A Study of Economic Growth and Foreign Direct Investment: An Econometric Approach in SAARC Region

Dr.Dinesh Kumar
Associate Professor, Department of Economics, Ch.Charan Singh University, Meerut

I. INTRODUCTION

Foreign direct investment (FDI) being the non-debt financial capital is considered the most preferred international capital to contribute economic growth to the host economies. It is a win-win investment for both home and host economies. It contributes to the economic growth mainly through technological and managerial advancements, increasing return to production via positive externalities, creation of economic climate more competitive and productive spillovers etc. Through investment, it increases the level of employment, income and saving. In this way, it's has been established itself as the major contributor to economic growth to host economies. The South Asian Association for Regional Cooperation (SAARC) covers the areas of cooperation in agriculture, biotechnology, economic and trade, education, energy, poverty alleviation, science and technology, security aspects etc with the aim at accelerating economic growth and stimulates socio-cultural development in the South Asian Region. FDI has been established itself as a major source of higher economic growth in the region since around last two decades.

Research investigating the determinants of FDI has been increasing along with rising international investment in emerging economies. Most such studies are for one country or two. It is with this background, being motivated by this fact, the present study attempts to examine the determining factors of FDI in the SAARC region during 2001 to 2015 with the objective to provide some conclusive evidence on the authentic evidence of FDI in the region.

II. REVIEW OF LITERATURE

There has been no consensus over the determinants of FDI in recipient economies. There is huge amount of literature available to understand and analyze the issue. To assess the FDI determinants related issue in SAARC countries, the following studies have been reviewed and explored. Srinivasan (2011) investigated the determinants of FDI in selectedSAARC countries for the period 1970-2007 employing traditional fixed effectsand random effects models. His empirical results indicate that the market size,GDP per capita, trade openness, infrastructure, inflation, degree of risk anduncertainty are the most significant factors in determining FDI in the region. Healso finds that other variables such as human capital, degree of industrialization,real exchange rate, domestic investment, and terms of trade are insignificant inattracting FDI in the region. He employs traditional fixed and random effectsmodels for estimation, and does not use panel cointegration methodology. Basnetand Pradhan (2014) examine the influence of FDI on growth in five SAARCmember countries - Bangladesh, India, Nepal, Pakistan, and Sri Lanka. Using timeseries data from 1990 to 2010, an error correction model is estimated in whichgrowth of real GDP depends on FDI, investment, openness, tax policy, andinflation. Their empirical results indicate that, unlike investment and openness totrade, FDI has not played a significant role in promoting economic growth in thesecountries. They conclude that the effectiveness of FDI may depend in part on thesize of the inflows, as well as the level of economic development. Their sampleperiod is relatively short and they do not utilize the panel data set and panelestimation techniques, just conducting time series analysis.Saha and Pradhan (2011) examine the determinants of FDI in seven SAARC countries over the period of 1980-2010. Using VAR model, the study resulted that FDI are largely influenced by economic growth, exchange rate,inflation, labor population,trade balance, current account balance and long term debt outstanding. The study concluded that economic growth and exchange rate are bidirectional, while the other factors are unidirectional on FDI flows.Jun, Sangjoon (2015) examines the effects of foreign direct investment (FDI) on South Asian economies' output growth, utilizing recent panel cointegration testing and estimation techniques. Annual panel data on eight SAARC (South Asian Association for Regional Cooperation) member countries' macroeconomic variables over the period 1960- 2013 are employed in empirical analysis. Using various heterogeneous panel cointegration and panel causality tests, a bi-directional relationship between FDI and growth is found. The study finds evidence for both FDI-led growth and growth-induced FDI hypotheses for the South Asian economies over the sample period. Individual member countries exhibit heterogeneity in terms of the direction or existence of causality subject to their idiosyncratic economic conditions. Among various regressors, FDI, financial development, human capital, and government consumption show the most significant positive effects on output growth. As determinants of FDI, GDP, financial development, human capital, and government consumption are found significant in the region. The bi-directional causality between FDI and growth is found robust to the inclusion of other control variables and using different estimation techniques.

The present study has been conducted with the following objectives-

1. To examine the determinants of FDI in SAARC countries
2. To investigate the casual relationship among/between the selected determinants

III. EMPIRICAL ANALYSIS

Data

To examine the determinants of FDI, the study empirically analyze the annual panel data from 2001 to 2015 on eight SAARC (South Asian Association for Regional Cooperation) countries' macroeconomic variables. The eight SAARC nations are Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, and Sri Lanka. The annual panel data on the SAARC countries' macroeconomic variables are extracted from the World Bank's *World Development Indicators (WDI) 2016*.The variable that are selected for the study are real GDP (RGDP), the labor force (L), the domestic investment share (GCF), foreign direct investment (FDI), domestic credit (DC), inflation (INF), and trade openness (TRAD) . Real GDP is constant at 2010 US dollars. Labor (L) is the total labor force in thousands of persons. The labor force comprises people at ages 15 and older who meet the International Labor Organization definition of the economically active population. The domestic investment share (GCF) is gross capital formation (% of GDP). FDI is foreign direct investment, net inflows (% of GDP). Inflation in consumer prices (annual %) and trade openness (trade/GDP) are used. Frankel and Romer (1999) also use the trade share of GDP as a measure of openness and find a robust positive relationship between openness (the trade share) and income levels. By utilizing economic data series from the same source, *World Development Indicators (WDI)* of the World Bank, comparability of the data across different countries is secured.

Table-1 : Description for the selected variables

Series name	Definition	Description
RGDP	Real Gross Domestic Product	GDP at Market (Constant at 2010US$)
LF	Labor Force	Labor force total
GCF	Investment Ratio	Gross Capital Formation (% of GDP)
FDI	Foreign Direct Investment	Foreign Direct Investment net inflows (% of GDP)
DC	Domestic Credit	Domestic Credit to private sector (% of GDP)
INF	Inflation rate	Inflation consumer prices (annual %)
TRAD	Trade ratio	Trade (export +import) (% of GDP)

Source- World Development Indicators, 2016, World Bank

To examine the determinants of FDI in SAARC countries, the Granger causality test technique is employed (as in , for example, Granger (1988) and Granger (1981). To employ the Granger causality test, stationarity and cointegration properties are also required to be tested for the relevant time series variables (Johansen,1988). Therefore, the present study attempts to examine the determinants of FDI through panel unit root test, test for cointegration and Granger causality test. Thrice of these tests are done at panel level.

Unit Root Test:In most of the studies,The Augmented Dickey Fuller (Dickey et al., 1981) unit root test has been employed to detect the order of integration of time series variables at the individual country analysis. But the traditional Augmented Dickey Fuller (ADF) unit root test suffers the problem of low power in rejecting the null hypothesis of stationarity of the time series, particularly for small size of data. To resolve this issue, studies suggests for the use of LLC (Levin et al., 2002) and IPS (Im et al., 2003) panel unit root tests. These two tests have higher power than the unit root test based on individual time series. Both LLC and IPS are very popular and both are based on the lines of ADF principles. The LLC assumes homogeneity in the dynamics of the autoregressive coefficients for all panel numbers, while IPS assumes heterogeneity in these dynamics. LLC proposes a panel-base augmented Dickey-Fuller (ADF) test with a panel setting and restricts γ to keep it identical across cross-sectional regions. The test imposes homogeneity on the autoregressive coefficient that indicates the presence or absence of a unit root whereas the intercept and trend may vary across individual series. The model allows heterogeneity only in the intercept

Panel cointgegration Tests and Estimation-The cointegration methodology as applied to time series data was first introduced by Engle and Granger (1987), Johansen (1988,1991,1992), Johansen and Juselius (1990,1992) and others in the 1980s. Bythe early 1990s,cointegration techniques had been extended to apply to panel data. Since 1990, there have been sufficient amount of studies that have exploited this technique since the late 1990s.There has been much research on panel cointegration since the late 1990s. Excellent surveys onnonstationary panels, panel cointegration, and dynamic panels are presented in Baltagi (2008: Ch. 12), Baltagi and Kao (2000), and Banerjee (1999), among others. A panel unit root and cointegration approach has many benefits compared to a conventional time series approach. First, by pooling time series and cross sections, the finite sample power of a test is significantly improved. Conventional unit root tests, such as the augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests, are widely reported to have low power performance when the time-series sample size is small. Levin, Lin, and Chu (2002) and Im, Pesaran, and Shin (2003), among others, demonstrate that the power of unit root tests using panel data is substantially improved over univariate testing procedures. Mark and Sul (2001),and Pedroni(1999, 2004) also report power improvement with the panel cointegration approach. Second, pooling time series and cross sections (using panel data) may provide more useful information on the nature of the economicsystem of equations for a group of countries or institutions, than individually analyzing a single equation for each country or institution. Panel unit root tests can be categorized into tests assuming a common unit root process across cross sections and those positing individual unit root processes.Levin, Lin, and Chu (LLC, 2002), Breitung (2000), Hadri (2000), and Harris and Tzavalis (1999) all postulate that there is a common unit root process across cross sections. Im, Pesaran, and Shin (IPS, 2003), Choi (2001), Maddala and Wu (MW, 1999) propose panel unit root tests that allow for individual unit root processes, so that the persistence parameter (autocorrelation coefficient) may vary across crosssections. Among these, only Hadri (2000)'s panel unit root test has the null hypothesis of no unit root, similar to the single series unit root test of Kwiatkowski, Phillips, Schmidt, and Shin (KPSS, 1992). All other panel unit root tests have the null of unit roots. All the researchers above corroborate the fact that panel unit root tests have greater power than conventional single-series unit root tests by Monte Carlo simulations. It is in this light , the panel cointegration tests have been estimated in the present study.

Granger Causality Test-Granger causality test is a technique to estimate the lagged Y influence lagged X significantly and lagged X influence Y significantly. The present study employs this method to analyse the cause and effect relationship among various determinants. The study examines individual time series and panel Granger causality tests for the eight countries.

IV. RESULTS AND DISCUSSION

Table -2 present the results of panel unit root tests for the determinants of FDI in SAARC countries for the period of 2001 to 2015.

Table-2 : Panel unit root tests for the variable (2001-2015)

	Tests assuming a Common Unit Root Process			Tests assuming a Individual Unit Root Process		
Series Name	LLC t*-stat: H_o : Unit root	Breitung t-stat: H_o : Unit root	Hadri Z-stat: H_o : No Unit root	IPS-stat: H_o : Unit root	ADF-Fisher Chi ^{2} stat: H_o : Unit root	PP-Fisher Chi ^{2} H_o : Unit root
RGDP	-3.35 (.0004)	-3.27(.000)	8.32(.000)	-7.781(.499)	18.17(.314)	9.93(.869)
FDI	-7.70(.000)	-4.62(.000)	6.105(.000)	0.805(.490)	12.21(.729)	16.37(.403)
DC	-3.67(.001)	-3.15(.000)	5.82(.000)	0.004(1.000)	.773(1.000)	.7657(1.000)
INF	-9.77(.000)	-8.53(.000)	3.17(.000)	-2.72(.003)	31.60(.011)	35.67(.003)
GCF	8.35(1.000)	1.42(.9223)	2.75(.003)	1.047(.852)	11.72(.762)	.52(.707)
LF	-1.79(.037)	-0.89(.1885)	7.21(.000)	3.22(.999)	5.10(.995)	13.54(.632)
TRAD	-9.84(.000)	-3.45(.000)	6.58(.000)	-0.718(.236)	17.40(.359)	18.20(.318)

Note-RGDP-real GDP, FDI –Foreign Direct Investment, DC-Domestic credit to private sector (% of GDP), INF-Inflation, consumer prices (annual %),GCF-Gross capital formation (% of GDP), LF-Labor force, total,TRAD-Trade (% of GDP). Numbers in parentheses denote level of significance (p-values).

The table explains the six distinct unit root tests as Levin, Lin and Chu (LLC 2002), Breitung (2000), Hadri (2000), Im, Pesaran, and Shin (IPS 2003) and ADF chi square statistics on the level variables. Among these, LLC, Breitung and Hadri are based on common unit root test that the autocorrelation coefficients of the tested variables across cross sections are identical. While IPS,ADF-Fisher and PP-Fisher's tests rely on the individual unit root process assumption that the autocorrelation coefficients vary across cross sections. All the five panel unit root tests except for Hadri have the null hypothesis of unit roots, while Hadri's test assumes the null hypothesis of no unit roots (stationarity). The table explains that there is an existence of unit roots in the different variables. This lack of stationarity demands the estimation of panel cointegration to examine the long run association ship among/between the various determinants and FDI.

The table -3 explains the diverse panel cointegration tests. The study employs the heterogeneous panel cointegration tests of Pedroni (1999, 2004) which allows the heterogeneouscointegration vectors and dynamic errors, and residual based ADF panel cointegration test of Kao (1999). All the test assume null hypothesis of no cointegration. The table explains the various P-values for the no deterministic trends, deterministic intercept and trend, no deterministic intercept or trend for Pedroni test. Alternative hypothesis and Kao test have also been presented for estimation the cointegration test. The cointegration test was tested with different pairs and combinations. The trend of this test show that the long term relationship exists only between FDI and GDP within the selected determinants. The table explains the significant evidence for a bidirectional cointegration from FDI to GDP and GDP to FDI but this evidence does not confirm the causality between GDP and FDI. It is therefore, causality has to be verified with the help of Granger causality.

Table –4 provides the results of individual and panel Granger causality tests for the SAARC countries. The individual time series explores that it is only Pakistan which shows a strong casual relationship between FDI and GDP and GDP and FDI. Afghanistan, Bhutan, India,Nepal and Sri Lanka have one way causality from GDP to FDI while Maldives does not explain any causality. The panel Granger causality test indicates that there are two way causal relationships between real GDP and FDI and FDI and real GDP in SAARC region. Thus in terms of direction or existence of causality for individual member countries, heterogeneity exist.

Table-3 : Panel cointegration test using FDI and GDP for SAARC Countries (2001 -2015)

Panel cointegration tests	P-Values		
Pedroni:(H_o:Nocointegration)	No deterministic trend	Deterministic intercept and trend	No deterministic intercept or trend
Panel v statistics	0.0775	0.0100	0.0002
Panel rho statistics	0.2687	0.0012	0.0303
Panel PP statistics	0.1409	0.0003	0.0170
Panel ADF statistics	0.1507	0.0000	0.0158
Alternate Hypothesis: individual AR Coefs. (between dimensions)			
Group rho statistics	0.3129	0.794	0.6984
Group PP statistics	0.0013	0.0030	0.0233
Group ADF statistics	00.000	0.0000	0.0079
Kao (H_o : No cointegration)			
ADF t-statistics -3.609620	Prob.-0.0002		

Note- All the values are at 5 % level of significance.

Table-4 : Granger Causality Tests
Individual countries and the panel (2001-2015)

	The null hypothesis of Granger causality tests	
Countries	H_o: FDI does not Granger cause GDP growth	H_o: GDP does not Granger cause FDI growth
Afghanistan	.51 (0.62)	9.78 (0.00)
Bangladesh	1.51(0.42)	4.29 (0.08)
Bhutan	3.51(0.85)	6.28 (0.01)*

India	0.39(0.41)	8.16 (0.00)**
Maldives	0.10(0.48)	0.83 (0.32)**
Nepal	0.11(0.87)*	1.16 (0.001)**
Pakistan	3.91(0.02)**	11.26(0.000)**
Sri Lanka	0.53(0.002)	13.29(0.000)**
Panel Granger causality test (F)	5.51(0.042)**	43.96 (0.000)**

Note- Ho= null hypothesis, figures out of the parentheses are F-statistics, Numbers in parentheses denote level of significance (p-value), * and ** indicate 1 % and 5 % level of significance respectively.

V. CONCLUSION

The findings of the study suggests that out of the various studied determinants i.e. real GDP (RGDP), the labor force (L), the domestic investment share (INV), domestic credit (DC), inflation (INF), and trade openness (TRAD) , FDI is mainly affected by GDP only. The other determinants except GDP are not evident in having long run association ship with FDI. This express clear and straightforward policy implications that on the basis of individual time series FDI is rarely affecting GDP but it is GDP which is affecting FDI in a significant manner, the economic growth must be targeted to be achieved at individual basis as well as on total basis. All the determinants of growth are needed to be targeted keeping the long term climatic growth in mind.

BIBLIOGRAPHY

[1] Anop, S. (2010). Determinants of Foreign Direct Investment in Real Estate in European Countries- Panel Data Analysis. 17th Annual European Real Estate Society Conference in Milan, Italy.

[2] Basnet, H.C asn G.Pradhan.2014. “ Does the inflow of FDI stock matter ? Evidence from SAARC countries,” Economic Papers, vol.33, no. 3, pp. 305-312.

[3] Bhagwati, J. N. 1994. “Free trade: Old and new challenges,” Economic Journal, vol. 104, no. 423, pp. 231-246.

[4] Breitung, J. 2000. “The local power of some unit root tests for panel data,” In Baltagi, B. H., Fomby, T. B. and R. C. Hill(eds.) Nonstationary Panels, Panel Cointegration, and Dynamic Panels, Advances in Econometrics. vol. 15. Amsterdam: JAI Press.pp. 161-177.

[5] Dickey, D. A., & Fuller, W. A. (1981). Likelihood Ratio Statistics for Autoregressive Time Series with a Unit Root. Econometrica, 49, 1057-1072.

[6] Dunning, J. H. 1993. Multinational Enterprise and the Global Economy. Wokingham: Addison-Wesley.

[7] De Mello, Jr., L. R. 1997. “Foreign direct investment in developing countries: A selective survey,” Journal of Development Studies, vol. 34, no. 1, pp. 1-34.

[8] “FDI-led growth: evidence from time series and panel data,” Oxford Economic Papers, vol. 51, no. 1, pp. 133-151.

[9] Edwards, S. 1998. “Openness, productivity, and growth: What do we really know?,”Economic Journal, vol. 108, no. 447, pp. 383-398.

[10] Engle, R. F. and C. W. J. Granger. 1987. “Co-integration and error correction:representation, estimation and testing,” Econometrica, vol. 55, no. 2, pp. 251-276.

[11] Frankel, J. and D. Romer. 1999. “Does trade cause growth?,” American EconomicReview, vol. 89, no. 3, pp. 379-399.

[12] Granger, C. W. J. (1981). Some Properties of Time Series Data and Their Use in Econometric Model Specification. Journal of Econometrics, 16, 121-130.

[13] Granger, C. W. J. (1988). Some Recent Developments in a Concept of Causality. Journal of Econometrics, 39, 199-211.

[14] Holtz- Eakin, D., Newey, W., & Rosen, H. S. (1988). Estimating Vector Auto Regressions with Panel Data. Econometrica, 56, 1371-1395.

[15] Im, K. S., Pesaran, M. H., & Shin, Y. (2003). Testing for Unit Roots in Heterogeneous Panels. Journal of Econometrics, 115, 53-74.

[16] Jun, Sangjoon. 2015. “ The Nexus between FDI and Growth in the SAARC Member Countries” Journal of East Asian Economic Integration, Vol.19.No.1 (March) pp-39-70

[17] Hadri, K. 2000. “Testing for stationarity in heterogeneous panel data,” EconometricsJournal, vol. 3, no. 2, pp. 148-161.

[18] Hansen, H. and J. Rand. 2004. “On the causal links between FDI and growth in developing countries,” Discussion Papers, 04-30, Institute of Economics, University of Copenhagen.

[19] Kao, C. 1999. “Spurious regression and residual-based tests for cointegration in panel data,” Journal of Econometrics, vol. 90, no. 1, pp. 1-44.

[20] Kao, C. and M. H. Chiang. 2000. “On the estimation and inference of a cointegrated regression in panel data,” In Baltagi, B. H., Fomby, T. B. and R. C. Hill(eds.)

[21] Levin, A., Lin, C-F. and C-S. J. Chu. 2002. “Unit root tests in panel data: asymptotic and finite-sample properties,” Journal of Econometrics, vol. 108, no. 1, pp. 1-24.

[22] Lian, L. and H. Ma. 2013. “FDI and economic growth in western region of China and dynamic mechanism: Based on time-series data from 1986-2010,” InternationalBusiness Research, vol. 6, no. 4, pp. 180-186.

[23] Narula, R. and J. H. Dunning. 2000. “Industrial development, globalization, and multinational enterprises: New realities for developing countries,” Oxford Development Studies, vol. 28, no. 2, pp. 141-167.

[24] Pedroni, P. 1999. “Critical values for cointegration tests in heterogeneous panels with multiple regressors,” Oxford Bulletin of Economics and Statistics, vol. 61, no. S1, pp. 653-670.

[25] “Fully modified OLS for heterogeneous cointegrated panels,” In Baltagi, B. H., Fomby, T. B. and R. C. Hill(eds.) Nonstationary Panels, PanelCointegration, and Dynamic Panels, Advances in Econometrics. vol. 15, Amsterdam: JAI Press (Elsevier Science). pp. 93-130.

[26] “Panel cointegration: asymptotic and finite sample properties of pooled time series tests with an application to the PPP hypothesis,” EconometricTheory, vol. 20, no. 3, pp. 597-625.

[27] Pesaran, M. H., Shin, Y. and R. P. Smith. 1999. “Pooled mean group estimation of dynamic heterogeneous panels,” Journal of the American Statistical Association, vol. 94, no. 446, pp. 621-634.

[28] Pradhan, Rudhr P and DevdutSaha. 2011. “ Determinants of FDI in SAARC Countries: An Investigation Using Panel VAR Model” Information Management and Business Review, vol.3, no.2,pp 117-126 (August)

[29] Srinivasan, P. 2011. “Determinants of foreign direct investment in SAARC nations: An econometric investigation,” IUP Journal of Managerial Economics, vol. 9, no.3, pp. 26-42.

[30] Wei, Y. and X. Liu. 2001. Foreign Direct Investment in China: Determinants and Impact. Cheltenham, UK: Edward Elgar.