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The Nexus between FDI and Growth in the SAARC Member Countries

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This paper examines the effects of foreign direct investment (FDI) on South Asian economies' output growth, utilizing recent panel cointegration testing and estimation techniques. Annual panel data on eight SAARC (South Asian Association for Regional Cooperation) member countries' macroeconomic variables over the period 1960- 2013 are employed in empirical analysis. Using various heterogeneous panel cointegration and panel causality tests, a bi-directional relationship between FDI and growth is found. We find evidence for both FDI-led growth and growth-induced FDI hypotheses for the South Asian economies over the sample period. Individual member countries exhibit heterogeneity in terms of the direction or existence of causality subject to their idiosyncratic economic conditions. Among various regressors, FDI, financial development, human capital, and government consumption show the most significant positive effects on output growth. As determinants of FDI, GDP, financial development, human capital, and government consumption are found significant in the region. The bi-directional causality between FDI and growth is found robust to the inclusion of other control variables and using different estimation techniques.

Keywords: FDI, Growth, Heterogenity, Panel Cointegration and Causality, SAARC
JEL Classification: F2, F4, O2, O4, O5

I. INTRODUCTION

Research investigating the relationship between foreign direct investment (FDI) and economic growth has been increasing along with rising international investment in emerging economies. Most such studies are based on the neoclassical FDI-led

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growth hypothesis, arguing that increased FDI generates output growth through improving multifactor productivity or production efficiency (Borensztein et al., 1998; De Mello, 1997; Kotrajaras et al., 2011). However, some researchers contend that output growth induces FDI inflows - a reverse causality - as in Moudatsou and Kyrkilis (2011) among others. On the opposite side of the debate, there are some studies which conclude that FDI has no impact on long run economic growth such as Carkovic and Levine (2002), Herzer et al. (2008), and Iwasaki and Tokunaga (2014). This controversy is not yet settled and raises important policy implications that the FDI-led growth hypothesis suggests investment liberalization policies or export-promotion industrialization strategies for developing countries. In contrast, the reverse causation or noneffectiveness results substantially weaken the persuasiveness of such development policies pursued by low and middle-income countries.

This paper is motivated by the following facts. First, despite much research, we do not yet fully know the direction of causality between FDI and growth, i.e. whether FDI causes growth or vice versa or if bi-directional causality exists. Second, the effects of various country or regional characteristics on the FDI-growth nexus have not been fully investigated in the literature so far. Third, the results of research on the above two facts can furnish vital policy implications for growth strategies and investment policies of developing countries, which currently make up more than 80% of the world population based on recent World Bank and OECD data.

The objective of this paper is to provide conclusive evidence on the validity of the FDI-led growth hypothesis and its alternatives, and to extract FDI and growth policy implications for developing countries. The empirical analysis of this study exploits annual panel data on eight SAARC (South Asian Association for Regional Cooperation) member countries' macroeconomic variables. The annual panel data are extracted from the *World Development Indicators (WDI) 2014* of the World Bank and the sample period runs from 1960 to 2013.

The SAARC (South Asian Association for Regional Cooperation) is an international organization consisting of eight South Asian countries. It was founded by seven states - Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, and Sri Lanka - in December 1985 and Afghanistan joined SAARC as its eighth member in April 2007. The SAARC's Secretariat is located in Kathmandu, Nepal. The SAARC's areas of cooperation cover agriculture and rural, biotechnology, culture, economic and trade, education, energy, environment, finance, information, communication and media, poverty alleviation, science and technology, security aspects, social development, etc. The SAARC's policies aim at accelerating economic growth and stimulating socio-cultural development in the South Asian region. The SAARC's combined nominal GDP was estimated at $2.4 trillion with GNI per capita of $1,482 and the population of 1.69 billion in 2013 (World Bank, 2014). Although the SAARC's per capita income is very low, its total nominal GDP is 7th in the world. India, also a member of BRICS, is the largest economy in the SAARC region and ranks 10th in nominal GDP and one of the fastest growing economies in the world. The SAARC's large population (24% of the world) and abundant natural resources indicate a high potential for rapid growth like China. The SAARC established the South Asian Free Trade Area (SAFTA) on 1 January 2006. The SAARC's ultimate objective is to gradually evolve into a customs union, common market, and economic union like the EU.

One reason for the selection of the SAARC sample is the fact that empirical studies on the nexus between FDI and growth in this region have been relatively scarce compared to other more developed regions of the world. A second reason is that studying the relationship between FDI and growth in one of the least-developed regions in the world could provide valuable insights for FDI and growth policies of developing countries in general. A third reason is that recent World Bank statistics on GDP growth and FDI inflows into the SAARC region seem to suggest a potential significant role of FDI for stimulating growth in the region. This warrants a further study on the possible causal link between FDI and growth in the region. A fourth reason is that there have been few studies conducted on the causal relationship between FDI and growth in SAARC nations. However, the causality issue has not been settled conclusively.

For instance, Srinivasan (2011) explores the determinants of FDI in selected SAARC countries for the period 1970-2007 employing traditional fixed effects and random effects models. His empirical results indicate that the market size, GDP per capita, trade openness, infrastructure, inflation, degree of risk and uncertainty are the most significant factors in determining FDI in the region. He also finds that other variables such as human capital, degree of industrialization, real exchange rate, domestic investment, and terms of trade are insignificant in attracting FDI in the region. He employs traditional fixed and random effects models for estimation, and does not use panel cointegration methodology. Basnet and Pradhan (2014) examine the influence of FDI on growth in five SAARC member countries - Bangladesh, India, Nepal, Pakistan, and Sri Lanka. Using time series data from 1990 to 2010, an error correction model is estimated in which growth of real GDP depends on FDI, investment, openness, tax policy, and inflation. Their empirical results indicate that, unlike investment and openness to trade, FDI has not played a significant role in promoting economic growth in these countries. They conclude that the effectiveness of FDI may depend in part on the size of the inflows, as well as the level of economic development. Their sample period is relatively short and they do not utilize the panel data set and panel estimation techniques, just conducting time series analysis.

Table 1 reports nominal GDP and GNI per capita levels and real GDP growth rates for the 8 SAARC member countries from 2006 to 2013. India's nominal GDP in 2013 was 1.9 trillion dollars, ranking 10th in the world and the largest in the SAARC region. The second and third largest economies were Pakistan and Bangladesh, respectively. In terms of GNI per capita, Maldives was the richest, Sri Lanka and Bhutan were second and third, and Nepal was the poorest country.

Table 1. GDP levels and growth rates for SAARC economies (2006-2013)

(%, $)

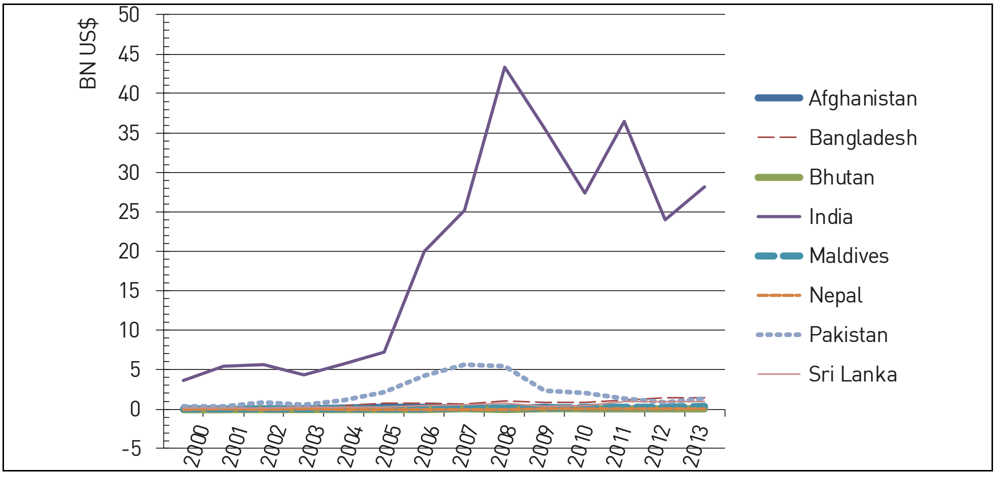
Year	2006	2007	2008	2009	2010	2011	2012	2013	2013 Nominal GDP(B$)	2013 GNI per capita ($)
Afghanistan	5.6	13.7	3.6	21.0	8.4	6.1	14.4	4.2	20.3	690
Bangladesh	6.6	6.4	6.2	5.7	6.1	6.7	6.2	6.0	150.0	1,010
Bhutan	6.8	17.9	4.8	6.7	11.7	8.6	4.6	5.0	1.8	2,330
India	9.3	9.8	3.9	8.5	10.3	6.6	4.7	5.0	1,876.8	1,570
Maldives	19.6	10.6	12.2	-3.6	7.1	6.5	1.3	3.7	2.3	5,600
Nepal	3.4	3.4	6.1	4.5	4.8	3.4	4.9	3.8	19.3	730
Pakistan	6.2	4.8	1.7	2.8	1.6	2.8	4.0	6.1	232.3	1,360
Sri Lanka	7.7	6.8	6.0	3.5	8.0	8.3	6.3	7.3	67.2	3,170

Source: *World Development Indicators 2014*, World Bank, 2014.

Note: B$ denotes billion US dollars. Real GDP is in constant 2005 US dollars, and nominal GDP and GNI per capita are in current US dollars.

Figure 1 displays trends of FDI net inflows (in current US dollars) for SAARC countries over the period 2000-2013. The figure shows general upward trends of FDI inflows into the region until 2007. FDI net inflows reached peaks in 2007 just before the global financial crisis as in other emerging regions and are proportional to the size of the economy (GDP), indicating the largest FDI amount for India among the members.

Figure 1. FDI net inflows for SAARC countries (2000-2013)



Source: *World Development Indicators 2014*, World Bank, 2014.
Note: FDI net inflows are in current billion US dollars.

This paper explores the nexus between FDI and growth in the SAARC region, using recent panel cointegration testing and estimation techniques. This paper improves upon the above studies by utilizing more expanded panel data and panel cointegration techniques as compared to time series data and traditional fixed and random effects models used in the previous research. Various panel unit root tests are conducted to demonstrate that the data variables are integrated processes with unit roots. A cointegration relationship, i.e. a long-run equilibrium relationship among the variables in the regression equation, is found by various heterogeneous panel cointegration tests. Two distinct panel cointegration estimation techniques, dynamic OLS (DOLS) and fully-modified OLS (FMOLS), are employed to estimate the regression equation for heterogeneous nonstationary panels. Moreover, panel Granger causality tests are conducted to determine the direction of causation between output and FDI.

The contributions of this paper are as follows. First, this study finds a two-way cointegration and causality between FDI and output growth, based on various panel cointegration and panel Granger causality tests. Second, this study greatly improves the credibility of estimation and inference in regression analyses by employing various recent panel cointegration testing and estimation techniques in contrast with traditional fixed- and random-effects panel estimations used in previous research. Third, this paper expands the boundaries of empirical analysis on the nexus between FDI and economic development by focusing on SAARC emerging economies, which have been relatively ignored in empirical research.

The major findings of this paper are as follows. First, through various types of heterogeneous panel cointegration tests, we find evidence for both the FDI-led growth and growth-induced FDI hypotheses in the SAARC region. Second, panel and individual time-series Granger causality tests present strong evidence for a two-way causality running from FDI to GDP and vice versa in the sample. For the SAARC region as a whole, there are bi-directional causal relationships, while individual member countries exhibit heterogeneity in terms of the direction or existence of causality subject to their idiosyncratic economic conditions. Third, from the results of panel cointegration estimation, we find that FDI, financial development, human capital, government consumption, and trade openness levels have significant positive effects on GDP growth of the SAARC region.

This paper is organized as follows. Section 2 presents a literature survey and the controversy surrounding opposing theories in existing studies. In section 3, the hypotheses and regression models for empirical analysis are specified and panel unit root and cointegration testing and estimation techniques for econometric analyses are explained. Section 4 provides data descriptions and empirical results. In section 5, the findings are recapitulated and the contributions of this paper are presented.

II. LITERATURE AND CONTROVERSY

There has been much controversy over the FDI (foreign direct investment)-led growth hypothesis in the literature, based on the mixed and sometimes opposite results (e.g. growth-induced FDI) obtained from empirical studies. To assess the validity of such opposing views, we briefly summarize the papers exploring the FDI-growth nexus as follows.

First, on the positive side of the controversy, we have arguments as follows. Babatunde (2011) explores the relationship between trade openness, infrastructure, FDI and economic growth using a panel of 42 sub-Saharan Africa (SSA) countries over the period 1980-2003. His results show that FDI depends on trade openness and GDP per capita, and the interaction between trade openness and infrastructure leads to a slight increase in FDI inflows, and FDI has a positive and significant effect on growth. Bhavan et al. (2011) investigate the determinants and growth effect of FDI in four South Asian countries over the period of 1995-2008, using panel data and the Arellano-Bond dynamic panel system method of moment estimator. Their results suggest that FDI in South Asian countries is significantly and positively associated with growth rate.

Chee and Nair (2010) analyze the relationship between FDI, financial sector development and economic growth in 44 Asia and Oceania countries for the period 1996-2005, using panel data methods. Their analysis shows that financial sector development enhances the contribution of FDI on economic growth and the complementary role of FDI and financial sector development on economic growth is most important for least developed economies in the region. Chen and Zulkifli (2012) explore the association between outward FDI and economic growth for Malaysia over the 1980-2010 period. Their results from a vector error-correction model (VECM) reveal that there exists a positive long-run relationship between outward FDI and growth as well as long-run bi-directional causation between them. Hong (2014) evaluates the effect of FDI on economic growth in China for the 1994-2010 period using dynamic panel data from 254 prefecture-level cities. He finds that FDI exerts positive impact on economic development, and economies of scale, human capital, infrastructure, wage levels, and regional differences interact actively with FDI and promote economic growth.

Irsova and Havranek (2013) meta-analyze horizontal productivity spillovers from FDI to domestic firms. Their results suggest that horizontal spillovers are on average zero, and foreign investors who form joint ventures with domestic firms than fully foreign-owned projects and who come from countries with a modest technology edge create the largest spillover benefits for the domestic economy. Kotrajaras et al. (2011) examine the impacts of FDI in groups of 15 East Asian countries using panel data analysis with cointegration methods for the 1990-2009 period. Their results show that favorable impacts of FDI on the countries depend on complementary factors, such as levels of financial market development, institutional development, better governance, and appropriate macroeconomic policies.

Second, on the negative side of the debate, we may note the following studies. Applying ARDL cointegration methods for Tunisia from 1970 to 2008, Belloumi (2014) finds that there is no significant Granger causality from FDI to economic growth and from economic growth to FDI in the short run. His empirical results for Tunisia fail to confirm the common belief that FDI can produce positive spillover externalities for the host economy. Carkovic and Levine (2002) estimate the effects of FDI on growth after controlling for the potential biases caused by country-specific effects, endogeneity, and the omission of some regressors, and conclude that FDI has no impact on long run economic growth. Herzer et al. (2008) re-examine the FDI-led growth hypothesis for 28 developing countries using cointegration techniques on a country-by-country basis. They find that there is not a single country with a positive unidirectional long-term effect from FDI to GDP. Their results also indicate that there is no clear association between the growth impact of FDI and the levels of per capita income, education, openness, and financial market development in developing countries.

Iwasaki and Tokunaga (2014) conduct a meta-analysis of the literature examining the impact of FDI on economic growth in Central and Eastern Europe and the former Soviet Union. They find that the relevant studies fail to present genuine evidence of a non-zero FDI effect. Lian and Ma (2013) analyze the causal relationship between FDI and economic growth in the western region of China, employing time-series data and cointegration and error-correction techniques for the period 1986-2010. Their results suggest that inward FDI flow does not lead to Granger-cause economic growth, and economic growth also does not exert significant impacts on FDI inflows.

Yalta (2013) investigates the causal relationship between FDI and GDP in China for the 1982-2008 period, employing simulation based inference. His maximum entropy bootstrap based approach shows that a statistically significant relationship between FDI and GDP growth does not exist, indicating that FDI does not necessarily lead to higher economic growth at the aggregate level. He also explores whether this result is driven by the level of financial development and finds that there is no evidence of a change in the noncausal relationship due to this effect.

Third, there are some studies that report mixed results on the FDI-led growth hypothesis. Azman-Saini et al. (2010) use a threshold regression model and find new evidence that the positive impact of FDI on growth kicks in only after financial market development exceeds a threshold level, and until then, the benefit of FDI is non-existent. Beugelsdijk et al. (2008) estimate the growth effects of vertical (efficiency seeking) and horizontal (market seeking) FDI activity of the U.S. into 44 host countries over the 1983-2003 period. They find that horizontal and vertical FDI have positive and significant growth effects in developed countries with a superior growth effect of horizontal over vertical FDI. Yet, no significant effects of horizontal or vertical FDI were found in developing countries. Moudatsou and Kyrkilis (2011) attempt to determine the causal-order between inward FDI and economic growth using panel data on EU and ASEAN countries over the period 1970-2003. They find that the results support the hypothesis of GDP-FDI causality (growth driven FDI) in the EU panel and in Singapore and the Philippines, while there is a two-way causality between GDP and FDI in Indonesia and Thailand.

III. MODEL AND ECONOMETRIC FRAMEWORK

1. Hypotheses and Model Specification

Some theoretical foundations are needed on the relationship between FDI (foreign direct investment) and output growth in an econometric model specification for empirical analysis. First, advocates of the FDI-led growth hypothesis claim as follows. FDI inflows facilitate the incorporation of advanced new technologies in the host country's production function through improving total factor productivity or productive efficiency as argued in Borensztein et al. (1998). A rise in FDI promotes long run economic growth of the host economy through capital accumulation, knowledge transfers in terms of labor training and skill acquisition (human capital augmentation), adoption of advanced new technologies, and productivity improvement as in De Mello (1997). Yao and Wei (2007) emphasize the dual role of FDI as a mover of production efficiency and a shifter of the host country's production frontier.

Moudatsou and Kyrkilis (2011) provide detailed explanations on the mechanism that FDI can have positive impact of economic growth, using Dunning (1993)'s eclectic model relying on OLI (ownership specific, internalization and location) advantages and the investment development path (IDP) framework based on Rostow (1959)'s model of economic growth in four stages. They emphasize the superiority of positive spillover externalities of FDI in stimulating technology transfer and economic growth over domestic investment and other forms of international production such as exports.

In contrast, supporters of the growth-induced (-driven) FDI or reverse causality argue that GDP growth may attract more FDI inflows of foreign investors seeking higher investment returns on their capital. Foreign investors can extract more profits from their FDI through economies of scale effects, arising from the expanded market size and purchasing power due to higher GDP in the host economy. These arguments are closely related to location advantages of the eclectic model as in Dunning (1993), Narula (1996), Narula and Dunning (2000, 2010) and Moudatsou and Kyrkilis (2011).

Last, a bi-directional or feedback relationship between FDI and output growth could exist. That is, FDI can increase GDP growth through improving productive efficiency and in turn higher GDP may attract more FDI of foreign investors seeking higher profits and returns in an expanded market. Specialized investments in export sectors, scale economies, productivity improvement, cost reduction, knowledge and technology transfers, and better management systems from FDI contribute to output growth, and in turn output growth leads to more FDI inflows by increasing profits and returns of foreign investors through market expansion, creating an interactive mechanism (Al-Iriani and Al-Shamsi, 2007; Basu et al., 2003; Hansen and Rand, 2004).

This paper attempts to investigate the validity of the following hypotheses based on the theoretical arguments presented above.

Hypothesis 1: FDI has significant positive effects on output growth. This is called the conventional FDI-led growth hypothesis.

In order to test this hypothesis, we need to estimate a regression equation with real output as the dependent variable, and FDI and other control variables as explanatory variables. We perform panel unit root tests for the existence of integrated processes and panel cointegration tests for long-run equilibrium relations between the integrated processes, prior to any possible panel cointegration estimation. We also need panel Granger causality tests to determine the direction of causation between FDI and output.

Hypothesis 2: Output growth may have significant positive effects on FDI inflows. This could be called the growth-induced (-driven) FDI hypothesis.

That is, there could be a reverse causation running from output to FDI. To test this hypothesis, estimating a regression equation with FDI as the dependent variable, and real output and other control variables as regressors is required.

Hypothesis 3: There could be a bi-directional or feedback relationship between FDI and growth.

This is a third possibility and testing this hypothesis will involve comparing the estimation results of the two regression equations with either output or FDI as the dependent variable. Furthermore, panel Granger causality tests are also required to determine the direction of causation between FDI and growth.

Considering the above hypotheses, the generalized form of the regression equation for empirical analysis can be specified as follows:

$$y = f(FDI, Controls_1, \varepsilon). \tag{1}$$

$$FDI = g(y, Controls_2, \eta), \tag{2}$$

where y = real GDP, FDI = foreign direct investment, Controls = control variables = other variables that influence output or FDI, and ε and η = error terms. The above two regression equations take into account the possibilities of uni- and bi-directional causation between FDI and output growth as stated in the hypotheses above. In this study, both individual time-series and panel Granger causality tests are employed to find causal relationships between FDI and output growth.

Following endogenous growth models in which FDI affects output growth through improving total factor productivity (Kotrajaras, et al., 2011; Zhang, 2003), we may specify total factor productivity as a function of FDI in the aggregate production function.

$$Y_{it} = A_{it} \cdot L_{it}^{\alpha} \cdot K_{it}^{\beta}, \tag{3}$$

$$A_{it} = B \cdot FDI_{it}^{\gamma}, \ i = 1, \cdots, n; \ t = 1, \cdots, T, \tag{4}$$

where Y_{it} denotes output of country i at time t, A_{it} is total factor productivity (TFP) or the technology level, L_{it} is labor, K_{it} is capital stock, B is a constant term, FDI_{it} is foreign direct investment, α, β, and γ stand for input shares of output.

Substitution of A_{it} (TFP) into the production function (3) and taking natural logarithms gives us a basic simple regression equation as follows.

$$ln(Y_{it}) = c + \alpha\, ln(L_{it}) + \beta\, ln(K_{it}) + \gamma\, ln(FDI_{it}) + e_{it}, \tag{5}$$

where c and e_{it} signify a constant term and the error term, respectively. Equations (3)-(5) above are based on the assumption that FDI can enhance TFP and output growth through technology transfer and spillover effects as in Wei and Liu (2001) and Bende-Nabende et al. (2001).

Many researchers (Kose et al., 2009; Edwards, 1998; Yanikkaya, 2003; Roy and Berg, 2006) have found that the impact of FDI on output growth largely depends on the host country's economic infrastructure or threshold conditions such as financial market development, human capital or educational attainment, better governance or macro policy, and trade openness. All the threshold conditions above are expected to exert positive complementary effects on economic growth by increasing total factor productivity (TFP). Thus, we may augment the aggregate production function by including financial development, human capital, and trade openness variables in TFP as follows.

$$Y_{it} = A_{it} \cdot L_{it}^{\beta_1} \cdot K_{it}^{\beta_2}, \quad (6)$$

$$A_{it} = B \cdot FDI_{it}^{\beta_3} \cdot HK_{it}^{\beta_4} \cdot FD_{it}^{\beta_5} \cdot TRAD_{it}^{\beta_6}, \quad (7)$$

where HK, FD, and TRAD stand for human capital, financial development, and trade openness, respectively.

Based on the theories and variable selection of the existing literature elaborated above, this paper employs the following regression equations as applied to heterogeneous panel data. Substitution of the augmented TFP function (7) into the production function (6) and taking logs yields the extended version of the panel regression equation as follows.

$$\begin{aligned} ln(Y_{it}) = \beta_{0i} + \beta_1\, ln(L_{it}) + \beta_2\, ln(K_{it}) + \beta_3\, ln(FDI_{it}) \\ +\beta_4\, ln(HK_{it}) + \beta_5\, ln(FD_{it}) + \beta_6\, ln(TRAD_{it}) + \varepsilon_{it}, \end{aligned} \quad (8)$$

$$\begin{aligned} ln(Y_{it}) = \beta_{0i} + \beta_1\, ln(L_{it}) + \beta_2\, ln(K_{it}) + \beta_3\, ln(FDI_{it}) + \beta_4\, ln(HK_{it}) \\ +\beta_5\, ln(FD_{it}) + \beta_6\, ln(TRAD_{it}) + \beta_7\, ln(GFC_{it}) + \beta_8 INF_{it} + \varepsilon_{it}, \end{aligned} \quad (9)$$

where country i = 1,⋯,N, time t = 1,⋯,T, Y = real GDP, L = the labor force; K = gross capital formation/GDP; FDI = foreign direct investment/GDP, HK = human capital or educational attainment, FD = financial market development measure, TRAD = trade/GDP, GFC = government final consumption/GDP, INF = consumer price inflation, ε = disturbance term. β_{0i} captures fixed or individual specific effects of cross section members in heterogeneous panels. Our empirical analysis using panel data is based on the simple basic regression equation (5) and the augmented or generalized version in equation (9) with some additional control variables such as government expenditure and inflation added to equation (8). The size of the public sector such as the government expenditure/GDP ratio is often used to represent governance or public sector efficiency, and inflation rates are also commonly used as a proxy measuring the effectiveness of macroeconomic policy in the growth literature (Aghion and Durlauf, 2005). Expansionary fiscal and monetary policies can both accelerate inflation through increasing aggregate demand as stated in macroeconomics textbooks. Relying on seigniorage to finance government budget deficits which results in high inflation has been the major cause of creating financial crisis, severe recession, and national default in many developing countries as in Latin American countries such as Argentina, Brazil, and Mexico. The theoretically expected signs of coefficients β_j 's on the explanatory variables are all positive except for the inflation rate. The negative relationship between output and inflation has been extensively documented in the growth literature (Aghion and Durlauf, 2005).

This paper employs two different techniques to estimate the panel cointegration regression model established above, namely, DOLS (dynamic OLS) as in Saikkonen (1992) and Kao and Chiang (2000), and FMOLS (fully-modified OLS) of Kao and Chiang (2000), and Pedroni (2004).

2. Panel Cointegration Tests and Estimation

The cointegration methodology as applied to time series data was first introduced in the 1980s by Engle and Granger (1987), Johansen (1988, 1991, 1992), Johansen and Juselius (1990, 1992), and others. By the early 1990s, cointegration techniques had been extended to apply to panel data. There has been much research on panel cointegration since the late 1990s. Excellent surveys on nonstationary panels, panel cointegration, and dynamic panels are presented in Baltagi (2008: Ch. 12), Baltagi and Kao (2000), and Banerjee (1999), among others.

A panel unit root and cointegration approach has many benefits compared to a conventional time series approach. First, by pooling time series and cross sections, the finite sample power of a test is significantly improved. Conventional unit root tests, such as the augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests, are widely reported to have low power performance when the time-series sample size is small. Levin, Lin, and Chu (2002) and Im, Pesaran, and Shin (2003), among others, demonstrate that the power of unit root tests using panel data is substantially improved over univariate testing procedures. Mark and Sul (2001), and Pedroni (1999, 2004) also report power improvement with the panel cointegration approach. Second, pooling time series and cross sections (using panel data) may provide more useful information on the nature of the economic system of equations for a group of countries or institutions, than individually analyzing a single equation for each country or institution.

Panel unit root tests can be categorized into tests assuming a common unit root process across cross sections and those positing individual unit root processes. Levin, Lin, and Chu (LLC, 2002), Breitung (2000), Hadri (2000), and Harris and Tzavalis (1999) all postulate that there is a common unit root process across cross sections. Im, Pesaran, and Shin (IPS, 2003), Choi (2001), Maddala and Wu (MW, 1999) propose panel unit root tests that allow for individual unit root processes, so that the persistence parameter (autocorrelation coefficient) may vary across cross sections. Among these, only Hadri (2000)'s panel unit root test has the null hypothesis of no unit root, similar to the single series unit root test of Kwiatkowski, Phillips, Schmidt, and Shin (KPSS, 1992). All other panel unit root tests have the null of unit roots. All the researchers above corroborate the fact that panel unit root tests have greater power than conventional single-series unit root tests by Monte Carlo simulations.

Kao (1999), McCoskey and Kao (1998), and Pedroni (1999, 2004) have proposed panel cointegration tests. Kao (1999) presents residual-based tests for cointegration regression in panel data. He constructs Dickey-Fuller (DF) and augmented Dickey-Fuller (ADF) tests for the null of no cointegration. McCoskey and Kao (1998) propose a residual-based Lagrange multiplier (LM) test for the null of cointegration in panel data. They find that the empirical sizes of the LM-FM (Lagrange multiplier-fully modified OLS) and LM-DOLS (LM-dynamic OLS) are close to the true size even in small samples. Pedroni (1999, 2004) examines the properties of residual-based tests for the null of no cointegration for dynamic panels in which both the short-run dynamics and the long-run slope coefficients are permitted to be heterogeneous across individual members of the panel. He considers both pooled within dimension tests and the group mean between dimension tests. He shows that the limiting distributions of the tests are normal and free of nuisance parameters. He derives seven test statistics for the null of no cointegration in heterogeneous panels with multiple regressors.

In the presence of panel unit roots, estimating the regression equation by panel cointegration techniques such as DOLS (dynamic OLS), and FMOLS (fully-modified OLS), based on panel cointegration tests, is required. Pesaran, Shin, and Smith (1999) show that the traditional procedures for estimation of pooled models such as the fixed effects, instrumental variables or the Generalized Method of Moments (GMM) estimators can produce inconsistent, and potentially very misleading estimates of the long-run coefficients in dynamic heterogeneous panel data models. Kao and Chiang (2000) study the asymptotic distributions for ordinary least squares (OLS), fully-modified OLS (FMOLS), and dynamic OLS (DOLS) estimators in cointegrated regression models of panel data. Their Monte Carlo simulation results show that the OLS estimator has a non-negligible bias in finite samples, the FMOLS estimator does not improve over the OLS estimator in general, and the DOLS outperforms both the OLS and FMOLS estimators. Pedroni (2000, 2004) also presents independently estimation methods of the panel cointegration model using FMOLS.

In this paper, we estimate the panel regression model on the FDI-output nexus, utilizing DOLS (dynamic OLS), and FMOLS (fully-modified OLS) techniques, after properly considering the panel unit root test results on the data variables. Due to space limitations, technical details of specific panel cointegration tests and estimation procedures have been omitted from the paper. Readers may refer to the papers summarized above for technical details.

IV. EMPIRICAL ANALYSIS

1. Data

Empirical analysis of this paper uses annual panel data from 1960 to 2013 on eight SAARC (South Asian Association for Regional Cooperation) countries' macroeconomic variables. The eight SAARC nations are Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, and Sri Lanka. The annual panel data on the SAARC countries' macroeconomic variables are extracted from the World Bank's *World Development Indicators (WDI) 2014*.

In the regression equation, real GDP (RGDP) is used as the dependent variable, and the labor force (L), the domestic investment share (INV), foreign direct investment (FDI), human capital such as public spending on education (PSE), government expenditure (GFC), financial development measures such as M2 and domestic credit (DC), inflation (INF), and trade openness (TRAD) are exploited as explanatory variables. Real GDP (RGDP) is GDP in constant 2005 US dollars. Labor (L) is the total labor force in thousands of persons. The labor force comprises people at ages 15 and older who meet the International Labour Organization definition of the economically active population.

The domestic investment share (INV) is gross capital formation (% of GDP). FDI is foreign direct investment, net inflows (% of GDP). For human capital or educational attainment, proxies such as public spending on education (PSE: % of GDP) and SES (school enrollment ratio, secondary: % gross) are utilized. Control variables include the relative size of the public sector such as general government final consumption expenditure (GFC: % of GDP), inflation in consumer prices (annual %), and trade openness (trade/GDP). Human capital or educational attainment measures above are extracted from Barro and Lee (2013) and the World Bank (2014). Frankel and Romer (1999) also use the trade share of GDP as a measure of openness and find a robust positive relationship between openness (the trade share) and income levels. By utilizing economic data series from the same source, *World Development Indicators (WDI)* of the World Bank, comparability of the data across different countries is secured.

Table 2. Descriptions for the variables used in regressions

Series Name	Definition	Description
RGDP	Real GDP	GDP in constant 2005 US$
L	Labor force	Labor force, total
INV	Investment ratio	Gross capital formation (% of GDP)
FDI	Foreign direct investment	Foreign direct investment, net inflows (% of GDP)
DC	Domestic credit	Domestic credit to private sector (% of GDP)
M2	Money and quasi money (M2)	Money and quasi money (M2) as % of GDP
PSE	Public spending on education	Public spending on education, total (% of GDP)
SES	School enrollment, secondary	School enrollment, secondary (% gross)
GFC	Government final consumption	General government final consumption expenditure (% of GDP)
INF	Inflation rate	Inflation, consumer prices (annual %)
TRAD	Trade ratio	Trade (=exports+imports) (% of GDP)

Source: *World Development Indicators* 2014, World Bank, 2014.

Table 3. Summary statistics for the variables used in regressions

Series Name	Mean	Median	Maximum	Minimum	Std. Dev.	No. of Obs.
RGDP	9.05e+10	1.58e+10	1.46e+12	1.34e+08	2.16e+11	329
L	68,418,608	8,755,249	4.84e+08	57,271	1.34e+08	184
INV	22.14	19.83	69.27	4.70	10.66	336
FDI	1.03	0.46	14.14	6.01	1.97	282
DC	19.79	18.97	69.33	1.05	13.58	350
M2	35.88	34.80	85.58	5.41	16.14	350
PSE	2.89	2.57	7.65	0.94	1.36	135
SES	35.37	33.38	99.34	1.96	20.73	230
GFC	11.08	10.44	23.73	3.16	4.32	310
INF	7.96	7.59	30.55	-18.11	5.39	285
TRAD	54.99	36.87	375.38	7.53	51.61	356

Source: *World Development Indicators* 2014, World Bank, 2014.
Note: Sample period is from 1960 to 2013. Std. Dev.=standard deviation, No. of Obs.=number of observations, RGDP=real GDP, L=labor force, INV=gross capital formation (% of GDP), FDI=foreign direct investment (% of GDP), DC=domestic credit (% of GDP), M2=M2 (% of GDP), PSE=public spending on education (% of GDP), SES=school enrollment, secondary (%), GFC=government final consumption (% of GDP), INF=inflation rate (%), and TRAD=exports and imports (% of GDP).

For instance, employing GDP in constant 2005 US dollars as Real GDP (RGDP) instead of GDP in local currency guarantees the comparability of GDP data among the SAARC member nations.

Table 2 presents definitions and descriptions for the variables used in regressions and Table 3 provides summary statistics of the variables.

2. Empirical Results

This section reports the results of panel unit root tests on the data variables, panel cointegration tests, and panel cointegration estimation.

Table 4 displays the results of five distinct panel unit root tests: Levin, Lin, and Chu (LLC: 2002)'s t*, Breitung (2000)'s t, Hadri (2000)'s Z, Im, Pesaran, and Shin (IPS: 2003)'s W, and Maddala and Wu (1999)'s ADF-Fisher χ^2 statistics on the level variables in the regression equation. Among these, LLC, Breitung, and Hadri's tests are based on the common unit root process assumption that the autocorrelation coefficients of the tested variables across cross sections are identical. However, IPS and ADF-Fisher χ^2 tests rely on the individual unit root process assumption that the autocorrelation coefficients vary across cross sections.

All the other 4 panel unit root tests except for Hadri (2000)'s have the null hypothesis of unit roots, while Hadri's test posits the null of no unit roots (stationarity).

Table 4. Panel unit root tests for the variables used in regressions (1960-2013)

	Tests Assuming a Common Unit Root Process			Tests Assuming Individual Unit Root Processes	
Series Name	LLC t*-stat.: H_0: Unit root	Breitung t-stat.: H_0: Unit root	Hadri Z-stat.: H_0: No unit root	IPS W-stat.: H_0: Unit root	ADF-Fisher χ^2-stat.: H_0: Unit root
RGDP	31.05 (1.00)	16.18 (1.00)	13.36 (0.00**)	29.98 (1.00)	0.45 (1.00)
L	3.61 (1.00)	-0.11 (0.46)	9.63 (0.00**)	6.12 (1.00)	2.72 (1.00)
INV	8.68 (1.00)	8.15 (1.00)	9.92 (0.00**)	7.99 (1.00)	0.92 (1.00)
FDI	6.97 (1.00)	6.08 (1.00)	6.91 (0.00**)	5.06 (1.00)	5.61 (0.99)
DC	2.34 (0.99)	4.03 (1.00)	10.64 (0.00**)	2.33 (0.99)	13.82 (0.61)
M2	3.09 (1.00)	2.87 (1.00)	12.07 (0.00**)	4.08 (1.00)	10.39 (0.85)
PSE	-0.57 (0.28)	1.14 (0.87)	4.34 (0.00**)	1.48 (0.93)	7.75 (0.96)
SES	8.83 (1.00)	-0.72 (0.24)	10.22 (0.00**)	9.92 (1.00)	0.76 (1.00)
GFC	0.04 (0.52)	-0.72 (0.23)	2.61 (0.00**)	-0.39 (0.35)	18.24 (0.31)
INF	9.73 (1.00)	-1.40 (0.08)	3.24 (0.00**)	-0.71 (0.24)	11.79 (0.46)
TRAD	1.40 (0.92)	2.14 (0.98)	4.37 (0.00**)	0.51 (0.70)	23.21 (0.11)

Note: Stat.=statistic, RGDP=real GDP, L=labor force, INV=gross capital formation (% of GDP), FDI=foreign direct investment (% of GDP), DC=domestic credit (% of GDP), M2=M2 (% of GDP), PSE=public spending on education (% of GDP), SES=school enrollment, secondary (%), GFC=government final consumption (% of GDP), INF=inflation rate (%), and TRAD=exports and imports (% of GDP). Numbers in parentheses denote marginal significance levels (p-values). ** and * denote significance at the 1% and 5% levels, respectively. All other 4 panel unit root tests above except for Hadri (2000)'s have the null hypothesis (H_0) of unit roots (nonstationarity), while Hadri's test posits the null of no unit root (stationarity).

For the core variables in the aggregate production function and the regression equation, real GDP (RGDP), labor (L), domestic investment (INV), foreign direct investment (FDI), financial development (DC, M2), and human capital (PSE, SES), the null of panel unit roots cannot be rejected by LLC, Breitung, IPS, and ADF-Fisher tests and the null of no unit roots is rejected by Hadri's test at conventional significance levels. The null hypothesis of panel unit roots is also not rejected at conventional significance levels for the control variables, government expenditure (GFC), consumer price inflation (INF), and trade openness (TRAD). Thus, we may conclude that panel unit roots exist at level in all the core and control variables of the panel regression equation, considering the various panel unit root test results in Table 4.

Since we found the existence of unit roots in the variables of the regression equation, panel cointegration tests should be conducted to examine whether there is a cointegration (long-term equilibrium) relationship between the dependent variable (RGDP) and foreign direct investment (FDI), the core explanatory variable of the regression equation. Table 5 reports the results of diverse panel cointegration tests. We perform the heterogeneous panel cointegration tests of Pedroni (1999, 2004), which allow for heterogeneous cointegration vectors and dynamic errors, and the residual-based ADF panel cointegration test of Kao (1999). The null hypothesis of all the tests is no cointegration. Pedroni (1999)'s 7 heterogeneous panel cointegration test statistics are all standardized and follow the standard normal distribution asymptotically.

Table 5. Panel cointegration tests using real GDP and FDI (1960-2013)

Panel coint. tests	Dep. var. of coint. reg.	
Pedroni: (H_0: No coint.)	RGDP(real GDP)	FDI(foreign direct investment)
Panel γ (nu)	3.02 (0.00**)	6.00 (0.01**)
Panel ρ (rho)	-3.10 (0.00**)	-5.03 (0.00**)
Panel PP	-2.12 (0.01**)	-3.89 (0.00**)
Panel ADF	-1.99 (0.02*)	-2.69 (0.00**)
Group ρ (rho)	-0.004 (0.50)	-1.97 (0.02*)
Group PP	-0.44 (0.33)	-5.13 (0.00**)
Group ADF	2.38 (0.99)	-3.80 (0.00**)
Kao (H_0: No coint.): ADF t	-3.46 (0.00**)	-3.13 (0.00**)

Note: Dep.var. of coint.reg.=dependent variable of the cointegrating regression. H_0=null hypothesis, coint.= cointegration. Numbers in parentheses denote marginal significance levels (p-values). ** and * denote significance at the 1% and 5% levels, respectively.

In 5 and 8 out of 8 panel cointegration test statistics of Table 5, respectively, from the cointegrating regressions with real GDP or FDI as the dependent variable, the null of no cointegration between real GDP and FDI can be rejected at conventional significance levels. This implies that there is evidence for cointegration between real GDP and FDI. By comparing the two columns in Table 5, we find that there is significant evidence for a bi-directional cointegration running from FDI to real GDP, and from real GDP to FDI, where the latter seems a little stronger.

The evidence for cointegration between real GDP and FDI does not necessarily imply the causality between real GDP and FDI. Thus, we need the results of Granger causality tests to verify causal relationships.

Table 6 provides the results of individual time series and panel Granger causality tests for the eight SAARC countries. From the individual time series Granger causality tests in Table 6, we see that Pakistan shows a strong two-way causality between real GDP and FDI. On the other hand, Afghanistan, Bangladesh, Bhutan, India, and Sri Lanka display a one-way causality from real GDP to FDI, while Maldives and Nepal do not reveal any causality at conventional significance levels. The panel Granger causality tests also show that there are bi-directional causal relationships between real GDP and FDI in the SAARC region as a whole. Thus, for the SAARC region as a whole, there are bi-directional causal relationships, while individual member countries exhibit heterogeneity in terms of the direction or existence of causality subject to their idiosyncratic economic conditions.

Table 6. Granger causality tests for individual countries and the panel (1960-2013)

	The Null Hypothesis of Granger Causality Tests	
Country	H_0: FDI does not Granger cause GDP growth	H_0: GDP growth does not Granger cause FDI
Afghanistan	0.30 (0.75)	11.04 (0.01**)
Bangladesh	1.09 (0.35)	3.98 (0.03*)
Bhutan	2.09 (0.17)	5.07 (0.03*)
India	0.62 (0.54)	9.41 (0.00**)
Maldives	0.14 (0.87)	0.46 (0.65)
Nepal	0.04 (0.96)	1.70 (0.20)
Pakistan	5.36 (0.01**)	17.09 (0.00**)
Sri Lanka	0.76 (0.47)	15.25 (0.00**)
Panel Granger Causality Test (F)	4.81 (0.01**)	64.09 (0.00**)

Note: H_0=null hypothesis. F-test statistics are provided. Numbers in parentheses denote marginal significance levels (p-values). ** and * denote significance at the 1% and 5% levels, respectively.

Since we discovered the existence of bi-directional cointegration (long-run equilibrium) and causality relationships among the core variables in the regression equation, we need to perform panel cointegration estimation using appropriate techniques. Tables 7-8 present the results of panel cointegration estimation of the regression equation employing 2 distinct techniques, namely, DOLS (Dynamic OLS) and FMOLS (Fully-Modified OLS). In Table 7, the estimation results of a simple regression equation with the core explanatory variables, labor (L), domestic investment (INV), foreign direct investment (FDI), and financial development measures (M2 and DC) are presented. We see that FDI and both financial development proxies (M2 and DC) have significant positive effects on real GDP.

Table 7. Panel cointegration estimation of the regression equation using financial development proxies M2 and DC (1960-2013)

Dep.var.: RGDP , FD: M2			Dep.var.: RGDP , FD: DC		
Regressor	DOLS	FMOLS	Regressor	DOLS	FMOLS
L	1.21 (0.00**)	1.39 (0.00**)	L	1.45 (0.00**)	1.43 (0.00**)
INV	0.33 (0.01**)	0.10 (0.01**)	INV	1.17 (0.00**)	0.13 (0.00**)
FDI	8.74 (0.03*)	1.27 (0.00**)	FDI	1.08 (0.08)	1.32 (0.00**)
M2	0.43 (0.00**)	0.35 (0.00**)	DC	0.28 (0.00**)	0.17 (0.00**)
R^2	0.99	0.99	R^2	0.99	0.99
Adjusted R^2	0.99	0.99	Adjusted R^2	0.99	0.99
S.E. of reg.	0.05	0.11	S.E. of reg.	0.05	0.11

Note: Dep.var.=dependent variable, FD=financial development, DOLS=dynamic OLS, and FMOLS=fully-modified OLS. RGDP=real GDP, L=labor force, INV=gross capital formation (% of GDP), FDI=foreign direct investment (% of GDP), DC=domestic credit (% of GDP), M2=M2 (% of GDP), S.E.=standard error, and reg.=regression. Numbers in parentheses denote marginal significance levels (p-values). ** and * denote significance at the 1% and 5% levels, respectively. Numbers in the Table are organized in the order of coef(prob)=coefficient estimate(p-value). The standard errors used in the calculations of the t-statistics in all the Tables are panel heteroskedasticity consistent standard errors of the White (1980) type.

In Table 8, the estimation results of an extended regression equation with additional control variables, human capital (PSE), government expenditure (GFC), inflation (INF), and trade openness (TRAD) are presented. We find that FDI and financial development measures still exhibit significant positive effects. Most control variables - human capital, government consumption, and trade openness - also display significant positive effects, while the impact of inflation on growth seems to be relatively weak. From Tables 7-8, we may conclude that FDI, financial development, human capital, government expenditure, and trade openness have played significant positive roles in the economic growth of the SAARC countries, while inflation has made relatively weaker impact on output growth in the area.

In Table 9, the results of panel cointegration estimation with lagged inputs for the bi- directional causality hypothesis are reported. This modification is to account for the possible flow-stock relationship between Y, L, and K in the aggregate production function (3). That is the possibility of lagged inputs – L_{t-1} and K_{t-1}– contributing to current output, Y_t. The estimation results considering the flow-stock relationship in Table 9 are generally consistent with those in Table 8.

Table 8. Panel cointegration estimation of the regression equation using other control variables (1960-2013)

Dep.var.: RGDP , FD: M2			Dep.var.: RGDP , FD: DC		
Regressor	DOLS	FMOLS	Regressor	DOLS	FMOLS
L	1.49 (0.00**)	1.23 (0.00**)	L	1.04 (0.00**)	0.92 (0.00**)
INV	0.26 (0.01**)	0.06 (0.05*)	INV	0.33 (0.00**)	0.33 (0.00**)
FDI	1.06 (0.00**)	1.18 (0.00**)	FDI	4.52 (0.05*)	5.10 (0.00**)
M2	0.26 (0.01**)	0.28 (0.00**)	DC	0.07 (0.15)	0.05 (0.05*)
PSE	0.39 (0.00**)	0.07 (0.01**)	PSE	0.32 (0.00**)	0.08 (0.00**)
GFC	0.50 (0.00**)	0.09 (0.01**)	GFC	0.24 (0.01**)	0.01 (0.79)
INF	-0.002 (0.36)	-0.002 (0.03*)	INF	-0.001 (0.72)	-0.001 (0.21)
TRAD	0.03 (0.75)	0.15 (0.00**)	TRAD	0.05 (0.49)	0.15 (0.00**)
R^2	0.99	0.99	R^2	0.99	0.99
Adjusted R^2	0.99	0.99	Adjusted R^2	0.99	0.99
S.E. of reg.	0.08	0.05	S.E. of reg.	0.05	0.04

Note: Dep.var.=dependent variable, FD=financial development, DOLS=dynamic OLS, and FMOLS=fully-modified OLS. RGDP=real GDP, L=labor force, INV=gross capital formation (% of GDP), FDI=foreign direct investment (% of GDP), DC=domestic credit (% of GDP), M2=M2 (% of GDP), PSE=public spending on education (% of GDP), GFC=government final consumption (% of GDP), INF=inflation rate (%), TRAD=exports and imports (% of GDP), S.E.=standard error, and reg.=regression. Numbers in parentheses denote marginal significance levels (p-values). ** and * denote significance at the 1% and 5% levels, respectively.

Table 9 also shows the results of reverse estimation with FDI as the dependent variable for the reverse causality or growth-induced FDI hypothesis. This reverse regression can be interpreted as a model for the determinants of FDI. The Table indicates that the levels of real GDP, labor, investment, financial development, human capital, and public sector size have been significant, while inflation and trade openness have been relatively insignificant factors in attracting FDI into the SAARC nations.

In Table 10, the results of Johansen cointegration rank tests of panel VAR estimation for the bi-directional causality hypothesis are provided. The Table displays trace and maximum eigenvalue test statistics and their critical values at the 5% level.

Table 9. Panel cointegration estimation with lagged inputs for the bi-directional causality hypothesis (1960-2013)

Dep.var.: RGDP , FD: M2			Dep.var.: FDI , FD: M2		
Regressor	DOLS	FMOLS	Regressor	DOLS	FMOLS
L(-1)	1.39 (0.00**)	0.85 (0.00**)	L(-1)	2.01 (0.05*)	4.73 (0.00**)
INV(-1)	0.21 (0.02*)	0.39 (0.00**)	INV(-1)	6.79 (0.01**)	1.31 (0.00**)
FDI	0.88 (0.00**)	0.41 (0.00**)	RGDP	1.89 (0.01**)	3.93 (0.00**)
M2	0.31 (0.00**)	0.06 (0.01**)	M2	7.91 (0.01**)	1.46 (0.00**)
PSE	0.32 (0.00**)	0.12 (0.00**)	PSE	2.39 (0.45)	7.86 (0.00**)
GFC	0.26 (0.02*)	0.01 (0.77)	GFC	3.61 (0.31)	9.24 (0.00**)
INF	-0.001 (0.79)	-0.001 (0.03*)	INF	-5.89 (0.95)	-1.67 (0.06)
TRAD	0.05 (0.50)	0.02 (0.29)	TRAD	1.13 (0.96)	6.91 (0.73)
R^2	0.99	0.99	R^2	0.76	0.90
Adjusted R^2	0.99	0.99	Adjusted R^2	0.71	0.86
S.E. of reg.	0.08	0.04	S.E. of reg.	0.04	0.03

Note: Dep.var.=dependent variable, FD=financial development, DOLS=dynamic OLS, and FMOLS=fully-modified OLS. RGDP=real GDP, L(-1)=lagged labor force at (t-1), INV(-1)=lagged gross capital formation (% of GDP) at (t-1), FDI=foreign direct investment (% of GDP), DC=domestic credit (% of GDP), M2=M2 (% of GDP), PSE=public spending on education (% of GDP), GFC=government final consumption (% of GDP), INF=inflation rate (%), TRAD=exports and imports (% of GDP), S.E.=standard error, and reg.=regression. Numbers in parentheses denote marginal significance levels (p-values). ** and * denote significance at the 1% and 5% levels, respectively.

Table 10. Johansen cointegration rank tests of panel VAR estimation for the bi-directional causality hypothesis (1960-2013)

		Trace Test			Max-Eig. Test		
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.	Max-Eig Statistic	0.05 Critical Value	Prob.
None	0.81	213.41	197.37	0.01*	65.05	58.43	0.01*
At most 1	0.73	148.36	159.53	0.17	51.61	52.36	0.06
At most 2	0.68	96.75	125.62	0.70	44.96	46.23	0.07
At most 3	0.49	51.79	95.75	0.99	26.54	40.08	0.67
At most 4	0.24	25.25	69.82	1.00	10.60	33.88	1.00
At most 5	0.21	14.65	47.86	1.00	9.23	27.58	0.99
At most 6	0.11	5.43	29.80	1.00	4.41	21.13	1.00
At most 7	0.02	1.01	15.49	1.00	0.99	14.26	1.00
At most 8	0.001	0.03	3.84	0.87	0.03	3.84	0.87

Note: Panel VAR estimation model has 9 endogenous variables - RGDP, L, INV, FDI, M2, PSE, GFC, INF, and TRAD. Max-Eig.=Maximum Eigenvalue, No.=number, CE=cointegrating equation, Prob.=Probability. A linear deterministic trend and one lag interval are used. * denotes rejection of the null hypothesis at the 5% level. MacKinnon-Haug-Michelis (1999) p-values are provided. The above results of both Trace and Maximum Eigenvalue Tests indicate 1 cointegrating equation at the 5% level.

Both test statistics indicate the existence of one cointegrating equation in the VAR model with 9 endogenous variables - RGDP, L, INV, FDI, M2, PSE, GFC, INF, and TRAD. Thus, we see that traditional Johansen cointegration test results based on panel VAR estimation also support the panel cointegration test results (Kao, 1999; Pedroni, 1999) presented in Table 5. We do not proceed with panel VAR procedures consisting of the usual impulse response and variance decomposition analysis. The reason is that it is inappropriate to apply the usual time series VAR-VECM analysis for panel data, by just stacking up the data and ignoring various heterogeneity of panel data as in most econometric packages. Panel VAR-VECM procedures appropriate for heterogeneous panel data are still under research and development as surveyed in Canova and Ciccarelli (2013).

In Table 11, the results of traditional fixed effects (FE) and random effects (RE) panel estimation for the bi-directional causality hypothesis are presented for comparison with those of previous research in the existing literature. We see that the results of traditional panel estimation in Table 11 are generally consistent with those in Table 8. FDI, financial development, human capital, and government consumption have significantly positive effects on growth, while inflation and trade openness have relatively insignificant impacts on output. As determinants of

Table 11. Traditional panel estimation of the regression equation using fixed effects (FE) and random effects (RE) models (1960-2013)

Dep.var.: RGDP , FD: M2			Dep.var.: FDI , FD: M2		
Regressor	Fixed effects	Random effects	Regressor	Fixed effects	Random effects
L	0.99 (0.00**)	1.31 (0.00**)	L	9.38 (0.02*)	1.60 (0.04*)
INV	0.34 (0.00**)	0.26 (0.01**)	INV	5.86 (0.00**)	1.45 (0.01**)
FDI	4.59 (0.04*)	1.07 (0.00**)	RGDP	9.53 (0.00**)	1.50 (0.01**)
M2	0.12 (0.02*)	0.34 (0.00**)	M2	5.61 (0.00**)	1.01 (0.00**)
PSE	0.34 (0.00**)	0.42 (0.00**)	PSE	8.87 (0.95)	4.23 (0.28)
GFC	0.21 (0.00**)	0.46 (0.00**)	GFC	6.45 (0.00**)	1.25 (0.00**)
INF	-0.00 (0.89)	-0.002 (0.36)	INF	-5.69 (0.26)	-1.37 (0.08)
TRAD	0.01 (0.93)	0.02 (0.77)	TRAD	3.43 (0.00**)	8.64 (0.00**)
R^2	0.99	0.94	R^2	0.67	0.59
Adjusted R^2	0.99	0.93	Adjusted R^2	0.60	0.55
S.E. of reg.	0.05	0.08	S.E. of reg.	0.03	0.04

Note: Dep.var.=dependent variable, FD=financial development, RGDP=real GDP, L=labor force, INV=gross capital formation (% of GDP), FDI=foreign direct investment (% of GDP), M2=M2 (% of GDP), PSE=public spending on education (% of GDP), GFC=government final consumption (% of GDP), INF=inflation rate (%), TRAD=exports and imports (% of GDP), and S.E. of reg.=standard error of regression. Numbers in parentheses denote marginal significance levels (p-values). ** and * denote significance at the 1% and 5% levels, respectively.

FDI, RGDP, financial development, government consumption, and trade openness are significant, while human capital and inflation are relatively insignificant factors.

From the results of Tables 5-11, we find strong evidence for significant bi-directional cointegration (long-run equilibrium) and causality relationships between real GDP and FDI. This relationship is statistically robust, when we included alternative control variables in the panel regression equation. The direction of cointegration and causality is two-way from FDI to real GDP, and vice versa.

Summarizing the empirical results in Tables 4-11, we find evidence for both the FDI-led growth and growth-induced FDI hypotheses in the SAARC region. Financial market development, human capital, and government expenditure levels are found to be the most important complementary factors in expanding the positive effects of FDI on growth. As determinants of FDI, the levels of GDP, labor, investment, financial development, human capital, and government consumption have been significant, while inflation and trade openness have been relatively insignificant factors in attracting FDI into the SAARC nations. The empirical results imply that net inflows of foreign direct investment (FDI) contributed to economic growth in the SAARC countries over the 1960-2013 period and in turn growth attracted more FDI inflows into the region. We find evidence supporting the bi-directional causality hypothesis in the SAARC sample.

V. CONCLUSION

This paper investigates the relationship between foreign direct investment (FDI) and economic growth, using panel cointegration testing and estimation techniques. The empirical analysis of this study exploits annual panel data on eight SAARC (South Asian Association for Regional Cooperation) countries' macroeconomic variables. The annual panel data are extracted from the *World Development Indicators (WDI) 2014* of the World Bank, and the sample period runs from 1960 to 2013.

The contributions of this paper, which explores the causal link between foreign direct investment and economic development, are as follows. First, this study finds a two-way cointegration and causality between FDI and output growth, based on various panel cointegration and panel Granger causality tests. Second, this study greatly improves the credibility of estimation and inference in regression analyses by employing various recent panel cointegration testing and estimation techniques in contrast with traditional fixed- and random-effects panel estimations used in previous research. Third, this paper expands the boundaries of empirical analysis on the nexus between FDI and economic development by focusing on SAARC emerging economies, which have been relatively ignored in empirical research.

The major findings of this paper are as follows. First, through various types of heterogeneous panel cointegration tests, we find evidence for both the FDI-led growth and growth-induced FDI hypotheses. There are statistically significant bi-directional cointegration (long-run equilibrium) relationships between FDI and GDP growth in the SAARC region.

Second, panel Granger causality tests present strong evidence for a two-way causality running from FDI to GDP and vice versa in the sample. This implies that FDI inflows into the SAARC countries contributed to their GDP growth and in turn output growth also attracted more FDI into the region over the 1960-2013 period. Individual time series Granger causality tests reveal that Pakistan shows a strong two-way causality between real GDP and FDI. On the other hand, Afghanistan, Bangladesh, Bhutan, India, and Sri Lanka display a one-way causality from real GDP to FDI, while Maldives and Nepal do not reveal any causality at conventional significance levels. The panel Granger causality tests also show that there are bi-directional causal relationships between real GDP and FDI in the SAARC region as a whole. Thus, for the SAARC region as a whole, there are bi-directional causal relationships, while individual member countries exhibit heterogeneity in terms of the direction or existence of causality subject to their idiosyncratic economic conditions.

Third, from the results of panel cointegration estimation, we find that FDI, financial development, human capital, and government consumption levels have significant positive effects on GDP growth of the SAARC region. In contrast, inflation and trade openness are found to have made relatively weaker impacts on output growth in the region. As determinants of FDI, the levels of GDP, labor, investment, financial development, human capital, and government consumption have been significant, while inflation and trade openness have been relatively insignificant factors in attracting FDI into the SAARC nations. This bi-directional causal relationship is statistically robust to the inclusion of alternative control variables in the regression equation and using different estimation techniques.

The empirical findings above have some interesting policy implications for developing countries. An effective investment policy for attracting foreign direct investment to provide financial capital in the production process is essential in promoting economic growth in developing nations. Bhagwati (1994) argues that the volume and effectiveness of FDI inflows vary according to whether a country is following an export-promotion (EP) or an import-substitution (IS) strategy. Balasubramanyam et al. (1996) prove that FDI plays a greater role in output growth in export-promotion economies than in import-substitution countries. These results imply that countries with export-oriented development strategy such as China, Korea, Singapore, and Taiwan may be able to reap more growth benefits from FDI than those with import-substitution policy. A financial market development policy aimed at the banking and securities sectors as suggested in Azman-Saini et al. (2010), Beck and Levine (2004), and Chee and Nair (2010) is also required to increase the synergy or complementary effects between FDI and financial development promoting growth in developing nations.

REFERENCES

Aghion, P. and S. Durlauf. 2005. *Handbook of Economic Growth*. Volume 1A and 1B, edition 1, Amsterdam: North Holland.

Al-Iriani, M. and F. Al-Shamsi. 2007. "Foreign Direct Imvestment and economic growth in the GCC countries: A causality investigation using heterogeneous panel analysis." *Topics in Middle Eastern and North African Economies*, vol. 9.

Azman-Saini, W. N. W., Law, S. H. and A. H. Ahmad. 2010. "FDI and economic growth: New evidence on the role of financial markets," *Economics Letters*, vol. 107, no. 2, pp. 211-213.

Babatunde, A. 2011. "Trade openness, infrastructure, FDI and growth in sub-Saharan African countries," *Journal of Management Policy and Practice*, vol. 12, no. 7, pp. 27-36.

Balasubramanyam, V. N., Salisu, M. and D. Sapsford. 1996. "Foreign direct investment and growth in EP and IS countries." *Economic Journal*, vol. 106, no. 434, pp. 92-105.

Baltagi, B. H. 2008. *Econometric Analysis of Panel Data* (4th ed.). Ch. 12. New York: John Wiley.

Baltagi, B. H. and C. Kao. 2000. "Nonstationary panels, cointegration in panels, and dynamic panels: a survey," In *Baltagi, B. H., Fomby, T. B. and R. C. Hill(eds.) Nonstationary Panels, Panel Cointegration, and Dynamic Panels, Advances in Econometrics*. vol. 15. Amsterdam: JAI Press. pp. 7-52.

Banerjee, A. 1999. "Panel data unit roots and cointegration: an overview," *Oxford Bulletin of Economics and Statistics* (special issue, supplement), vol. 61, no. S1,

pp. 607-629.
Barro, R. J. and J. W. Lee. 2013. "A new data set of educational attainment in the world, 1950-2010," *Journal of Development Economics*, vol. 104, pp. 184-198.
Basnet, H. C. and G. Pradhan. 2014. "Does the inflow of FDI stock matter? Evidence from SAARC countries," *Economic Papers*, vol. 33, no. 3, pp. 305-312.
Basu, P., Chakraborty, C. and D. Reagle. 2003. "Liberalization, FDI, and growth in developing countries: A panel cointegration approach," *Economic Inquiry*, vol. 41, no. 3, pp. 510-516.
Beck, T. and R. Levine. 2004. "Stock markets, banks, and growth: Panel evidence," *Journal of Banking and Finance*, vol. 28, no. 3, pp. 423-442.
Belloumi, M. 2014. "The relationship between trade, FDI and economic growth in Tunisia: An application of the autoregressive distributed lag model," *Economic Systems*, vol. 38, no. 2, pp. 269-287.
Bende-Nabende, A. and J. Ford. 1998. "FDI, policy adjustment and endogenous growth: Multiplier effects from a small dynamic model for Taiwan, 1959-1995," *World Development*, vol. 26, no. 7, pp. 1315-1330.
Bende-Nabende, A., Ford, J. and J. Slater. 2001. "FDI, regional economic integration and endogenous growth: Some evidence from Southeast Asia," *Pacific Economic Review*, vol. 6, no. 3, pp. 383-399.
Beugelsdijk, S., Smeets, R. and R. Zwinkels. 2008. "The impact of horizontal and vertical FDI on host's country economic growth," *International Business Review*, vol. 17, no. 4, pp. 452-472.
Bhagwati, J. N. 1994. "Free trade: Old and new challenges," *Economic Journal*, vol. 104, no. 423, pp. 231-246.
Bhavan, T., Xu, C. and C. Zhong. 2011. "Determinants and growth effect of FDI in South Asian economies: Evidence from a panel data analysis," *International Business Research*, vol. 4, no. 1, pp. 43-50.
Borensztein, E., De Gregorio, J. and J. Lee. 1998. "How does foreign direct investment affect economic growth?," *Journal of International Economics,* vol. 45, no. 1, pp. 115-135.
Breitung, J. 2000. "The local power of some unit root tests for panel data," In *Baltagi, B. H., Fomby, T. B. and R. C. Hill(eds.) Nonstationary Panels, Panel Cointegration, and Dynamic Panels, Advances in Econometrics.* vol. 15. Amsterdam: JAI Press. pp. 161-177.
Canova, F. and M. Ciccarelli. 2013. "Panel vector autoregressive models: A survey," Working Paper Series No. 1507, European Central Bank.
Carkovic, M. and R. Levine. 2002. "Does foreign direct investment accelerate economic growth?," Working Paper Series, University of Minnesota. Also published in Morean, T. H., Graham, E. D. and M. Blomström. (eds.), *Does Foreign Direct Investment Promote Development?* Washington, D.C.: Institute for International Economics, 2005, pp. 195-220.
Chee, Y. L. and M. Nair. 2010. "The impact of FDI and financial sector development on economic growth: Empirical evidence from Asia and Oceania," *International Journal of Economics and Finance*, vol. 2, no. 2, pp. 107-119.

Chen, J.-E. and S. A. M. Zulkifli. 2012. "Malaysian outward FDI and economic growth," *Procedia - Social and Behavioral Sciences*, vol. 65, no. 3, pp. 717-722.
Choi, I. 2001. "Unit root tests for panel data," *Journal of International Money and Finance*, vol. 20, no. 2, pp. 249-272.
De Mello, Jr., L. R. 1997. "Foreign direct investment in developing countries: A selective survey," *Journal of Development Studies*, vol. 34, no. 1, pp. 1-34.
__________________. 1999. "FDI-led growth: evidence from time series and panel data," *Oxford Economic Papers*, vol. 51, no. 1, pp. 133-151.
Dunning, J. H. 1993. *Multinational Enterprise and the Global Economy*. Wokingham: Addison-Wesley.
Edwards, S. 1998. "Openness, productivity, and growth: What do we really know?," *Economic Journal*, vol. 108, no. 447, pp. 383-398.
Engle, R. F. and C. W. J. Granger. 1987. "Co-integration and error correction: representation, estimation and testing," *Econometrica*, vol. 55, no. 2, pp. 251-276.
Frankel, J. and D. Romer. 1999. "Does trade cause growth?," *American Economic Review*, vol. 89, no. 3, pp. 379-399.
Hadri, K. 2000. "Testing for stationarity in heterogeneous panel data," *Econometrics Journal*, vol. 3, no. 2, pp. 148-161.
Hansen, H. and J. Rand. 2004. "On the causal links between FDI and growth in developing countries," Discussion Papers, 04-30, Institute of Economics, University of Copenhagen.
Harris, R. D. F. and E. Tzavalis. 1999. "Inference for unit roots in dynamic panels where the time dimension is fixed," *Journal of Econometrics*, vol. 91, no. 2, pp. 201-226.
Herzer, D., Klasen, S. and F. Nowak-Lehmann D. 2008. "In search of FDI-led growth in developing countries: The way forward," *Economic Modelling*, vol. 25, no. 5, pp. 793-810.
Hong, L. 2014. "Does and how does FDI promote economic growth? Evidence from dynamic panel data of prefecture city in China," *IERI Procedia*, vol. 6, pp. 57-62.
Im, K. S., Pesaran, M. H. and Y. Shin. 2003. "Testing for unit roots in heterogeneous panels," *Journal of Econometrics*, vol. 115, no. 1, pp. 53-74.
Irsova, Z. and T. Havranek. 2013. "Determinants of horizontal spillovers from FDI: Evidence from a large meta-analysis," *World Development*, vol. 42, pp. 1-15.
Iwasaki, I. and M. Tokunaga. 2014. "Macroeconomic impacts of FDI in transition economies: A meta-analysis," *World Development*, vol. 61, pp. 53-69.
Johansen, S. 1988. "Statistical analysis of cointegration vectors," *Journal of Economic Dynamics and Control*, vol. 12, no. 2-3, pp. 231-254.
_________. 1991. "Estimation and hypothesis testing of cointegration vectors in Gaussian vector autoregressive models," *Econometrica*, vol. 59, no. 6, pp. 1551-1580.
_________. 1992. "Cointegration in partial systems and the efficiency of single-equation analysis," *Journal of Econometrics*, vol. 52, no. 3, pp. 389-402.
Johansen, S. and K. Juselius. 1990. "Maximum likelihood procedure for inference on cointegration - with applications to the demand for money," *Oxford Bulletin of*

Economics and Statistics, vol. 52, no. 2, pp. 169-210.

_________. 1992. "Testing structural hypotheses in a multivariate cointegration analysis of the PPP and the UIP for U.K," *Journal of Econometrics*, vol. 53, no. 1-3, pp. 211-244.

Kao, C. 1999. "Spurious regression and residual-based tests for cointegration in panel data," *Journal of Econometrics*, vol. 90, no. 1, pp. 1-44.

Kao, C. and M. H. Chiang. 2000. "On the estimation and inference of a cointegrated regression in panel data," In *Baltagi, B. H., Fomby, T. B. and R. C. Hill(eds.) Nonstationary Panels, Panel Cointegration, and Dynamic Panels, Advances in Econometrics.* vol. 15, Amsterdam: JAI Press (Elsevier Science). pp. 179-222.

Kose, M. A., Prasad, E., Rogoff, K. and S-J. Wei. 2009. "Financial globalization: A reappraisal," *IMF Staff Papers*, vol. 56, no. 1, pp. 8-62.

Kotrajaras, P., Tubtimtong, B. and P. Wiboonchutikula. 2011. "Does FDI enhance economic growth? New evidence from East Asia," *ASEAN Economic Bulletin*, vol. 28, no. 2, pp. 183-202.

Kwiatkowski, D., Phillips, P. C. B., Schmidt, P. and Y. Shin. 1992. "Testing the null hypothesis of stationarity against the alternative of a unit root," *Journal of Econometrics*, vol. 54, no. 1-3, pp. 159-178.

Levine, R. 2005. "Finance and growth: Theory and evidence," In Aghion, P. and S. Durlauf (eds.) *Handbook of Economic Growth.* Elsevier, edition 1, volume 1, chapter 12, pp. 865-934.

Levin, A., Lin, C-F. and C-S. J. Chu. 2002. "Unit root tests in panel data: asymptotic and finite-sample properties," *Journal of Econometrics*, vol. 108, no. 1, pp. 1-24.

Lian, L. and H. Ma. 2013. "FDI and economic growth in western region of China and dynamic mechanism: Based on time-series data from 1986-2010," *International Business Research*, vol. 6, no. 4, pp. 180-186.

MacKinnon, J. G., Haug, A. and L. Michelis. 1999. "Numerical distribution functions of likelihood ratio tests for cointegration," *Journal of Applied Econometrics*, vol. 14, no. 5, pp. 563-577.

Maddala, G. S. and S. Wu. 1999. "A comparative study of unit root tests with panel data and a new simple test," *Oxford Bulletin of Economics and Statistics*, (special issue, supplement), vol. 61, no. S1, pp. 631-652.

Mark, N. C. and D. Sul. 2001. "Nominal exchange rates and monetary fundamentals: evidence from a small post-Bretton Woods panel," *Journal of International Economics*, vol. 53, no. 1, pp. 29-52.

McCoskey, S. and C. Kao. 1998. "A residual-based test of the null of cointegration in panel data," *Econometric Reviews*, vol. 17, no. 1, pp. 57-84.

Moudatsou, A. and D. Kyrkilis. 2011. "FDI and economic growth: Causality for the EU and ASEAN," *Journal of Economic Integration*, vol. 26, no. 3, pp. 554-577.

Narula, R. 1996. *Multinational Investment and Economic Structure.* London: Routledge.

Narula, R. and J. H. Dunning. 2000. "Industrial development, globalization, and multinational enterprises: New realities for developing countries," *Oxford Development Studies*, vol. 28, no. 2, pp. 141-167.

________________________. 2010. "Multinational enterprises, development, and globalization: Some clarifications and a research agenda," *Oxford Development Studies*, vol. 38, no. 3, pp. 263-287.

Pedroni, P. 1999. "Critical values for cointegration tests in heterogeneous panels with multiple regressors," *Oxford Bulletin of Economics and Statistics*, vol. 61, no. S_1, pp. 653-670.

________. 2000. "Fully modified OLS for heterogeneous cointegrated panels," In *Baltagi, B. H., Fomby, T. B. and R. C. Hill(eds.) Nonstationary Panels, Panel Cointegration, and Dynamic Panels, Advances in Econometrics*. vol. 15, Amsterdam: JAI Press (Elsevier Science). pp. 93-130.

________. 2004. "Panel cointegration: asymptotic and finite sample properties of pooled time series tests with an application to the PPP hypothesis," *Econometric Theory*, vol. 20, no. 3, pp. 597-625.

Pesaran, M. H., Shin, Y. and R. P. Smith. 1999. "Pooled mean group estimation of dynamic heterogeneous panels," *Journal of the American Statistical Association*, vol. 94, no. 446, pp. 621-634.

Rostow, W. W. 1959. "The stages of economic growth," *Economic History Review*, New Series, vol. 12, no. 1, pp. 1-16.

Roy, G. A. and H. V. Berg. 2006. "Foreign direct investment and economic growth: A time-series approach," *Global Economy Journal*, vol. 6, no. 1, pp. 1-19.

Saikkonen, P. 1992. "Estimation and testing of cointegrated systems by an autoregressive approximation," *Econometric Theory*, vol. 8, no. 1, pp. 1-27.

Srinivasan, P. 2011. "Determinants of foreign direct investment in SAARC nations: An econometric investigation," *IUP Journal of Managerial Economics*, vol. 9, no. 3, pp. 26-42.

Wei, Y. and X. Liu. 2001. *Foreign Direct Investment in China: Determinants and Impact.* Cheltenham, UK: Edward Elgar.

World Bank. 2014. World Development Indicators 2014. Washington D.C: World Bank.

Yalta, A. Y. 2013. "Revisiting the FDI-led growth hypothesis: The case of China," *Economic Modelling*, vol. 31, pp. 335-343.

Yanikkaya, H. 2003. "Trade openness and economic growth: A cross-country empirical investigation," *Journal of Development Economics*, vol. 72, no. 1, pp. 57-89.

Yao, S. and K. Wei. 2007. "Economic growth in the presence of FDI: The perspective of newly industrializing economies," *Journal of Comparative Economics*, vol. 35, no. 1, pp. 211-234.

Zhang, K. H. 2003. "Foreign direct investment in China: 1978-2002," In *Columbus, F.(ed.) Asian Economic and Political Issues.* vol. 8, New York: Nova Science Publishers. pp. 1-18.

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