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Foreign Direct Investment (FDI) and Economic Growth Relationship Among Highest FDI Recipient Asian Economies: A Panel Data Analysis

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Abstract: Foreign Direct Investment (FDI) is considered as one of the major catalyst that induces and accelerates economic growth and development of an economy. This study examines the relationship between FDI and economic growth in the 6 highest FDI recipient Asian emerging economies. Asian emerging economies selected for conducting the study include China, India, Malaysia, Thailand, Singapore and Saudi Arabia while time period chosen for the study ranged between 1985-2011. To investigate the proposed relationship the study was conducted at both panel and individual county level with a view to provide a comparative empirical analysis, based on cointegration and causality test. Researchers conclude that FDI and economic growth are co-integrated at the panel level and thus, have a long-run relationship in these economies. These conclusions were further supported by confirming bidirectional causality through the results of Vector Error Correction Model (VECM) and Granger Causality analysis.

Key words: FDI, stationarity, cointegration, VECM, Asia

INTRODUCTION

Foreign investments are considered to be an important part of a country's economic growth and have often been quoted in literature as one of the principal factors that accelerated economic growth (Tardivo and Dias, 2003; Okamoto and Sjoholm, 2005). Most of the countries globally, especially those in the developing and transition phase are actively aiming to attract Foreign Direct Investment (FDI), due to anticipated favorable effects on product, labor, technology, Research and Development (R&D) and capital market. Furthermore, it is also termed as a medium/source of income generation from capital inflows, technological advancement, governance measures, management skills and market proficiency. Over the years developing countries like China and India considering foreign capital in the form of FDI as a necessary means for their economic growth and development. According to UNCTAD's (United Nations Conference on Trade and Development) World Investment Report in 2012, the rise of FDI flows in 2011 was widespread in all three major groups viz. developed, developing and transition economies. In-spite of uncertainties around the global economy, global FDI flows rose by 16% in 2011 to $1,524 billion, up from $1,309 billion in 2010 (Fig. 1).

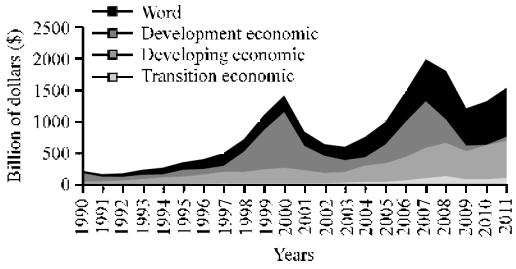

Fig. 1: FDI inflows global and group of economies, 1990-2011; UNCTAD 2012 world investment report

FDI is widely recognized as a means of providing economic benefits to the recipient countries by providing capital, foreign exchange, technology and by increasing competition and access to foreign markets (Romer, 1993; World Bank, 1999; Crespo and Fontoura, 2007). Studies conducted on investigating FDI and economic growth nexus have broadly focused on 2 main approaches including the production function approach (Harms and Ursprung, 2004; Lipesy, 2000) and the time series approach (Pradhan, 2009; Nair-Reichert and Weinhold, 2001; Bahmani-Oskooee and Niroomand, 1999). Pradhan (2009) in his study suggested 2-way link between FDI and economic growth which stems from the fact that higher amount of FDI stimulates high economic growth in the host country and higher economic growth in the host

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countries is instrumental in attracting more FDI. However, the FDI and economic growth relationship that appears to be simple theoretically, becomes complex when referred to the empirical literature. Researchers have summarized these facts in Fig. 2 which provides a brief insight into various studies conducted in view of exploring FDI-economic growth relationship. It is apparent from these studies that the empirical evidence around this relationship is mixed and sometimes inconclusive. It varies around the economy/economies and the time period selected for the study.

The FDI and economic growth relationship has encouraged comprehensive empirical literature with a focus on emerging, transition and developed economies around the world. Studies conducted by Blomstrom *et al.* (1994) and Borensztein *et al.* (1998) reported a positive correlation between FDI and economic growth of an economy. It is expected that a country experiencing a consistent and steady positive economic growth over the years is likely to appear as an attractive destination for investors compared to an economy with moderate to slow growing rate. Coe *et al.* (1997) detected a positive association between FDI and economic growth in their study but suggested that the host country should have an attained a certain level of development that helps in achieving the benefits of higher productivity. On a similar perspective, Lui *et al.* (2006) found a positive coefficient for economic growth rates, suggesting that higher economic growth attracts more FDI inflows. Khondoker (2007) investigated the correlation between FDI and economic growth and indicated that developing countries can attract more FDI with high economic growth rate and investment friendly policies. Ljunwal and Li (2007) evaluated the relationship between FDI and economic growth with the role of financial sector in China and observed strong positive and significant effects of FDI to economic growth. These observations were similar to the findings of Hermes and Lensink, (2003), Alfaro *et al.* (2004) and Krogstrup and Linda (2005). Roy and Mandal (2012) attempted to empirically identify the effect of FDI on India's economic growth by using the co-integration approach for the period 1990-2011 on the basis of Ordinary Least Square (OLS) method and suggested that there exist a positive relationship between FDI and GDP and vice versa. Another study by Gursoy and Kalyoncu used Engle Granger co-integration and Granger causality tests in order to analyze the causal relationship between FDI and economic growth and confirmed FDI led growth hypothesis in case of Georgia over the period 1997-2010.

However, there also exists contradicting theories that predict FDI in the presence of pre-existing trade, price,

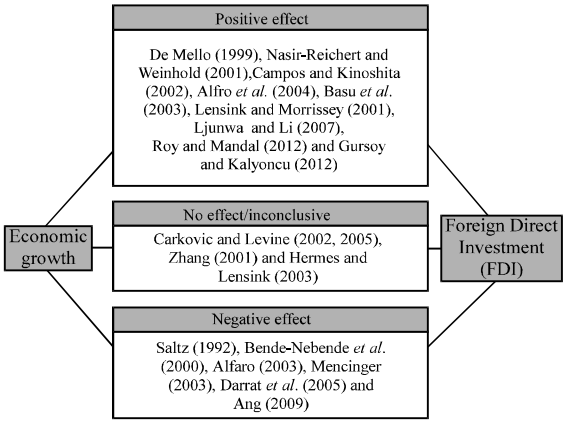

Fig. 2: Empirical literature investigating relationship FDI and economic growth nexus

financial and other distortions which will hurt resource allocation and slow growth (Boyd and Smith 1992; Zhang 2001; Carkovic and Levine, 2005). Carkovic and Levine (2002) reported a relationship between FDI and economic growth from samples collected from 72 countries. It was concluded that FDI do not exert any independent influence on economic growth for both developed and developing countries. Duasa (2007) found no causality between FDI and economic growth in Malaysia and suggested that FDI does contribute to stability of growth. Other studies conducted at firm and macroeconomic level suggest that FDI does not accelerate economic growth (Gorg and Strobl, 2001; Akinlo, 2004; Herzer *et al.*, 2008).

These previously published studies thus provide sufficient evidence that the nexus between foreign direct investment and economic growth is far from straightforward (Vu and Noy, 2009). It might vary across economies selected for the study and the time considered for conducting the analysis.

The present study attempts to specifically focus on the time series approach for investigating the FDI-economic growth relationship on a panel data of 6 major Asian emerging economies. Thus, the major focus of the study is to empirically investigate the relationship existing between FDI and economic growth considering a group of emerging economies that have over the years been the highest receiver of FDI inflows in Asia. The study further contributes to the existing pool of literature on FDI and economic growth nexus by investigating the set of economies that contribute towards Asia's economic growth and development by attracting huge amount of foreign investments during the last few decades. The methodology adopted in the study is similar to the one adopted by Pradhan (2009) for investigating the FDI led

growth hypothesis in ASEAN-5 countries where the empirical analysis was based on examining the hypothesis at both panel and country level.

Hypothesis: The study investigates the FDI-led growth hypothesis and provides an insight into the increasing urge for encouraging foreign investments in emerging economies that in turn are instrumental in generating high level of economic growth and development.

MATERIALS AND METHODS

Selection of countries: It is evident form Fig. 3 and Table 1 that Asian regions receives maximum FDI globally and East Asian region comprising of China has the major contribution to the overall regional FDI inflows. This was the major criteria behind selecting Asian region for the current research. The countries selected for the study were identified on the basis of UNCTAD yearly World Investment Report in 2012 that divide the Asian region into 4 parts comprising of East (7 countries), West (13 countries), South (9 countries) and South East Asia (12 countries). Out of these countries 6 countries were selected for the study that have received highest amount of FDI inflows from 1985-2011. Table 1 presents the total amount of FDI received by these economies during the selected period. China being the highest contributor in the East Asian region was selected and India in the South Asian region. About 3 countries namely Singapore, Thailand and Malaysia were indentified in the South East Asian region. In the Western Asian region, Saudi Arabia being the top recipient of incoming FDI's was considered.

Table 1: Countries receiving highest FDI inflows in Asia

Region	Country	Amount of FDI inflows (1985-2011) (US $)
East Asia	China*	12,28,669.43
	China, Hong Kong SAR	702655.96
	Korea	122029.60
South Asia	India*	234150.61
	Pakistan	31703.66
South East Asia	Singapore*	430494.75
	Thailand*	117639.79
	Malaysia*	1,15,208.34
	Indonesia	115396.97
West Asia	Saudi Arabia*	181837.23
	Turkey	124745.00
	United Arab Emirates	84702.40

*Countries selected for analysis. Author calculation based on UNCTAD statistical database

Data: The study considers a balanced panel of 6 countries, i.e., China, India, Malaysia, Singapore Thailand and Saudi Arabia over the period of 26 years from 1985-2011. About 2 variables (i.e., foreign direct investment and gross domestic product (indicator for economic growth)) have been used for conducting the empirical investigation. The data used in the study is collected from UNCTAD's and world bank's statistical database. The findings of stationary, causality and co-integration tests have been computed with the help of Econometric Views (E Views) 7.0.

Econometric methodology: In order to investigate a long run relation between variables the first step involves checking the order of integration by applying unit root tests. A data series is said to be stationary if its mean and variance are constant (non-changing) over time and the value of covariance between the 2 time periods depends only on the distance or lag between the 2 time periods and not on the actual time at which the covariance is computed. For the individual series Augmented Dickey Fuller (ADF) test (Dickey and Fuller, 1979) is while and for the panel data Levin-Lin (LLC) tests (Levin *et al*., 2002; Im *et al*., 2003) has been identified. IPS test is considered to be one of the most powerful tests compared to the other tests for unit root. It is among most frequently cited unit root test in the literature and is based on heterogeneity of the autoregressive parameters.

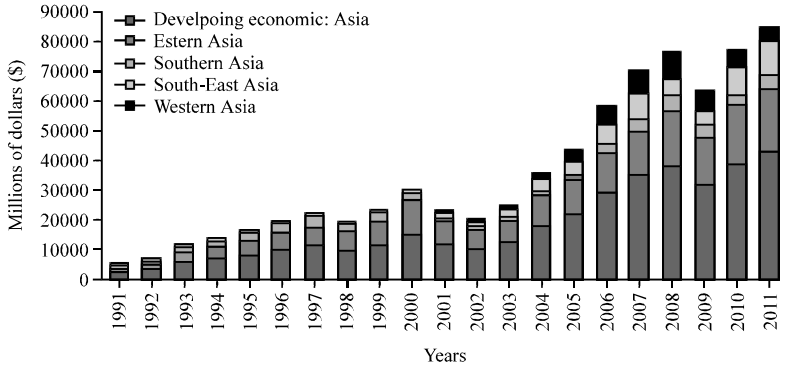

Fig. 3: Amount of FDI inflows in Asian developing economies: UNCTAD 2012 world investment report

After identification of the order of the integration, the Pedrons test is applied on panel data and Johansen Cointegration Test for the individual country level analysis. Johansen test is a procedure for testing co-integration between time series. One of its notable properties includes the fact that all test variables are treated as endogenous variables (Johansen and Juselius, 1990). The Panel cointegration technique Pedroni (1999) refers to 7 different statistics for testing unit roots in the residuals of the postulated long-run relationship. Out of these statistics, the first 4 are known as the panel cointegration statistics whereas the last 3 are referred as group mean panel cointegration statistics. In the presence of a long run relationship or co-integrating relation, it is expected that the residuals are stationary. Finally, the study investigates the causal relationship between FDI and economic growth both at individual level (using pair-wise granger causality analysis) and at the panel level using VEC granger causality/block exogeneity wald test.

RESULTS

The data analysis began by testing of the statistical properties of the data series used. Table 2 and 3 represent the test of the stationarity on the data series both at individual and panel level, respectively. Stationarity check of any time series data is one of the most important requirements before analysis of co-integration and causality. The current study used 2 different approaches to investigate the integration properties of the data: Univariate unit root test and panel unit root test. ADF test has been applied to individual series while LLC and IPS test have been applied to panel of 6 countries selected for the study namely China, India, Indonesia, Thailand, Malaysia and Saudi Arabia. The results indicate that all the time series variables that researchers used in the study have unit roots. The estimated ADF statistics cannot reject the null hypothesis of non-stationarity at 5% level of significance. It is stationary at the first difference level, as the null hypothesis of non-stationarity is rejected at 5% level of significance. This indicate that the variables are integrated of order one, i.e., I (1). Table 3 summarizes the results for the individual panel countries. Akaike Information Criteria (AIC) was chosen for the lag length selection. The results of IPS and LLC clearly suggest that that the series are stationary only after being differenced. Due to the shorter span/time-period considered for individual country series, researchers can more confidently accept LLC and IPS panel test results which does not reject the unit root null of unit roots for the panel.

Table 2: Unit root test results individual sample (ADF test) (individual sample ADF test)

	FDI		GDP		
Countries	Level	First difference	Level	First difference	Order of integration
China	1.9840	-5.572*	4.208	-5.343*	I (1)
India	-0.7540	-5.067*	0.787	-4.549*	I (1)
Malaysia	-1.8510	-7.796*	0.506	-6.334*	I (1)
Thailand	-1.9530	-7.389*	-0.592	-4.356*	I (1)
Singapore	0.0747	-8.852*	-0.058	-4.146*	I (1)
Saudi Arabia	-1.3940	-4.846*	0.580	-6.899*	I (1)

FDI = Foreign Direct Investment; GDP = Economic growth (Gross Domestic Product); *Significant and 1% level of significance; Critical value; 1% level -3.689; 5% level -2.971; 10% level -2.625

Table 3: Panel unit root test

Root test	Level statistics	First differences statistics	Order of integration
FDI			
Levin, Lin and Chu (LLC)	-0.960	-7.485*	I (1)
Im, Pesaran and Shin W-Stat (IPS)	-0.201	-7.397*	I (1)
ADF-Fisher χ^2	9.038	71.752*	I (1)
PP-Fisher χ^2	7.223	147.990*	I (1)
GDP			
Levin, Lin and Chu (LLC)	5.848	-6.588*	I (1)
Im, Pesaran and Shin W-Stat (IPS)	7.619	-4.907*	I (1)
ADF-Fisher χ^2	0.027	44.461*	I (1)
PP-Fisher χ^2	0.059	43.313*	I (1)

FDI = Foreign Direct Investment; GDP = Economic growth (Gross Domestic Product); No. of cross-sections = 6; *Significant and 1% level of significance

After confirming the existence of unit roots for all the data series considered for the study, the next step involves checking the possibility of existence of long run relationship between FDI and economic growth. Here, Cointegration test was applied at both individual level, as well as panel level. The Johansens Cointegration maximum likelihood test was applied for each country whereas Pedronis panel Cointegration test was selected for the 6 countries panel. Table 4 and 5 report the results of the Johansens and Pedronis test, respectively. The results of Pedronis test indicate existence of long run cointegration relationship between economic growth and FDI on the panel of6 Asian economies selected for the study. It is observed in the test results that 5 out of 7 of Pedronis statistics significantly reject the null of no cointegration. This implies existence of a long run co-movement of FDI and GDP. However, Johansen Cointegration test at individual country level suggests existence of cointegration between FDI and economic growth for India, Malaysia, Singapore and Saudi Arabia. Existence of cointegration postulates possibility of existence of causal relationship between FDI and economic growth. Moreover, the existence of no cointegration between the two countries, namely; China and Thailand not mean the absence of causality or any relation in the short run.

Table 4: Cointegration test

		Trace statistics			Max. eigen value statistics		
Countries	Null hypothesis	Statistics	0.05 critical value	Probability	Statistics	0.05 critical value	Probability
China	None	9.263	15.494	0.341	9.0932	14.264	0.278
	At most one	0.170	3.841	0.680	0.1700	3.841	0.680
India	None*	30.249	15.494	0.000	30.1930	14.264	0.000
	At most one	0.056	3.841	0.812	0.0560	3.841	0.812
Malaysia	None*	21.797	15.494	0.004	21.5940	14.264	0.002
	At most one	0.202	3.841	0.652	0.2020	3.841	0.652
Thailand	None	5.687	15.494	0.732	5.2839	14.264	0.705
	At most one	0.403	3.841	0.525	0.4030	3.841	0.525
Singapore	None*	27.620	15.494	0.000	27.4520	14.264	0.000
	At most one	0.167	3.841	0.682	0.1670	3.841	0.682
Saudi Arabia	None*	17.782	15.494	0.022	17.6040	14.264	0.014
	At most one	0.177	3.841	0.673	0.1770	3.841	0.673

Johansen's cointegration test results

Table 5: Pedronis panel cointegration test results

Test	Statistics	Probability
Panel v-statistic	1.0921	0.130
Panel rho-statistic	-2.9715*	0.000
Panel PP-statistic	-2.0526*	0.020
Panel ADF-statistic	-2.0526*	0.020
Group rho-statistic	-0.9394	0.170
Group PP-statistic	-1.7925*	0.030
Group ADF-statistic	-1.7925*	0.030

*Statistical significance at 5% level

Table 6: Causality test (pair wise Granger causality analysis)

Country	Null hypothesis	F-statistic	Probability
China	GDP does not Granger cause FDI	2.33907	0.118
	FDI does not Granger cause GDP	4.56212*	0.020
India	GDP does not Granger cause FDI	31.61890*	2.E-07
	FDI does not Granger cause GDP	7.70485*	0.002
Malaysia	GDP does not Granger cause FDI	6.78303*	0.004
	FDI does not Granger cause GDP	5.91572*	0.008
Thailand	GDP does not Granger cause FDI	0.58184	0.566
	FDI does not Granger cause GDP	0.31450	0.733
Singapore	GDP does not Granger cause FDI	15.30880*	5.E-05
	FDI does not Granger cause GDP	7.08702*	0.003
Saudi Arabia	GDP does not Granger cause FDI	4.64700*	0.019
	FDI does not Granger cause GDP	11.53200*	0.000

GDP = Gross Domestic Product; FDI = Foreign Direct Investment; *,**Statistical significance at 5% and 10% levels, respectively

Table 7: VEC Granger causality/block exogeneity wald tests

	GDP		FDI	
Dependent variables	χ^2 statistics	Probability	χ^2 statistics	Probability
FDI	27.87873*	0.00000	-	-
GDP	-	-	24.51562*	0.00000

GPD = Gross Domestic Product (economic growth); FDI = Foreign Direct Investment; *Statistical significance at 5% level

Thus, Table 6-8 represents causality test analysis results at both individual and panel level, respectively. The results at individual country level indicate presence of bidirectional causality between FDI and economic growth in India, Malaysia, Singapore and Saudi Arabia. However, at the panel level bidirectional causality between FDI and economic growth was observed between the economies selected for the study pointing towards existence of a feedback between these

Table 8: Summary of Granger causality (uindividual and panel level)

Country	Granger causality relationships individual pair-wise Granger causality	Significance level (%)
China	FDI→GDP	5
India	FDI↔GDP	5
Malaysia	FDI↔GDP	5
Singapore	FDI↔GDP	5
Thailand	FDI-GDP	-
Saudi Arabia	FDI↔GDP	5
VEC Granger causality		
All	FDI↔GDP	5

2 variables. It is thus, quite evident from this empirical analysis that FDI causes economic growth and vice versa in the case where all the 6 economies are included in the sample. On the other hand, at individual country analysis 3 economies (India, Malaysia, Singapore and Saudi Arabia) shared a bi-directional causality. The finding of the study also supports the fact that panel data analysis is very robust in overcoming the problems arising due to small sample size. As evident from the results, mixed and inconclusive results were obtained when the data was analysed at individual country level, as compared to the robust and conclusive findings of panel data analysis.

CONCLUSION

The study contributes some interesting new research information to the international business literature specifically with a focus on FDI-economic growth nexus. The study is conducted using annual data from 1985-2011. The study investigates this relationship for a group of economies, recipient of highest FDI inflows in the recent past using econometric time series methodology including univariate and panel cointegration. The study suggests that FDI-economic growth share long run relationships or are integrated in long run at group (panel) level as confirmed through Pedroni's panel cointegration test results. However, similar results were not achieved for all the economies (except India, Malaysia, Singapore and

Saudi Arabia) when they are investigated at individual level using Johansens cointegration test. Further, the Granger causality test at panel level confirmed the presence of bidirectional causality between FDI-economic growths.

The increase noted in the level of FDI help in inducing economic growth and development and vice-versa. Therefore for improving the economic growth of an economy, higher amount of foreign investments needs to be attracted and favourable policies must be fabricated that could be instrumental in the growth of a country, especially when it is in the emerging/transition phase. The study clearly suggest a positive correlation between growth and foreign investments in a bidirectional way. Hence, if economic growth is likely to attract more FDI inflows, then various policies to attract inward FDI could become unnecessary. Therefore, efforts should also be made to encourage the other potential sources of economic development that would in-turn simulate and enhance foreign investments. Sound macroeconomic policies together with growth led policies promoting a positive rate of return on investments and thus attract FDI.

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