Empirics of FDI and Economic Growth: The Role of Human Capital and Financial Development

CHHENG Kimlong*
SURUGA Terukazu**

Ⅰ. Introduction

This paper uses an endogenous approach to empirically analyze the dynamic growth effects of foreign direct investment (FDI) in a panel of 50 economies over two decades 1981-2000. The authors argue that FDI, fueled by human capital, financial development, economic freedom, and R&D-based industrial innovations, accumulates the stock of capital investment and endogenizes the rate of technological progress and long-term per capita GDP growth[1]. The authors investigate the validity and robustness of the determinants of inward FDI to solve the problem of underinvestments and credit constraints, to undertake technological innovations, and to adopt technical efficiency.

Numerous empirical studies on FDI-growth effects found that FDI enhances growth and transfers new technologies, while some found a crowding-out effect of FDI on domestic investment or that FDI alone plays an ambiguous role without well-developed financial markets (Alfaro et al, 2004) and absorptive capacities (Borensztein et al, 1998)[2]. Laura et al (2001) and Hermes and Lensink (2003) found a major contribution of FDI to GDP growth rate, fueled by well-developed financial development. Since technological progress increases the productive efficiency, economic growth results from the productivity gains due to accumulated specialization of the increased independent economic units (IEU) and multinational enterprises (MNCs) equipped with advanced technologies.[3] Capital accumulation fuels this process and it is inextricable of technological progress, financial development, and international capital mobility.[4]

The stylized facts on the constraints faced by LDCs and developing nations are

* Former Graduate Student, Graduate School of International Cooperation Studies, Kobe University.
** Professor, Graduate School of International Cooperation Studies, Kobe University.

that these economies lack three basic ingredients for pertaining growth. First, they face capital and credit constraints or lack substantial capital resources for investment in the industrial production, human capital development, R&D activities, and industrial innovations. Second, they face technological constraint; i.e., a sufficient human resource and improved technology for the discoveries of new ideas. Third, they lack well-developed institutions and political stability (Hall and Jones, 1999). This paper attempts to find out ways to solve these challenges. Based on Barro (1991), Romer (1990), Lucas (1988), Borensztein et al (1998), Levine et al (2000), and Alfaro et al (2004), this paper estimates an empirical model to analyze the effects of FDI on economic growth in three panel data sets.[5]

This paper hypothesizes that FDI, human capital, financial development, and economic freedom determine the rate of long-term per capita GDP growth, productivity growth, technological change, and economic performance. FDI embodies capital and new technologies, while financial development diminishes capital and credit constraints. Human capital adopts and transfers new technologies, acquire new skills, and augment productive efficiency and technological progress. Financial development endogenously increases new domestic investments and economic activities, and it helps enhance industrial growth and innovations. Economic freedom and industrial innovations contribute as many positive externalities to GDP growth. Economic freedom determines the magnitude and choices of economic activities, capital flows, externalities, and thus growth rate. The improved absorptive capacities will exert significant positive technological externalities and sustain subsequent long-term growth rates.

We argues that government financing and domestic private credits are necessary but not sufficient to sustain cumulative growth and to catch up with or respond to global rising rate of technological advancements, all of which produce idea gaps, income gaps, and object gaps.[6] The absorption of FDI is the key to dealing with these situations.[7] A minimum threshold of human capital and the absorptive capacities are a prerequisite for the full benefits from FDI, the adoption of new technologies, and long-term growth.

The paper is organized as follows. Section II deals with the literature review and the existing empirical growth-nexus evidence; Section III explains the data,

the variable choices, and the importance of the inclusion of additional variables; Section IV presents the empirical growth regression models and the FDI equation; Section V explains the econometric methods and analyzes the results; and Section VI summarizes the empirical results and conclude. The rest of the paper devotes to tables, appendices, and references.

Ⅱ. Literature Review

A hallmark of theoretical and empirical literatures on long-term growth mechanisms indicates that physical capital and human capital accumulation are essential for technological progress and long-run per capita GDP growth {see Barro, 1991; Romer 1990; Lucas, 1988}. FDI with an adequate stock of capable human capital produces positive growth rate (Borensztein et al, 1998). FDI with well-developed financial institutions (Alfaro et al, 2004) and absorptive capacities (Durham, 2004) plays a more important role in growth process. In this respect, FDI and domestic investment alone may not be efficient and sufficient for long-term and sustained cumulative growth. To gain the efficiency, well-developed economic institutions, adequate human capital, and financial development should be a plausible mechanism. Economic freedom or institutions and the factors influenced by the government policies account for the long-run growth process, public choices on economic activities, per-worker productivity, and growth rate.

The studies of FDI-growth dynamics have allured controversial and arduous debates. Nevertheless, since FDI provides access to advanced technologies, increases capital stock, and accumulate exports, FDI has been widely deemed a major engine of technological diffusion, knowledge spillovers, productivity growth, and per capita income growth. Since new technologies are engines of cost reduction and long-term growth, technological progress is conducive in the long-term growth process.[8] Technological improvements arise from foreign direct investment (FDI) firms equipped with new advanced technology. Technological embodiment comes along with equipment investment by foreign profit-seeking firms or multinational corporations (MNCs).[9]

International investment firms plus the readiness of local environment play a major role in the diffusion and the effective transfer of new technologies

(Findlay, 1978). Therefore, FDI contributes to economic growth via the accelerated rate of technological accumulation and the absorptive capacities. Technological change that arises from the international capital investments fuels growth (Romer, 1990), which can be sustained by the accumulation of the factor inputs and long-term investment in physical and human capital that generate positive externalities. FDI and domestic investment embody investment in new ideas, and thus technology progress occurs.

The positive effect of FDI relies on such absorptive capacities of host economies as financial or institutional development (Durham, 2004) and the substitutability and complementarity between FDI and domestic investment (De Mello, 1999). De Long and Summers (1991) found a robust association between per worker GDP growth rate and the equipment investment over the period 1960-1980. Hsiao and Shen (2003) argued that FDI boosts productivity through competition, positive technological externalities, and accelerated spillovers, while Li and Liu (2004) found a strong complementarity between FDI and economic growth.

Balasubramanyam et al (1996) found evidence that supports Bhagwati.[10] Their evidence is suggestive of the substantial and beneficial growth-enhancing effects of FDI in countries with open trade policy. FDI exerts a significant and positive influence on per capita income, irrespective of human capital requirements and that FDI is more productive and efficient than domestic investment (Khawar, 2005).

The authors argue that human capital has innovative, creative, and productive capacity to transform resources in the process of discoveries and development into economic values. Human capital accumulation through education and learning-by-doing accommodates technological change and sustained growth.[11] The authors argue that the employment of human capital in industrial R&D investment produces technology. Technological progress results from the rate of adoption of new technologies by human capital (Galor and Tsiddon, 1997). Rebelo (1991) assumed constant returns to a broad concept of capital which includes stock of human capital. Physical capital, human capital or R&D capital affects the arrival rate of innovations, and the course of investment in physical capital or human capital produces knowledge spillovers.

Human capital and economic freedom fuel growth and facilitate FDI allocations (Bengao and Sanchez-Robles, 2003).[12] Innovations and growth are endogenized by the stock of human capital (Howitt and Aghion, 1998). King and Levine (1993) and Levine and Renelt (1992), and Levine et al (2000) found that financial development is a major driver for real GDP growth {see also Benhabib and Spiegel, 2000; Beck et al, 2000}. De Gregorio and Guidotti (1995) found that bank and private credit to GDP ratio, a proxy for financial development, is positively growth-correlated.

This paper argues that efficiency, rather than the magnitude or overall increase in the volume of investment, is the main channel through which financial development is necessary and sufficient in both ways. First, it accumulates stock of capital for investment with an increase in investment opportunities and economic activities. Second, it enhances the efficiency of capital accumulation and contributes to the process of technological diffusion associated with FDI. Guiso et al (2004) found that financial development promotes new businesses, supports the entry of new investment firms, increases competition, and enhances growth.[13] Greenwod and Jovanovic (1990) found that growth provides wherewithal to develop financial institutions, which in turn leads to higher growth rate. This inextricable process results in more efficiently undertaken investments.

De Haan and Sturm (2000) and Gwartney and Lawson (2004) found potential effects of economic freedom in an increasingly important association with long-run growth rate and the absorption of capital inflows. Human and physical capital accumulation is a prerequisite to set the stage for cumulative growth, while better institutions and trade openness are significant for faster growth (Dollar and Kraay, 2003). Economic freedom plays the role of the institutions for enhanced growth, and various economic and political variables affected by government policies are correlated with economic performance and growth rates (Grossman and Helpman, 1994).

The conditional convergence in neoclassical theory implies that economies with lower initial level of real per capita GDP enjoy relatively faster growth rate in the long-run steady state. Convergence of economies with different initial levels of per capita income reflects the diminishing returns to capital (Solow, 1956).[14]

Ⅲ. Data and Variables

This article employs four data sources for the empirical tests on FDI and long-term growth dynamics and the determinants of FDI inflows to 50 countries.

(i) FDIGDP = The gross foreign direct investment inflows to real GDP ratio;
(ii) GCEGDP = The ratio of the government consumption expenditure to real GDP;
(ii) LLGDP = The aggregate financial liquid liabilities of M3 as a share to real GDP;
(iv) H = The stock of human capital, measured in the average years of educational attainment for males and females aged 25 and over;[15]
(V) GEGDP = The share of the government expenditure to real GDP;
(vi) VAIGDP = The value added of industrial share to real GDP;
(vii) EF = The economic freedom index, capturing institutions;
(viii) LogGDPI = The initial real per capita GDP in logarithms; and
(vx) TGDP = The total lump sump of imports plus exports to real GDP ratio

First, the data on FDIGDP, LLGDP, a proxy for financial development, and VAIGDP, a proxy for industrial development, are obtained from the World Development Indicator CD-ROM 2004. The inclusion of the industry variable (VAIGDP) in the growth regressions allows for an accurate detection of the effects of foreign capital investment (FDI) on technological improvements and economic growth. The assumption is made upon a view that a portion of FDI and of domestic investment are devoted to (i) R&D investments for industrial innovations and (ii) to the value added of the new industrial production, which are aggregated in GDP growth.[16]

Second, rather than using the school enrolment rate, fertility rate, or literacy rate as a proxy for human capital, this paper uses the data on educational attainment (H), a proxy for the stock of human capital. This variable is used to measure human capital quality and education investment, which are optimized for increased skills efficiency to augment technological adaptation, technological change and innovations, and production efficiency. The data are collected from Barro and Lee dataset (2001).

Third, the data on GEGDP (known as 'government share'), GCEGDP (known as 'consumption share'), DinvGDP (known as 'investment share'), real per capita GDP growth rate (RPGDP), LogGDPI, and TGDP, capturing openness to international trade, are obtained from Summers and Heston (2002). The purpose of including the logarithms of the initial real per capita GDP, (LogGDPI), in the growth regressions is to investigate the conditional income convergence.

Fourth, the data on EF were constructed by Gwartney and Lawson (2004). This index consists of property rights, assurances of property security, political institutions, social infrastructures, and fiscal structures that affect the individual's choices and economic agents in optimizing their consumption utility and investment incentives.[17] This variable is included to detect its partial effects on economic growth.

We incorporate three interaction terms between FDI and the stock of knowledge accumulation, H*FDI, FDI and financial development, LLGDP*FDI, and FDI and economic freedom, EF*FDI. These interactions are able to better detect their reflections in the joint roles and explain the simultaneous and partial effects on growth process.

The inclusion of public expenditure on both productive and unproductive sectors such as education, subsidies, and national defense, domestic investment (both government and private investment), and government consumption expenditure, which goes directly to unproductive sectors, into the regressions may account for three phenomena.[18] First, the public expenditure may have endogenous growth-enhancing effect and consumption distortions. Second, the crowding-out effects made by foreign capital investment may promote or reduce growth ability. Third, the endogeneity of government investment on human capital accumulation enhances technological progress.

Ⅳ. The Empirical Models

We calculate each country's growth experiences using a five-year average basis. Three major benefits are derived from this method: (i) it avoids short-term cyclical fluctuations; (ii) it minimizes growth distortions since the effects of education, public expenditure, and other explanatory variables on economic growth are not

instantaneous; and (iii) this method deals with the joint endogeneity and reverse causality.[19] Other choices of variables rely on the large strand of literature and the hypotheses that the absorption of FDI relies upon the abilities of host countries, the quality and sufficiency of both local physical and institutional infrastructures, economic freedom, legal systems, the magnitude of international trade, and growth of industrial size that partially reflect technological innovations and productivity growth.

The empirical growth model is developed based on the endogenous growth models introduced by Barro (1991), Romer (1990), Lucas (1988), Alfaro et al (2004), Borensztein et al (1998), and Levine et al (2000). Then the authors analyze the extended empirical models based on the hypothesis that an inexhaustible stock of efficient human capital accrues growth and that FDI accumulates the stock of capital and knowledge spillovers that deepen technological advancements. Growth relies not only on capital investment but also on social and political institutions (Grier and Tullock, 1989). The empirical model of per capita GDP growth rate is given by:

$$\begin{aligned} Growth_i = {} & \alpha_0 + \alpha_i \Sigma Dm_i + \beta_1 FDIGDP_i + \beta_2 LogGDPI_i + \beta_3 H_i + \beta_4 GEGDP_i \\ & + \beta_5 VAIGDP_i + \beta_6 LLGDP_i + \beta_7 DinvGDP_i + \beta_8 GCEGDP_i \\ & + \beta_9 EF_i + \lambda_i \Sigma INTERATIONS_i + \varepsilon_i \end{aligned}$$

where (i) Growth = The five-year average growth rate of real per capita GDP; Subscript i represents each country i among N countries in the sample; (ii) DmDping = Developing countries' dummy; DmDping = 1 if developing countries; 0 otherwise. The benchmark group is OECD, so OECD dummy is dropped; (iii) DmLDCs = LDCs dummy; DmLDCs = 1 if LDCs; 0 otherwise; (iv) DmEA = East Asian dummy; DmEA = 1 if East Asian countries; 0 otherwise; (v) DmSSA = Sub-Saharan dummy; DmSSA = 1 if Sub-Saharan countries; 0 otherwise; The benchmark dummy for Latin America and elsewhere is dropped, and (vi) ε = The stochastic error term.

The empirical model for the determinants of inward FDI is given by:

$$FDI_i = \alpha_i^{'} + \beta_1 TGDP_i + \beta_2 EF_i + \beta_3 VAIGDP_i + \beta_4 DinvGDP_i + \beta_5 GEGDP_i + \beta_6 H + \varepsilon_i^{'}$$

(Notes: The other variables in the two models are presented in Section III)

The growth estimations fall into three stages. First, we test the panel data on all 50 LDCs, developing countries, and OECD countries. Second, we test the panel data on 21 OECD countries. Third, we test the panel data on 29 LDCs and developing countries. These methods allow us to check the validity of (i) the pooling of data in a mixture of countries with regional or group dummies, (ii) the pooling of data of a separate group of countries based on their similar development level (without controlling for the fixed effects), (iii) and the robustness of the empirical macroeconomic variables.[20]

V. Empirical Results and Analysis

For the empirical analysis, the paper estimates the growth regression equations using five-year averages. This paper employs two econometric methods to estimate the two empirical models.[21] First, the White's heteroscedasticity-consistent covariances matrix tests are used for the growth regression models. This method reduces heteroscedasticity among the variables and the heterogeneity in the panel data. Therefore, the relaxation of the problem of heretoscedasticity allows for more accurate estimations of the coefficients in the growth regressions. Second, the Ordinary Least Squares (OLS) is used to explore the determinants of inward FDI.

The estimation results are presented from Table 1 to 4 for the model of per capita GDP growth rate and in Table 5 for the determinants of inward FDI. The main estimation results produced by White's heteroscedasticity-consistent tests indicate a significant contribution of FDI to 5-year-averaged per capita GDP growth rate in the 50 LDCs, developing countries, and OECD countries.[22] FDI, human capital, and financial development are positively growth-correlated. The empirics provide insights into the literature and theory of endogenous growth: FDI, fueled by human capital (H), produces positive effects on long-term economic growth by raising per-worker output productivity, providing more access to new technologies, and increasing the level of capital stock and investment efficiency.

FDI exerts positive externalities on per capita GDP growth rate in both developing (including LDCs) and developed OECD countries. However, the results postulate that FDI plays a more significant role and generates larger positive externalities in countries with adequate human capital, implying that most of the stock of human capital is employed in accord with the right skills and where most of the population has higher and sufficient education. Like Li and Liu (2004), we found that there is a strong positive interaction effect of FDI with human capital.

Human capital and technology-absorptive capabilities are necessary for FDI to positively enhance endogenous growth. Human capital (H), as shown in Table 1, 2, and 3 is essential to adopt technological diffusion and to enhance growth. This result is supported by Barro (1991), Romer (1990), Akinlo (2004), and Borensztein et al (1998). As such, human capital with higher level of education is more efficient in absorbing new know-how, augmenting technological adoption and progress, and fostering growth than human capital with low or very low education attainment {compare Table 3 and 4}. However, Table 4 reveals an ambiguous role of human capital in the least developed and developing countries, where the average years of education ranging from a minimum 1.7 to an approximate maximum 6 years, which are far below the education of the human capital in OECD countries.[23] The interpretation of this relatively insignificant role of human capital in these non-OECD countries may be due to three reasons. First, low educational attainment or insufficient investment in human capital accumulation is an evidence to show that human capital with low level of education is not efficient to attract FDI, to adopt technological spillovers, and thus to generate growth. Second, a portion of human capital stock with higher education graduating from abroad may be seeking jobs in the foreign countries or may not have been provided with a job fit with their skills in their own countries. Third, it may be due to the nature of the data itself, which may not be appropriate for LDCs and developing countries.[24] These observable features of the phenomenon postulate poor institutions, poor social infrastructures, and a weak government with too many restrictive policies. However, the interaction terms between FDI and human capital, (H*FDI), reveal better validity of the stock of human capital (H) in accommodating FDI, adopting new technologies and technical efficiency, new

managerial and organizational skills, and in promoting long-run growth.

The simultaneous implications of human capital and the H*FDI interaction terms into the models also provide the same conclusive result. The interactions between human capital (H) and FDI better interpret the joint role of FDI and human capital (H) in promoting externalities on growth. The interaction term H*FDI enters positively significantly into the growth estimation equations (1.4), (1.6), (1.7), (2.5), (2.6), (2.7), (2.8), (3.4), (4.2), (4.3), and (4.8). H*FDI also enters positively or negatively insignificantly and negatively significantly in the other growth regressions. This phenomenon may be due partly to the problem of multicollinearity between FDI or H and the interaction term H*FDI. When H*FDI is statistically significant but with a negative sign, H*FDI becomes a substitute for either H and/or FDI. The results on the effects of human capital is conclusive and is supportive of Borensztein et al (1998) in that higher productivity of FDI can be achieved if the host economy has a threshold stock of human capital. Our results, together with Borensztein et al (1998) and Durham (2004), indicate that the effect of FDI on growth can be highly recognized if the host country has sufficient absorptive capacities to deal with the new advanced technologies.[25]

Barro (1991) argued that the negative correlation between the initial level of real per capita income and subsequent growth rates could be an evidence of the identification of diminishing returns to capital.[26] Our empirics on the log-level of the initial real per capita GDP are evidently consistent with the aforementioned empirical study, Solow (1956), Barro and Sala-i-Martin (1997), and thus with the theory of conditional convergence {see Table 1 through Table 4}.[27]

As argued by Levine et al (2004), we found that financial development (LLGDP) contributes to economic growth {see Table 1, 2, and 4}. The development of financial system helps mobilize capital resources to productive investment, increases investment efficiency, and endogenizes technological innovations. The interaction FDI*LLGDP in Table 3 supports the significant role of financial development. Economic freedom (EF) is conducive to growth. The negativity of EF*FDI means it is a substitute for EF {Table 4}.

Not only do human capital, economic freedom, and industrial development attract FDI inflows {Table 5}, but these three macroeconomic variables exert potential

positive externalities on technological progress, innovations, and subsequent growth rates {Table 1 through 4}. The evidence shows the existence of complementarity between FDI and domestic investment. However, FDI may crowd out capital-deficient and inefficient domestic investment enterprises whose technological and competitive capacities are far too lower than those of FDI. As such, a large-scale substitutability and crowding-out effects of FDI on domestic investment may be hard to observe directly from the growth regressions. Empirically, domestic investment rate －the breakdown of public and private investment－ is highly positively correlated with growth. The phenomenon of substantial crowding-out effect by FDI on the domestic firms may not be readily observed since the domestic investment includes the lagged FDI, which entered the host economy in the previous years and they are comparatively as efficient as the new FDI.[28]

The effects of FDI on growth rate mostly result from efficiency gains and technological improvements, rather than the overall increase in the magnitude of investment capital stock. Government consumption is negatively correlated with growth in most of the model specifications, since it suggests the transfer of government budget to the unproductive households rather than to reproductive investment. This evidence is supported by Grier and Tullock (1989) and Sala-i-Martin et al (2004). Government expenditure produces a significant negative sign as well. Consistent with Le and Suruga (2005), excessive expenditure reduces the ability to save and invest and thus it reduces growth. As argued by Barro (1991), government expenditure on unproductive sectors such as national defense, wars, and natural disasters reduces the ability to invest in productive sectors. This condition reduces the economic growth.

Table 1 FDI and Per Capita GDP Growth for 50 Countries: Human Capital

Dependent Variable: Average Per Capita GDP Growth (PGDP)								
Estimation Equation	(1.1)	(1.2)	(1.3)	(1.4)	(1.5)	(1.6)	(1.7)	(1.8)
Independent Variables								
Log*(initial GDP)*	-1.0839	-1.1124	-1.4979	-1.7924	-1.7943	-1.9317	-1.8736	-1.9235
	(2.58)***	(2.71)***	(3.23)***	(3.81)***	(3.84)***	(3.97)***	(3.90)***	(3.76)***
FDI/GDP	0.1011	0.0956	(---)	(---)	(---)	0.1163	(---)	0.0979
	(2.05)**	(1.92)**	(---)	(---)	(---)	(1.82)*	(---)	(0.43)
Human Capital *(H)*	0.2239	0.2346	0.2599	0.0438	(---)	0.0899	0.0595	0.0832
	(2.19)**	(2.18)**	(2.05)**	(0.35)	(---)	(0.56)	(0.35)	(0.48)
Government Consumption	-0.0416	-0.0673	-0.0295	-0.0267	-0.0243	-0.0243	-0.0247	-0.0243
(GCGDP)	(3.01)***	(3.06)***	(2.38)**	(1.81)*	(1.76)**	(1.75)*	(1.78)*	(1.75)*
Government Expenditure	-0.0612	-0.0277	-0.0638	-0.0491	-0.0478	-0.0487	-0.0491	-0.0487
(GEGDP)	(2.63)***	(2.23)**	(2.71)***	(2.15)**	(2.05)**	(2.01)**	(2.02)**	(2.00)**
Industry Share/GDP		0.0686	0.0638	0.0846	0.0808	0.0738	0.0799	0.0749
(VAIGDP)		(1.99)**	(1.98)**	(2.62)***	(2.37)**	(2.12)**	(2.34)**	(2.16)**
Liquid Liabilities-M3/GDP			0.0149	(---)	0.0127	0.0122	0.0128	0.0123
(LLGDP)			(2.58)***	(---)	(2.27)**	(2.21)**	(2.34)**	(2.14)**
*H*FDI*			0.0082	0.0162	0.0143	(---)	0.0135	0.0023
			(1.50)	(3.37)***	(2.86)***	(---)	(2.32)**	(0.10)
Developing Countries'				-1.9859	-1.9409	-1.9258	-1.7758	-1.9081
dummy *(DmDping)*				(2.50)**	(2.56)**	(1.98)**	(1.80)*	(1.81)*
LDCs dummy				-3.9406	-3.7575	-3.8327	-3.5425	-3.7992
(DmLDCs)				(2.86)***	(2.78)***	(2.38)**	(2.29)**	(2.25)**
Constant	13.4583	10.5988	13.0582	18.3271	17.7291	18.5968	18.0074	18.5168
	(3.41)***	(2.96)***	(3.28)***	(3.87)***	(3.70)***	(3.85)***	(3.80)***	(3.68)***
Number of Observations	200	200	168	200	168	168	168	168
R-squared	0.1174	0.1447	0.1655	0.1953	0.1973	0.1993	0.1979	0.1994

Notes: The absolute *t*-values in the parentheses are based on the robust standard errors or White's heteroscedasticity-consistent (corrected) standard errors. Asterisk *, **, and *** denotes the significance level at 10%, 5%, and 1%, respectively. The financial ratio *LLGDP* variable is available in 42 countries: 29 LDCs and developing countries and 13 OECD countries. The sign (---) means the variable is excluded from the estimation equation(s) of the growth model specifications.

To achieve rapid growth, a country should encourage the inward FDI and open its economy to international trade. It should foster human capital development and industrial innovations, develop well-established financial system, and greater economic freedom. To do so, the economy will grow and the new technologies will be adopted as fast as the stock of FDI inflows accumulate.

Table 2 FDI and Per Capita GDP Growth for 50 Countries: Domestic Investment and Economic Freedom

Dependent Variable: Average Per Capita GDP Growth (PGDP)								
Estimation Equation	(2.1)	(2.2)	(2.3)	(2.4)	(2.5)	(2.6)	(2.7)	(2.8)
Independent Variables								
Log*(initial GDP)*	-1.6746	-1.5139	-1.8109	-2.4062	-2.3029	-2.3225	-2.1818	-2.1793
	(4.53)***	(3.25)***	(3.58)***	(5.47)***	(5.48)***	(5.19)***	(4.53)***	(4.54)***
FDI/GDP	0.0725	0.0539	0.1465	0.1299	(---)	(---)	(---)	(---)
	(1.67)*	(1.00)	(3.12)***	(2.80)***	(---)	(---)	(---)	(---)
Human Capital *(H)*	1.1937	0.2913	0.0837	0.0837	(---)	-0.2022	-0.2583	-0.2659
	(1.97)**	(2.41)**	(0.71)	(0.74)	(---)	(1.31)	(1.31)	(1.36)
Government	-0.0192	-0.0298	-0.0420	-0.0129	-0.0068	-0.0025	-0.0037	-0.0029
Consumption *(GCGDP)*	(1.68)*	(2.19)**	(2.59)***	(1.15)	(0.57)	(0.21)	(0.30)	(0.24)
Gov't Expenditure	-0.0653	-0.0645	-0.0433	-0.0460	-0.0468	-0.0456	-0.0396	-0.0392
(GEGDP)	(3.26)***	(2.75)***	(1.79)*	(2.17)**	(2.33)**	(2.14)**	(1.79)*	(1.79)*
Domestic Investment	0.1692	(---)	(---)	0.1764	0.1706	0.1486	0.1590	0.1573
(DinvGDP)	(5.97)***	(---)	(---)	(6.80)***	(6.71)***	(5.40)***	(5.29)***	(5.16)***
Industry Share		0.0637			0.0425	0.0774	0.07471	0.07856
(VAIGDP)		(1.85)*			(1.58)	(2.76)***	(2.39)**	(2.37)**
*H*FDI*					0.0154	0.0327	0.0349	0.0387
					(3.73)***	(1.95)*	(1.99)**	(2.06)**
Economic Freedom						0.8984	1.1138	1.1475
(EF) (1 Worst, 10 Best)						(3.51)***	(3.72)***	(3.94)***
*EF*FDI*						-0.2917	-0.0384	-0.0494
						(1.40)	(1.79)*	(1.79)*
Liquid Liabilities-		0.0148					-0.0061	-0.0082
M3/GDP *(LLGDP)*		(2.51)**					(1.08)	(1.40)
*LLGDP*FDI*								0.0009
								(0.69)
Developing Countries'			-1.9875	-1.5930	-1.6581	-1.4431	-1.2782	-1.2994
dummy *(DmDping)*			(2.51)**	(2.14)**	(2.68)***	(1.95)*	(1.35)	(1.36)
LDCs dummy			-3.9259	-4.2268	-4.2793	-4.0151	-3.8230	-3.8332
(DmLDCs)			(2.73)***	(3.41)***	(3.96)***	(3.22)***	(2.58)***	(2.59)***
Constant	14.3202	13.1707	21.7127	21.6258	19.6374	14.6819	12.7276	12.5330
	(4.44)***	(3.30)***	(4.15)***	(4.99)***	(4.57)***	(3.11)***	(2.50)**	(2.49)**
Number of Observations	200	168	200	200	200	200	168	168
R-squared	0.2841	0.1637	0.1648	0.3391	0.3489	0.4007	0.4125	0.4134

Notes: The absolute *t*-values in the parentheses are based on the robust standard errors or White's heteroscedasticity-consistent (corrected) standard errors. Asterisk *, **, and *** denotes the significance level at 10%, 5%, and 1%, respectively. The *(LLGDP)* variable is available in 42 countries: 29 LDCs and developing countries and 13 OECD countries. The sign (---) means the variable is excluded from the estimation equation(s) of the growth model specifications.

To the extent that FDI accumulates capital stock and that financial development (LLGDP) mobilizes capital resources and enhances growth, technology-based industrial development (VAIGDP), fueled by human capital (H) and better-developed institutions or greater economic freedom (EF), boosts industrial innovations via R&D investments. Industrial innovations increase technological

progress associated with FDI and foster GDP growth. Industrial development is associated with both the productivity growth and the growth of the size of economy.

Table 3 FDI and Per Capita GDP Growth in 21 OECD Countries

Dependent Variable: Average Per Capita GDP Growth (PGDP)								
Estimation Equation	(3.1)	(3.2)	(3.3)	(3.4)	(3.5)	(3.6)	(3.7)	(3.8)
Independent Variables								
Log*(initial GDP)*	-3.5251 (4.84)***	-3.7137 (5.28)***	-3.1555 (4.21)***	-2.6773 (3.42)***	-3.2265 (4.25)***	-3.3225 (4.05)***	-3.2339 (4.33)***	-3.8425 (5.16)***
FDI/GDP	0.0997 (2.15)**	0.6255 (2.03)**	0.6086 (2.22)**	(---) (---)	0.5813 (2.01)**	0.9117 (1.74)*	0.9872 (1.98)*	1.0053 (2.00)*
Human Capital *(H)*	0.1409 (1.09)	0.3365 (2.26)**	0.3432 (2.37)**	0.0966 (0.77)	0.3164 (1.84)*	0.4270 (2.00)*	0.4622 (2.34)**	0.2396 (1.03)
Government Consumption *(GCGDP)*	-0.0989 (2.97)***	-0.0974 (3.12)***	-0.0638 (2.01)**	0.008 (0.01)	-0.0505 (2.01)**	-0.1184 (2.18)**	0.0099 (0.16)	0.0223 (0.35)
Government Expenditure *(GEGDP)*	-0.1320 (3.89)***	-0.1323 (4.04)***	-0.1003 (2.86)**	-0.0207 (0.32)	-0.0992 (2.71)***	-0.1318 (2.41)**	0.0449 (0.60)	0.0865 (1.08)
*H*FDI*		-0.0557 (1.85)*	-0.0529 (1.96)*	0.0140 (2.93)***	-0.0505 (1.80)*	-0.0759 (1.64)	-0.7247 (1.67)	-0.0723 (1.64)
Industry Share/GDP *(VAIGDP)*			0.0736 (2.11)**	0.0775 (2.00)**	0.0732 (2.07)**	0.0118 (0.30)	-0.0359 (0.89)	-0.0285 (0.75)
Liquid Liabilities-M3/GDP *(LLGDP)*						-0.0053 (0.80)	-0.0056 (0.80)	-0.0053 (0.78)
*LLGDP*FDI*						-0.0015 (1.78)*	-0.0021 (2.26)**	-0.0025 (2.62)**
Domestic Investment *(DinvGDP)*				0.1138 (1.47)			0.2642 (3.17)***	0.2754 (3.40)***
Economic Freedom *(EF)* (1 Worst, 10 Best)					0.0851 (0.31)			0.6866 (2.06)**
Constant	42.7494 (5.68)***	42.7634 (5.99)***	32.3094 (3.88)***	21.9211 (2.03)**	32.7261 (3.92)***	39.4359 (4.57)***	23.0364 (2.40)**	24.6079 (2.59)**
Number of Observations	84	84	84	84	84	52	52	52
R-squared	0.4063	0.4327	0.4556	0.4455	0.4563	0.5150	0.6421	0.6679

Notes: The absolute *t*-values in the parentheses are based on robust standard errors or White's heteroscedasticity-consistent (corrected) standard errors. Asterisk *, **, and *** denotes the significance level at 10%, 5%, and 1%, respectively. The value of *H*FDI* is positively significant at 1% significance level (coefficient = 0.0140 and *t*-statistics = 2.93) when adding domestic investment *(DinvGDP)* and excluding *FDI* in equation (3.4). From model specifications of equations (3.6) to (3.8), the data on liquid liabilities in terms of M3 over aggregate real GDP *(LLGDP)* is available in 13 out of 21 OECD countries in the sample. The sign (---) means the variable is excluded from the estimation models.

There is a crowding-in effect of FDI: FDI complements domestic investment. However, the crowding-out effect of FDI on DinvGDP exists only when certain DinvGDP is constrained with its market potential, capital, and technology. Table 3 and Table 4 show that FDI are more efficient than the domestic investment since the FDI coefficients are greater than those of DinvGDP. Conversely, Table

2 seems to indicate the opposite result. Overall, FDI complements but may not crowd out or substitute DinvGDP substantially.

Table 4 FDI and Per Capita GDP Growth in 29 Least Developed and Developing Countries

Dependent Variable: Average Per Capita GDP Growth (PGDP)								
Estimation Equation	(4.1)	(4.2)	(4.3)	(4.4)	(4.5)	(4.6)	(4.7)	(4.8)
Independent Variables								
Log*(initial GDP)*	-1.5268	-1.4809	-1.6261	-1.5189	-1.7762	-2.9609	-3.3307	-3.0259
	(2.90)***	(2.97)***	(3.16)***	(3.03)***	(3.77)***	(4.84)***	(5.09)***	(5.11)***
FDI/GDP	0.0846	-0.4497	-0.4046	0.2242	0.1921	-0.1969	-0.2806	0.5806
	(1.07)	(1.80)*	(1.66)*	(2.50)**	(2.26)**	(0.94)	(1.38)	(1.23)
Human Capital *(H)*	0.2086	-0.0165	0.0030	-0.0324	0.0420	0.0524	-0.1107	-0.3012
	(1.03)	(0.07)	(0.01)	(0.15)	(0.20)	(0.20)	(0.41)	(1.25)
Government Consumption *(GCGDP)*	-0.0339	(---)	-0.0209	-0.0113	-0.0152	-0.0118	-0.0053	-0.0040
	(2.42)**	(---)	(1.72)*	(0.78)	(1.02)	(0.89)	(0.43)	(0.33)
Gov't Expenditure *(GEGDP)*	-0.0592	-0.0663	-0.0650	-0.0024	-0.0177	-0.0698	-0.0702	-0.0655
	(1.94)*	(2.39)**	(2.29)**	(0.08)	(0.61)	(2.34)**	(2.56)**	(2.53)**
*H*FDI*	(---)	0.0894	0.0811	(---)	(---)	0.0639	0.0390	0.1129
	(---)	(2.17)**	(2.02)**	(---)	(---)	(1.48)	(1.03)	(1.99)**
Liquid Liabilities-M3/GDP *(LLGDP)*	0.0321	0.0323	0.0311	(---)	0.0161	0.0279	0.0145	-0.0051
	(3.21)***	(3.40)***	(3.30)***	(---)	(1.41)	(2.13)**	(1.17)	(0.36)
Industry Share *(VAIGDP)*		0.0909	0.7445			0.0437	0.1269	0.1087
		(2.13)**	(1.70)*			(1.00)	(2.93)***	(2.75)***
Domestic Investment *(DinvGDP)*						0.1950	0.1669	0.1859
						(4.70)***	(4.25)***	(4.75)***
*LLGDP*FDI*						-0.0019	-0.0013	0.0064
						(0.91)	(0.13)	(1.70)*
Economic Freedom *(EF)* (1 Worst, 10 Best)							1.3529	1.8384
							(3.90)***	(5.07)***
*EF*FDI*								-0.2578
								(2.01)**
East Asian dummy *(DmEA)*				1.9297	1.3761	1.0312	-2.0986	-2.2221
				(2.78)***	(1.67)*	(1.04)	(2.41)**	(2.62)***
Sub-Saharan African dummy *(DmSSA)*				-3.1661	-2.9847	-3.1679	-3.5788	-3.6789
				(3.41)***	(3.09)***	(4.03)***	(4.61)***	(4.75)***
Constant	14.9516	10.6274	13.7189	14.968	20.2832	22.5869	17.4131	14.0749
	(3.12)***	(2.86)***	(3.13)***	(3.84)***	(3.96)***	(5.14)***	(3.38)***	(2.96)***
Number of Observations	116	116	116	116	116	116	116	116
R-squared	0.1840	0.2082	0.2178	0.2688	0.3933	0.4036	0.4865	0.5100

Note: The absolute *t*-values in the parentheses are based on robust standard errors or White's heteroscedasticity-consistent (corrected) standard errors. Asterisk *, **, and *** denotes the significance level at 10%, 5%, and 1%, respectively. Latin America, South Asia, and the Middle East (countries in the sample) are treated as a benchmark; therefore, their dummy is dropped. The sign (---) means the variable is excluded from the estimation equation(s) of the growth model specifications.

The OLS results in Table 5 postulate that technology-based industrial development, economic freedom, trade openness, human capital, and the policies that

accommodate these mechanisms are a prominent catalyst that determines the volume and types of inward FDI, that hosts and benefits from FDI, and that ultimately speeds up long-term growth.[29] The domestic investment rate and public expenditure are negatively correlated to FDI inflows. To attract FDI inflows, the policy implications are straightforward. The least developed countries and the developing countries, which are heavily dependent on foreign capital investments and new foreign technologies, should develop the capacities of their human capital. Furthermore, they should open their economies to international trade and capital flows, bolster greater economic freedom, strengthen absorptive capacities, and foster industrial development.[30] The accelerated investment rate and the magnitude of the benefits from FDI plus these augmented absorptive capacities provide access to technological advancements and thus accumulate long-term per capita growth.[31]

Table 5 Determinants of FDI Inflows to 50 LDCs, Developing, and OECD Countries

Dependent Variable: FDI (FDIGDP)				
Estimation Equation *Independent Variables*	(5.1)	(5.2)	(5.3)	(5.4)
Trade Openness *(TGDP)*	0.03409 (6.31)***	0.03673 (6.73)***	0.04281 (7.46)***	0.05044 (7.85)***
Economic Freedom *(EF)* (1 Worst, 10 Best)	1.31787 (6.54)***	1.16073 (6.87)***	1.34501 (5.44)***	0.77573 (2.33)**
Industry Size *(VAIGDP)*	0.05373 (1.56)	0.09021 (2.42)**	0.09834 (2.68)***	0.08605 (2.35)**
Domestic Investment *(DinvGDP)*		-0.0916 (2.36)**	-0.11423 (2.95)***	-0.14113 (3.55)**
Government Share *(GEGDP)*			-0.07999 (2.95)***	-0.07481 (2.79)***
Human Capital *(H)*				0.36044 (2.51)**
Constant	-8.65806 (5.08)***	-10.0629 (5.63)***	-7.29667 (2.95)***	-5.79743 (2.83)***
Number of Observations	200	200	200	200
Adj. R-squared	0.3979	0.4116	0.4339	0.4489

Notes: The absolute *t*-values in the parentheses are based on standard errors, rather than robust standard errors. Asterisk *, **, and *** denotes the significance level at 10%, 5%, and 1%, respectively. Overall investment rate is included to test whether it has a positive or negative influence on the decisions and attractiveness of new investments.

Ⅵ. Summary and Conclusions

This article investigates the endogenous growth effects of and the dynamic gains from FDI, fueled by human capital and financial development, with simultaneous implications of domestic investment, endogenous industrialization, and economic freedom. Then, the authors explore the determinants of FDI inflows to absorb an adequate stock of capital investment and to boost long-term per capita growth.

The results from the three panel data produced by White's heteroscedasticity tests lend support for and shed lights on the theory and models of endogenous growth. The findings indicate a significant and robust endogenous correlation between FDI, human capital, and the growth rate. FDI, human capital (H), financial development (LLGDP), and economic freedom bear on an essential role in exerting positive externalities on long-term per capita growth. FDI transfers new technologies to low-tech host countries. FDI is more effective in countries with sufficient absorptive capacities, which means countries with adequate stock of human capital or sufficient investment in human capital accumulation, thus OECD rather than LDCs and developing economies, experience higher growth rate, faster technological diffusion and progress, and greater investment efficiency. Therefore, FDI tends to contributes more to growth when the host country strengthens its human capital. Furthermore, greater economic freedom, R&D-based industrial innovations, and financial market deepening are positively growth-associated.

To sum up, absorptive capacities, financial development (LLGDP), industrial development (VAIGDP), and higher degree of economic freedom (EF) are a major engine of growth. Financial development (LLGDP) plays a fundamental role in channeling domestic and foreign capital resources to productive investments, which helps reduce private domestic credits constraints and contributes to rate of technological diffusion. Human capital is essential to absorb technological spillovers and to produce faster technological progress and positive externalities associated with FDI in the economies with higher absorptive capacities or in countries endowed with better-developed human.

Our findings on convergence are consistent with the conditional convergence

theory: the initial per capita GDP is negatively correlated with subsequent growth rates. Government consumption (GCEGDP) and government expenditure (GEGDP) on unproductive sectors reduce growth pace.[32] Public investment, decomposed out of gross domestic investment, DinvGDP, in infrastructures and human capital development increases the overall investment share, speed up development process, thus produce direct and indirect effects on technological progress and economic growth.

While international trade openness, economic freedom, industrial development, and human capital are positively correlated with FDI inflows, domestic investment rate and government expenditure are negatively associated with FDI inflows. Therefore, to attract FDI to bolster economic growth, a host country should develop the domestic human capital, improve the overall economic freedom, open its trade, and foster its industrial development, while controlling the level effects of government expenditure.

Appendices

Appendix A: Economic Freedom Index

The five major categories calculated into economic freedom index:

(i) Size of Government: Expenditures, Taxes, and Enterprises
(ii) Legal Structure and Security of Property Rights
(iii) Access to Sound Money
(iv) Freedom to Trade Internationally
(v) Regulation of Credit, Labor, and Business

Appendix B: List of the Countries in Regressions

The countries in the sample are classified into three main categories according to their development levels.[33]

(*1*) ***Least Developed Countries:*** Bangladesh, Lesotho, Republic of Congo, and Togo.
(*2*) ***Developing Countries:*** Argentina, Bolivia, Brazil, Chile, China, Colombia,

Costa Rica, Dominican Republic, Ecuador, Egypt, India, Indonesia, Jordan, Kenya, Malaysia, Mexico, Pakistan, Paraguay, Peru, the Philippines, Singapore, Thailand, Tunisia, Uruguay, and Venezuela.

(*3*) ***OECD Countries:*** Austria, Australia, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, South Korea, Netherlands, New Zealand, Norway, Spain, Sweden, Switzerland, United Kingdom, and the Unites States.

Appendix C: **Descriptive Statistics for 50 Countries over Two Decades 1981-2000**

Variable	Obs	Mean	Std. Dev.	Min	Max
Per Capita GDP (PGDP)	200	1.897575	2.529517	-5.548	9.566
FDIGDP	200	3.301051	4.149263	0.00104	22.2622
Human Capital (H)	200	6.603035	2.664807	1.77	12.22
Government Consumption (GCEGDP)	200	66.37161	13.47532	36.774	151.016
Government Expenditure (GEGDP)	200	16.56728	9.701200	4.5680	53.2480
Domestic Investment (DinvGDP)	200	19.18146	7.812686	4.5420	49.9460
Liquid Liabilities-M3 (LLGDP)	168	55.59829	35.35063	14.0420	189.176
Industry Share (VAIGDP)	200	32.64635	6.725133	13.2620	57.5240
Economic Freedom (EF)	200	6.168200	1.225561	3.22	9.92
Trade Share (TGDP)	200	60.88910	45.73206	9.48	331.11

Notes

1. This is part of the paper's hypothesis that FDI, human capital, and financial development exert substantial positive externalities on long-run growth. Domestic investment or investment rate and economic freedom (*EF*) are tested simultaneously with government consumption (*GCEGDP*) and expenditure (*GEGDP*).
2. Durham (2004) claimed that absorptive capacities, Hall and Jones (1999) and Dollar and Kraay (2003): institutions, Gwartney and Lawson (2004), and references therein: economic freedom, are a necessity.
3. See Romer (1990), Barro (1991), and Barro and Sala-i-Martin (1997). Internationally-sought technological progress is the outcome of the accumulation of *the stock of new knowledge and know-how* by human capital employed in the R&D sector. The authors argue that FDI boosts economic growth via the arrival of new technologies, new managerial skills, and new technical ideas.
4. Capital accumulation is commonly considered to have a short-term effect on growth, while R&D

or technological accumulation is considered to exert a long-term effect on growth.

5. The authors extend these models with implications of such other growth determinants as government expenditure, domestic investment, economic freedom, and technology-based industrial development.
6. Romer (1993) studied the idea gaps and the object gaps in economic development and claimed that poor (developing) countries or countries that face technological constraints to produce economic values suffer from idea gaps and maybe object gaps. This paper argues that since the sole objective in economic growth is long-term per capita GDP growth, which can be sustained in cumulative growth paths, technological progress, capital resource mobilization and accumulation, and absorptive capacities are a precondition.
7. This outweighs foreign borrowings in that the former gains technological externalities, new ideas spillovers, and diffusion while benefiting from more required capital stock and increased production efficiency, simultaneously.
8. Short-term growth impacts resulting from these mechanisms suggest permanent changes in the economy's income level. Among the determinants of long-run growth, human capital, R&D, and capital investment lead to technological progress, raise the growth rate, and improve citizens' living standard.
9. Romer (1990) and Grossman and Helpman (1994) stated that technological progress results from competition among firms in the industry that have incentives to generate innovations.
10. The hypothesis and theory advanced by Jagdish Bhagwati (1978) is that the volume and efficacy of inward FDI is driven by whether a country adopts export-promoting (EP) or import-substituting (IS) policy {cited in Balasubramanyam et al, 1996}.
11. Many studies focused on the role of education as a potential driver for long-term growth. Most of which have confirmed the dynamic contribution of human capital in generating positive externalities and in raising real per capita income growth (see Barro, 1991; Romer, 1990; Lucas, 1988).
12. They specified the relationship between FDI, economic freedom, primary and secondary enrolment, public consumption, and growth.
13. This paper, however, hypothesizes that capital accumulation under well-developed financial markets and free capital mobility (domestic credits and foreign capital inflows) will rival out private domestic credits distortions, increases savings, channels capital resources to productive investment, and thus increases overall financial resources and investment rate. This process will in turn be interpreted in long-term growth.
14. This implies that economies with lower initial level of capital per worker, in the balanced growth path, have less capital per worker and thus higher rates of return to capital. Neoclassical models deal with cross-country income convergence better than new growth models. The accumulation of capital and scientific knowledge has both level effects and growth effects.
15. Human capital H in all the regressions is a stock of skilled labor with education. This implication is due to the fact that only human capital with skills and education is supposed to adopt new technologies.
16. See Grossman and Helpman (1991), "Innovation and Growth in the Global Economy," Chapter 1, pp.6-21. See also Grossman and Helpman (1994), "Endogenous Innovation in the Theory of

Growth," *Journal of Economic Perspective*.

17. Consult the Appendix A for the details of the components which are taken into account for this institutional economic freedom index by the Fraser Institute.
18. A negative effect caused by taxation, inflation of investment prices on growth, and public consumption expenditure, reduces the capacity to invest and lowers per capita growth {see, for instance, Barro, 1991; Barro and Sala-i-Martin, 1997; Sala-i-Martin *et al,* 2004}. These implications allow for a rich insight into the government mechanisms in controlling the level effects of government financing on long-run growth and to accommodate a policy for efficient allocations of economic resources.
19. Grier and Tullock (1989), Beck *et al* (2000), and others use five-year averages on all variables over the period of their studies. Grier Tullock (1989) listed the benefits of using the 5-year averages of all variables, which are summarized in this paper.
20. This method takes special advantages since it detects the robustness of each variable, especially how each of such variables as foreign direct investment, human capital, financial development, industrial innovation and development, and economic freedom (or institutions) actually plays a role in affecting long-term economic growth when it is used in different sets of data pooling of the countries in observations.
21. The model includes the interaction terms between FDI and financial development, (*LLGDP*FDI*), and FDI and economic freedom, (*EF*FDI*). In Table 4, the regional dummies- East Asian dummy (*DmEA*) and Sub-Saharan African dummy (*DmSSA*) are incorporated to detect the countries' specific fixed effects.
22. Low-income, middle-income, and high-income countries, classified by World Bank 2005, have similar characteristics of the least developed, developing, and developed OECD countries, classified by the UN.
23. An interpretation could be that more unskilled labor than skilled labor prevails in low-income or developing economies.
24. The data on human capital, proxied by the average years of secondary education for people aged 25 and over, may be much higher than the education levels attained in LDCs and most developing nations. Sala-i-Martin *et al* (2004) found primary education to be highly correlated with growth. Therefore, primary educational attainment or average years of education for those aged 15 or over may be an appropriate variable for these countries. Yet, it is left to be empirically tested.
25. Strong institution, which means higher economic freedom or better-developed social infrastructures plus favorable government policies, is also implied in this interpretation.
26. Barro (1991) notes that new growth theory has less to deal with conditional convergence than neoclassical theory since the former is less efficient in terms of convergence prediction than the latter.
27. This evidence is consistent with and supportive of the conditional convergence theory since the logarithms of the initial per capita GDP are negatively correlated with subsequent economic growth rates and since they enter highly significantly in all growth regressions of the model specifications.
28. From Summers and Heston (2002) and as noted by Barro (1991) and Borensztein *et al* (1998),

domestic investment rate includes both pure public investment and private (both domestic and foreign) investment. Economic integration and open trade policy accommodate the accelerated economic activities and output growth. Public and private domestic investments are also an important, indispensable source of growth.

29. LDCs and developing economies are constrained with capital, crippled with technological constraint, and faced with a large overall investment gap.
30. This implies a strong legal system, a protection of property rights, and an environment where economies trade freely, less bureaucracy, and overall good governance {see Gwartney and Lawson, 2004}.
31. Li and Liu (2004) found similar conclusion. Likewise, industrial growth can be explained as growth in market size and/or level of economic development.
32. Grossman and Helpman (1991) argued that countries with high shares of government consumption in GDP have grown on average more slowly than others.
33. This classification is according to the United Nations, UNDP: Human Development Report 2004.

References

Akinlo E. A., (2004), "Foreign Direct Investment and Growth in Nigeria: An Empirical Investigation," *Journal of Policy Modeling,* 26(5), pp.627-639.

Alfaro, Laura, et al, (2004), "FDI and Economic Growth: The Role of Financial Markets," *Journal of International Economics,* 64, pp.89-112.

Balasubramanyam, V. N., M. Salisu, and David Sapsford, (1996), "Foreign Direct Investment and Economic Growth in EP and IS Countries," *Economic Journal,* 106(434), pp.92-105.

Barro, Robert J., (1991), "Economic Growth in a Cross Section of Countries," *Quarterly Journal of Economics,* 106(2), pp.407-443.

Barro, Robert J. and Xavier Sala-i-Martin, (1997), "Technological Diffusion, Convergence, and Growth," *Journal of Economic Growth,* 2(1), pp.1-27.

Beck Thorsten, Levine R., and Loayza N., (2000), "Finance and Sources of Growth," *Journal of Financial Economics,* 58, pp.261-300.

Bengao, Marta, and Blanca Sanchez-Robles, (2003), "Foreign Direct Investment, Economic Freedom and Economic Growth: New Evidence from Latin America," *European Journal of Political Economy,* 19, pp.519-545.

Benhabib, Jess and Mark M. Spiegel, (2000), "The Role of Financial Development in Growth and Investment," *Journal of Economic Growth,* 5, pp.341-360.

Borensztein E., J. De Gregorio, and Jong-Wha Lee, (1998), "How Does Foreign Direct Investment Affect Economic Growth?" *Journal of International Economics,* 45, pp.115-135.

De Gregorio, Jose and Pablo Guidotti, (1995), "Financial Development and Economic Growth," *World Development,* 23(3), pp.433-448.

De Haan, J. and Jan-Egbert Sturm, (2000), "On the Relationship between Economic Freedom and Economic Growth," *European Journal of Political Economy,* 16, pp.215-246.

De Long, J. Bradford and Lawrence H. Summers, (1991), "Equipment Investment and Economic

Growth," *Quarterly Journal of Economics,* 106(2), pp.445-502.

De Mello, L.R., Jr., (1999), "Foreign Direct Investment-Led Growth: Evidence from Time Series and Panel Data," *Oxford Economic Papers,* 51, pp.133-151.

Dollar, David and Aart Kraay, (2003), "Institutions, Trade, and Growth," *Journal of Monetary Economics,* 50(1), pp.133-162.

Durham, J. B., (2004), "Absorptive Capacity and the Effects of Foreign Direct Investment and Equity Foreign Portfolio Investment on Economic Growth," *European Economic Review,* 48, pp.285-306.

Findlay, Ronald, (1978), "Relative Backwardness, Direct Foreign Investment, and the Transfer of Technology: A Simple Dynamic Model," *Quarterly Journal of Economics,* 92(1), pp.1-16.

Galor, Oded and Daniel Tsiddon, (1997), "The Distribution of Human Capital and Economic Growth," *Journal of Economic Growth,* 2(1), pp.93-124.

Glaeser, Edward and Rafael La Porta, et al (2004), "Do Institutions Cause Growth," *Journal of Economic Growth,* 9, pp.271-303.

Greenwood, J. and Boyan Jovanovic, (1990), "Financial Development, Growth, and Distribution of Income," *Journal of Political Economy,* 98(5), pp.1076-1107.

Grier, Kevin B. and Gordon Tullock, (1989), "An Empirical Analysis of Cross-National Economic Growth, 1951-1980," *Journal of Monetary Economics,* 24, pp.259-276.

Grossman, Gene M., and Elhanan Helpman, (1991), *Innovation and Growth in the Global Economy,* Cambridge, Massachusetts: MIT Press.

Grossman, Gene M., and Elhanan Helpman, (1994), "Endogenous Innovation in the Theory of Growth," *Journal of Economic Perspectives,* 8(1), pp.23-44.

Guiso, Luigi, Paola Sapienza, and Luigi Zingales, (2004), "Does Local Financial Development Matter," *Quarterly Journal of Economics,* 119(3), pp.929-969.

Gwartney, James D. and Robert Lawson, (2004), *Economic Freedom of the World: 2004 Annual Report,* the Fraser Institute.

Hall, Robert E., and Charles I. Jones, (1999), "Why Do Some Countries Produce So Much More Output per Worker Than Others?" *Quarterly Journal of Economics,* 114(1), pp.83-116.

Hermes, Niels and Robert Lensink, (2003), "Foreign Direct Investment, Financial Development and Economic Growth," *Journal of Development Studies,* 40(1), pp.142-163.

Howitt, Peter and Philippe Aghion, (1998), "Capital Accumulation and Innovation as Complementary Factors in Long-Run Growth," *Journal of Economic Growth,* 3(2), pp.111-130.

Hsiao, Cheng and Yan Shen, (2003), "Foreign Direct Investment and Economic Growth: The Importance of Institutions and Urbanization," *Economic Development and Cultural Change,* 51(4), pp.883-897.

Khawar, Mariam, (2005), "Foreign Direct Investment and Economic Growth: A Cross-Country Analysis," *Global Economy Journal,* 5(1), Article 8.

King, Robert J. and Ross Levine, (1993), "Finance and Growth: Schumpeter Might Be Right," *Quarterly Journal of Economics,* 108(3), pp.717-737.

Le, Vu M. and Terukazu Suruga, (2005), "Foreign Direct Investment, Public Expenditure, and Economic Growth," *Applied Economics Letters,* 12, pp.45-49.

Levine, R. and David Renelt, (1992), "Sensitivity Analysis of Cross-Country Growth Regressions,"

American Economic Review, 82(4), pp.942-963.

Levine, R., Norman Loayza, and Thorsten Beck, (2000), "Financial Intermediation and Growth: Causality and Causes," *Journal of Monetary Economics,* 46(1), pp.31-77.

Li, Xiaoying and Xiaming Liu, (2004), "Foreign Direct Investment and Economic Growth: An Increasing Endogenous Relationship," *World Development,* 33(3), pp.393-407.

Rebelo, Sergio, (1991), "Long-Run Policy Analysis and Long-Run Growth," *Journal of Political Economy,* 99(3), pp.500-521.

Romer, Paul, (1990),"Endogenous Technological Change," *Journal of Political Economy,* 98(5), pp.S71-102.

Romer, Paul, (1993), "Idea Gaps and Object Gaps in Economic Development," *Journal of Monetary Economics,* 32(3), pp.543-573.

Sala-i-Martin, X, Gernot Doppelhofer, and Ronald I. Miller, (2004), "Determinants of Long-Term Growth: A Bayesian Averaging of Classical Estimates (BACE) Approach," *American Economic Review,* 94(4), pp.813-835.

Solow, Robert M., (1956), "A Contribution to the Theory of Economic Growth," *Quarterly Journal of Economics,* 70(1), pp.65-94.