Empirical Evidence on the Relationship between Foreign Direct Investment and Economic Growth: A Cross-Country Exploration in Asia

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The issue of capital flows is considered to be the most accessible route for economic growth whereby investment is regarded as the engine of growth. The worldwide changes have recognized the importance of Foreign Direct Investment (FDI) as one of the possible options to stimulate growth momentum. Against this backdrop this paper examines the short run and long run dynamics between economic growth and foreign direct investment for selected Asian economies covering the period from 1975 to 2010. A neo-classical production function is estimated to capture the short run dynamics followed by cointegration technique to capture the long run effect. This paper provides strong evidence regarding the existence of long run equilibrium relationship between FDI and growth for majority of the countries followed by varied causality between foreign direct investment and economic growth. The policy recommendations may not be uniform for the entire Asian region due to their diversified industrialization experience.

Keywords: Foreign Direct Investment, Economic growth, Cointegration, Granger causality

JEL Classification: C22, F30, O40

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I. Introduction

The international financial scenario is exhibiting the process of transition of which capital flows are the most significant. Emerging economies are successful enough in attracting capital flows of which foreign direct investment (FDI) is most important. Generally speaking, FDI refers to capital inflows from abroad that invest in the productive capacity of the economy. They are usually preferred over other forms of external finance because they are non-debt creating, non-volatile and their returns depend on the performance of the projects financed by the investors. It also facilitates international trade, transfer of technology, knowledge, and skills. Developing countries can gain potentials by attracting FDI. This would enable these countries to expand domestic savings which are usually at low levels and in long run will increase capital formation. As a consequence, the long term growth prospects will be enhanced.

Considering technological progress and labour growth as exogenous factors, any inward flow of foreign direct investment merely increases the investment rate, leading to a transitional increase in per capita income but has no long run effect. The new endogenous growth theory in 1980s considers that FDI can have a permanent growth effect in the host country due to the inclusion of technological progress. Hence the flow of FDI is expected to increase the growth rate of the economy. In this regard the success stories of East and South East Asian countries suggest that FDI acts as a powerful tool of establishing link between domestic and foreign markets. Asian countries are recognized as the growth pole of global economy. These countries have surpassed European countries in terms of innovation, investment, and FDI inflows. A clear investigation reveals that the liberalization scenario has dramatically upgraded the investment climate of Asian economies.

In favour of the above propositions, this paper proposes to make some quantitative explorations into the nature of relationships between FDI, domestic investment, and economic growth especially for selected Asian economies namely India, China, Singapore, Hong Kong, Malaysia, Indonesia, South Korea, Japan, Thailand, and Philippines covering the period from 1975 to 2010. The selection of countries is done on the basis of their industrialization experience and thereby the entire Asian region has been classified into four groups due to non-homogeneity of their growth patterns.

The groups are categorized with respect to the directions of industrial-

ization process. The economies of Singapore and Hong Kong belong to Group-I characterized by private investment directed industrialization policy, the economies of South Korea and Japan belong to Group-II characterized by State-directed industrialization policy, the economies of Indonesia, Malaysia, Thailand, and Philippines belong to Group-III characterized by liberal and free market policy directed industrialization process and finally, the economies of India and China belong to Group-IV characterized by Soviet model of economic planning directed industrialization policy.

An integrated empirical framework is conducted to capture the interrelationship between short run and long run behaviour of FDI and economic growth. A cointegration approach is used to study this relationship. Cointegration test is conducted using the framework of Johansen and Juselius (1990) on the data for real GDP per capita (PPP) as a proxy for economic growth, FDI inflows and real Gross Domestic Fixed Capital Formation which acts as a proxy for domestic investment (Sahoo 2001) for each country. This study addresses the short run and long run dynamics of the relationship between FDI and economic growth followed by causality analysis.

The paper is organized as follows. Section II reviews the existing literature on the subject. Section III discusses on the justification for the selection of these Asian countries. Section IV presents the theoretical framework to carry out empirical explorations. Section V discusses the data and methodology issues. Empirical results are presented in Section VI with illustrations. The final section VII summarizes the conclusions of the paper.

II. Review of Literature

A large number of interesting studies have addressed the issues related to the contribution of foreign direct investment to economic growth. FDI can encourage the adoption of new technology in the production process through capital spillovers. FDI may stimulate knowledge transfers, both in terms of labour training and skill acquisition and by introducing alternative management practices and better organizational arrangements. These findings are listed in the excellent survey conducted by de Mello (1999). Similar study done by OECD (2002) underpins these observations and documents that 11 out of 14 studies have found FDI to contribute positively to income growth and factor productivity. Both de Mello

and OECD stress one key insight from all the studies reviewed: the way in which FDI affects growth is likely to depend on the economic and technological conditions in the host country. Cross-country regressions have looked into the conditions necessary for identifying FDI's positive impact on economic growth.

Four studies relying on a variety of cross-country regressions have looked into the conditions necessary for identifying FDI's positive impact on economic growth. First, Blomstrom and Kokko (1998) argue that FDI has a positive growth-effect when a country is sufficiently rich in terms of per capita income. Second, Balasubramanyam, Salisu, and Sapsford (1999) emphasize trade openness as being crucial for acquiring the potential growth impact of FDI. Third, Borensztein, De Gregorio, and Lee (1998) find that FDI raises growth, but only in countries where the labour force has achieved a certain level of education. However, when Carkovic and Levine (2002) estimate the effects of FDI on growth after controlling for the potential biases induced by endogeneity, country-specific effects, and the omission of initial income, the results of these four papers appear to break down. Carkovic and Levine conclude that FDI has no impact on long-run growth.

The macro literature on empirical studies has focused more directly on the causal relationships between FDI and growth and, at least, six studies have tested for Granger causality between the two series using different samples and estimation techniques. Zhang (2001) looks at 11 countries on a country-by-country basis, dividing the countries according to the time-series properties of the data. Tests for long-run causality based on an error correction model, indicate a strong Granger-causal relationship between FDI and GDP growth. For six countries where there is no cointegration relationship between the log of FDI and growth, only one country exhibited Granger causality from FDI to growth. Chowdhury and Mavrotas (2003) take a slightly different route by testing for Granger causality using the Toda and Yamamoto (1995) specification, thereby overcoming possible pre-testing problems in relation to tests for cointegration between series. Using data from 1969 to 2000, they find that FDI does not Granger cause GDP in Chile, whereas there is bi-directional Granger causality between GDP and FDI in Malaysia and Thailand.

Finally the study by Basu, Chakraborty, and Reagle (2003) addresses the question of the two-way link between FDI and growth. Allowing for country-specific cointegrating vectors as well as individual country and time fixed effects they find a cointegrated relationship between FDI and growth using a panel of 23 countries. Basu, Chakraborty, and Reagle

emphasize trade openness as a crucial determinant for the impact of FDI on growth, as they find two-way causality in open economies, both in the short and the long run, whereas the long-run causality is unidirectional from growth to FDI in relatively closed economies. Kaushik *et al.* (2008) used Johansen's co-integration analysis and a vector error-correction model to investigate the relationship between economic growth, export growth, export instability, and gross fixed capital formation (investment) in India during the period 1971-2005. The empirical results suggested that there exists a unique long-run relationship among these variables and the Granger causal flow is unidirectional from real exports to real GDP. For example, *ceteris paribus*, a 1% increase in exports raises GDP by an estimated 0.42% in the long run.

Carbajal, Canfield, and De la Cruz (2009) examined both the existence of causality, in the Granger Sense, and its direction between Gross Domestic Product (GDP), Exports, Imports, and Foreign Direct Investment in Mexico (FDI). GDP was broken down into two sectors: industrial and services. The cointegration methodology developed by Liu, Burridge, and Sinclair (2002). The estimation showed a stable and causal relationship of FDI over variables such as the industrial GDP, Exports, and Imports. However, the service sector tends not to have a direct effect over investments. Notwithstanding that Mexico greatly benefits from FDI, as such those benefits are triggered by exports and the industrial GDP, variables that hold a stronger linkage with the economic activity of the United States and not with the actual evolution of the Mexican economy. Ullah *et al.* (2009) investigated export-led-growth by time series econometric techniques (Unit root test, Co-integration, and Granger causality through Vector Error Correction Model) over the period of 1970 to 2008 for Pakistan. In this paper, the results reveal that export expansion leads to economic growth. They also checked whether there is uni-directional or bidirectional causality between economic growth, real exports, real imports, real gross fixed capital formation, and real per capita income. The traditional Granger-Causality Test suggests that there is unidirectional causality between economic growth, exports, and imports. On the other hand Granger causality through vector error correction was checked with the help of F-value of the model and t-value of the error correction term, which partially reconciles the traditional Granger-Causality Test.

The objective of the present study is to complement the existing literature in the following ways. Firstly the existing studies are done with a generic perspective of developing economies without any mentioning of their historical expereince. This paper has a significant contribution to

the macro literature in terms of categorizing the Asian region according to industrialization experience in spite of non-homogeneity in their structural patterns. Secondly, the contribution lies in focusing on the linkage between foreign direct investment inflows and macroeconomic fundamentals rather than identifying the determinants of FDI inflows as done in majority of the studies.

III. Economic Growth Profile of Selected Asian Countries

The justification regarding the selection of Asian countries lies in their macro-economic framework and structural pattern. The entire cascade of Asian countries has certain important areas of similarity. The growth trends of Asian economies are consistent since 1960 till 2002 (Barro and Lee 2003). Overall the Asian economies have followed up export oriented strategy which mostly accounts for Mercantilist Strategy. An initiative was taken among these economies to go for rapid expansion in export markets through systematic government intervention which simultaneously protected domestic producers and at the same time also subsidized and encouraged export production. Other common features relate to emphasis on skill formation. These economies have gone for a systematic transformation in terms of structural adjustment programme to rectify domestic and external imbalances as well as to improve international competitiveness.

Despite these similarities, these economies follow non-homogenous growth pattern. So it is rational to categorize the economies into different groups. These economies have many aspects to differ. They differ with respect to their natural resource base and with respect to accumulated human capital. Finally, these economies differ in the relative importance given to the roles of the state and private sector in the industrial growth process and also regarding the importance of foreign direct investment.

The grouping of the countries is done on the basis of industrialization policy. The economies of Singapore and Hong Kong have followed export-oriented industrialization where private investment played a crucial role. They have used up this potential to generate employment within a strict political regime. The development potential of Singapore is largely dependent on foreign investment and even FDI has controlled more than three-fourths of the total output. Together, these economies are analyzed in terms of FDI-Growth nexus under Group-I.

The countries of South Korea and Japan went through the process of industrialization since 1960s. They have been successful enough to transform production conditions in agriculture by sweeping away land reform programme. This led to the development of a more egalitarian base through demand for mass production wage goods. State-directed industrialization played a crucial role rather than foreign-investment led production. Japanese economy has exhibited signs of state-directed industrialization through close network of control and patronage links between private and public sector, competitive flexibility and by transfer of investible resources from agriculture. In this manner, Japanese experience has helped to mould the East Asian pattern not only to follow successful mercantilist export-oriented strategy but also by drawing attention of the other countries to new trade and production. Attitudes toward FDI were rather stringent in these economies. Japan has experienced an upsurge in FDI which resulted in wider output and employment in the short run as a result of relocative expansion in South-East Asian Newly Industrialized Countries. South Korea is described to be an economy with abundant labour relative to capital and hence exports of labour intensive products become the natural means of financing industrialization (Kim 2007). Overall these countries are together studied under Group-II.

Thirdly, the economies of Indonesia, Malaysia, Thailand, and Philippines are characterized by a liberal environment conducive with foreign investment led exports. These countries are successful enough to transform domestic production structure through free market policies and thereby create a congenial environment for FDI. However for these economies, the interventionist role of the government is significant and the growth pattern is rather complex. One of the notable features in case of Indonesia and Malaysia is the absence of restrictions on capital flows. FDI has played a significant role in export-oriented manufacturing. These four economies are dealt together under Group-III due to similar pattern of policies as well as due to geographical proximity.

Finally, the economies of China and India are clubbed together in Group-IV. The exceptional growth pattern of China makes the study more interesting. Chinese economy followed a socialist mode of planning through various phases of economic reconstruction and changes and finally registered relatively high saving and investment ratios. China started on the 'reform and liberalization' path at the end of the 1970s on the basis of an egalitarian agrarian structure and an almost complete absence of a domestic capitalist class, as well as on the basis of continuing state control over the dominant segments of the economy. Actually China fol-

lowed the Soviet model of industrialization more closely than India. Initially, India embarked on the strategy of import substitution but later on attitude towards FDI began to change with liberalized imports and exposing the Indian industry to foreign competition. Hence India and China show similar behaviour. These two economies are compared and clubbed under Group-IV.

Against this backdrop, the paper justifies the selection of the countries and proposes to go for empirical investigations. In this regard a theoretical framework is set up to explore the relationship between foreign direct investment and economic growth.

IV. Theoretical Framework

The impact of FDI on economic growth will vary across countries under different economic conditions. The selected economies considered in this paper have certain basic similarities in terms of demographic and social profiles. In spite of these, they have varied nature of growth patterns. Therefore, it is difficult to draw inferences about the possible impact of FDI on growth without a proper empirical investigation. The impact of FDI on growth can be estimated in a growth accounting framework as follows:

$$Y=F(K,\ L) \tag{1}$$

Where Y is the output produced in an economy using two inputs such as labour and capital. However, total capital consists of domestic capital (K_d) and foreign capital financed by foreign direct investment (K_f). Thus domestic capital and foreign capital has been taken seperately. Thus the production function can be stated as:

$$Y=F(K_d,\ K_f,\ L) \tag{2}$$

In per capita sense, the production function can be expressed as:

$$\text{Output per capita}=f(\text{Domestic Investment per capita, Foreign investment per capita}) \tag{3}$$

Finally, the proposed growth equation for estimation can be stated as:

(All the variables are taken in logarithmic form)

$$\text{Real GDP per capita} = f(\text{Real Gross Domestic Capital Formation per capita, Real FDI Inflows per capita})$$

$$\text{Or, } GDPC = f(GCFPC, FDIPC) \quad (4)$$

Where GDPC acts as a proxy for economic growth, GCFPC (Gross Domestic Capital Formation per capita) is proxied for domestic investment and FDIPC (FDI inflows per capita) acts as a proxy for foreign direct investment per capita respectively.

This production function exhibits several potential ways in which FDI can promote economic growth. For example, a Solow type standard neoclassical growth model suggests that FDI increases the capital stock and thus growth in the domestic economy by financing capital formation (Blomstrom and Kokko 1998).

V. Data and Methodology Issues

A. Data Issues

The paper examines the relation between FDI and economic growth for the selected Asian economies over the period 1975-2010. The data for the variables for every country is collected from World Development Indicators published by World Bank. The database has more than 500 time series indicators covering the years 1960-2010.

The series for GDP per capita (PPP) in real terms is collected from the database. It is expressed in US dollars. Similarly the series on FDI inflows in US dollars is also collected and converted to real terms using appropriate deflators for every country. The data on Gross Domestic Capital Formation is also converted into real terms in the similar manner. All these variables are examined in per capita sense. The data on total labour force is collected from World Development Indicators.

B. Methodology Issues

The paper employs an estimation technique to study the short run and long run relationship between foreign direct investment (FDI) and economic growth for the selected Asian economies. For this purpose, cointegration technique and error-correction mechanism are applied. Together with these Granger-Causality Tests are also performed.

The concept of cointegration was introduced in the economic literature by Granger and was further extended and formalized by Engle and Granger (1987). Generally the economic time series exhibit trend and so if any linear combination could remove it then the relevant time series variables are said to be cointegrated. This indicates the existence of long run or a steady state equilibrium relationship. The research on cointegration tests has developed two main directions:

(a) Tests based on residuals from a cointegrating regression suggested by Engle and Granger (1987)
(b) Tests based on system of equations utilizing Vector Autoregressive models (VAR) suggested by Johansen and Juselius (1990).

The approach developed by Johansen and Juselius (1990) is superior to Engle and Granger (1987) due to the following reasons. This approach provides a multivariate framework and allows for more than one cointegrating vector in the estimated model and prevents any loss of efficiency. For the JJ method, two tests are commonly used to determine the number of cointegrating vectors. These are the Trace Test and Maximum Eigen Value Test. In the Trace Test, the null hypothesis is that the number of cointegrating vectors is less than or equal to ρ, where $\rho = 0, 1, 2...$ *etc.* In each case the null hypothesis is tested against the alternative. In the Maximum Eigen Value Test, the alternative for $\rho = 0$ is that $= 1$; $\rho = 1$ is tested against $\rho = 2$ and so on.

If the variables in the VAR model are found to be cointegrated, the next step is to use an error correction mechanism to estimate the short run dynamics of the selected model. The link between the cointegrating technique and the Error Correction Model (ECM) is formalized by Granger Representative Theorem. The estimation of ECM involves the following two steps, namely identification of the unique cointegration vector implying the long run model and estimation of short run VAR in error correction form. It is also interesting to study the response of the variables to a random shock. This is an issue of short run disequilibrium dynamics. It studies how each variable responds or corrects to the residual or error from the cointegrating vector. This justifies the use of ECM. It picks up the speed of adjustment of each variable in response to a deviation from steady state equilibrium. If no cointegration is found, and then causality analysis can be done.

To carry out this exercise the following steps are involved: testing the order of integration, the cointegration test, the error correction mechan-

ism and if necessary, Granger-Causality Test. This involves unit root test, cointegration test, error correction mechanism, and Granger-Causality Analysis.

a) Unit Root Test

This involves testing of the order of integration of the individual time series under consideration. These tests are initially performed at levels and then in first difference form. Three different models with varying deterministic components are considered while performing the tests. These are (1) model with an intercept which assumes that there are no linear trends in the data such that the first differenced series has zero mean (2) model with a linear trend which includes a trend stationary variable to take account of unknown exogenous growth and (3) a model which neither includes a trend nor a constant. The most popular ones are Augmented Dickey-Fuller (ADF) test due to Dickey and Fuller (1979, 1981), and the Phillip-Perron (PP) due to Phillips (1987) and Phillips and Perron (1988). Augmented Dickey-Fuller test relies on rejecting a null hypothesis of unit root (the series are non-stationary) in favour of the alternative hypotheses of stationarity. The tests are conducted with and without a deterministic trend (t) for each of the series.

The general form of ADF test is estimated by the following regression

$$\Delta yt = \alpha_0 + \alpha_1 \ y_{t-1} + \Sigma\alpha\Delta y_t + e_t$$

$$\Delta yt = \alpha_0 + \alpha_1 \ y_{t-1} + \Sigma\alpha\Delta y_t + \mu_1 + e_t$$

Where:

Y is a time series, t is a linear time trend, Δ is the first difference operator, α_0 is a constant, n is the optimum number of lags in the dependent variable and e is the random error term;

and the Phillip-Perron (PP) equation is thus:

$$\Delta yt = \alpha_0 + \alpha \ y_{t-1} + e_t.$$

This test is referred as non-parametric test.

b) The Cointegration Test

The concept of cointegration defined by Engle and Granger has become a useful concept for analyzing many linear dynamic systems in econom-

ics. This involves testing of the presence or otherwise of cointegration between the series of the same order of integration in form of cointegrating equation. The basic idea of Cointegration is that if, in the long-run, two or more series move closely together, even though the series themselves are trended, the difference between them is constant. It is possible to regard these series as defining a long-run equilibrium relationship, as the difference between them is stationary (Hall and Henry 1989). A lack of cointegration suggests that such variables have no long-run relationship: in principal they can wander arbitrarily far away from each other (Dickey *et al.* 1991). However multiple cointegration vectors can exist when there is more than one cointegration relation among the non-stationary variables according to the study done by Kang (2002).

We employ the maximum-likelihood test procedure established by Johansen and Juselius (1990) and Johansen (1991). Specifically, if Y_t is a vector of n stochastic variables, then there exists a p-lag vector auto regression with Gaussian errors of the following form:

Johansen's methodology takes its starting point in the vector auto regression (VAR) of order P given by

$$Y_t = \mu + \Delta_1 Y_{t-1} + - - - + \Delta p\, y_{t-p} + e_t$$

Where:

Y_t is an nx1 vector of variables that are integrated of order commonly denoted (1) and ε_t is an nx1 vector of innovations.

c) The Error Correction Model

If cointegration is proven to exist, then the third step requires the construction of error correction mechanism to model dynamic relationship. Although disturbances in individual variables have permanent effects, they have only temporary effects on the system as a whole. If the system gets deviated from the initial equilibrium due to shocks and retains back its original state then the shocks have temporal effect on the system (Kim 2003). This is corrected by error-correction mechanism. The purpose of the error correction model is to indicate the speed of adjustment from the short-run equilibrium to the long-run equilibrium state.

d) Granger-Causality Test

According to Granger (1969), Y is said to "Granger-cause" X if and only if X is better predicted by using the past values of Y than by not doing so with the past values of X being used in either case. In short, if a scalar Y can help to forecast another scalar X, then we say that Y Granger-causes X. If Y causes X and X does not cause Y, it is said that uni-directional causality exists from Y to X. If Y does not cause X and X does not cause Y, then X and Y are statistically independent. If Y causes X and X causes Y, it is said that feedback exists between X and Y. Essentially, Granger's definition of causality is framed in terms of predictability.

For Granger Causality, the series should be integrated of same order. If d differences have to be made to produce a stationary process, then it can be defined as integrated of order d. Engle and Granger (1987) state that if several variables are all $I(d)$ series, their linear combination may be cointegrated, that is, their linear combination may be stationary. The definition of the Granger causality is based on the hypothesis that X and Y are stationary or $I(0)$ time series.

The model for every country is estimated using the annual data for the period 1975-2010. All the variables are taken in logarithmic form. The following section discusses the empirical results.

VI. Empirical Results

The empirical exercise is based on the theoretical specification in Section IV. The production function in per capita terms (Equation 4 in Section IV) is explored for examining long run and short run dynamics.

Before carrying out the unit root tests this paper looks into the properties of the variables considered under study namely GDPC, FDIPC, and GCFPC respectively. It is necessary to ensure that these variables satisfy Normality test. This is because it is the underlying distribution of the further econometric exercise. Jarque-Bera test is conducted on the data and the results are reported in Table 1. It can be concluded that all the variables for every country satisfy Normality assumptions or in other words Jarque-Bera test statistic accepts the null hypothesis at 5% level. This justifies the application of the following exercise. The empirical results can be illustrated as follows:

TABLE 1
NORMALITY TEST ON DATA VARIABLES

Countries	Variables	Jarque-Bera Test Statistic (Probability)
Singapore	FDIPC	1.75 (0.41)
	GDPC	2.89 (0.23)
	GCFPC	2.39 (0.30)
Hong Kong	FDIPC	2.46 (0.11)
	GDPC	2.48 (0.28)
	GCFPC	3.02 (0.22)
South Korea	FDIPC	4.23 (0.12)
	GDPC	3.05 (0.21)
	GCFPC	3.46(0.17)
Japan	FDIPC	2.57 (0.57)
	GDPC	3.34 (0.18)
	GCFPC	2.67 (0.12)
Indonesia	FDIPC	2.08 (0.16)
	GDPC	2.80 (0.24)
	GCFPC	3.69 (0.15)
Malaysia	FDIPC	2.01 (0.36)
	GDPC	3.15 (0.20)
	GCFPC	0.16 (0.92)
Thailand	FDIPC	3.34 (0.18)
	GDPC	3.25 (0.19)
	GCFPC	3.08 (0.21)
Philippines	FDIPC	2.75 (0.14)
	GDPC	2.68 (0.26)
	GCFPC	3.01 (0.12)
India	FDIPC	0.90 (0.63)
	GDPC	2.32 (0.31)
	GCFPC	2.71 (0.13)
China	FDIPC	3.65 (0.16)
	GDPC	2.50 (0.28)
	GCFPC	2.04 (0.12)

A. Unit Root Test Results

Both the Augmented Dickey Fuller (ADF) and Phillips-Perron (PP) tests are applied to check the existence of unit root in each of the variables for every country. The results are reported in Table 2. All the variables in logarithmic form for every country are stationary only at first differences

TABLE 2
UNIT ROOT TEST RESULTS

Countries	Variables	Augmented Dickey Fuller Test Results		Phillips-Perron Test Results	
		At Levels	At First Differences	At Levels	At First Differences
Singapore	GDPC	-2.2817	-3.5373*	-1.6615	-3.6138*
	FDIPC	-1.6565	-5.5717*	-3.2308	-14.576*
	GCFPC	-1.9891	-5.4603*	-2.0474	-5.4600*
Hong Kong	GDPC	-3.3362	-3.6422*	-2.8084	-3.6422*
	FDIPC	-2.5256	-5.7510*	-2.3374	-8.6328*
	GCFPC	-2.6876	-4.2749*	-2.9631	-4.2020*
South Korea	GDPC	-2.1006	**-4.514***	-2.1006	**-4.3939***
	FDIPC	-2.5879	**-6.146***	-2.5879	**-6.2684***
	GCFPC	-2.1606	**-4.888***	-2.1606	**-4.7891***
Japan	GDPC	-1.4114	**-4.464***	-1.5563	**-4.3211***
	FDIPC	-4.7691	**-9.48***	-4.7691	**-10.7411***
	GCFPC	-1.0741	**-4.12***	-1.0741	**-4.1034***
Indonesia	GDPC	-2.4920	**-5.9284***	-2.5773	**-5.9284***
	FDIPC	-3.3483	**-6.0465***	-3.3160	**-9.9381***
	GCFPC	-2.3532	**-5.1126***	-2.3532	**-5.0742***
Malaysia	GDPC	-2.4920	**-5.9284***	-2.5425	**-4.4307***
	FDIPC	-1.3483	**-6.0465***	-2.6034	**-6.6005***
	GCFPC	-2.3532	**-5.1126***	-1.5832	**-4.1303***
Thailand	GDPC	-2.3973	**-3.4303***	-2.0086	**-3.9581***
	FDIPC	-2.5937	**-3.9589***	-2.7560	**-6.9107***
	GCFPC	-2.4198	**-3.8611***	-1.8886	**-3.8264***
Philippines	GDPC	-0.6246	**-3.5769***	-1.2021	**-3.5508***
	FDIPC	-4.0693	**-8.3270***	-4.0327	**-10.381***
	GCFPC	-2.6053	**-3.8625***	-1.7727	**-3.6223***
India	GDPC	-0.0911	**-4.596***	-0.5271	**-4.6347***
	FDIPC	-1.6209	**-6.238***	-3.5810	**-13.0361***
	GCFPC	-0.5072	**-5.418***	-0.6799	**-5.4182***
China	GDPC	-0.8484	**-3.22***	-0.9405	**-5.5062***
	FDIPC	-0.9501	**-3.84***	-0.8823	**-4.4575***
	GCFPC	-2.0058	**-3.36***	-2.0058	**-3.3856***

* indicates significance at 5% level.

but not at levels as confirmed by Augmented Dickey Fuller Test and Phillips-Perron Test results respectively. This finding strongly confirms the presence of unit root at levels. Further this finding concludes that all

the variables for every country are integrated of order one, $I(1)$ or in other words the test statistics confirm that all the variables in series for every country are stationary after first-differencing.

This finding throws light on the possibility to have a cointegrating vector whose coefficients can be interpreted as a long term equilibrium. For this purpose a VAR structure under Johansen-Juselius framework is constructed. Using Akaike Information criteria and Schwartz Information Criteria, optimum lag structure for each country is computed. At lag length two, the following tests are conducted for every country under study.

B. Cointegration Test Results

Therefore as next step, Johansen Trace test is used to check whether cointegrating relation exist or not. This is carried out by applying VAR based cointegrating tests using the methodology developed by Johansen. Using the assumption of linear deterministic trend in the data, the Trace test and Maximum Eigen Value test are conducted. The results are reported in Table 3 and the cointegrating equations are reported in Table 4 respectively.

As far as Group-1 is concerned relating to the economies of Singapore and Hong Kong, the cointegrating tests provide uniform results. The results confirm that both the Trace test as well as the Maximum Eigen Value test statistic confirms the presence of cointegration at 5% level of significance. The implied cointegrating relationships for all countries as reported in Table 4 provide evidence regarding the long-run association between the variables.

According to the result, 1 percent increase in real FDI results to 1.119 percent increase in real GDP per capita which is statistically significantly. This ensures that foreign investment plays a crucial role to boost economic growth. This confirms the development profile of this economy. Further it is observed that domestic investment however reduces growth. That is if the level of GCF goes up by 1 percent then GDP per capita decreases by 0.628 percent. This confirms that economy largely depends on foreign capital. Liu found a positive coefficient for economic growth rates suggesting higher growth rates attract more foreign direct investment. The essence of FDI based expansion lies in the genesis of a major regional business hub centre in Singapore TNCs base their entire operations for East Asia and the western Pacific.

In case of Hong Kong the cointegrating relationship corroborates the previous finding for Singapore economy. Similar to the above FDI in-

TABLE 3
COINTEGRATION TEST RESULTS

Countries	Null Hypothesis Ho: rank = ρ	Maximum Eigen Value Test		Trace Test	
		Test Statistic	Critical Value	Test Statistic	Critical Value
Singapore	$\rho = 0$	**24.07***	21.13	**34.71***	27.61
	$\rho \leq 1$	12.56	14.26	13.63	15.26
	$\rho \leq 2$	1.06	3.84	1.06	3.84
Hong Kong	$\rho = 0$	**27.70***	21.13	**32.72***	27.61
	$\rho \leq 1$	12.16	14.26	11.54	15.26
	$\rho \leq 2$	2.61	3.84	2.61	3.84
South Korea	$\rho = 0$	20.25	21.13	20.23	27.61
	$\rho \leq 1$	10.24	14.26	11.26	15.26
	$\rho \leq 2$	1.05	3.84	1.05	3.84
Japan	$\rho = 0$	22.25	21.13	29.65	27.61
	$\rho \leq 1$	7.41	14.26	9.43	15.26
	$\rho \leq 2$	2.37	3.84	2.37	3.84
Indonesia	$\rho = 0$	**34.07***	21.13	**41.35***	27.61
	$\rho \leq 1$	6.77	14.26	7.28	15.26
	$\rho \leq 2$	0.50	3.84	0.50	3.84
Malaysia	$\rho = 0$	**22.07***	21.13	**29.74***	27.61
	$\rho \leq 1$	7.51	14.26	7.66	15.26
	$\rho \leq 2$	0.15	3.84	0.15	3.84
Thailand	$\rho = 0$	**29.18***	21.13	**28.83***	27.61
	$\rho \leq 1$	8.12	14.26	12.37	15.26
	$\rho \leq 2$	0.18	3.84	0.18	3.84
Philippines	$\rho = 0$	**26.61***	21.13	**29.96***	27.61
	$\rho \leq 1$	8.10	14.26	9.35	15.26
	$\rho \leq 2$	1.25	3.84	1.25	3.84
India	$\rho = 0$	**22.46***	21.13	**28.88***	27.61
	$\rho \leq 1$	9.54	14.26	12.15	15.26
	$\rho \leq 2$	2.64	3.84	2.64	3.84
China	$\rho = 0$	**21.55***	21.13	**28.88***	27.61
	$\rho \leq 1$	7.30	14.26	7.32	15.26
	$\rho \leq 2$	0.02	3.84	0.02	3.84

* indicates the rejection of the null hypothesis of non-cointegration at 5% level.

flows boost up economic growth and hence their grouping gets justified. According to World Development Report (2010), Hong Kong ranks fourth in terms of FDI recipients and it is positioned in the heart of Asia as a

TABLE 4
ESTIMATED COINTEGRATING VECTORS (NORMALIZED ON GDPC)

Countries	GDPC	FDIPC	GCFPC
Singapore	1.0000	1.119 (2.15)*	-0.693 (2.01)*
Hong Kong	1.0000	0.018 (2.22)*	-2.828 (2.49)*
Japan	1.0000	0.231 (1.98)*	0.471 (2.05)*
Indonesia	1.0000	-0.495 (2.43)*	0.747 (2.16)*
Malaysia	1.0000	1.19 (1.95)*	-2.16 (3.21)*
Thailand	1.0000	0.64 (2.54)*	0.16 (2.61)*
Philippines	1.0000	1.82 (2.47)*	2.25 (3.01)*
India	1.0000	0.535 (2.66)*	0.182 (2.81)*
China	1.0000	0.569 (2.48)*	0.691 (2.79)*

* indicates the significant t-values at 5% level (t-values are in parentheses).

stimulator of economic growth. Further Hong Kong aims at bringing new ideas and technicalities to facilitate domestic investment and also to strengthen overall competitiveness. With regard to domestic investment the growth is not enhancing and this calls for a conducive climate to attract foreign capital.

For the second group of countries, South Korea and Japan, the results are mixed. The finding (Table 3) confirms that cointegration exist for Japan but not for South Korea. Both these countries adopted State-directed industrialization. These economies have exhibited resistance towards large scale foreign investment and generally favoured large scale local capital accumulation throughout the major phase of industrialization. In Japan, foreign direct investment was initially banned but the affinity grew overtime. For Japan the cointegrating equation confirms that FDI and domestic investment affect growth positively. This finding throws light on the complementarities between the two and it also supports the relocative expansion in South-East Asian Newly Industrialized

Countries which caused upsurge in FDI inflows. However for South Korea no long run relationship exists.

The third group of countries refers to the economies of Indonesia, Malaysia, Thailand, and Philippines. All these economies exhibit also it cointegrating relationship as confirmed by Trace test and Eigen Value test results reported in Table 3 and 4 respectively.

For Malaysia, Thailand, and Philippines, FDI enhances economic growth as explained by statistically significant coefficients reported in Table 4. The difference lies in case of Indonesia.

For Indonesia FDI inflows reduce economic growth. This finding is as expected due to the very basic nature of FDI within the Indonesian economy. One of its thrust is towards rapid industrialisation. Unlike Singapore, Indonesia has not been able to reap the benefits of FDI including technological upgradation. For a long time the economy is concerned with Small and Medium enterprises (SMEs) as the major players in production, distribution, and service sectors. They are directly exposed to external conditions and these vulnerable units are subjected to compete with expensive foreign inputs and consequently they had to go out of business. So the inflow of foreign investment has been detrimental to economic growth. The role of domestic investment is conducive to growth. It should be encouraged to protect SMEs. For the economies Singapore and Hong Kong the advantages of cheap labour are ephemeral depending on which FDI gets attracted to these economies.

In case of Malaysia cointegrating relationship exist as confirmed by Trace test and Eigen Value test reported in Table 3. This finding follows the results of Jung and Marshall (1985). One of the notable features of this economy is the absence of restrictions on capital flows. FDI has played a significant role in export-oriented manufacturing. The cointegrating equation result confirms that FDI positively affects economic growth but domestic investment is adverse to growth potentials.

Again in case of Thailand and Philippines, both the Trace and Eigen Value test confirm the existence of a cointegration equation as reported in Table 2. In case of Thailand the cointegrating equation (Table 4) finds that the estimated coefficient of FDI carries the expected positive sign and it is statistically significant. This signifies the importance of FDI as a determinant of GDP per capita. Basically the external deficits in the Thai economy are financed with sudden rush of FDI inflows which supported export growth and raised the rate of growth. According to World Development Report (2004), Thailand provides an excellent example of the dividends to be obtained through outward orientation, receptivity to foreign

investment and a market friendly philosophy backed up by conservative macro management policies. The coefficient of GDP per capita with respect to domestic investment is positive and significant which signifies the role of domestic investment. This finding is similar to that of Indonesia.

In case of Philippines, the cointegrating equation suggests that the effect of FDI on economic growth is positive and statistically significant. Further the rise in GDP per capita is by 1.82 percentage points due to foreign investment. This justifies FDI to be more productive in influencing economic growth. A plausible explanation is that the foreign firms that invest in Philippines may be enjoying low cost of production and higher productive efficiency than its domestic competitors. Overall, the economy is undergoing trade and institutional reforms which stimulates the inflow of FDI. This will potentially encourage the entry of foreign firms. However the overall investment climate is conducive to economic growth for these economies.

Finally in case of India and China the results are somewhat similar. Both the countries confirm the presence of cointegration (Table 3 and 4). For both the economies, FDI has a positive and significant impact though the magnitude substantially differs. For India, one percent rise in FDI inflows will increase economic growth by only 0.53 percent and it is 0.56 percent in case of China. This puts importance to the role of foreign investment relatively more in China relative to India. Domestic investment is also conducive to growth as the estimated coefficient is not only positive but also significant (Table 4). Actually for both the economies FDI contribute to the growth rate by augmenting capital stock and infusion of new technology. However China has recorded extremely high foreign investment inflows along with rapid success in savings and investment potentials. However for both India and China, FDI will open up frontiers of new technology which will promote the level of GDP of the host country. This finding coincides with Basu, Chakraborty, and Reagle (2003) in case of India. Overall, these findings are similar to that of Sahoo (2001), Athreye and Kapur (2002) on the ground that FDI in complementary with domestic investment can enable the economy to reap economies of scale and scope in terms of market expansion and generating employment opportunities.

C. Residual Test Results

The estimated results for every country is subjected to a series of diagnostic tests that include residual tests (Normality test, Heteroskedasticity

TABLE 5
RESIDUAL TEST RESULTS

Countries	VAR Residuals Normality Test			VAR residuals Heteroskedasticity Test
	Ho: Residuals are Multivariate Normal			Ho: Residuals are Homoscedastic
	Skewness	Kurtosis	Jarque-Bera	
	Chi-Square Statistic [Prob value]	Chi-Square Statistic [Prob value]	Chi-Square Statistic [Prob value]	Chi-Square Statistic [Prob Value]
SINGAPORE	1.29 [0.102]	2.34 [0.198]	4.63 [0.135]	111.11 [0.121]
HONG KONG	2.25 [0.254]	1.34 [0.197]	6.11 [0.125]	85.83 [0.412]
SOUTH KOREA	2.07 [0.462]	2.93 [0.342]	5.76 [0.202]	76.89 [0.5103]
JAPAN	4.532 [0.124]	5.78 [0.287]	8.12 [0.314]	79.96 [0.1763]
INDONESIA	5.431 [0.261]	4.676 [0.115]	14.22 [0.076]	83.86 [0.2145]
MALAYSIA	7.586 [0.213]	6.481 [0.211]	12.37 [0.181]	65.95 [0.6621]
THAILAND	2.664 [0.615]	7.751 [0.101]	10.41 [0.237]	112.06 [0.6162]
PHILIPPINES	3.842 [0.277]	4.25 [0.740]	6.45 [0.530]	84.21 [0.1513]
INDIA	6.812 [0.732]	6.74 [0.541]	8.94 [0.112]	74.34 [0.4011]
CHINA	4.671 [0.619]	5.47 [0.489]	8.76 [0.475]	82.36 [0.1894]

test). The results are reported in Table 5. White test accept the null hypothesis of homoscedasticity in the specified among the residuals for all the countries. Finally the Cholesky test confirms that multivariate residuals follow normal distribution for all the countries. Thus the model employed under study does not suffer from misspecification errors.

TABLE 6
ERROR-CORRECTION MODEL AND SHORT-RUN CAUSALITY RESULTS

Countries	Granger-Causality Test Ho: GDPC and FDIPC do not Granger Cause each other			Error-Correction Model ECM estimates (t-values)
	Direction of Causality	Probability	Decision	
Singapore	GDPC→FDIPC	0.0121	**Yes**	-1.08*(-3.08)
	FDIPC→GDPC	0.8568	No	
Hong Kong	GDPC→FDIPC	0.0323	**Yes**	-0.01*(-2.02)
	FDIPC→GDPC	0.1561	No	
South Korea	GDPC→FDIPC	0.7198	No	No Cointegration
	FDIPC→GDPC	0.6810	No	
Japan	GDPC→FDIPC	0.0374	**Yes**	-1.39*(-4.18)
	FDIPC→GDPC	0.6953	No	
Indonesia	GDPC→FDIPC	0.8399	No	-1.70*(-3.04)
	FDIPC→GDPC	0.0026	**Yes**	
Malaysia	GDPC→FDIPC	0.8481	No	-0.35*(-1.82)
	FDIPC→GDPC	0.1175	No	
Thailand	GDPC→FDIPC	0.0131	**Yes**	-0.95*(-3.94)
	FDIPC→GDPC	0.8315	No	
Philippines	GDPC→FDIPC	0.1993	No	-0.70*(-3.39)
	FDIPC→GDPC	0.1132	No	
India	GDPC→FDIPC	0.0010	**Yes**	-0.56*(-2.83)
	FDIPC→GDPC	0.8844	No	
China	GDPC→FDIPC	0.0362	**Yes**	-0.04*(-1.16)
	FDIPC→GDPC	0.4055	No	

* indicates significance at 5% level

D. Error-Correction Model and Granger-Causality Test Results

In order to appropriately model the full dynamic behaviour of real GDP per capita, we need to incorporate short-run adjustment factors along with the cointegrating relationship. This is best done using the error correction model technique introduced above. This mechanism will determine whether the variables actually adjust to disequilibrium by examining its coefficient. This coefficient will be stable if its absolute value is less than one and its sign should be negative such that a positive shock to the system will ensure adjustment in opposite direction (Ansari and

Ahmed 2007).

The error-correction estimates with their statistical significance at 5% level are reported in Table 6. The error correction estimates represent the proportion by which long run disequilibrium in GDP per capita can be corrected in each year. The findings reveal that for all the countries namely Singapore, Hong Kong, Japan, Malaysia, Indonesia, Thailand, Philippines, India, and China, the error-correction term is negative as expected and is statistically significant at 5% level respectively. For example, 56% of the total disequilibrium in real GDP per capita is being corrected each year in case of India.

The focus on causality analysis captures the short run impacts. Table 6 also presents the Granger-Causality Test results. It can be inferred that for countries—Singapore, Hong Kong, Japan, Thailand, India, and China reverse causality runs from economic growth to FDI. But for Malaysia, Philippines, and South Korea no causality exists at all. Only in case of Indonesia causality runs from FDI to growth. Growth-driven FDI calls for better and efficient functioning system within the economy to attract FDI inflows for future growth. This finding corroborates with Yusop and Soo (2004). An upsurge in the investment potentials will create better opportunities for FDI inflows (Corden 1967). For FDI driven growth as in case of Malaysia, FDI accompanied by human capital, exports, and technology transfer will play a proactive role in generating growth momentum (Borenzstein and Lee 1998; Lim and Maisom 2000).

VII. Conclusion

This paper investigates the impact of FDI on economic growth using a cross-country sample of selected Asian economies for the period from 1975 to 2010. The grouping of the Asian economies is done on the basis of industrialization experience. There has been a paradigm shift in the orientation towards FDI in Asian countries for the last two decades. This paper further supports the view that FDI can act as tool to supplement growth momentum in the long run for certain economies. The cointegration technique is applied to the empirical specification of neo-classical type production function. Further the error-correction models supported by Granger-Causality Analysis are done for every country under study.

The empirical results clearly reveal that there exists cointegrating relation between FDI and growth for all the countries except South Korea.

The grouping of the countries is justified from the results in spite of their non homogeneity patterns. The hypothesis of Growth driven FDI is supported by most of the counties except Malaysia even though Philippines and South Korea do not show any sort of causality. Their growth momentum is largely dependent on factors other than foreign capital. FDI driven Growth in the short run exist for Malaysia which supports the economy's structure and its affinity towards capital inflows.

It is evident from the above discussions that liberal FDI inflows may be necessary for economic growth in the sense that high capital mobility is one of the driving forces of globalization. The study done by Kim (2004) pointed out that increased capital mobility enhances economic efficiencies for allocation. The macro-economic policy continues to exercise a major influence on the magnitudes of FDI inflows and it acts as a signaling device to attract foreign investors. At the same time equal or even more attention to be paid to growth rates of industry, socio-economic infrastructure and this will create suitable environment for more FDI inflows. One way to maximize the contribution of FDI to the host development is to improve chances of FDI crowding-in domestic investments and minimize the possibilities of it crowd-out domestic investments. In this context, the experiences of south-east Asian countries such as Malaysia, Korea, China, and Thailand in channeling FDI into export-oriented manufacturing through selective policies and export performance requirements imposed at the time of entry deserve careful consideration (Kumar 2003). The export-oriented FDI minimizes the possibilities of crowding-out of domestic investments and generates favorable spillovers for domestic investments by creating demand for intermediate goods. Another policy that can help in maximizing the contribution of FDI inflows is to push them to newer areas where local capabilities do not exist as that minimizes the chances of conflict with domestic investments. This will extract the independent influence of FDI.

This study yields interesting results which imply certain policy lessons. A more ambitious policy to upgrade the local environment, enhance human capital endowment in terms of skills and expertise, creating strong infrastructure base in tandem with FDI inflows is complementary to economic growth. Hence the Asian economies can reap the benefits of foreign capital which will enhance future growth potentials.

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