and GDP was the explained variable. This study found the positive and significant short run and long run relationship between FDI and economic growth and to employ the full benefit of

FDI on economic growth it is necessary to develop the infrastructure and quality of human resources.

To sum up, the prior studies on relationship between FDI flows and economic growth have shown the positive and significant relationship however, most of the research works focused on cross country relationship but this study has tried to explore the impact of FDI on economic growth by employing macroeconomic variables.

Method

In order to achieve the goals, this section has crafted an econometric model and conducted explanatory analysis. Additionally, it has incorporated data sources and diagnostic tests, while adhering to the writing style guidelines outlined in the publication manual of the American Psychological Association (2020, 7th edition).

In this study, the Engel-Granger cointegration and error correction model were employed to examine the relationship between FDI flows and economic growth in Nepal. Nepalese data were used in this study by covering 27 years of observations from the fiscal year 1995/96 to 2021/2022 and twenty-eight observations. For data analysis, the paper has employed real GDP as explained variable and real broad money supply (M_2), real remittance flow (RRMT), and real foreign direct investment have been considered as explanatory variables. The dataset underwent rigorous time series property tests, followed by the application of cointegration model to examine the impact of FDI on economic growth based on time series data.

Source of Reliable Information

The data used in this analysis are secondary time series data from 1995/96 -2021/2022 which obtained from Nepal Data (2023), Quarterly Economic Bulletin of Nepal Rastra Bank (2023). 27 observations have been used to analyze the causal relationship between FDI and economic growth in Nepal.

Model Specification

The models have been formulated based on neoclassical growth model (Solow, 1956) and endogenous growth model (Romer, 1990). In this model real gross domestic product (RGDP) as a proxy of economic growth used as dependent variable and real foreign direct investment (RFDI), real remittance (RRMT) which is income from human capital and real broad money supply (RM_2) have been used as explanatory variable.

$$RGDP = f(RFDI, RRMT, RM_2) \quad (1)$$

Econometrically, the single equation model is articulated as

$$RGDP = \beta_0 + \beta_1 RFDI + \beta_2 RRMT + \beta_3 RM_2 + \mu_t \tag{2}$$

Model 2 was changed into a log form, and calculation was made up as following equation:

$$\begin{aligned} \text{Ln}RGDP = \beta_0 + \beta_1 \text{Ln}RFDI + \beta_2 \text{Ln}RRMT + \beta_3 \text{Ln}RM_2 + \mu_t \tag{3} \\ \beta_1 < 0, \beta_2 > 0, \beta_3 > 0 \end{aligned}$$

where Ln refers to the natural logarithm

Analysis Tools

In this study, Eviews (Version 9) software has been employed to process and analyze the data. Several statistical tools and tests were used to conduct the analysis, including unit root tests, cointegration analysis, and various significant tests such as F test, coefficient of determination (R²). Specially, cointegration model has been applied to investigate the impact of FDI on economic growth in Nepal.

Unit Root Test

In most cases, time series data tend to exhibit nonstationary, as highlighted by Nelson and Plosseri in 1982, which could lead to spurious regression result. To mitigate this issue and ensure reliability of this analysis, this paper has been performed stationary test. Specifically, Augmented Dickey-Fuller (ADF) and Phillip Perron (PP) test have been used. These tests have been involved regressing the first difference of the series against the first lagged value, a constant term, and a time trend, helping to determine the order of integration in the following manner:

$$\text{No intercept and trend } \Delta F_t = \delta F_{t-1} + \mu_t \tag{4}$$

$$\text{With intercept } \Delta F_t = \alpha + \delta F_{t-1} + \mu_t \tag{5}$$

$$\text{With intercept and trend } \Delta F_t = \alpha + \beta S + \delta F_{t-1} + \mu_t \tag{6}$$

The ADF test involves of assessing equation 7:

$$F_t = \alpha + \beta S + \delta F_{t-1} + \sum_{i=1}^k \beta_i \Delta F_{t-i} + e_t \tag{7}$$

here e_t refers to statistically independent random term and $\Delta F_{t-1} = (F_{t-1} - F_{t-2})$, $\Delta F_t = (F_{t-1} - F_{t-2})$, and so on; k is the lagged values of ΔF and t is a trend.

This hypothesis was set:

$$H_0: \delta = 0 \text{ (i.e., exist the problem of unit root in variable).}$$

$$H_1: \delta \neq 0 \text{ (i.e., no problem of unit root in a variable or stationary).}$$

Cointegration Analysis

Engle and Granger (1987) cointegration test has been used to investigate the short run and long run causal relationship between FDI flows and economic growth in Nepal. This paper begins the cointegration analysis by initially applying the ordinary least squares (OLS) method. Subsequently, first derived the residual series, denoted as

$\hat{\mu}_t$ from the regression model and subjected $\hat{\mu}_t$ to a unit root test to assess its stationary.

To confirm the presence of cointegration, this study conducted ADF stationary test on the residual terms, $\hat{\mu}_t$, and compare the result with the critical values established by Mackinnon. If the ADF t statistics surpassed the Mackinnon critical value, it signified the presence of cointegration among the variables encompassed within the model.

Following the confirmation of cointegration processing to construct an error correction model to elucidate both short-term dynamics and long run equilibrium relationship. The error correction model is expressed as:

$$\Delta RGDP = \beta_0 + \beta_1 \sum_i^k \Delta RGDP_{t-1} + \beta_2 \sum_i^k \Delta RFDI_{t-1} + \beta_3 \sum_i^k \Delta RM_{2(t-1)} + \beta_4 \sum_i^k \Delta RRMT_{t-1} + \lambda EC_{t-1} + \epsilon_t \quad (8)$$

Were,

Δ = The first difference operator

EC_{t-1} = The error correction term lagged one period

λ = Short term coefficient of the error correction term ($-1 < \lambda < 0$)

ϵ_t = The white noise term

Results and Discussion

The data were analyzed by employing cointegration technique where GDP is taken as dependent variables and foreign direct investment, broad money supply and remittance are taken as explanatory variables. Descriptive statistics of the variables used in the model are presented in Table 1.

Table 1

Descriptive Statistics of Variables

	<i>N</i>	Min	Max	Median	Mean	Std. Dev.	Jarque-Bera
<i>LnRGDP</i>	27	13.54	14.62	14.08	14.09	0.32	1.59
<i>LnRRMT</i>	27	4.59	8.71	7.96	7.28	1.51	3.90
<i>LnRFDI</i>	27	-0.44	5.01	3.67	3.63	1.21	1.71
<i>LnRM₂</i>	27	8.08	10.53	9.20	9.24	0.76	1.72

Note: Calculation Based on Nepal Data of Rastra Bank. All data are converted into real term and data are log transform.

Table 1 depicts the descriptive statistics of the variables used in the Model. Descriptive statics shows the nature of data whereas Jarque-Bera statics of the all variables (*LnRGDP*, *LnRRMT*, *LnRFDI*, *LnRM₂*) shows that data are appropriate for analysis. Similarly, mean and median value of all variables used in the analysis are

positive and nearest value i.e., mean and median of the variables fall at the same point. Variable used in analysis having the small standard deviation and there is no very big difference between minimum and maximum value of the variables. Therefore, variables used in the model are appropriate for further analysis. Similarly, Table 2 and Table 3 show the unit test best on Philips Peron (PP) tests and Augmented Dickey–Fuller (ADF).

In Table 2 all variables are used in the analysis having the unit root in level. ADF and PP test shows that LnRGDP, LnRFDI, LnRRMT, and Ln M₂ having the calculated t statistics less than critical value, therefore, variables are not stationary.

Table 2 :

Stationary Test Through ADF& PP Method of Log Levels of Variables at level

Variables in level	Test Statistic			
	ADF		PP	
	Test statistic	Critical value at 5 percent	Test Statistic	Critical value at 5 percent
LnRGDP	0.48	-2.99	-2.51	-2.97
LnRRMT	-1.72	-2.97	-1.65	-2.97
LnRFDI	-2.40	-2.97	-2.39	-2.97
LnRM ₂	0.76	-2.97	1.18	-2.97

Note : Calculation Based on Nepal Data of Rastra Bank (2023)

Table 2 provides the evidence from ADF and PP test time-series data became nonstationary in the level form. However, the variables become stationary in first difference, which is shown in Table 3.

Table 3 :

Stationary Test Through ADF and PP Method at First Difference

Variables in level	Test Statistic				Order of Integration
	ADF		PP		
	Test statistic	Critical value at 5 percent	Test Statistic	Critical value at 5 percent	
LnRGDP	-5.28	-2.98	-11.68	-2.98	I(1)
LnRRMT	-3.93	-2.98	-3.91	-2.98	I(1)
LnRFDI	-8.03	-2.98	-8.00	-2.98	I(1)

LnRM ₂	-4.74	-2.98	-4.70	-2.98	I(1)
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Note :Calculation Based on Nepal Data of Rastra Bank (2023)

Table 3 provided the evidence of all variables become stationary in first difference and integrated at same order *I* (1) and stationary variables permit to employ Engel Granger cointegration method to test the long run and short run causal relationship between LnRGDP and LnRFDI, LnRRMT, LnRM2.

Model 1

Long Run Relationship Between FDI and Economic Growth

$$\text{Ln(RGDP)} = 10.33 + 0.01\text{Ln(RRMT)} + 0.14\text{Ln(RFDI)} + 0.39\text{LnM}_2$$

T	(110.02)	(2.73)	(2.74)	(24.24)
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$$R^2 = 0.99, N = 27, F = 223.86, DW = 1.51$$

Model 1 shows that explanatory variables are positive and statistically significant. The contribution foreign direct investment into Nepalese economy is significant shown by the coefficient of RFDI (0.14) implies that 1% increase in FDI flows led to 0.14 percent increase in RGDP into Nepal. FDI flows lead to rise the capital stock within the country that rise the productivity and production. Hence, rise in FDI flows rise the volume of real GDP is based on neo-classical growth Model (Solow, 1956). Furthermore, the coefficient of remittance (0.01) implying that 1 % increase in Remittance flows within the country led to indirectly 0.01% increase in GDP growth. Remittance flows within the country led to in the one hand, rise in capital stock and on the other rise in investment in human capital (in the form of training, skill development programme etc.). Furthermore, money supply is another important component of GDP growth in Nepal whose coefficient (0.39) is positive and statistically significant implying 1% increase in money supply within the country lead to 0.39% increase in GDP. The finding of this study aligns with those of previous research by Amin et al. (2020), Odhiambo (2021), and Quoc and Thi (2018) as these studies also found that FDI makes positive impact on economic growth.

Model 1 exhibits that all long run coefficients have proper sign statistically significant implying FDI is a one of the major components which bridge the gap between demand for capital and scarce supply of capital and rise the capital stock within country (Sunde, 2023). Similarly, rise in money supply leads to rise bank deposit which reduce interest rate and rise demand for money to invest in productive sector leading to rise production within the economy.

In Model 1 all long run coefficients are significant and residual obtained from

Model 1 and its ADF test statistics (-5.99)—based on Mackinnon (1996)—conforms those variables having the cointegration relationship and it permits to estimate Error Correction Model (ECM). Model 2 shows the ECM model:

Model 2

Error Correction Model

$$\Delta RLnGDP = 0.01 + 0.13Ln\Delta RFDI + 0.24\Delta LnRM_2 + 0.003\Delta LnRRMT - 0.67EC_{t-1}$$

T	(1.77)	(2.55)	(2.54)	(0.18)	(-3.29)
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$R^2 = 0.56, F = 3.10, DW = 1.84, N = 27$

Note: Error correction model calculation based on Model 1 with first difference of the log transformed variables. EC_{t-1} = Error correction term, Δ = first difference, Ln = Log

The coefficient of Error Correction Term (-0.67) implying that 67% of GDP adjusted back towards long run equilibrium due to explanatory variables. The negative and statistically significant ECT indicates that the dependent variable (GDP) tends to correct by explanatory variables when it deviates from its equilibrium. The short run coefficient of RFDI (0.13) and RM_2 (0.24) have found proper sign with statistically significant however, the short run coefficient of RRMT (0.003) has found proper sign but statistically insignificant. Hence, FDI is one of the major variables which makes the positive impact on GDP growth in Nepal in short run as well as in long run.

The coefficient of R^2 (0.56) indicates that 56% of the explanatory variables (RRMT, RFDI, RM_2) explain the GDP of Nepal. F statistics (3.10) shows that model is good fit. Furthermore, Breusch-Godfrey serial correlation LM test coefficient (4.49) and $DW = 1.84$ indicating Model 2 has no problem of autocorrelation. Similarly, the variance inflation factor (VIF) ($RM_2 = 1.31, RFDI = 1.013, RRMT = 1.31$) of all variables having less than 10, therefore the Model 2 have no problem of multicollinearity. Hence, all these residual diagnoses provide the evidence for unfailing result.

Conclusion

Using the Engel-Granger method of cointegration to investigate the impact of FDI on GDP of Nepalese economy by employing data of 1995/96 to 2021/22, this study aimed to examine the contribution of FDI to GDP. The Engel-Granger test results revealed a cointegration relationship between real GDP and Real FDI flows into Nepal. furthermore, the error correction term was statistically significant and had negative sign, indicating that these macroeconomic factors (RFDI, RM_2 , RRMT) have both short-run and long-run impact on GDP growth in Nepal.

Based on the result from Model 1 and 2, it is government of Nepal takes specific

action to rise inflows of FDI, take expansionary monetary policy and rise investment in human capital which develop the human skill and technical manpower earn the more in foreign countries that lead to rise remittance inflow within country. Therefore, policymakers in Nepal should seriously consider implementing expansionary monetary policy, and create favorable environment for foreign investors which boost the FDI flows into Nepal, as it can serve as a potent tool to boost GDP growth within Nepalese economy.

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