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RESEARCH ARTICLE

International Capital Flow and Economic Growth: A Case of FDI in Asian Economies

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Abstract

International capital flow-growth nexus has identified the potential gains of FDI to recipient country only if they attain threshold level of absorptive capacities. The present study has made an effort in this direction to investigate whether international financial flow affects economic growth based on a panel data for 27 Asian economies over the period 1975-2010. This paper applies panel cointegration technique to establish the long-run equilibrium relationship between foreign direct investment and economic growth. The findings strongly suggest that though FDI is growth enhancing in Asia, yet the extent of its impact depends on the threshold levels of absorptive capacities measured by the levels of human capital and infrastructure. Those Asian economies which satisfy these threshold levels can only enjoy the benefits of FDI. Thus this study provides convincing evidence of the synchronized efforts by the Asian economies to attract FDI for their economic growth.

INTRODUCTION

International capital flow-growth nexus has identified the potential gains of FDI to recipient country only if they attain threshold level of absorptive capacities. 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 in the mindset and pro-business orientation have recognized the importance of Foreign Direct Investment as one of the possible options to stimulate growth momentum. Discussions on foreign capital and growth originate from pre-classical views. Basically the issue of foreign capital originated from the mercentalist investment-trade mechanism which was enhanced through protection of domestic producers and making exports competitive. In spite of the rise in saving potentials in export-surplus countries, a large proportion of savings could not be invested due to poor investment opportunities. The Asian countries have experienced upsurge in private capital flows due to liberalization in their capital accounts. One of the fundamental motivations for attracting private capital was the much needed funds that the foreign investors require for recapitalizing their economic systems. Among the Asian economies, Indonesia, South Korea, Thailand, Philippines and Singapore are the enthusiastic liberalizers (RajanR, 2004). The major drivers of foreign capital have been the favorable policies towards encouraging cross border mergers and acquisitions in the financial sector. Hence the search for higher returns in Asian economies motivated the study to investigate the theoretical and empirical relationship between FDI and economic growth.

II. Review of Literature

Economic growth can be explained by a variety of social, political, economic and institutional factors. The FDI-Growth nexus has gained importance in the growth literature in its varied dimensions. The overview of the studies confirm various dimensions such as fundamental theories of FDI, various macro economic variables that influence FDI, the impact of economic integration on the movements of FDI followed by advantages and disadvantages of FDI (Yusop 1992; Jackson and Murkowski 1995; Cheng and Yum 2000; Lim and Maisom 2000). The theoretical

models refer to the propositions of FDI led Growth; Growth led FDI and their interdependency through feedback mechanism. The hypothesis of FDI-led Growth emerged with the development of endogenous growth theory. FDI-led-Growth has been propounded by Goldsmith(1969) who stated that financial intermediaries can be stimulative to economic growth either by capital accumulation or by raising the levels of saving and investment rate(Shaw,1973).This view originates from Schumpeter(1911) growth theory. Subsequently, the empirical studies of Sala-i-Martin(2002) provides strong evidence to this proposition.FDI accompanied by human capital, exports and technology transfer will play a proactive role in generating growth momentum(Borenzstein and Lee, 1998 and Lim and Maisom,2000).These growth inducing factors should be nurtured to realize the potential gains from FDI. Microeconomic studies also corroborate this proposition in the sense that spillover efficiency occurs when domestic firms are capable of absorbing the benefits of MNCs embodied in FDI. Besides FDI also creates backward and forward linkages which get stimulated through MNCs in spurting up economic growth and development. Blomstrom, Kokko and Zejan (1992) concluded that productivity will rise due to the spillover effects of FDI. De

Hence, the above existing literature points out various dimensions to justify the propositions under the preview of FDI-Growth nexus. Keeping in mind the shortcomings of cross-sectional and time series studies, this paper examines the impact of FDI on the economic growth in Asia within panel framework. A panel framework is constructed to look into the absorptive capacities of the Asian economies. This paper contributes to the existing literature in terms of its search for cointegrating relation and thereby estimating for policy conclusions. Unlike the previous studies, this paper attempts to determine the threshold levels of human capital and infrastructure necessary for economic growth

III. Empirical Specification

This section examines the importance of FDI on economic growth taking care of absorptive capacity of the host country on the basis of a neo classical production function. According to Zhang (2001), FDI can influence growth in two ways. Firstly this paper considers the direct impact of FDI on economic growth with the help of the following production function, where output is a function of labour, domestic capital and foreign capital respectively. Thus the production function can be stated as :

Specification-I

$$\mathbf{Y_{it} = f(L_{it}, K_{dit}, K_{fit})} \quad \text{.....(1)}$$

Where Y_{it} denotes output

K_{dit} and K_{fit} denote domestic and foreign capital stock respectively

L_{it} denotes the labour force

Here the subscript **'it'** refers to the panel set up consisting of i=1.....N number of sample countries having t=1.....T number of time-periods. Secondly the impact of FDI can be endogenized by the measure of absorptive capacity. Actually Sala-i-Martin (2002) pointed out the difficulties for selecting the potential determinants of economic growth in the context of empirical discussions. In his study he considered 67 variables but among which only 18 variables are srongly correlated with economic growth. The strongest indication is found for enrollment in secondary education and level of infrastructure. Taking these findings into account, this paper considers the inclusion of gross enrollment in secondary education as a proxy of human capital and levels of infrastructure development as the measures of absorptive capacity which affect growth. Thus the Equation **1** can be modified as:

Specification-II

$$\mathbf{Y_{it} = f(L_{it}, K_{dit}, K_{fit}, Secedcn_{it}, Infra_{it})} \quad \text{.....(2)}$$

where gross enrollment in secondary education is represented by **Secedcn** and level of infrastructure is denoted by **Infra** respectively.The inclusion of these two variables are also supported by the findings of Levin and Raut (1997) and Roy and Berg (2006) who concluded that these variables are growth-enhancing.

As per the contributions of Romer (1990) and extending the hypothesis of Boreinstein et. Al (1998), the issue of absorptive capacity can be captured by the interaction terms such as the levels of FDI multiplied by the levels of human capital and infrastructure. If the coefficients related to the interaction terms are found to be positive and statistical significant, then the countries having high levels of human capital and infrastructure will be conducive to economic growth.

The Equation **2** can be modified as below:

Specification-III

$$\mathbf{Y_{it} = f(L_{it}, K_{dit}, K_{fit}, Secedcn_{it}, Infra_{it}, Secedcn_{it}*Kf_{it}, Infra_{it}*Kf_{it})} \quad \text{.....(3)}$$

Here the indirect impact of FDI on economic growth can be investigated by the interaction terms, Secedcn and Infra multiplied by foreign capital proxied by FDI flows.
Finally, the output equation in per capita terms with the variables in logarithmic form can be stated as:

Specification-IV

$$\log (GDPC_{it}) = \alpha_0 + \alpha_1 \log (GCFPC_{it}) + \alpha_2 \log (FDIPC_{it}) + \alpha_3 \log (SECEDCN_{it}) + \alpha_4 \log (INFRINDEX_{it}) + \alpha_5 \log (FDIPC_{it} * ASC_{it}) + \eta_i + \varepsilon_{it} \quad (4)$$

Where,

$\log (GDPC_{it})$: natural logarithm of GDP per capita in real terms as a proxy for economic growth used as dependent variable for all specifications

$\log (GCFPC_{it})$: natural logarithm of Gross Domestic Capital Formation per capita in real terms as a proxy for domestic capital. The inclusion of this variable is supported by the findings of Olofsdotter (1998) and Sahoo (2006) in explaining the determinants of economic growth.

$\log (FDIPC_{it})$: natural logarithm of inward FDI flows per capita in real terms as a proxy for foreign capital.The inclusion of this variable is supported by UNCTAD studies (1999).

$\log (SECEDCN_{it})$: natural logarithm of the percentage of gross enrolment in secondary education as a proxy for human capital. A higher level of human capital is expected to boost up the potentials of FDI in stimulating growth (Aleksynska et al. 2003).

$\log (INFRINDEX_{it})$: natural logarithm of infrastructure index computed for all the selected countries on the basis of variables related to all types of infrastructure, namely transport, ICT, energy and banking.

$\log(FDIPC_{it} * ASC_{it})$: The multiplicative product of FDI with the host country's absorptive capacity variables **(ASC_{it})** , namely gross enrollment in secondary education and infrastructure captures the interaction term or the indirect impact of FDI on economic growth. This will determine the education and infrastructure threshold levels.

i and t : Country (i) and time period (t) respectively

η_i : unobserved country specific effect

ε_{it}: the disturbance term

Given the above model specifications, the expected results that can examine the role of host country's absorptive capacity factors to channelise the impact of FDI on economic growth can be illustrated as follows:

1. If both α_2 and α_5 have positive (negative) sign in the growth equation, then FDI inflows have an unambiguously positive (negative) effect on economic growth.
2. If α_2 is positive, but α_5 is negative, then FDI inflows have a positive effect on growth, and this effect diminishes with the improvements in the host country's absorptive factors.
3. If α_2 is negative and α_5 is positive, then this means that the host country has to achieve a certain threshold level (in terms of absorptive capacity developments) for FDI inflows to have a positive impact on economic growth.

The above specified growth model is empirically tested in a panel structure comprising of 27 countries in Asian continent covering the period,1975 to 2010.This paper looks into the time-series properties of panel data followed by panel estimation methods.

IV. Data and Methodology

The scope of this study is limited to 27 Asian economies covering the period 1975 to 2010. The secondary data on the variables namely GDP per capita (PPP), Gross Domestic Capital Formation (GCF) , Foreign Direct Investment Inflows(FDI), Gross enrolment in secondary education (SECEDCN) and total labour force are collected from World Development Indicators published by World Bank. The variables Gross Domestic Capital Formation (GCF) and Foreign Direct Investment Inflows (FDI) are converted to real terms at constant prices. The Infrastructure Index is constructed with the help of Principal Component Analysis (PCA). The concept of cointegration was first introduced into the literature by Granger (1987). Cointegration implies the existence of a long-run relationship between economic variables. The principle of testing for cointegration is to test whether two or more integrated variables deviate significantly from a certain relationship (Abadir and Taylor, 1999). In other words, if the variables are cointegrated, they move together over time so that short-term disturbances will be corrected in the long-term.

V. Empirical Results

The main purpose is to justify long run dynamism of FDI on economic growth and to investigate whether the countries have the absorptive capacities to reap the potential gains of FDI. This paper attempts to establish the presence of cointegration among the variables specified in the growth equation in Section III. For this exercise the first step is to ensure stationarity for the panel variables. As discussed in the Methodology section, this paper

applies panel unit root tests namely IPS, LLC, ADF-Fisher and PP-Fisher tests respectively. Table 1 presents the results of the tests both at level and at first-difference including constant and constant with time trend. The four panel series variables namely GDPC, GCFPC, FDIPC, INFRINDEX and SECEDCN are found to be non-stationary at their level form, which accepts the hypothesis regarding the presence of panel unit root with and without time trend respectively. The last part of Table1 shows the results of IPS, LLC, ADF-Fisher and PP-Fisher tests at their first-differences with and without time trend respectively. The results confirm that all the panel series variables are stationary at their first difference that is the null hypothesis regarding the presence of panel unit root is rejected at 5% level of significance. Further the results provide strong evidence regarding the series that they are all individually integrated of order one (I (1)) across countries.

However according to Harris and Sorris, the panel variables are cointegrated. Specification 2 presents the estimated results of the growth equation with the inclusion of absorptive capacity variables, SECEDCN and INFRINDEX respectively.The coefficients of FDIPC and GCFPC (as a proxy for domestic investment) are statistically significant but they affect economic growth with opposite signs. The coefficient of SECEDCN (education) estimated under random-effect model is found to be positively significant confirming the positive correlation between the level of human capital and economic growth (Barro,1995).In this case one percent increase in the level of secondary educational attainment increases economic growth by 0.457 percentage points. This justifies the inclusion of this variable in the growth equation. The coefficient of infrastructure index positively and significantly contributes to economic growth such that it rises by 3.062 percentage points due to the improvement in infrastructure. However as addressed in World Bank (1994) studies, Asian economies need to improve the effective usage of infrastructure stocks and services. Though this variable significantly contributes to economic growth yet the works of Alexander and Estache (2000), Reinikka and Svenson (1999) and Canning and Bennathan (2000) confirms the link between infrastructural investment and economic growth is 'at best ambiguous'. Specification 4 tests the hypothesis regarding the growth effect of FDI in terms of interaction term with secondary education as a proxy for human capital. It reports that FDI has a negative impact on economic growth while the interaction term with secondary education is positive and significant to economic growth. The coefficient of the interaction term captures the effect of a well-educated workforce on the absorptive capability of the economy. Using the similar procedure, secondary education threshold is computed and reported in Table 4. It is found to be positive which confirms that that a minimum level of human capital is required for FDI to contribute positively to growth, confirming the results of Borensztein et al. (1989). According to the discussions in Section III, it can be concluded that the positive effects of FDI diminishes with the improvement in domestic investment. Thus the empirical results obtained are to some extent on the expected lines and this call for policy recommendations.

Table 1: Panel Unit Root Test Results

Variables	Constant				Constant and Trend			
	ADF test	PP test	IPS test	LLC test	ADF test	PP test	IPS test	LLC test
GDPC	-0.20	-0.29	-0.68	-1.04	-0.54	-0.66	-0.87	-0.86
GCFPC	-1.14	-0.47	-1.07	-0.41	-0.47	-0.51	-0.76	-0.76
FDIPC	-0.49	-0.76	-1.06	-0.23	-0.56	-0.42	-0.36	-0.32
INFRINDEX	-0.66	-0.54	-1.45	-0.67	-0.12	-0.36	-1.08	-0.88
SECEDCN	-0.59	-0.34	-0.76	-0.54	-1.25	-1.45	-1.08	-1.23
Panel Unit Root Test Results At First-Differences								
GDPC	-13.54*	-9.32*	-12.45*	-7.22*	-11.56*	-8.78*	-10.55*	-8.54*
GCFPC	-11.32*	-8.76*	-11.65*	-6.59*	-12.32*	-9.66*	-10.43*	-7.836*
FDIPC	-12.64*	-7.69*	-18.46*	-8.92*	-13.43*	-7.65*	-9.58*	-8.78*
INFRINDEX	-11.32*	-8.41*	-10.62*	-6.61*	-11.42*	-8.56*	-7.68*	-7.44*
SECEDCN	-10.44*	-7.67*	-7.99*	-8.23*	-10.32*	-8.21*	-7.43*	-8.08*

Table 2 :Pedroni Panel Cointegration Test Results (Specification I)

Test Statistics	Individual Intercept		Individual Intercept and Constant Trend	
	Statistic	Prob.	Statistic	Prob.
	Within Dimension			
Panel rho-Stat	3.477556*	0.0003	0.496942*	0.3096
Panel v-Stat	-8.886716*	0.0000	-5.195046*	0.0000
Panel PP Stat	-11.05264*	0.0000	-12.04549*	0.0000
Panel ADF Stat	-8.060624*	0.0000	-8.497430*	0.0000
	Between Dimension			
Group rho Stat	-5.502022*	0.0000	-2.641395*	0.0041
Group PP Stat	-10.16093*	0.0000	-13.42647*	0.0000
Group ADF Stat	-8.69874*	0.0000	-7.790504*	0.0000

Note: 1. All statistics are from Pedroni's procedure (1999).
2. * indicates rejection of the null hypothesis of no co- integration at 5% levels of significance

Table 3. Pedroni Panel Cointegration Test Results (Specification II)

Test Statistics	Individual Intercept		Individual Intercept and Constant Trend	
	Statistic	Prob.	Statistic	Prob.
	Within Dimension			
Panel rho-Stat	0.706823	0.2398	-1.662650	0.9518
Panel v-Stat	-2.483361*	0.0065	-0.452409	0.3255
Panel PP Stat	-12.70203*	0.0000	-14.65569*	0.0000
Panel ADF Stat	-8.618903*	0.0000	-9.029617*	0.0000
	Between Dimension			
Group rho Stat	-0.299385	0.3823	1.449232	0.9264
Group PP Stat	-14.69785*	0.0000	-18.05361*	0.0000
Group ADF Stat	-7.243145*	0.0000	-7.493950*	0.0000

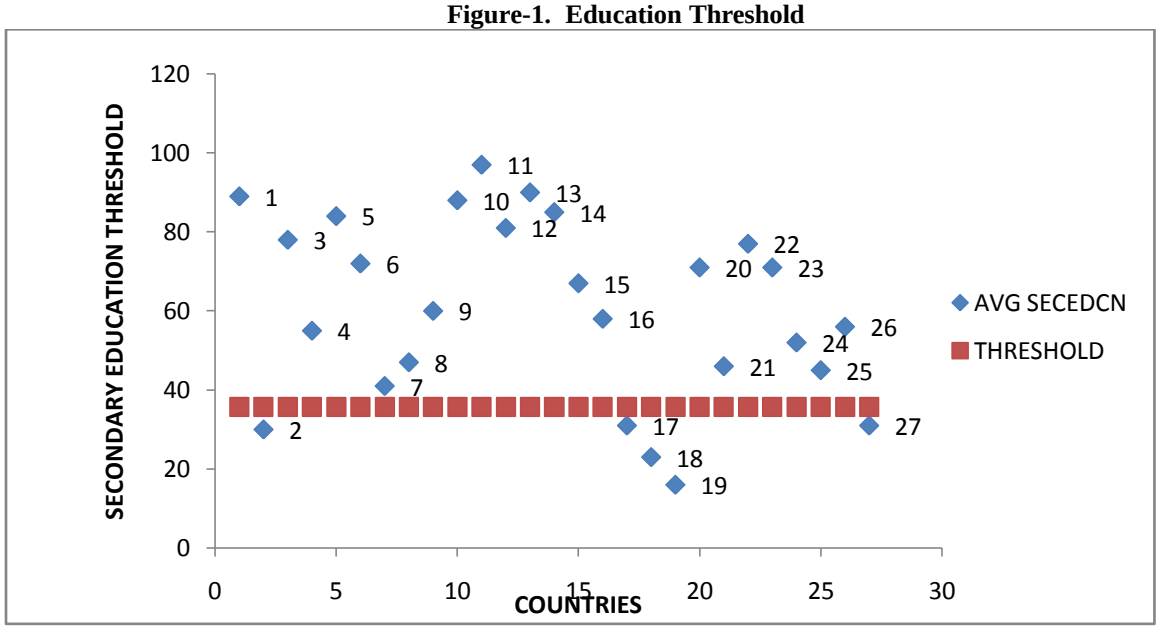
Note: 1. All statistics are from Pedroni's procedure (1999).
2. * indicates rejection of the null hypothesis of no co- integration at 5% levels of significance

Table 4. Impact of FDI on economic growth; 1975-2010 (Random Effect Estimator) Dependent variables: log of GDP per capita (GDPC)

Variables	Equation Specifications				
	1	2	3	4	5
GCFPC	-0.12* (0.000)	-0.044* (0.000)	-0.041* (0.000)	-0.043* (0.000)	-0.03* 0.000
FDIPC	0.14* (0.000)	0.067* (0.000)	-0.28* (0.000)	-0.13* (0.000)	0.09* 0.000
INFRINDEX		3.062* (0.000)	3.37* (0.000)	3.071* (0.000)	3.01* 0.000
SECEDCN		0.457* (0.000)	0.406* (0.000)	0.495* (0.000)	0.423* 0.000
FDIPC*INFRINDEX			0.35* (0.000)		
FDIPC*SECEDCN				0.15* (0.007)	
FDIPC*GCFPC					-0.016* (0.000)
Constant	3.87* (0.000)	2.69* (0.000)	2.08* (0.000)	2.28* (0.000)	1.57* 0.000
Breusch-Pagan Test (LM Test)	81.14* (0.000)	93.32* (0.000)	75.32* (0.000)	78.43* (0.000)	77.65* 0.000
No of Observations	972	972	972	972	972
Threshold Value			0.80	0.86	
P –value of Hausman Test	0.1621	0.2627	0.1127	0.1651	0.1482

Note: * indicates significance of the variables at 5% levels

Figure-1. Education Threshold



Note: The dotted line represents the education threshold level equal to 35.75.The Asian economies lie below and above this threshold on the basis of their average secondary education levels for the period, 1975-2010.

VI. Conclusion

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 but the effect of FDI depends on the threshold conditions of the host country. The panel cointegration technique is applied to the empirical specification of neo-classical type production function. Further the panel estimation techniques are carried out for policy results. The empirical results clearly reveal that there exists panel cointegrating relation and hence the estimation procedure can be justified. This finding asserts that the production function in per capita terms exist in the long run. The inclusion of the absorptive capacity variables does not deviate the results from the attainment of long-run equlibrium.Hence their inclusion is justified. The random effect panel estimation procedure is applied to the panel cointegrating relation. The results clearly reflect that FDI contributes positively to economic growth followed by significant coefficients for human capital and infrastructure, which supports the empirical literature.

The study further contributes to the existing literature in respect of absorptive capacity variables. In the context of existing FDI-Growth literature, this study provides evidence to the proposition that the ability to absorb the advantages embodied in FDI inflows is conditional on the capability of the host country with respect to human capital and the level of infrastructure. The findings confirm that certain Asian economies do not satisfy the threshold education and infrastructure levels and hence these countries need to invest more in education and infrastructure. 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.

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