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

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Abstract

This study has been carried out to find out the linkage between Foreign Direct Investment (FDI) and economic growth in terms of Gross Domestic Product Growth Rate (GDPGR) for Nepal over the period 1980-2006; using the Granger Causality test, Unit root test and Co-integration test. The results show that there exit a long term relationship between the variable and direction of causality runs from FDI to GDPGR.

Keywords: FDI, GDPGR, Regression, Co-integration, Unit root test, Causality

1. Introduction

The ultimate goal of development is to reduce poverty and improve standard of living. For this to happen, sustainable economic growth and investment in people are necessary. However, given the prevalence of resources constraint, poorer countries like Nepal cannot achieve this goal by itself. There is a need that the poorer countries 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 important Acts. In the aftermath of liberalization that began in the early 1990s, FDI increased substantially. 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.

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 relationship between FDI inflows and economic growth in terms of GDPGR and to find the direction of linkage between them.

2. Literature Review

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, which 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 .M.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 capital bundle of capital stock, know-how 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 J.I. (2003), 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.

3. Analytical Framework 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 foreign direct investment, 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.

For this study, Statistical Package for Social Sciences (SPSS) and E-views Microsoft package has been applied. Ordinary Least Square test was run using SPSS Microsoft regression package with GDPGR as a dependent variable while FDI as an independent. Then calculated F value is then compared to the critical value or level of significance. If the calculated F value is greater than the critical F value at a chosen level of significance, the null hypothesis is rejected; otherwise accepted.

Similarly; Granger Causality Test was run using E-views Microsoft package. But before using the Granger Causality Test, nature of the data has been studied using unit root test and Co-integration test using same Microsoft package. Then with maximal order of integration ($d_{max} = 1$) and optimal lag (k = 1, 2, 3), Granger Causality Test was run using E-views Microsoft package. Then calculated F value is then compared to the critical value or level of significance. If the calculated F value is greater than the critical F value at a chosen level of significance, the null hypothesis is rejected; otherwise accepted.

Unit root test: The objective of the unit root test is to empirically examine whether a series contains a unit root or not. If the series contains a unit root, this means that the series is non-stationary. Otherwise, the series will be categorized as stationary.

Co-integration test: Co-integration test is used to find out the long-term relation bet the variables.

Ordinary least square method: Here we will assume the hypothesis that there is no relationship between Foreign Direct Investment (FDI) and Economic Growth in terms of GDP (GDPGR). To confirm about our hypothesis let us consider, linear regression Equation

$$GDPGR_i = \alpha_i + \beta_i FDI_i + \varepsilon_i \quad (1)$$

where, $GDPGR_i$ and FDI_i shows the Gross Domestic Product annual growth rate and Foreign Direct Investment at a particular time respectively while ε_i represents the "noise" or error term; α_i and β_i represent the slope and coefficient of regression. The coefficient of regression, β_i indicates how a unit change in the independent variable (foreign direct investment) affects the dependent variable (gross domestic product). The error, ε_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 (α, β) are unbiased with an expected value of zero i.e., E (ε_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 dependents 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 GDPGR 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.

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

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

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

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 ε_1 and ε_2 are error term.

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

$$\ln GDPGR_t = \gamma_0 + \sum_{i=1}^{k+1} \alpha_{1i} \ln GDPGR_{t-1} + \sum_{i=1}^{k+1} \beta_{1j} \ln FDI_{t-1} + \varepsilon_{1t} \quad 4$$

$$\ln FDI_t = \gamma_0 + \sum_{i=1}^{k+1} \alpha_{2i} \ln FDI_{t-1} + \sum_{i=1}^{k+1} \beta_{2j} \ln GDPGR_{t-1} + \varepsilon_{2t} \quad 5$$

Here, we analysis our research with lag value 2, 3 and 4 using the Granger.

4. Empirical results

In Ordinary least Square Method, we reject the hypothesis that there is no relationship between the variable and the results of the Ordinary Least Squares Regression are summarized in the Table 1.Similarly the results of Unit Root test ,Co –Integration Test and Granger Causality test are summarized in the Table 2, Table 3 and Table 4 respectively.

5. Result and Discussion

The Ordinary least Square Method indicates that there is positive relationship between FDI and GDP and Unit Root Test indicates that data are non-stationary in level but stationary in first difference so these data are integrated in order (1). Similarly Johansen Co-Integration test indicates that indicates 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. And Granger Causality Test 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.

6. 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 data; which may not provide a representative picture of the overall situation of FDI and GDPGR in Nepal.

The empirical analysis on basis of ordinary Least Square Method suggests that there is weak positive relationship between the variables and Unit Root Test suggested that variables that used in this study are non-stationary in their levels. Similarly, Johansen Co-Integration test suggests that there is long-run equilibrium relationship among these variables and Granger Causality Test suggest that causality runs from Foreign Direct Investment to Gross Domestic

Product Growth Rate after four year. Then from above analysis we may conclude that Nepal's Gross Domestic Product growth Rate especially does not depend up on FDI.

References

Andreas, J. (2005). The effects of FDI inflows on host country economic growth. Doctorate Paper in progress. [Online] Available: http://econpapers.repec.org/paper/hhscesisp/0058.htm

Balasubramanyam, V.N., M. Salisu., and D. Spasford. (1996). Foreign direct investment and economic growth in EP an IS countries. *Economic Journal*, 106: 92-105.

Bengoa and S.B. Robles, (2003). Foreign direct investment, economic freedom and growth: New evidence from Latin America. *European Journal of Political Economics*, 19: 529-545

Choe, J.I. (2003). Do foreign direct investment and gross domestic investment promote economic growth? *Review of Development. Economics*, 7: 44-57.

De Gregoria, J. (1992). Economic growth in Latin America. *Journal of Development Economics*.

De Mello, L. (1999). Foreign direct investment led growth: Evidence from time-series and panel data. *Oxford Economic Papers*, 51: 133-151.

Durham, J.B. (2004). Absorptive capacity and effects of FDI and equity foreign portfolio investment on economic growth. *European Economic Review,* 48: 285-306.

Findlay, R. (1978). Relative backwardness, direct foreign investment and the transfer of technology: A simple dynamic model. *Quarterly Journal of Economics*, 92: 1-16.

Gorg, Greenaway D. (2004). World Bank. *Research Observer*. 19: 171-97.

Granger, C. W.J. (1969). Investigating casual relationship by econometric models and cross spectral methods. *Econometrica*, 37: 424-458.

Gujarati, D. (2003). *Basic Econometrics*. 4th Edn., McGraw-Hill, New York. 1002pp.

Jeffrey M. Wooldridge. (2007). *Introductory Econometrics, A Modern Approach*, 3rd edition, 894pp .

Maurice G., & Alan Stuart Kendall. (1967). *Advanced Theory of Statistics*, Volume Two: Inference and relationship. pp690.

Noorzoy, M.S. (1980). Flows Direct Investment and their effects on US domestic investment. *Economic letter*, 5: 311-317.

Sebra, F., and L. Flach, (2005). Foreign direct investment and profit outflows; A causality analysis for the Brazilian economy. *Economics Bulletin*, 6, 1-15.

Solomon, E. (2006). Do host country factors affect the impact of foreign direct investment on economic growth? *Proceeding of the ESDS International Annual Conference*, Institute of MaterialsLondon, UK, Nov. 27-27, pp, 1-15.

Stevens., Guy V. G., & Lipsey, Robert E. (1992).Interactions between domestic and foreign investment. *Journal of International Money Finance*, 11, 40-62.

Toda, H.Y., and Yamamoto, T. (1995) .Statistical Inference in Vector Auto regressions with possibly integrated Processes, *Journal of Econometrics*, 66, 225-250.

UNCTAD. (1999). *World investment report*, FDI and the challenge of development.

UNCTAD. (2003*). Investment Policy Review*, Nepal, New York and Geneva.

World Bank, (1993). *FDI benefits beyond finance, development brief*, number-14.

Yamada, H., and Toda, H.Y. (1998). Inference in possibly Integrated Vector Autoregressive Models: Some Finite Sample Evidence. *Journal of Econometrics,* 86, 55-95.

Table 1. Ordinary least square

Variable	Coefficient	t-value	R^2	p-value	F-statistics
			0.113		3.192
GDP/alpha	3.184	4.992		0.000	
FDI/beta	0.108	1.787		0.086	

H_o: There is no relationship between the variables; H_1: There is relationship between the variables

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*

Ho: unit root; H1: trend stationary,* significance at 1 and 5 % level of significance

Table 3. Co-integration test

Null hypothesis	**Max. eigen value**	**5% critical value**	**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

Ho: has no co-integration; H1: has co-integration

Table 4. Granger causality test

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

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