# A Time Series Analysis of Foreign Direct Investment and Economic Growth: A Case Study of Nepal

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### Abstract

*Proponents of foreign direct investment (FDI) such as development institutions, economists, academics and policy makers argued that foreign direct investment ensures efficient allocation of resources as compared to other forms of capital inflows. However, some literature suggests that the FDI inflows have a positive impact on economic growth of host countries and other literature suggests not at all. Although a large volume of econometric literature includes the impacts of FDI on economic growth in developing countries, not enough studies has been carried out on the question of linkage between them. This study has been carried out to find out the linkage between FDI and economic growth for Nepal over the period 1980-2006 using the Granger Causality test, Unit root test and Co-integration test. The results showed that there exit a long term relationship between the variable and Foreign Direct Investment granges the Gross Domestic Product. From the result, it can be concluded that there exits a long term relationship and relationship ceases from FDI to GDP after four year.*

### Introduction

The ultimate goal of development is to reduce poverty and improve standard of living. For this sustainable economic growth and investment in people are necessary. However, given the prevalence of resource constraint, poorer countries cannot achieve this goal by itself. There is a need that the poorer countries like Nepal should seek support from donors in the form of aid for financing project and programmers in needy areas.

Today, Nepal is one of the most liberalized countries in the South Asian region. However, growth performance has been very poor in recent years. In this context, a closer examination of the linkages between foreign direct investment and economic growth is critically important from a policy point of view. There are highly liberal Foreign Direct Investment (FDI) and Gross Domestic Product (GDP)-related policies supplemented by various acts. In the aftermath of liberalization that began in the early 1990s, FDI increased substantially.

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However, that could not be sustained for long. After becoming a World Trade Organization (WTO) member in 2004, Nepal has been pursuing further opening up and liberalization policies on the FDI. Nepal is also a member of the South Asian Preferential Trade Arrangement (SAPTA) and the Bay of Bengal Initiative for Multi-Scrotal Technical and Economic Cooperation-Free Trade Area (BIMST-EC FTA). New initiatives on FDI have been taken with the aim of enhancing sustained growth and reducing poverty.

Nepal liberalized its policy on FDI with the New Industrial Policy of 1992 and the amendment of its Foreign Investment and Technology Act of 1980. The 1992 policy identifies FDI promotion as an important strategy in achieving the objectives of industrial development and employment creation and the government is encouraging FDI in the country by providing attractive incentives and facilities within a liberal and open policy. The volume of FDI inflows into Nepal has been small, averaging only about $8 million annually and FDI has not been an important source of aggregate investment finance and its impact on economic development has also been minimal. A comparison with selected high and low performing Asian countries brings out the underperformance of Nepal in terms of FDI inflows.

- During 1980-1989, FDI flows to Nepal were minimal or even negative and there was a distinct acceleration during the 1990s and peaked at $23 million in 1997 because of liberal trade policy (treaty with India1996; which allowed India to import goods from Nepal free of import duty and quantitative restrictions if the goods were manufactured in Nepal and liberalization of the exchange rate regime).

The economic performance of Nepal was exceptionally very weak even registering as negative growth rate in some year leading a major negative impact on the government's fiscal position. Despite a series of ambitious development plans and assistance from international aid agencies, Nepal's economic growth has barely kept pace with its expanding population.

The main objective of this study is to test the relation between Foreign Direct Investment Inflows and Economic Growth in terms of Gross Domestic Product (GDPGR) and the direction of linkage between FDI and GDPGR.

### Literature review

The term FDI raises important conceptual questions regarding definition and interpretation, as well as practical problems of measurement. The classification of certain types of investment is sometimes based on arbitrary arguments. But we use the definition which introduced by the World Trade Organization (WTO) in 1996. The WTO indicates that FDI occurs when an investor based in ne country acquires an asset in another country with the intent to manage that asset. Accordingly, the management dimension is what distinguishes FDI from portfolio investment in foreign stocks, bonds and other financial instruments. The growth of international production is driven by economic and technological forces. It is also driven by the ongoing liberalization of Foreign Direct Investment and

trade policies. In this context, globalization offers an unprecedented opportunity for developing countries to achieve faster economic growth through trade and investment. To date, the growth in foreign direct investment shows that sustainable growth for several developing countries is progressively being influenced by Multinational Enterprises (MNE's) through foreign direct investment flows. Thus, attracting foreign direct investment has become very crucial for most countries because of its perceived positive impact on economic growth and development. According to World Bank, developing countries should endeavor to attract more foreign direct investment because it encourages production improvements, contributes to the advancement in technology, boosts employment opportunities, bolsters business sector competition and creates exports.

However it has been accepted that FDI in economic growth may have both positive effects like addition to the investment increases the total factor productivity, positive spillovers and negative effect as inappropriate technology, repatriations of excessive profits and negative competition effect.

Previous literature suggests that the FDI inflows have a positive impact on economic growth of host countries and not in developed countries. According to Gorg and Greenaway foreign direct investment has negative rather than positive spillovers in transition economies.

Findlay postulates that FDI increases the rate of technological progress in the host country through a "contagion" effect from the more advanced technology, management practices etc. used by the foreign firms, UNCTD (1999) finds that the FDI has either a positive or negative impact on output depending on the variables that are entered alongside it in the test equation.

De Gregorio shows, in a panel data of 12 Latin American countries, that FDI is about three times more efficient than domestic investment using time series data at the industry level for US firms during the early 1970's Noorzoy (1980), concluded that a positive relationship prevailed between investment at home and abroad. On the other hand, more recent studies have shown a negative relationship to exist between FDI and home-country investments.

Bengoa and Sanchez-Robles show that positively correlated with economic growth, but host countries require human capital, economic stability and liberalized markets in order to benefit from long term FDI inflows. As summarized in Balasuramanyam, Salisu and Spasford and De Mello FDI is a bundle of capital stock, knowhow and technology and can augment the existing stock of knowledge in the recipient economy through labor training, skill acquisition and diffusion and the introduction of alternative management practices and organizational arrangement. Unfortunately, the impact of FDI on growth remains more contentious in empirical than in theoretical studies. While some studies observe a positive impact of FDI in economic growth, other detects a negative relationship between these two variables. The controversy has arisen partially due to data insufficiency in either cross country and time series investigation Durham fails to identify a positive relationship between FDI and economic growth, but instead suggest that effects of FDI are contingent on the "absorptive capability of host countries According to the findings of Choe's causality

between economic growth and FDI runs in either direction but with a tendency towards growth causing FDI, there is little evidence that FDI causes host country growth.

Foreign Direct Investment (FDI) and economic growth nexus has spurred volumes of empirical studies on both developed and developing countries This nexus has been studied by explaining the determinants of both growth and FDI, the role of transnational companies (TNCs) in host countries and the direction of causality between the two variables. In other words, not only FDI can 'Granger cause' GDPGR (with either positive or negative impacts), but GDP growth can also affect the inflow of FDI or there could be no causal link.

### Materials and Methods

#### *Data Source and Methodology*

The data used in this study is aggregate annual time series at constant prices for gross domestic product, GDP (annual growth) and total net inflows for FDI as a percentage of GDP (FDI ratio) covering the period of 1980-2006 in 27 pairs of observations. The data was extracted from the International Monetary Fund, World economic Outlook and World Investment Report, Fact Book of various years and Econ- stat.

In this study, two methods are used. The statistical methods used are: the Ordinary Least Squares Method (OLS) and the Granger causality test. Before using the Granger causality test we performed some of the other test like unit root test and co-integration test.

#### *Ordinary Least Square Method*

Here we will assume the hypothesis that there is no relationship between Foreign Direct Investment (FDI) and Economic Growth (GDPGR). To confirm about our hypothesis let us consider, linear regression Equation

$$GDPGR_i = \alpha_i + \beta_i FDI_i + \varepsilon_i \qquad\qquad 1$$

where, $GDPGR_i$ and $FDI_i$ shows the Gross Domestic Product annual growth rate and Foreign Direct Investment at a particular time respectively while $\varepsilon_i$ represents the "noise" or error term; $\alpha_i$ and $\beta_i$ represent the slope and coefficient of regression. The coefficient of regression, $\beta_i$ indicates how a unit change in the independent variable (foreign direct investment) affects the dependent variable (gross domestic product). The error, $\varepsilon_i$ is incorporated in the equation to cater for other factors that may influence GDP. The validity or strength of the Ordinary Least Squares method depends on the accuracy of assumptions. In this study, the Gauss-Markov assumptions are used and they include; that the dependent and independent variables (GDP and FDI) are linearly co-related, the estimators $(\alpha, \beta)$ are unbiased with an expected value of zero i.e., $E(\varepsilon_i) = 0$, which implies that on average the errors cancel out each other. The procedure involves specifying the dependent and independent variables; in this case, GDP is the dependent variable while FDI is the independent variable.

But it depends on the assumptions and that the results of the methods can be adversely affected by outliers In addition, whereas the Ordinary Least squares regression analysis can establish the dependence of either GDP on FDI or vice versa; this does not necessarily imply direction of causation. Stuart Kendal noted that "a statistical relationship however strong and however suggestive, can never establish causal connection." Thus, in this study, another method, the Granger causality test, is used to further test for the direction of causality.

### Granger Causality Test

FDI and GDP are in fact, interlinked and co-related through various channel. There is no theoretical or empirical evidence that could conclusively indicate sequencing from either direction. For this reason, the Granger Causality test was carried out on FDI and GDPGR.

The Granger causality test used in time series analysis to examine the direction of causality between two economic series has been one of the main subjects of many econometrics studies for the past three decades. Recent studies have shown that the conventional F-test for determining joint significance of regression-derived parameters, used as a test of causality, is not valid if the variables are non-stationary and the test statistic does not have a standard distribution Toda and Yamamoto (1995).

Following Seabra and Flach, Granger test is implemented by running the following regression:

$$\ln GDPGR = \gamma_0 + \sum_{i=1}^{k+d} \alpha_{1i} \ln GDPGR_{t-1} + \sum_{j=1}^{k+d} \beta_{1j} \ln FDI_{t-1} + \varepsilon_{1t} \qquad 2$$

$$\ln FDI_t = \gamma_0 + \sum_{i=1}^{k+d} \alpha_{2i} \ln FDI_{t-1} + \sum_{j=1}^{k+d} \beta_{2j} \ln GDPGR_{t-1} + \varepsilon_{2t} \qquad 3$$

where, lnGDPGR and lnFDI are, respectively, the natural logarithm of GDPGR growth and foreign direct investment FDI as a percentage of GDP. k is the optimal lag order, d is the maximal order of integration of the variables in the system and $\varepsilon_1$ and $\varepsilon_2$ are error term.

### Results

The results of the Ordinary Least Squares Regression are summarized in the Table 1 which indicates that there is positive relationship between FDI and GDP.

**Table 1: Ordinary Least Square**

| Variable | Coefficient | t-value | R² | p-value | F-statistics |
|----------|-------------|---------|-------|---------|--------------|
|          |             |         | 0.113 |         | 3.192        |
| GDP/alpha | 3.184 | 4.992 | | 0.000 | |
| FDI/beta | 0.108 | 1.787 | | 0.086 | |

The objective of the unit root test is to empirically examine whether a series contains a unit root. If the series contains a unit root, this means that the series is non-stationary. Otherwise, the series will be categorized as stationary. The common method to test the presence of a unit root is the Dickey-Fuller or Augmented Dickey-Fuller test (ADF test) using modified Akaike and results are shown Table 2.

**Table 2: Unit Root Test**

| Variables in levels | Variables in | | ADF value |
|---|---|---|---|
| | ADF value | first difference | |
| Ln (GDPGR) | -4.938894 | DLn (GDPGR) | -7.148367* |
| Ln (FDI) | -1.322019 | DLn (FDI) | -7.816663* |

$H_o$: unit root; $H_1$: trend stationary,* significance at 1 and 5 % level of significance

The result in Table 2 indicates that data are non-stationary in level but stationary in first difference. Hence these data are integrated in order (1).

Co-integration test is used to find out the long-term relation bet the variables. Here Johansen ML Co-integration test is used and results are shown Table 3.

**Table 3: Co-integration Test**

| Nullhypothesis | Max. eigen value | 5% criticalvalue | Trace statistics | 5% critical value |
|---|---|---|---|---|
| None* | 27.33121 | 15.89210 | 32.68519 | 20.26184 |
| At most one | 5.353985 | 9.164546 | 5.353985 | 9.164546 |

$H_o$: has no co-integration; $H_1$: has co-integration

Similarly results in table 3 indicate that the null hypothesis that there is no co-integration is rejected for rank of zero at 5% level of significance. This means that there exits a long-run relationship between the variable.

Priory to testing the Granger causality test (1980-2006), we performed other test given below.

**Table 4: Granger Causality Test**

| Null hypothesis | lag | Obs. | F-statistics | Probability | Decision |
|---|---|---|---|---|---|
| GDPGR does | 2 | 25* | 0.46045 | 0.63753 | Accept |
| notgranger | 3 | 24* | 0.51554 | 0.67710 | Accept |
| cause FDI | 4 | 23* | 1.17011 | 0.36570 | Accept |
| | 5 | 22* | 0.99579 | 0.46352 | Accept |
| FDI does not | 2 | 25* | 0.26828 | 0.76740 | Accept |
| grangercause | 3 | 24* | 0.09408 | 0.96288 | Accept |
| GDPGR | 4 | 23* | 1.06517 | 0.40999 | Accept |
| | 5 | 22* | 3.66647 | 0.03381 | Reject** |

· Obs.after lag; ** Reject at 5% level of significance

Using maximal order of integration ($d_{max} = 1$) and optimal lag ($k = 1, 2, 3, 4$) in Eq. 2 and 3:

$$\ln GDPGR_t = \gamma_0 + \sum_{i=1}^{k+d} \alpha_{1i} \ln GDPGR_{t-1} + \sum_{i=1}^{k+d} \beta_{1j} \ln FDI_{t-1} + \varepsilon_{1t}$$

$$\ln FDI_t = \gamma_0 + \sum_{i=1}^{k+d} \alpha_{2i} \ln FDI_{t-1} + \sum_{i=1}^{k+d} \beta_{2j} \ln GDPGR_{t-1} + \varepsilon_{2t}$$

Here, we analysis our research with lag value 2, 3 and 4 using the Granger, we did not find any causal relation but incase of lag value 5; we find the causal relation indicated in the Table 4. The result indicates that GDPGR does not Granger Cause FDI at all where as FDI Granger Cause GDPGR for the lag value 5. That means the Granger Causality Test shows that casual effect ceases to exit after 4 years and causality runs from FDI to GDP.

## Conclusion

There was no direct way of identifying the linkage between FDI and GDPGR. Unavailability of necessary data was an additional constraint. There were no official data required to research. Moreover, getting a quick response from the respondents involved in FDI activities was also a difficult task; therefore, the research had to be based on the secondary information which may not provide a representative picture of the overall situation of FDI and GDPGR in Nepal. In the Nepalese context, no study that examines the linkages between FDI and GDPGR and possible channels establishing linkages has been found. However, a few studies have examined the investment environment and FDI inflows. Here this study looks for the linkage between FDI and GDPGR.

The present study employs with the relationship between foreign direct investments and economic growth using annual data for the period 1980-2006. The empirical analysis on the basis of ordinary least square method. suggests that there is positive but small relationship even considered negligible where as unit root test suggested that variables used in this are non-stationary in their levels. Similarly, on this basis the Johansen co-integration test analysis suggests that there is long-run equilibrium relationship among these variables and Granger Causality test suggest that Foreign Direct Investment granges the Gross Domestic Product even after four year.

Then from above analysis we may conclude that Nepal's GDP especially does not depends on FDI and may depends on other factors like agricultural inputs, industrial inputs, remittances, which is left for a future research.

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