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How Does Inflow of FDI Affect Economic Growth in East Asia?

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Abstract
In this paper, we address the question that does FDI alone affect economic growth or interaction of FDI and human capital is required to boost economic growth. We develop the model with an expanding variety of products. We estimate the model using some advanced tests utilizing data on FDI flows from developed countries. We find stronger complementary effects between FDI and human capital on the productivity growth rate instead of having them as separate variables. This result is consistent with the idea that the flow of advanced technology brought along by FDI can increase the growth rate of the host economy only by interacting with that country's absorptive capability.

Keywords: Foreign Direct Investment, Human Capital, Economic Growth, Host Economy, Developed Countries

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1. Introduction

Investment is an important ingredient in the growth process. Countries lacking capital accumulation and technological progress usually grow much slower than countries with high investment rate.

According to the standard neoclassical theories, economic growth and development is based on the utilization of land, labor and capital in production. Since developing countries in general, have underutilized land and labor and exhibit low savings rate, the marginal productivity of capital is likely to be greater in these countries. Thus, the neo-liberal theories of development assume that interdependence between the developed and the developing countries can benefit the latter. This is because capital will flow from rich to poor areas where the returns on capital investments will be highest, helping to bring about a transformation of backward economies. Furthermore, the standard neo-classical theory predicts that poorer countries grow faster on average than richer countries because of diminishing returns on capital. Poor countries were expected to converge with the rich over time because of their higher capacity for absorbing capital. The reality, however, is that over the years divergence has been the case, the gap between the rich and poor economies has continued to increase. The volume of capital flow to the poor economies relative the rich has been low.

Other critics argue that FDI is often associated with enclave investment, sweatshop employment, income inequality and high external dependency (Durham, 2004). All these arguments regarding the potential negative impact of FDI on growth point to the importance of certain enabling conditions to ensure that the negative effects do not outweigh the positive impacts. At present, general idea is that there is a positive association between FDI inflow and economic growth, provided the enabling environment is created. Given the fact that economic growth is strongly associated with increased productivity, FDI inflow is particularly well suited to affect economic growth positively. The main channels which FDI affect economic growth, have been uncovered by the new growth theorists (Markusen, 1995; Barro and Sala-I-Martin, 1995; and Borensztein, 1998). They developed a simple endogenous growth model, which demonstrates the importance of FDI in engendering growth through technological diffusion. Typically, technological diffusion via knowledge transfer and adoption of best practice across borders is arguably a key ingredient in rapid economic growth. And this can take different forms. Imported capital goods may embody improved technology. Technology licensing may allow countries to acquire innovations and expatriates may transmit knowledge. Yet, it can be argued that FDI has greatest potential as an effective means of transferring technical skills because it tends to package and integrate elements from all of the above mechanisms. First, FDI can encourage the adoption of new and improved technology in the production process through capital spillovers. Second, FDI may stimulate knowledge transfers, both in terms of manpower training and skill acquisition and by introduction of alternative management practices and better organizational arrangements.

Using both cross section and panel data analysis, Johnson (2006) demonstrated that FDI inflows boosted economic growth in developing countries, but not in advanced nations. Numerous other empirical studies have also provided mixed evidence on the link between economic growth and FDI (Wijeweera et. al. 2007; Zhang 2001; Johnson 2006). The relationship between FDI and the rate economic growth is critically important for policy making in the real-world. The past two decades have witnessed a massive surge in FDI inflows. Indeed, according to UNCTAD (2005), global FDI inflows increased from approximately U$55 billion in 1980 to around U$1,400 billion in 2000. This unprecedented growth in FDI inflows has prompted academic economists and policy makers alike to devote much more effort to understanding the empirical relationships between GDP growth and FDI inflows in host countries. The surveys of the literature conclude that it is increasingly recognised that, within the right setting, foreign direct investment (FDI) can be a powerful engine for sustainable growth (Nissanke and Thorbecke, 2006; Ozturk, 2007; Meyer and Sinani, 2009). FDI is usually viewed as a channel through which knowledge and technology is able to spread into host countries contributing positively to economic growth (Findlay, 1978; Romer, 1993; Tang et al., 2008; Thangavelu et al., 2009 and Waldkirch, 2010). While the relationship between FDI, growth and the role of the moderating variable 'absorptive capacity' has been intensely debated, the identification of the minimum thresholds of absorptive capacity for a positive effect from FDI to arise remains largely unexplored (Ford et al., 2008; Meyer and Sinani, 2009). For this reason, using two threshold variables (host country's human capital level and the share of R&D performed by business sector on total GDP, this research revisits the relationship between FDI and economic growth.

2. Research Framework

This study aims to investigate links between human capital, FDI and economic growth using data for East Asian Countries. In addition, importance of human capital is highlighted as complementary to FDI inflows, underlying the importance of technology adoption.

We develop the model with an expending variety of products follow by Barro and Sala-i-Martin (1995) and Borensztein et al (1998). The model enables to show that how interaction between human capital and FDI support FDI-led growth in host countries. According to figure 1, we assume that there are three sections as follow: A) Final good sector produces a single consumption good under perfect competition. B) Intermediate good sector manufactures varieties of intermediate goods under monopolistic competition. C) Households supply human capital to final good sector and intermediate good sector. Final good is traded but intermediate goods are not traded. FDI primary goes through foreign affiliates in the host country. Therefore domestic firms then are affected by foreign affiliated through international knowledge spillovers. Both domestic firms and multinational enterprises (MNEs) produce intermediate good and then final good is produced using intermediate goods. Household consumes only final good. Specialized firms produce each variety of capital good and rent to final good sector.

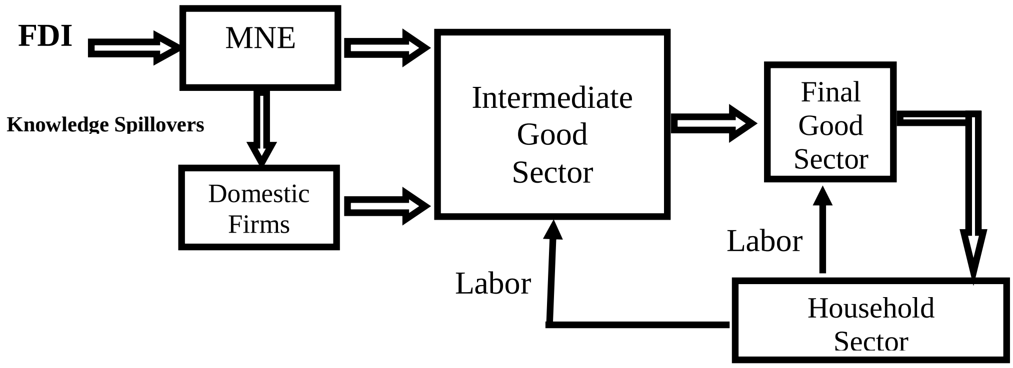

Figure 1: Interaction between human capital and FDI

We consider an economy where technical progress is the result of capital deepening in the form of an increase in the number of varieties of capital goods available, as in Romer (1990), Grossman and Helpman (1991), Barro and Sali-i-Martin (1995). The economy produces a single consumption good according to the following technology:

$$Y_t = AH_t^{\alpha} K_t^{1-\alpha} \tag{1}$$

Where "A" represents the overall measure of productivity or exogenous state of environment. "H" denotes labor output (human capital) and is a given endowment. K" stands for physical capital. Physical capital consists of aggregate of varieties of intermediate goods and we assume that capital accumulation takes place through the expansion of the number of varieties where N is the number of varieties of intermediates. This means that at each instant in time, the stock of domestic capital is given by:

$$K = \left\{ \int_0^N x_j^{1-\alpha} dj \right\}^{\frac{1}{1-\alpha}} \tag{2}$$

The equation 2 indicated that the total capital K is a composite of a continuum of varieties of intermediate goods. Each intermediate good denoted by xj and there are N intermediate good produced in the economy.

Capital accumulation takes place through increase in intermediate goods which needs technology adoption which is available in more advanced countries. This technology flows to host country through FDI and multinational firms. In other word, there are two types of firms that produce capital goods: domestic and foreign firms that have undertaken a direct investment in the economy. We assume that domestic firms produce "n" varieties out of the total number N, and the foreign firms produce n* varieties.

The present value of profit flow from time "t" to infinite for monopolistic firm inventing a new intermediate good "j" is:

$$V(t) = \int_t^{\infty} \pi_j . e^{-r(s-t)} ds - F \tag{3}$$

By maximizing the profit flow subject to demand for new intermediate good “j” we get:

$$\begin{aligned} &Max \\ &V(t) = \int_t^{\infty} \pi . e^{-r(s-t)} ds - F = \int_t^{\infty} (P_j x_j - x_j) . e^{-r(s-t)} ds - F \\ &s.t: \\ &P_{j=} A(1-\alpha) H_i^{\alpha} x_j^{-\alpha} \end{aligned} \tag{4}$$

The rate of return r will be such that profits are equal to zero. Solving for the zero profits condition we obtain:

$$\begin{aligned} &\int_t^{\infty} a(1-a)^{\frac{2-a}{a}} A^{1/a} H_i . e^{-r(s-t)} ds - F = 0 \\ &a(1-a)^{\frac{2-a}{a}} A^{1/a} H_i . \int_t^{\infty} e^{-r(s-t)} ds = F \\ &a(1-a)^{\frac{2-a}{a}} A^{1/a} H_i = F . \int_t^{\infty} e^{r(s-t)} ds \\ &r = A^{1/a} a(1-a)^{\frac{2-a}{a}} H_i F^{-1} \end{aligned} \tag{5}$$

$$where \quad r = \int_t^{\infty} e^{r(s-t)} ds$$

By maximizing the household and taking log from the equation over an infinite horizon subject to the budget constraint we get following equations. Budget constraint implies that household earn the rate of return “r” on assets and receive the wage rate “w” on the fixed aggregate quantity L of labor supply normalize to one. The rate of population growth “n” is zero.

$$\begin{aligned} &Max \\ &U_t = \int_0^{\infty} (\frac{c_t^{1-\sigma}}{1-\sigma}) e^{-\rho t} dt \\ &s.t: \\ &\dot{k} = w + rk - c \\ &g = \frac{\dot{c}}{c} = \frac{r-\rho}{\sigma} = \frac{1}{\sigma}\left[A^{1/\alpha}\alpha(1-\alpha)^{\frac{2-\alpha}{\alpha}} F^{-1} H - \rho\right] \end{aligned} \tag{6}$$

$$g = \frac{1}{\sigma}\left[A^{1/\alpha}\alpha(1-\alpha)^{\frac{2-\alpha}{\alpha}} F^{-1} H - \rho\right]$$

To have a specific form for the fixed setup cost, we assume that fixed cost represents the fixed human capital inputs needed to produce intermediate goods. Furthermore, we assume that spillover effects from all foreign countries are the same. Then we can construct the following functional form for fixed cost.

$$\begin{aligned} &F(n) = a\left[\sum_j^C \delta_j n_j\right]^{\beta}, \; j = 1,2,...,C \\ &\beta < 0, and, 0 \le \delta_j \le 1 \\ &assumption: \begin{cases} C = 2 \\ \beta = -1 \end{cases} \\ &F(n) = a\left[\delta_1 n + \delta_2 n^*\right]^{-1} \end{aligned} \tag{7}$$

where “a” represents the fixed amount of human capital needed to produce the intermediate goods which are assumed to be identical in all countries. Also “δj” denotes the magnitude of spillovers from intermediate goods produced by firms in country j and β stands to extend that spillovers contribute to the productivity improvement. Because β is negative, fixed cost decreases with the large value of δj. There are perfect spillover when δj=1 and there is no spillovers when δj=0.

In addition, as n and n* are number of intermediate goods produced in foreign countries and in the host country, it is assumed that n and n* are functions of FDI and domestic investment. Then we have:

$$n = \gamma_1 DIN \qquad \gamma_1 > 0$$
$$n^* = \gamma_2 FDI \qquad \gamma_2 > 0$$

Now we can substitute for fixed setup cost in equation as follow:

$$\begin{aligned} &g = -\frac{\rho}{\sigma} + \frac{A^{1/\alpha}(1-\alpha)^{\frac{2-\alpha}{\alpha}} \delta_1}{\sigma} \\ &\gamma_1 . DIN . H + \frac{A^{1/\alpha}(1-\alpha)^{\frac{2-\alpha}{\alpha}} \delta_2}{\sigma} \gamma_2 . FDI . H \end{aligned} \tag{8}$$

For simplicity denote:

$$\begin{aligned} &\beta_0 = -\frac{\rho}{\sigma} \\ &\beta_1 = \frac{A^{1/\alpha}(1-\alpha)^{\frac{2-\alpha}{\alpha}} \delta_1}{\sigma} \gamma_1 \\ &\beta_2 = \frac{A^{1/\alpha}(1-\alpha)^{\frac{2-\alpha}{\alpha}} \delta_2}{\sigma} \gamma_2 \end{aligned} \tag{9}$$

$$g = \beta_0 + \beta_1 . DIN . H + \beta_2 FDI . H$$

Following Borensztein (1998), we added initial level of GDP per capita, openness, government share of real GDP, and inflation rate as other determinants productivity growth.

Initial conditions and in particular the initial level of GDP per capita is particularly emphasized in the neoclassical growth theory where the convergence process is driven by capital accumulation (Levine and Renelt, 1992; Hendry and Krolzig, 2004). However, the initial level of GDP per capita is also important in theories emphasizing learning capabilities. For example, models emphasizing the advantage of backwardness or the technology gap used initial level of GDP per capita as a growth determinant. Inflation rate, openness and government share in real GDP also represent growth environment of host countries. Hence, our final equation becomes as follow:

$$g = \beta_0 + \beta_1.DIN.H + \beta_2 FDI.H + \beta_3 GDP_0 + \beta_4 Inf + \beta_5 GSG + \beta_6 Opens \quad (10)$$

The equation is our key empirical equation. It implies that growth rate of economy is affected by interaction of domestic investment and human capital and also with FDI and human capital. We decompose growth into efficiency improvement and technological progress. We use Mamquist productivity Growth (MPG) instead of g to denote the growth rate of productivity because we calculate it using MPI. Therefore, in our empirical model we get:

$$MPG_{it} = c_{i0}^M + c_1^M FDI_{it} \times H + c_2^M DIN \times H + c_3^M A_{it} + \varepsilon_{it} \quad (11)$$

since MPI was decomposed into EI and TI, and growth rates are calculated , we estimates the following two equations in order to analyze the effect of efficiency spillovers and technology spillovers through FDI.

$$EFFG_{it} = c_{i0}^E + c_1^E FDI_{it} \times H + c_2^E DIN \times H + c_3^E A_{it} + \varepsilon_{it}$$
$$TECG_{it} = c_{i0}^T + c_1^T FDI_{it} \times H + c_2^T DIN \times H + c_3^T A_{it} + \varepsilon_{it} \quad (12)$$

where *EFFG* and *TECG* represent efficiency improvement and technology progress and A is set of explanatory variables respectively.

3. Data

Data collected from various sources. Human capital refers to skilled human capital. Following Borensztein (1998), we used the educational attainment of the total population of aged 15 and over as secondary level constructed by Barro and Lee (2000). According to Barro and Lee this measure of educational attainment is the one most significantly correlated with growth. We used nominal FDI (current price) which refers to inflows of outflows. UNCTAD database was used to obtain the data on nominal Inflow FDI. To get data on domestic investment, we used Barro and Lee (2000) data set. Data on real GDP, inflation rate, and openness (constant 2005 US$) and government share in real GDP came from Penn World Table version 7.0. Our data includes observations of eight countries include China, Hong Kong, Indonesia, Korea, Malaysia, Philippine, Singapore and Thailand over 38 years from 1970 to 2007.

4. Results

In the first section, we estimate these three models using panel analysis techniques. We performed panel unit root test to ensure our variables are stationary.

The Table 1 shows results of panel unit root test of productivity growth. The lower part of the summary output gives the main test results, organized both by null hypothesis as well as the maintained hypothesis concerning the type of unit root process. For the all parts, the results fail to indicate the presence of a unit root. On the other word, there is no unit root in productivity growth.

The table shows that the Levin, Lin & Chu (LLC), Im, Pesaran and Shin W-stat (IPS), and both Fisher tests (ADF - Fisher Chi-square and PP - Fisher Chi-square) are significant and therefore we can reject the null of existing unit root ($P<0.05$) in productivity growth. Similarly, the Hadri test statistic (Hadri Z-stat), which tests the null of no unit root is not significant and hence it fails to reject the null ($P>0.05$).

Table 1: Panel Unit Root Test Of Total Productivity Growth

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-16.4117	0.0000	8	259
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-15.7757	0.0000	8	259
ADF - Fisher Chi-square	200.367	0.0000	8	259
PP - Fisher Chi-square	251.700	0.0000	8	264
Null: No unit root (assumes common unit root process)				
Hadri Z-stat	1.60566	0.0542	8	272

** Probabilities for Fisher tests are computed using an asympotic Chi -square distribution. All other tests assume asymptotic normality.

Source: **Authors**

The results of unit root test for efficiency improvement are presented in the Table 2. The findings show that efficiency improvement doesn't have unit root and is a stationary variable I(0). In contrast, the Levin, Lin & Chu (LLC), Im, Pesaran and Shin W-stat (IPS), and both Fisher tests (ADF - Fisher Chi-square and PP - Fisher Chi-square) are significant and they reject the null of a unit root (P<0.05).

The Hadri test statistic (Hadri Z-stat) to test the null of no unit root is not significant and then we can not reject the null hypothesis (P>0.05).

Table 2: Panel Unit Root Test Of Efficiency Improvement

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-16.7081	0.0000	8	262
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-15.3814	0.0000	8	262
ADF - Fisher Chi-square	190.500	0.0000	8	262
PP - Fisher Chi-square	194.365	0.0000	8	264
Null: No unit root (assumes common unit root process)				
Hadri Z-stat	-0.74423	0.7716	8	272

** Probabilities for Fisher tests are computed using an asympotic Chi -square distribution. All other tests assume asymptotic normality.

Source: **Authors**

The last dependent variable in our models was technological progress. The results of unit root test for technological progress are shown in the Table 3. The results indicate that technological progress is a stationary variable and has no unit root I(0). The Levin, Lin & Chu (LLC), Im, Pesaran and Shin W-stat (IPS), and both Fisher tests (ADF - Fisher Chi-square and PP - Fisher Chi-square) statistics are significant and reject the null of unit root (P<0.05).

Table 3: Panel Unit Root Test of Technological Progress

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-20.8434	0.0000	8	264
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-19.5538	0.0000	8	264
ADF - Fisher Chi-square	241.594	0.0000	8	264
PP - Fisher Chi-square	237.848	0.0000	8	264
Null: No unit root (assumes common unit root process)				
Hadri Z-stat	-0.64042	0.7391	8	272

** Probabilities for Fisher tests are computed using an asympotic Chi -square distribution. All other tests assume asymptotic normality.

Source: **Authors**

Therefore, we can not reject the hypothesis that technological progress is a stationary variable.

In the next step, we apply panel unit root test for main exogenous variables in the model. There independent variables existed in the models including interaction of human capital and Foreign direct investment (Human Capital x FDI), and interaction of domestic investment and human capital (Domestic Investment x Human Capital). Table 4 presents the results.

Table 4: Panel Unit Root Test

Variable	FDI x Human Capital		Domestic Investment x Human Capital	
Method	I(0)	I(1)	I(0)	I(1)
Levin, Lin & Chu	8.61901	-2.03437	10.1096	-0.52124
Prob.	1.0000	0.0210*	1.0000	0.3011
Im, Pesaran and Shin W-stat	9.93561	-4.20245	7.95136	-5.43952
Prob.	1.0000	0.0000*	1.0000	0.0000*
ADF - Fisher Chi-square	10.9533	50.1913	1.85812	99.6051
Prob.	0.8124	0.0000*	1.0000	0.0000*
PP - Fisher Chi-square	12.0316	154.344	0.42482	122.149
Prob.	0.7418	0.0000*	1.0000	0.0000*

Source: **Authors**

For the all variables of order zero, the Levin, Lin & Chu (LLC), Im, Pesaran and Shin W-stat (IPS) and Fisher tests (ADF - Fisher Chi-square and PP - Fisher Chi-square) were not significant (P=1). It implies that the null hypothesis of common unit root can not be rejected. Therefore, interaction of FDI and human capital, and interaction of domestic investment and human capital, are not stationary variable.

Then, we performed the test of integration order one I(1). The most of tests and especially Fisher tests with null hypothesis of unit root were significant. Therefore we can conclude that the first order of these variables is stationary. The overall results of unit root test imply that the regressands and regressors are of a different order of integration.

In the next section, in order to see the effect of FDI and its interaction with other exogenous variables and different countries, we defined a dummy variable for each country under study. Therefore, eight dummy variables were defined. Furthermore, to better see the effect we added additional independent variables into the model such as openness, and inflation rate, Initial level of GDP per capita and Government Share in Real GDP.

The Table 5 reveals several interesting results for the effects of FDI on economic growth. We conducted 4 regressions with various control variables to investigate how FDI, human capital and their interaction impact productivity growth.

Table 5: The Effects of FDI on Economic Growth

Reg.	Regression 1			Regression 2			Regression 3			Regression 4		
	MPG	EFFG	TECG	MPG	EFFG	TECG	MPG	EFFG	TECG	MPG	EFFG	TECG
Initial Real GDP	0.015	0.021	0.018	0.012	0.024	0.011	0.012	0.015	0.011	0.014	0.025	0.014
	(0.013)	(0.15)	(0.125)	(0.011)	(0.01)	(0.026)	(0.014)	(0.002)	(0.002)	(0.012)	(0.14)	(0.026)
Human Capital	0.022	0.024	0.012	0.014	0.015	0.001						
	(0.013)	(0.21)	(0.022)	(0.012)	(0.10)	(0.045)						
G.S. in Real GDP	0.025	-0.004	-0.014	0.004	0.000	0.012	0.024	0.023	0.017	0.005	0.000	-0.126
	(0.14)	(0.041)	(0.012)	(0.041)	(0.00)	(0.000)	(0.021)	(0.18)	(0.012)	(0.014)	(0.04)	(0.045)
FDI				0.0144	0.032	0.052						
				(0.012)	(0.042)	(0.036)						
FDI x HC							0.031	0.051	0.014	0.054	0.026	0.044
							(0.020)	(0.23)	(0.012)	(0.013)	(0.03)	(0.052)
D. Inv. x Human Capital							0.036	0.041	0.012	0.026	0.051	0.036
							(0.043)	(0.04)	(0.011)	(0.025)	(0.23)	(0.043)
Inflation				0.044	0.051	0.026	-0.014	0.014	-0.015	-0.006	0.004	-0.045
				(0.052)	(0.23)	(0.025)	(0.012)	(0.012)	(0.10)	0.012)	0.02)	0.016
Openness				-0.125	-0.021	-0.001				0.004	0.000	0.012
				(0.010)	(0.11)	(0.045)				(0.041)	(0.00)	(0.000)
Population	0.125	0.025	0.012									
	(0.010)	(0.14)	(0.011)									

Source: **Authors**

Regression 1 shows that FDI has a positive impact on economic growth, after controlling for initial GDP per capita, human capital, government share in real GDP, and population. In the next regression, we drop population as it was insignificant and we added FDI instead. This regression controls for inflation and openness as a measure of trade as well. Inclusion of FDI improves overall performance of our regression, while inflation remains insignificant.

Next, in regression 3 and 4, we dropped human capital and FDI, which were in the regression as two single variables, but we added interaction of human capital with FDI. Including the interaction between FDI and human capital improves the overall performance of the regression. The specification replaces the FDI variable by the product between FDI and human capital, and yields a coefficient that is positive and highly statistically significant. Thus, it is better to include FDI and human capital together instead of having them as separate variables. In that way, we can test jointly whether these variables affect productivity growth through the interaction term.

Our main results come from regression 4. It indicates that FDI has a positive overall effect on productivity growth, although the magnitude of this effect depends on its interaction with human capital in the host economy. Regressions 1 to 4 also test inclusion of additional control variables affecting productivity growth. In all cases, the interaction term between FDI and human capital is statistically significant, implying that the estimated effect does not result from the omission of other policy variables. Overall, the results from the regressions displayed in above table show strong complementary effects between FDI and human capital on the productivity growth rate. This result is consistent with the idea that the flow of advanced technology brought along by FDI can increase the growth rate of the host economy only by interacting with that country's absorptive capability.

We reproduced our main results from regression 4 in the Table 6 for more discussion. The results reported in Table 6 state that the interaction term of human capital and FDI has significant positive effect on productivity growth and technological progress. The influence on productivity growth is greater than technological progress. In particular, one percent increase in FDI and human capital will increase productivity growth by 5.4 percent. The results is consistent with Borensztein at al. (1998), which shows the interaction term of human capital and FDI has a positive effect on economic growth, and Xu (2007), which concludes MNEs are an important channel of international productivity spillovers for a country reaching a human capital threshold level.

The interaction term of human capital and domestic investment also has significant positive effect on productivity growth. This result shows that since East Asian countries have relatively large human capital, domestic investment is also an important factor to increase productivity growth. However, the effect of interaction term of human capital and domestic investment on productivity growth is smaller than those of human capital and foreign direct investment.

Among the other independent variables, the effect of Initial level of GDP per capita on productivity growth is greater than other growth determinants (0.014). For example this effect for inflation rate was negative (-0.006), for government share of real GDP was 0.005 and finally for openness is 0.004. These findings are consistent with Xu (2007) which shows that catch up effects are positive for developing countries. This positive effect seems to indicate that productivity tends to be accelerated in those countries that already have higher productivity levels.

Regarding the effect of FDI on efficiency improvement and technological progress, the results presented on the table show that H*FDI has significant positive effect on technological progress but insignificant effect on efficiency improvement. This implies that productivity growth through FDI is mainly due to technological progress rather than efficiency improvement. The interaction term of human capital and domestic investment (DInv*H) has positive effect of technological progress but insignificant on efficacy growth.

Table 6: Panel Least Squares Estimation

Independent Variable	Dependent Variable		
	Productivity Growth	Efficiency Improvement	Technological Progress
Domestic Investment x Human Capital	0.026*	0.051	0.036*
	(0.025)	(0.234)	(0.043)
FDI x Human Capital	0.054*	0.026	0.044*
	(0.013)	(0.036)	(0.052)
Initial level of GDP per capita	0.014	0.025	0.014
	(0.012)	(0.144)	(0.026)
Inflation Rate	-0.006	0.004	-0.045
	0.012)	0.024)	0.016
Openness	0.004	0.000	0.012
	(0.041)	(0.000)	(0.000)
Government Share in Real GDP	0.005	0.000	-0.126
	(0.0147)	(0.044)	(0.045)
China	2.125	1.025	1.457
	(1.542)	(1.455)	(6.458)
Hong Kong	0.160	1.026	1.126
	(0.241)	(0.165)	(0.856)
Indonesia	0.458	1.145	2.415
	(0.269)	(0.415)	(1.545)
Korea	0.186	1.106	2.241
	(0.245)	(0.235)	(1.31)
Malaysia	0.236	1.052	2.500
	(0.542)	(0.336)	(1.803)
Philippine	0.239	1.125	2.654
	(0.140)	(0.210)	(1.445)
Singapore	0.133	0.412	1.451
	(0.245)	(0.212)	(1.341)
Thailand	0.426	1.221	2.405
	(0.458)	(0.256	(1.541)
Adjusted R-Square	0.136	0.125	0.46
Schwarz Criterion	4.236	5.45	5.056

Source: **Authors**

5. Conclusion

Our central discussion is on the issues that how can foreign direct investment effect productivity growth in host country. Over the past decade, many developing countries have opened their economies to foreign direct investment. Governments have developed a number of policies aimed at attracting FDI, including the provision of subsidies and the creation of industrial parks and export zones. However, still, most of the FDI heads to only a handful of countries, reminding us that openness is a necessary but insufficient inducement to investors who are contemplating market entry. What are missing here are alternative conditions in host countries. Decision making of foreign firms depends on many other factors such as political, economic and cultural factors, including economic and political stability, language, the level of income per capita, the natural resources that are available, and the quality of infrastructure. The most powerful attraction for a host country, however, may be found in its work force.

We found that human capital formation is a critical variable. Casual evidence from countries like Singapore, Taiwan and Korea would suggest that this must be the case, and indeed there have been many evidences to highlight the key variables associated with FDI. Human capital in host countries is a determinant of foreign investment in developing countries. As Kamal Saggi (2000) suggested without adequate human capital or investments in R&D, spillovers from FDI will fail to materialize. Inadequate human capital may refer to the lack of senior managers or skilled labor. For this, OECD suggests active labor market policies in addition to a high-quality of primary education to many developing countries. Active labor market policies are those that provide workers with the sort of training that makes them attractive to a wide variety of sophisticated industries. In fact, to gain from FDI, governments need to ensure that labor markets are efficient, that the education and training system is able to meet emerging skill needs, and that firms invest in additional job-related training.

In conclusion, as it was stated by many other researchers, we showed that FDI helps promote productivity growth through technology diffusion and human capital development (Borensztein, De Gregorio and et al., 1998; de Mello 1999). This is particularly the case when there is interaction between FDI and human capital in host country. FDI helps overcome capital shortage in host countries and complements domestic investment when FDI flows to high risk areas or new industries where domestic investment is limited. When FDI combines with human capital, it increases productivity growth of East Asian countries mostly by increase technological progress rather than efficiency improvement. This results, emphasizes that FDI is in general more technological intensive than domestic investment.

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