ECONOMIC GROWTH AND FOREIGN DIRECT INVESTMENT IN MALAYSIA: EVIDENCE FROM EMPIRICAL TESTING

Mori Kogid*, Jaratin Lily, Rozilee Asid, Dullah Mulok
School of Business and Economics, Universiti Malaysia Sabah
88400 Kota Kinabalu, Sabah, Malaysia
*(Corresponding author) E-mail: morikogid@gmail.com / edy@ums.edu.my

Nanthakumar Loganathan
Department of Economics
Faculty of Management and Economics, Universiti Malaysia Terengganu
21030 Kuala Terengganu, Terengganu, Malaysia

Abstract

This study attempts to investigate the crucial relationship between FDI and economic growth in Malaysia for the period of 1971 to 2009 by considering the FDI net flows as an indicator for FDI growth. Using the Johansen and VECM approach in analyzing this relationship, the empirical results showed the existence of a long-run cointegration relationship between the FDI and the RGDP. In addition, a causal effect exists running from the FDI to the RGDP implying that FDI does influence economic growth. Therefore this study proposes the importance of inward FDI as a paramount factor to accelerate the economic development of a country, especially Malaysia, and could be taken as one of the key factors to stimulate the economy and for future economic development policy.

Keywords: RGDP, FDI net flows, Cointegration, Causality, Malaysia

JEL Classification Codes: C12, C13, C22, F21, O40

1. Introduction

For many years, Malaysia was one of the most open in the developing world to foreign investment. Malaysia was quick to recognize the powerful role that foreign investors could play in fuelling export-led growth, and well-placed to attract such investment during the years of regional structural adjustment in the late 1980s (Thomsen 1999). Similarly, in 1993 Malaysia was regarded as one of the newly industrializing economies. Malaysia has continued to grow at astonishingly high annual rates of 8 or 9 percent since the late 1980s (Okamoto 1994). Even Malaysia economy was the 29th largest in the world in 2007 and has a consistent record of economic growth over the period 1970-2005, averaging an annual rate of about 7 percent (Karimi and Yusop 2009).

The adoption of the Foreign Direct Investment (FDI) liberalization policy was one of the important factors behind the massive inflows of FDI into Malaysia in the late 1980s and eventually boosted the Malaysian economy tremendously. Obviously FDI has been seen as a key driver underlying the strong performance in Malaysia, regarded as a leading role in the growth of many of the economies of the Asian region particularly in export sectors, and has been a vital source of foreign capital during crisis (Thomsen 1999). The FDI liberalization policy was also said to have contributed to the creation of an 'economic miracle' in Malaysia (Okamoto 1994). However, there has been a persistent decline in the ratio of FDI inflows to gross domestic product (GDP) since the early 1990s (Ang 2008).

Generally the relationship between FDI and economic growth has been studied by examining four main objectives; the determinants of economic growth, determinants of FDI, long-run

cointegration or relationship, and a direction or causality pattern between FDI and economic growth. The latter two objectives are the main objectives in this study.

The paper is organized as follows: Section 2 presents selected past studies. Section 3 explains the data and methodology used. Section 4 discusses the empirical results and discussion. The last section of this study offers conclusions.

2. Selected Past Studies

In many empirical literatures, the main issue until now is challenges to the widespread belief that FDI generally has a positive impact on economic growth (Herzer, Klasen and Nowak-Lehmann 2008). Previous studies have recognized that the benefits from foreign direct investment (FDI) to recipient countries can only be realized when those countries have reached a certain level of financial development. The real GDP is found to have a significant positive impact on FDI inflows. Sustained economic growth has made Malaysia for instance on attractive prospect for FDI. Strong economic growth remains a necessary condition for Malaysia to attract FDI inflows (Ang 2008), while economic instability (inflation and unstable exchange rates) will probably discourage FDI (Wai-Mun, Kai-Lin and Kar-Man 2008).

The performance of one variable contributes to the stability of another variable. FDI contributes to the stability of growth and vice versa (Duasa 2007; Karimi and Yusop 2009). Continual price stability, macroeconomic balances, good governance and economic liberalization reforms are crucial towards sustaining the FDI (Mithani, Ahmad and Saifudin 2008). Countries that are

successful in attracting FDI can finance more investments and grow faster than those that deter FDI (Baharumshah and Thanoon 2006).

Some views believe that FDI (and other factors, government expenditure and exchange rate) may have a role as a catalyst and complement determinant factor to economic growth (Kogid, Mulok, Beatrice and Mansur 2010). Not only does FDI directly promote economic growth, but it also indirectly promotes economic growth via its interaction terms. FDI with human capital or labor interaction (Li and Liu 2005; Lean 2008; Vu and Noy 2009) has a strong positive effect on economic growth in developing countries, while FDI with a technology gap has a significant negative impact (Li and Liu 2005).

Some studies found that FDI alone plays an ambiguous role in contributing to economic growth. Countries with well-developed financial markets gain significantly from FDI. However, the evidences are more robust to different measures of financial market development, the inclusion of other determinants of economic growth, and consideration of endogeneity (Alfaro, Chanda, Kalemli-Ozcan and Sayek 2004). Sometimes, each country has different causality relations and does not yield general rules (Hsiao and Hsiao 2006). Although FDI is widely believed to have a positive effect on economic growth, the exact mechanism of how FDI impacts upon the development process is still unclear (Yao and Wei 2007). Furthermore, substantial support exists for positive spillovers from FDI, but there is still no consensus on causality (Lim 2001).

Likewise FDI is a mover of production efficiency because it helps reduce the gap between the actual level of production and a steady state production frontier. Second, FDI being embedded

with advanced technologies and knowledge is a shifter of the host country's production frontier. Due to its dual role as a mover of production efficiency and a shifter of production frontier, FDI is a powerful driver of economic growth (Yao and Wei 2007).

Some argue that better developed financial systems allow an economy to exploit the benefits of foreign direct investment more efficiently (see Ang 2009). This lends support to the validity of policy guidelines which emphasizes the importance of FDI for growth and stability in developing countries under the assumption of 'FDI-led growth' (Magnus and Fosu 2008). Extractive FDI might not be growth enhancing as much as manufacturing FDI (Akinlo 2004). In addition, evidence on the role financial market developments play in mediating the impact of FDI on growth can be seen in Azman-Saini, Law and Ahmad (2010). Another option is by making use of the bank-based theory of financial development. A researcher could develop a simultaneous equations model that allows one to empirically examine the interrelationship among economic growth, the stock of foreign investment and the stock of domestic capital (Anwar and Sun 2010).

A number of empirical studies have been carried out on the relationship between the FDI and economic growth and continued increasing over time with different time periods, cases and methodology frameworks. Among these are Lim (2001), Alfaro et al. (2004), Akinlo (2004), Chowdhury and Mavrotas (2005), Li and Liu (2005), Baharumshah and Thanoon (2006), Hsiao and Hsiao (2006), Duasa (2007), Ayanwale (2007), Yao and Wei (2007), Ang (2008), Wai-Mun et al. (2008), Mithani et al. (2008), Lean (2008), Magnus and Fosu (2008), Apergis, Lyroudi and Vamvakidis (2008), Herzer et al. (2008), Karimi and Yusop (2009), Yol and Teng-Teng (2009), Ang (2009), Adams (2009), Vu and Noy (2009), Lee and Chang (2009), Kogid et al. (2010),

Anwar and Sun (2010), Samimi, Rezanejad and Ariani (2010), Azman-Saini et al. (2010), Kottaridi and Stengos (2010), Azman-Saini, Baharumshah and Law (2010), and Alguacil, Cuadros and Orts (2011).

While some studies focus strictly on the relationship between FDI and economic growth (Chowdhury and Mavrotas, 2005; Baharumshah and Thanoon 2006; Duasa 2007; Yao and Wei 2007; Ang 2008; Magnus and Fosu 2008, Apergis et al. 2008; Wai-Mun et al. 2008; Mithani et al. 2008; Karimi and Yusop 2009; Samimi et al. 2010), other studies added additional variables such as human capital or labor (Akinlo 2004; Li and Liu 2005; Ayanwale 2007; Lean 2008; Vu and Noy 2009), exports (Akinlo 2004; Hsiao and Hsiao 2006; Kottaridi and Stengos 2010; Kogid et al. 2010), technology gap (Li and Liu 2005), financial development (Akinlo 2004; Alfaro et al. 2004; Herzer et al. 2008; Ang 2009; Lee and Chang 2009; Azman-Saini et al. 2010) and the remaining variables including exchange rate, consumption expenditure, education, economic freedom and so forth (Herzer et al. 2008; Kogid et al. 2010; Azman-Saini et al. 2010).

Most of the past studies used time-series data analysis (among others are Akinlo 2004; Hsiao and Hsiao 2006; Ayanwale 2007; Lean 2008; Wai-Mun et al. 2008; Magnus and Fosu 2008; Karimi and Yusop 2009; Yol and Teng-Teng 2009; Ang 2009; Adams 2009; Kogid et al. 2010; Anwar and Sun 2010; Samimi et al. 2010; Azman-Saini 2010; Alguacil et al. 2011), and panel data analysis (Li and Liu 2005; Hsiao and Hsiao 2006; Baharumshah et al. 2006; Apergis et al. 2008; Lee and Chang 2009; Azman-Saini et al. 2010) as well as cross-country data analysis (Alfaro et al. 2004; Vu and Noy 2009).

The scope of research is also wide. There have been some studies specifically done in Malaysia (Duasa 2007; Ang 2008; Wai-Mun 2008; Karimi and Yusop 2009; Yol and Teng-Teng 2009; Lean 2010; Anwar and Sun 2010; Kogid et al. 2010), other countries including Malaysia (Chowdhury and Mavrotas 2005; Hsiao and Hsiao 2006; Mithani et al. 2008) as well as on countries other than Malaysia (Akinlo 2004; Ayanwale 2007; Magnus and Fosu 2008; Ang 2009; Adams 2009; Vu and Noy 2009).

Some studies found no causal relations between FDI and economic growth (for instance Lim 2001; Duasa 2007; Herzer et al. 2008; Karimi and Yusop 2009; Kogid et al. 2010). However studies such as Hsiao and Hsiao (2006), Magnus and Fosu (2008) and Yol and Teng-Teng (2009) found causal relationship in at least unidirectional between FDI and economic growth. Though among others, studies done by Apergis et al. (2008) and Lee and Chang (2009) found a long-run cointegration relationship between FDI and economic growth, some studies found otherwise (see Herzer et al. 2008; Karimi and Yusop 2009).

Undoubtedly much evidence found in past studies showed that FDI has a positive impact on the economic growth (see Baharumshah and Thanoon 2006; Ayanwale 2007; Wai-Mun et al. 2008; Mithani et al. 2008; Adams 2009; Vu and Noy 2009; Azman-Saini et al. 2010), yet instances where FDI negatively affected economic growth has also been found (for instance Ang 2009). Also FDI with human capital interaction has been found to give a positive effect on economic growth, whereas FDI with technology gap has a significant negative impact (Li and Liu 2005). On the other hand, economic growth (GDP) is found to have both a positive effect on FDI (see Ang 2008 for instance) as well as a negative impact (Yol and Teng-Teng 2009).

Therefore in line with this issue and considering the importance of FDI, the government should emphasize on diffusion aspects in formulating FDI policies as knowledge diffusion is not sustained on welfare ground. Policies directed towards attracting FDI should go hand in hand with, not precede, policies that aims at promoting financial market developments (Azman-Saini, Law and Ahmad 2010). The review of the literature and findings of the study also indicates that the continent needs a targeted approach to FDI, increased absorption capacity of local firms, and cooperation between government and MNE to promote their mutual benefit (Adams 2009).

3. Data and Methodology

The annual time series variables data which are real gross domestic product (RGDP) as a proxy to economic growth indicator and foreign direct investment (FDI) which is in net flows as a proxy to FDI growth indicator from the periods 1971 to 2009 in this study were obtained from Central Bank of Malaysia and United Nations Conference on Trade and Development (UNCTAD). Both variables were transformed to logarithms. This research applied the Johansen approach to bivariate cointegration and vector error correction model (VECM) causality analysis. As a norm, unit root tests will be conducted to check for stationarity and the order of integration of the series variables before carrying out the cointegration test. In this case, this study conducts unit root tests by adopted the Dickey-Fuller, DF or Augmented Dickey-Fuller, ADF (Dickey and Fuller 1979) and Phillips-Perron, PP (Phillips and Perron 1988) as well as the Dickey-Fuller-Generalized Least Square, DF-GLS (Elliott, Rothenberg and Stock 1996). Besides, the optimal lag length was chosen by minimizing the Schwarz information criterion (SIC).

This study then employs the Johansen's procedure to check for the long-run movement of the variables. Only variables with the same order of integration could be tested for their cointegration. The test is based on the maximum likelihood estimation of the K-dimensional Vector Autoregression (VAR) of order *p*. This test made use of the Trace (Tr) eigenvalue statistic and Maximum (L-max) statistic (Johansen 1988, Johansen and Juselius 1990). The Tr and L-max statistics can be show as

$$Tr = -T\sum_{r+1}^{p-2} In(1-\hat{\lambda}_1) \qquad (1)$$

$$L-\max = -TIn(1-\hat{\lambda}_{r+1}) \qquad (2)$$

where $\hat{\lambda}_{r+1},.....,\hat{\lambda}_p$ are the smallest eigenvalues of estimated $p-r$. The null hypothesis for the trace eigenvalue test is that there are at most r cointegrated vectors. Meanwhile the null hypothesis for the maximum eigenvalue test is that r cointegrated vectors are tested against the alternative hypothesis of $r+1$ cointegrated vectors. In addition, if the cointegration relationship exists among the series variables, then the long-run cointegrating equation could be written as follows:

$$y_t = \alpha_0 + \alpha_1 y_{t-1} + \alpha_2 x_t + \varepsilon_t \qquad (3)$$

For causality test, this study employs the vector error correction model (VECM) approach. Generally, time series variables which are not stationary should not be applied in the regression model to avoid spurious regression. Based on the cointegration test, if both y_t and x_t

cointegrated, by the definition $\hat{\varepsilon}_t \sim I(0)$, the said cointegration vector must be used as the error correction term in modeling a short run relationship (Engle and Granger 1987). In the case where y_t and x_t are stationary variables $I(0)$, equation (4) and (5) in level form without error correction term can be estimated using the least squares method. However, if y_t and x_t are non-stationary variables, $I(1)$ and do not cointegrated, the VECM model such as equation (4) and (5) without error correction term can be used. Whereas equation (4) and (5) exactly can be used in the case where y_t and x_t are $I(1)$ and cointegrated.

$$\Delta LY_t = \alpha_0 + \sum_{i=1}^{p} \alpha_{1i} \Delta LY_{t-i} + \sum_{j=1}^{p} \alpha_{2j} \Delta LX_{t-j} + \alpha_3 \varepsilon_{t-1} + u_t \qquad (4)$$

$$\Delta LX_t = \beta_0 + \sum_{i=1}^{p} \beta_{1i} \Delta LY_{t-i} + \sum_{j=1}^{p} \beta_{2j} \Delta LX_{t-j} + \beta_3 \varepsilon_{t-1} + v_t \qquad (5)$$

x_t is Granger cause to y_t if the total of α_{2j} in equation (4) is significant without taking into account β_{1i} in equation (5). On the other hand, y_t would Granger cause to x_t if the total of β_{1i} in equation (5) is significant without taking into account α_{2j} in equation (4). Bilateral causal relationship exists between y_t and x_t if both the total of α_{2j} and the total of β_{1i} are significant. The order of VAR, p, was chosen by minimizing the SIC. Coefficient α_3 and β_3 are known as error correction coefficient because both these coefficients show some changes in LY and LX react to cointegrating error which is $LY_{t-1} - \alpha_0 - \alpha_1 LX_{t-1} = \varepsilon_{t-1}$ or $LX_{t-1} - \beta_0 - \beta_1 LY_{t-1} = \varepsilon_{t-1}$. Its rationale is that because the error will lead to the correction caused by conditions imposed on α_3 and β_3 to ensure that the stability condition is met that is $(-1 < \alpha_3 \leq 0)$ and $(0 \leq \beta_3 < 1)$. For instance, positive error, $\varepsilon_{t-1} > 0$ is exist due to $LY_{t-1} > (\alpha_0 + \alpha_1 LX_{t-1})$. A negative error correction

coefficient value (α_3) in the first equation that is equation (4) is to ensure the decline in changes to LY_t (ΔLY_t), while a positive error correction coefficient (β_3) in the second equation that is equation (5) is to ensure the rise in the changes to LX_t (ΔLX_t). Both error correction coefficients are less than 1 in absolute value to ensure the stability of the equation system.

4. Empirical Results and Discussion

Over the period, the RGDP trend tends to increase dramatically and continuously, whereas the FDI is slightly fluctuated and appears unstable in nature. From Figure 1, there is an unclear relationship between the RGDP and the FDI. One possible way to examine this relationship is perhaps through a formal method or empirical analysis using hypothesis testing.

Prior to testing the relationship between the RGDP and the FDI, a unit root test must be done first to ensure the series variables are stationary. In this study, three types of unit root tests were used; ADF, PP and the more robust unit root test, DF-GLS. Interestingly enough, all tests produced similar results showing that both variables (RGDP and FDI) in logarithmic form are stationary at first difference in both constant and constant and trend included in the test equations.

Since both variables are stationary at first difference and have the same order of integration, *I*(1), a cointegration test can be done using the Johansen approach. As shown in Table 2, both test statistics (Trace and Max-Eigen) also produced similar results indicating that there is cointegration relationship between the RGDP and the FDI. The number of cointegrating vector is two. However, the interpretation of these number of cointegrating vectors in advance will not be

discussed due to the complexity of the interpretation when dealing with more than one cointegrating vectors (see Maddala and Kim, 1998; Kogid et al., 2010).

One interesting point can be seen in Table 3, where the long-run cointegration coefficient is 0.7632 with negative sign and it's statistically significant at 1 percent level. This shows that the FDI has a negative effect upon the RGDP. Shouldn't the FDI have positive effect on the RGDP? What is the problem with this relationship? Undoubtedly, the relationship between the FDI and the RGDP should be positive in theory, and this was proven in a number of past empirical studies working on this issue with different time frame, data, and method and even with different case studies. Obviously the key of the issue here is the FDI itself. Generally, the FDI component can be categorized into three; FDI inflows, FDI outflows and of course net flows (the difference between the FDI inflows and the FDI outflows). As mentioned in the method section, the FDI used here is net flows. This is the reason for the negative relationship between the FDI and the RGDP. Therefore, the sign of the long-run cointegration coefficient is probably depending on the domination of the FDI inflows or FDI outflows. For instance, if the FDI inflows are more dominant, the sign could be positive; otherwise the sign could turn to negative. The behavior of the long-run cointegrating relationship between the FDI and the RGDP can also be seen in Figure 2.

So far some important facts have been discussed. The next set of findings using VECM revealed that there is a single causal relationship between the said variables running from the FDI to the RGDP (Table 4). This indicates that the FDI can influence the RGDP. Furthermore, the error correction coefficient that is -0.1183 is statistically significant at the 5 percent level with the

correct sign as expected. This also indicates that the correction adjustment speed is at a slow pace which is about 11.8 percent. Likewise, the imbalance between the FDI and the RGDP is corrected at the speed of 11.8 percent each year with convergence towards the long-run equilibrium. In addition, the model also passed the diagnostic tests (see Table 4).

To sum up, the empirical results in this study propose that both the FDI and the RGDP are stationary at first difference. A long-run cointegration relationship exists between the FDI and the RGDP with FDI having a negative effect on the RGDP, using FDI net flows. In other words, the FDI effects on the RGDP are twofold; it could be negative or positive. Otherwise, the effect should be always positive. Negative effects occur in the case where FDI outflows are used instead and the remaining factors are assumed constant (unchanged). Not only does a long-run cointegration exists, but also a causal effect running from the FDI to the RGDP implying that the FDI net flows as a proxy to FDI growth indicator influenced the RGDP as a proxy to economic growth indicator. The model also passed the diagnostic test indicating that the model fits the data. As a result, this study proposes the importance of the FDI as a paramount factor to accelerate the economic development of a country especially in Malaysia and could be taken as one of the key factors to stimulate the economy and for future economic development policy.

5. Conclusion

Malaysia was one of the most open countries in the developing world to foreign investment. Malaysia has also once been regarded as one of the newly industrializing economies. Considering the importance of FDI, Malaysian government should emphasize on diffusion aspect in formulating FDI policies. Policies directed towards attracting FDI should go hand in hand

with, not precede, policies that aims at promoting financial market developments as suggested by Azman-Saini et al. (2010) in their study. The review of the literature and findings from the past studies also indicate that the continent needs a targeted approach to FDI, increase absorption capacity of local firms, and cooperation between government and firms or companies to promote their mutual benefit. These issues also have been raised by Adams (2009) in his study.

Generally the relationship between FDI and economic growth has been studied by examining the determinants of economic growth, determinants of FDI, long-run cointegration or relationship, and the direction or causality pattern. Though there is much empirical literature on the relationship between FDI and economic growth, there are still unclear empirical evidences concerning the long-run cointegration relationship as well as the direction or causality pattern between FDI and economic growth.

In summary, the empirical results in this study show that a long-run cointegration relationship exists between FDI and economic growth. A causal effect exists running from FDI to economic growth implying that FDI influences economic growth. As a result, this study has proposed the importance of the FDI as a paramount factor to accelerate the economic development of a country especially in Malaysia and could be taken as one of the key factors to stimulate the economy and for future economic development policy. This perhaps could enlighten the direction of future study on the essential relationship between FDI and economic growth while considering the possibilities of other factors that could together stimulate and sustain economic growth via FDI.

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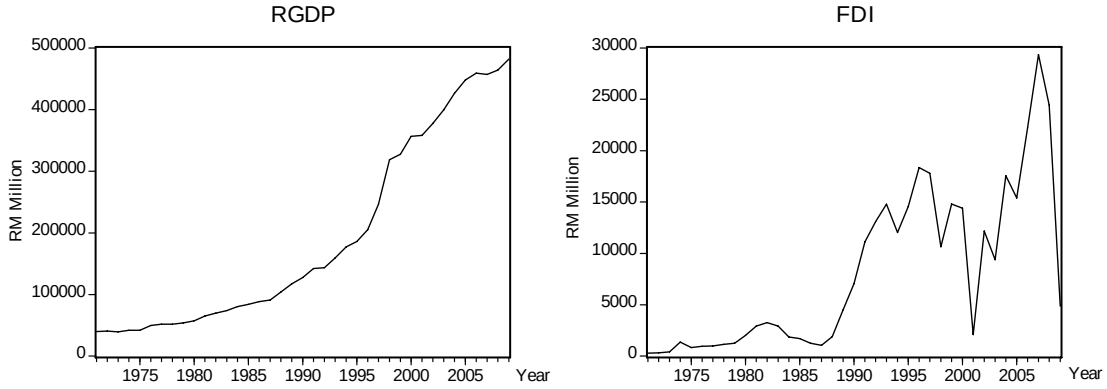

Figure 1: Real GDP and FDI

Table 1: Unit Root Tests Results

Variabel	ADF		PP		DF-GLS	
	Constant	Constant & Trend	Constant	Constant & Trend	Constant	Constant & Trend
RGDP	*I*(1)	*I*(1)	*I*(1)	*I*(1)	*I*(1)	*I*(1)
FDI	*I*(1)	*I*(1)	*I*(1)	*I*(1)	*I*(1)	*I*(1)

Notes: *I*(0) and *I*(1) denotes stationary at level and first difference respectively. All variables are transformed into logarithms.

Table 2: Johansen Bivariate Cointegration Test

H_0	H_1	Test Statistic: λ
Trace Statistic: λ_{trace}		
r = 0	r > 0	24.3981***
r ≤ 1	r > 1	3.8897**
Max-Eigen Statistic: λ_{max}		
r = 0	r = 1	20.5083***
r = 1	r = 2	3.8897**

Notes: ***, **, * denote significant and rejected at the 1%, 5% and 10% levels respectively. All variables are transformed into logarithms.

Table 3: Long-Run Cointegration Equation

Regressor	Coefficient	t-Statistic
Dependent Variable: RGDP		
Constant	-5.3658	-
FDI	-0.7632	-12.6864***

Notes: ***, **, * denote significant and rejected at the 1%, 5% and 10% levels respectively. All variables are transformed into logarithms.

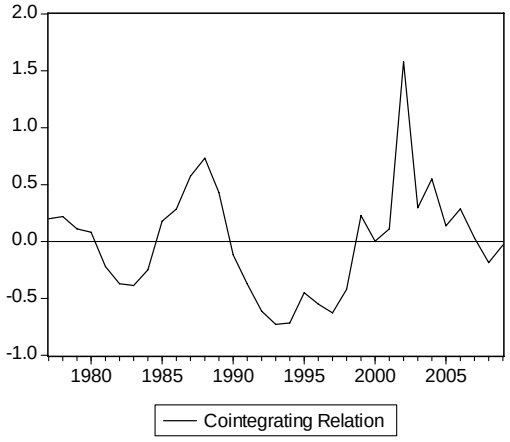

Figure 2: RGDP and FDI Cointegrating Relation

Table 4: Vector Error Correction Model

Variable	VAR(k)	Coefficient (t-statistic)	Wald Statistic
$\Delta FDI \not\Rightarrow \Delta RGDP$	5	-	9.7536*
ε_{t-1}		-0.1183 (-3.3216)**	-
$\Delta RGDP \not\Rightarrow \Delta FDI$	5	-	6.8741
ε_{t-1}		0.6485 (1.4752)	-
Diagnostic Tests: Residual Series			
SIC = 0.3946			JB = 11.4164
Heteroskedasticity Test Statistic = 59.2759			LM = 0.2408

Notes: ***, **, * denote significant and rejected at the 1%, 5% and 10% levels respectively. JB = Jarque-Bera statistic and LM = Breusch-Godfrey Serial Correlation LM statistic. All variables are transformed into logarithms.