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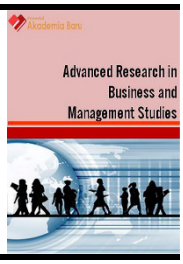

ARDL bound test approach for co-integration between FDI, human capital and innovation activities: Insights from Malaysia

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ABSTRACT

FDI can be beneficial in term of creating spillover in the hosts' country, but there is no direct evidence to confirm that FDI affects innovation activities in Malaysia. Innovation means fresh thinking and approaches that add value to consistently create wealth and social welfare. This study examines the effect of inward FDI and human capital on innovative activities thus to provide an evidence on the interaction term between inward FDI and human capital using the ARDL bound test approach. The results show that inward FDI is negatively related with the innovation activities in the short run but is positively related in the long run. The presence of the human capital as an absorptive tool helps in mediating the effects of inward FDI on innovative activities in Malaysia. Meanwhile, it suggests that the injection of inward FDI require human capital to facilitate the innovation process in order to enhance the innovation capacity. To raise the contribution of inward FDI and human capital on innovative activities, there is a need to shift from the old trend assembly of goods and products into the knowledge-based economy that concentrates on research, knowledge and skills.

1. Introduction

The on-going discussion about Malaysia's future economic growth remains questionable to all walks of researchers. Malaysia's credibility to achieve the status of fully developed industrialized country by the year of 2020 is still being questioned. To get into a high-income country, Malaysia needs to adopt an innovative-led technology into the country. Previous research indicated that FDI leads to transfer of technology and other skills from foreign firms to local firms [40]. It is through FDI that supplementary resources such as capital, management, technology and personnel become

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available to host countries. These resources may stimulate existing economic activities in a host country that encourage internal competition, and raise the level of national output.

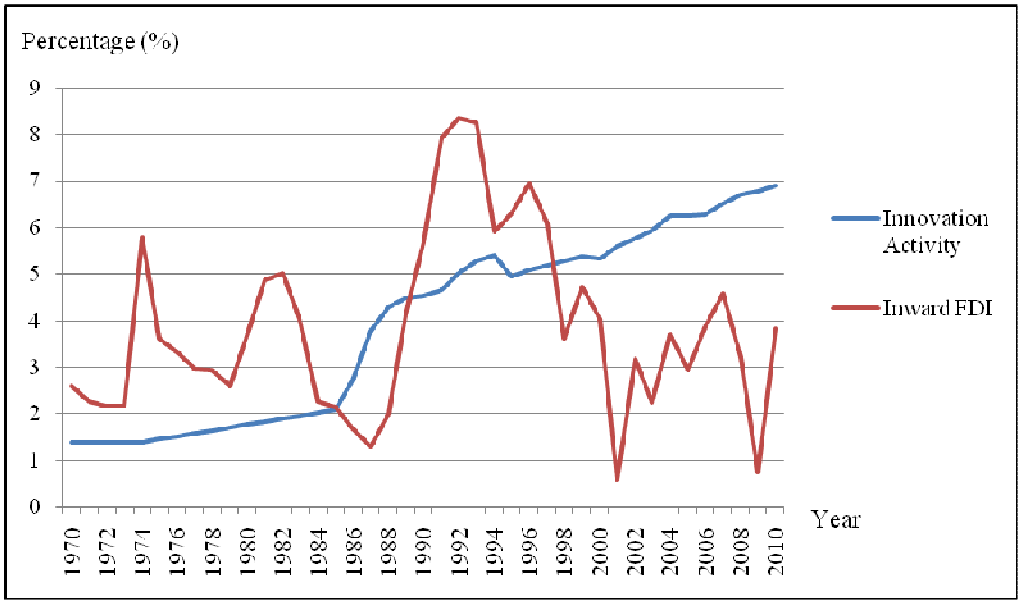

Fig. 1. Trend of Inward FDI, Human Capital and Innovation activities in Malaysia. *Source: World Development Indicators, 2010*

Figure 1 shows the trend of inward FDI, human capital and innovation activities in Malaysia from the year 1970 to 2010. As shown, innovation activities begin at its minimum point in the year of 1970 which recorded only 1.38% growth. However, the percentage increased steadily in the subsequent years until the year of 1995. Unfortunately, during the Asian Financial crisis from period of 1997 to 1998 had hindered the innovation activities in Malaysia. It was reported that, the firm that engaged with R&D faced difficulties in financing their research activities [41]. In 1997, there was a decline of 0.45% on innovation activities growth from the previous year. Surprisingly after the year of 1998, innovation activities had grown steadily over the following years until 2010.

In addition, inward FDI in Malaysia started fairly good during the year of 1970 which amounted for about 2.61% as a percentage of GDP. Due to the great recession in late 1970's, the FDI inflow in Malaysia faced instability from 1970 to 1980. In 1983, the total percentage of inward FDI over GDP is 4.02% which is lower than the previous year which amounted for about 5.01%. The slight decrease during the period of 1982 to 1983 was due to the world recession and electronic crisis. After the adoption of Industrial Master Plan (1986-1995), the inflow of FDI increased steadily from 4.13% in 1989 to 8.36% in 1992 before a drastic drop in 1998 which amounted to 3.62%. The drastic drop was due to the Asian financial crisis in which there was a newly introduced capital controls that had been confined into short-term capital flows and resulted it to become harder for short-term portfolio investors to sell their shares and keep the proceeds, and for offshore hedge funds to drive down the currency [4].

After recovered from the financial crisis, the inflow of FDI managed to improve and increase steadily. Unfortunately, due to the incidence that happened to the World Trade Center in the United States, the FDI inflow dropped drastically in 2001 which amounted only 0.59% [39]. After the incidence, the FDI inflow in Malaysia becomes volatile in the following year from 2002 to 2008. In 2009, there was a drastic drop again on FDI inflow. The condition was due to the financial crisis in the Unites States which was spread into world economy and affected Malaysia and other countries [30].

In comparison, there is only a significant effect of inward FDI and human capital on innovation activities. The effect can be seen during the year of 1997 to 1998 where the Asian financial crisis had spread in Malaysia. Due to the newly introduced capital controls that had been confined into short-term capital flows [4], firms that engaged with R&D activities faced difficulties in financing their research activities [40]. Therefore, this study is to examine whether inward FDI has an impact on innovation activities in Malaysia. Refer to the prior research, FDI is said to have significant effect on technological diffusion [17] and generate more innovation activities into the host country [15].

According to Fu [15], human capital can only contribute to innovation activities through interaction of other factors such as FDI. This means it interacts indirectly with the complements of other factors or plays a role as an absorptive component [10,14] in order to give a significant impact to innovation activities. However, there is still or yet no direct evidence to confirm that human capital helps in mediating the effects of inward FDI on innovation activities in Malaysia. Thus this study will try to justify the interaction term between inward FDI and human capital in promoting the innovation activities.

Many studies have been performed by researchers regarding the impact of FDI [9, 15, 16, 28, 44, 48] and human capital [3, 7, 8, 27, 42, 46] on innovation activities but there are a mixture of findings and conclusions on the relationship of FDI and human capital towards innovation activities. It appears that no exact consensus on the findings due to the different methodologies and techniques, data required, and the sample of economic structures. This research gap and the need to highlight the conditions that influence innovation performance motivate this study. This study argues that such incongruent findings are the result of incomplete theorizing about those effects that moderate the relationship between FDI, human capital and innovation activities.

The purpose of this study is to examine the link between inward FDI, human capital and innovation activities in Malaysia using the time series data from the period of 1970 to 2010. This study contributes to the literature in three aspects. First, it is hoped that the finding of this study will then lead to a better comprehension of the importance of simultaneous growth between FDI inflow, human capital and innovation activities as they directly affect each other. Second, this study also ultimately tries to justify the interaction between the role of human capital and FDI inflow towards innovation activities in order to enable the policy makers to develop a sound policy for the country. Third, the implication drawn from the results will provide useful information to attract new avenues for FDI and to build a better education system in Malaysia towards facilitating more innovation process.

This paper is arranged as follows. Section 1; Introduction. Section 2; Data and Methodology that applied to this study. Section 3; Empirical Results and Discussions and; lastly the Conclusion and implications of the role of FDI and Human Capital in Section 4.

2. Data and methodology

2.1. Data sources

This study employed annual data spanning from 1970 to 2010. In this study, data from the World Development Indicators 2010 (WDI) have been collected and compiled from various issues. The data set has an average time span of 41 years which therefore is long enough to capture the relationship between innovation activities and; FDI and human capital. The innovation activities data is obtained from the Intellectual Property Corporation of Malaysia and the number of patent granted data is being used in this study. The data for FDI were obtained through the United Nation Conference on Trade and Development while the data for human capital were taken from the Department of Statistics Malaysia. Meanwhile, for trade openness, financial liberalization and;

research and development expenditure, the data were taken from the World Development Indicators. Finally, all the variables are being transformed into natural logarithm.

2.2. Theoretical framework

Basically, the econometric analysis on innovation activities begins from a fundamental region's innovation production function. These studies pursue the innovation production function generated by Fu [15]. The suggested innovation function is as follows:

$$Y_t = \partial + \beta RDS_t + \beta RDP_t + \beta HC_t + \beta FDI_t + \mu_t \quad (1)$$

Where Y is innovation output, RDS is research and development expenditure, RDP is the number of people involved in research and development activity, HC is human capital, FDI is foreign direct investment and μ is the error term which has the normal property.

Fu [15] used 1-year lagged values for all explanatory variables and assumed that innovation production in a given year is reflected in the patents that are granted 1 year in the future. Following Jaffe [24], Fu [15] measured innovation output by number of patent granted. Research and development expenditure was also found to be significant determinant to innovation activities. Labor force skills are also recognized as a critical factor that contribute to firm innovation performance [22]. Therefore, Fu [15] added that the years of schooling (as a proxy of human capital) also have the potential to facilitate the innovation process. Through FDI, the industry and the technology in a region can be assimilated and thus can develop more innovation activity.

Later, Girma et al. [17] extended the model [15] in which they include the financial constraint (as a proxy of financial liberalization) into the model. Financial constraint is said to have a serious impediment to innovation activities [20]. Noted that, Bernard et al. [6] claimed that firms that are engaged in international trade are larger and more productive compared to the firms that serve domestically. So, we proposed the following model into this study.

2.2.1. The effects of FDI and human capital towards innovation activity

If the β_1 and β_2 are positive and significant, this implies that inward FDI (FDI) and Human Capital (HC) are significant to explain innovation activities given the control variables Trade Openness (TO), Financial Liberalization (FL) and Research and Development (RC) respectively.

$$I_t = \partial + \beta_1 FDI_t + \beta_2 HC_t + \beta_3 TO_t + \beta_4 FL_t + \beta_5 RD_t + \mu_t \quad (2)$$

In order to capture the role of Human Capital in mediating the effects of inward FDI, Fu [14] expand the model by including the interaction terms of FDI and Human Capital. As mentioned earlier, human capital is measured using the years of schooling. Cohen and Levinthal [11] added that, human capital can serve to enhance a region's capacity to absorb and recognize relevant external resources for innovation.
Supposed;

$$Y_t = \beta_0 + \beta_1 FDI_t + \beta_2 HC_t + \mu_t \quad (3)$$

Then, the interaction term is obtained;

$$Y_t = \beta_0 + \beta_1 FDI_t + \beta_2 HC_t + \beta_3 FDI_t HC_t + \mu_t \quad (4)$$

So, the propose model is as follows:

2.2.2. The interaction between the role of FDI and human capital in influencing innovation

$$I_t = \partial + \beta_1 FDI_t + \beta_2 HC_t + \beta_3 FDI_t HC_t + \beta_4 TO_t + \beta_5 FL_t + \beta_6 RD_t + \mu_t \quad (5)$$

If the coefficient of interaction term between FDI and HC (β_3) is positive and significant, this indicates that human capital helps in mediating the effects of inward FDI on innovation activities in Malaysia.

2.3. Estimation procedures

This study highlights two important levels. First is to test the unit root of the data by evaluate the stationary properties of both dependent and independent variables using Augmented Dickey-Fuller test (ADF) and Phillips-Perron test (PP). Although it has been argued in the literature that the ARDL bounds cointegration tests does not require the pre-testing of series for their order of integration, the need for series within an ARDL framework to satisfy the conditions required this study to test for the presence of unit root in the series [1]. Second is to test the existence of a relationship between dependent and a set of regressors using Bounds Test Approach based on the Autoregressive Distributed Lag (ARDL) modelling test.

2.3.1. The effects of FDI and human capital towards innovation activity

$$\Delta \ln(I)_t = \beta_1 \sum \Delta \ln(I)_{t-1} + \beta_2 \sum \Delta \ln(FDI)_{t-1} + \beta_3 \sum \Delta \ln(HC)_{t-1} + \beta_4 \sum \Delta \ln(TO)_{t-1} + \beta_5 \sum \Delta \ln(FL)_{t-1} + \beta_6 \sum \Delta \ln(RD)_{t-1} + v_1 \ln(I)_{t-1} + v_2 \ln(FDI)_{t-1} + v_3 \ln(HC)_{t-1} + v_4 \ln(TO)_{t-1} + v_5 \ln(FL)_{t-1} + v_6 \ln(FL)_{t-1} + \mu_t \quad (6)$$

According to Granger et al. [18], the significant error correction term indicates the long run causality between the dependent and the explanatory variables. However, this study follows Baharumshah et al. [5] where the ECT_{t-1} is the error correction term which represents the potential effects of departures from the long-run equilibrium. The values of error correction term will then be computed from the estimation of long run models.

Note that, the generation of ECT_{t-1} requires a complicated derivation on long run models, thus this study will simplify the process as shown above. Furthermore, as suggested by Pesaran et al. [36] and; Oskooee and Nasir [33], this study should consider the value of Akaike Information Criterion (AIC) to obtain the appropriate lag, but according to Lutkepohl [29] Schwarz Bayesion Criterion (SBC) model selection-criterion is more consistent than Akaike Information Criterion (AIC). Therefore, this study will use Schwarz Bayesion Criterion (SBC) in order to obtain the appropriate lag of the models.

2.3.2. The interaction between the role of inward FDI and human capital in influencing innovation activity

Since the FDI*HC interaction is simply the multiplication of FDI and HC, it is expected to distinguish a high correlation among them. So to avoid the multicollinearity problem, Hoque and Yusop [23] include only the interaction term and only one of the factor variables (either one) into

the model. But, our study follows Aiken and West [2] in which we obtained the estimated residuals (Ê) for the interaction term.
Suppose the expected value is:

$$\beta_0 + \beta_1 X_{n+1} \quad (7)$$

Then we estimate as:

$$Y_{n+1} = \beta_0 + \beta_1 (X_1 * X_2)_{n+1} \quad (8)$$

So, the proposed estimated value for the interaction term can be written as follows:

$$Y_{n+1} = \beta_0 + \beta_1 (FDI * HC)_{n+1} \quad (9)$$

The model (9) will then undergone the same process as in the first objective starts from the determining the long run coefficient until the short-run coefficient in order to capture the relationship.

2.3.3. Model diagnostic check

This study will attempt final diagnostic checking on the models. There are 5 tests that will be used in these procedures to test the standard assumptions of regression. Firstly, to check for the autocorrelation problem in the residuals, this study employs Breusch-Godfrey serial correlation LM test against first order autocorrelation. Secondly, to test the hypothesis of homoscedasticity of the residuals, the autoregressive conditional heteroscedasticity (ARCH) test will be used. After that this study will use Jarque-Bera normality test to test for the normality on the residuals. Then, this study will use Ramsey's RESET (Regression Specification Error) test to test the functional form of the models in order to identify any specification error.

Table 1
Augmented Dickey-Fuller and Phillip-Perron unit root test results

	ADF		**Phillip-Perron**	
		Level		
	Intercept	**Intercept and Trend**	**Intercept**	**Intercept and Trend**
LI_t	-0.9822	-2.101	-0.724	-1.413
$LFDI_t$	-3.650***	3.601**	-3.649***	-3.607**
LHC_t	-3.202**	-3.070	-2.968**	-3.136
LTO_t	-0.932	-2.208	-0.928	-1.959
LFL_t	-1.773	-1.972	-3.186**	-1.482
LRD_t	-1.487	-2.317	-1.696	-1.905
		First Difference		
LI_t	-3.816***	-3.824*	-2.901*	-2.751*
$LFDI_t$	-8.497**	-8.387*	-8.542**	-8.432**
LHC_t	-4.166**	-4.926*	-4.122**	-4.939**
LTO_t	-5.296***	-5.324***	-5.320***	-5.647***
LFL_t	-5.254***	-5.190***	-5.888***	-8.231***
LRD_t	-4.292***	-4.350***	-4.226***	-4.277***

The table shows the t-statistic of the respective unit root test. * 10% significant level, ** 5% significant level, ***1% significant level.

Finally, this study will apply the cumulative sum (CUSUM) and (CUSUM) squares test to examine the stability of the parameter. These procedures only applied to test the model stability and adequacy for ARDL bounds test approach for Model (9) and Model (18).

3. Results and discussions

3.1. Unit root tests

As referring to Table 1, the unit root tests proved that most variables are stationary in the first difference at 1%, 5% and 10% significant levels.

3.2. The impact of inward FDI and human capital on innovation activity

Table 2
ARDL Cointegration Test

Variables	**Lag Structure**
LI	(-1)
LFDI	(-2)
HC	(-1)
LTO	(-2)
LFL	(-1)
LRD	(-1)
F-statistic	5.339[.057]**

The F-statistic from Wald coefficient test is used to test the joint coefficient of the lagged variables in the ARDL model. The critical values were referred from table case 3: unrestricted intercept and no trend, Narayan (2005), page 1988. There are 6 explanatory variables for model (6). The ARDL cointegration test is estimated to analyze long-run correlation between the variables in the models.

Table 3
ARDL Coefficient for Long-Run Elasticity

Lag Structure		**(1,0,0,0,0,0)**
Independent Variables	**Dependent Variable**	***LIt***
	Coefficient	t-Statistic (P-value)
Constant	-7.378	(-1.220)[0.032]**
$LFDI_t$	0.256	(1.554)[0.030]**
LHC_t	0.011	(0.100)[0.021]**
LTO_t	8.084	(2.274)[0.030]**
LFL_t	-0.992	(-1.618)[0.016] **
LRD_t	0.764	(1.610)[0.018] **
Diagnostic Test		
Jarque-Bera		10.140[0.106]
LM test (1)		0.780[0.377]
ARCH test		0.144[0.704]
Ramsey RESET test		1.301[0.254]
CUSUM test		Stable
CUSUMSQ test		Stable

Notes: t-value in the parentheses (...) and p-value for diagnostic test in parentheses [...].***significant at 10%, **significant at 5%, ***significant at 1%.

Table 2 reports the results of ARDL cointegration test for model (6). With 5% confidence level, it was discovered that the test statistic of the model 5.339, is greater than the upper bound critical value, 4.324 of bounds test. As a result, the models are cointegrated and prove that there is a long-run correlation among the variables.

As shown in Table 3, the results infer that there is an existence of a long-run coefficient between inward FDI and Human Capital towards innovation activities. This is due to the significant relationship between $LFDI_t$ and LHC_t towards LI_t. The effect of $LFDI_t$ is positive (0.256), which imply that inward FDI helps in accelerating innovation activities in the long-run. This result suggests that FDI is an important vehicle for technology transfer. Furthermore, the effect of LHC_t is also positive which implies that an increasing number of enrollments in tertiary level will facilitate innovation activities by 0.011%.

Error correction Mechanism (ECM) is employed to check the short run relationship among LIt, LFDIt, LHCt, LFLt and LRDt. The t-statistics of ECM is significant which shows that there is a short run relationship among the variables. The results are incorporated in Table 4.

Table 4
Error correction model

Variables	Coefficient	Standard Errors	t-values
Constant	0.952	0.924	1.030**
ΔFDI_t	-0.033	0.016	-2.052**
ΔHC_t	-0.001	0.015	-0.100**
ΔTO_t	-1.044	0.551	-1.894*
ΔFL_t	0.128	0.043	2.968***
ΔRD_t	-0.098	0.048	-2.025*
ECM_t (-1)	-0.129	0.059	-2.159**

Notes: ***significant at 10%, **significant at 5%, ***significant at 1%.

The probability of the ECM_t (-1) is 0.039 which can be conclude that the short-run cointegration exists in the model and significant at 5% significant level. The estimated coefficient of ECM_t (-1) is -0.129 suggest that convergence to equilibrium of Malaysia's innovation activities in one year is corrected for about 12.9% in the next year. Furthermore, the results also indicate that inward FDI (ΔFDI_t), Human Capital (ΔHC_t) and other explanatory factors (ΔTO_t, ΔFL_t, and ΔRD_t) are statistically significant in the short run.

3.3. Interaction between inward FDI and human capital

The ARDL cointegration test is estimated again to analyze the long-run cointegration among the interaction of inward FDI and human capital on innovation activities. Table 5 shows the results of ARDL cointegration test for model (9). With 5% confidence level, it was discovered that the test statistic of the model, 5.899 is bigger than the upper bound critical value, 4.209 of bounds test. As a result, the models are cointegrated and prove that there is a long-run cointegration among the variables. The F-statistic from Wald coefficient test is used to test the joint coefficient of the lagged variables in the ARDL model. The critical values were referred from table case 3: unrestricted intercept and no trend, Narayan (2005), page 1988. There are 7 explanatory variables for model (9).

As shown in Table 6 below, the inclusion of the interaction between inward FDI and human capital improves the overall performance of the regression model. Such specification that adopted in regression model shows that the coefficient on inward FDI and the coefficient on Human Capital is positive thus yields the positive interaction term.

Table 5
ARDL cointegration test

Variables	Lag
LI	(-1)
LFDI	(-1)
HC	(-1)
LFDIHC	(-1)
LTO	(-1)
LFL	(-1)
LRD	(-1)
F-statistic	5.899[0.013]**

The values of these regression coefficients signify that the percentage increase in human capital growth will lead to an increasing of 0.007 in the $FDIHC_t$-to-LI_t ratio. Therefore, the coefficient of other control variables namely Trade Openness (LTO_t), Financial Liberalization (LFL_t) and R&D Expenditure (LRD_t) is significant to give impact on innovation activities given positive effects of LTO_t, and LRD_t; negative effects of LFL_t respectively. Given the interaction term, there is still a negative relationship between financial liberalization (LFL_t) on innovation activity (LFL_t).

Table 6
ARDL Coefficient for Long Run Elasticity

Lag Structure		**(1,0,0,0,0,0,0)**
Independent Variables	**Dependent Variable**	***LIt***
	Coefficient	t-Statistic (P-value)
Constant	-7.610	(-1.174)[0.050]**
$LFDI_t$	0.264	(1.426)[0.034]**
LHC_t	0.017	(0.134)[0.014]**
$LFDIHC_t$	0.007	(0.109)[0.003]***
LTO_t	8.162	(2.214)[0.035]**
LFL_t	-0.979	(-1.5591)[0.030]**
LRD_t	0.747	(1.491)[0.047]**
Diagnostic Test		
Jarque-Bera		10.0279[0.507]
LM test (1)		0.787[0.375]
ARCH test		0.136[0.711]
Ramsey RESET test		1.296[0.255]
CUSUM test		Stable
CUSUMSQ test		Stable

Notes: t-value in the parentheses (...) and p-value for diagnostic test in parentheses [...].***significant at 10%, **significant at 5%, ***significant at 1%.

After estimating the long-run coefficient of the variables, the Error Correction Model (ECM) will be used to determine the existence of the short-run cointegration. The probability of the ECM_t (-1) is 0.042 which can be conclude that the short-run cointegration exists in the model and significant at 5% significant level. The estimated coefficient of ECM_t (-1) is -0.129 suggest that convergence to equilibrium of Malaysia's innovation activities in one year is corrected for about 12.9% in the next year. Furthermore, the results also indicate that the interaction between inward FDI and Human Capital, $\Delta FDIHC_t$ and other explanatory factors (ΔFDI_t, ΔHC_t, ΔTO_t, ΔFL_t, and ΔRD_t) are statistically significant in the short-run. This can be concluded that the interaction between inward FDI and Human Capital are statistically important to explain the short-run effect on innovation activities in Malaysia.

Table 7
Error Correction Model

Variables	Coefficient	Standard Errors	t-values
Constant	0.985	0.984	1.000**
ΔFDI_t	-0.034	0.019	-1.764**
ΔHC_t	-0.002	0.016	-0.134**
$\Delta FDIHC_t$	-0.001	0.009	-0.109**
ΔTO_t	-1.056	0.571	-1.847*
ΔFL_t	0.126	0.045	2.775***
ΔRD_t	-0.096	0.052	-1.834*
$ECM_t(-1)$	-0.129	0.060	-2.126**

Notes: ***significant at 10%, **significant at 5%, ***significant at 1%.

In addition, the estimate regression for Model (6) and Model (9) had undergone the diagnostic tests to analyze the stability. The test that had been used are; Jarque-Bera Normality test, Breusch-Godfrey serial correlation LM test (testing for first order autocorrelation), ARCH test (homoscedasticity test), Ramsey RESET test, CUSUM test and CUSUM square test. Based on the tests employed, the regression model successfully obtained the same results. Firstly, the residuals of the model are normally distributed and free from autocorrelation problems in first order autocorrelation. Furthermore, the residuals are all homoscedastic. Moreover, the Ramsey RESET test concludes that the model is in correct functional forms. Lastly, the CUSUM and CUSUM square test agreed to show the model is stable in 5% significant level. The stability test of CUSUM and CUSUM square figures for Model (6) and Model (9) can be referred in Appendix A and Appendix B respectively.

4. Major findings

In particular, this study examined whether inward FDI and human capital will lead to innovation activities in Malaysia. Therefore, this study also tests whether inward FDI interacts with human capital to affect innovation activities. This study had discovered that the impact of inward FDI and human capital on innovation activity can be interpreted in two regimes; the short-run and the long-run. Taken as a whole, the hypothesis is rejected in both short-run and in the long-run.

Based on the empirical results, inward FDI gave negative impact on innovation activities in the short run. This indicates that the flow of FDI does not significantly accelerate innovation activities in Malaysia during a short period of time which possibly due to the inconstant market price, macroeconomic imbalances, unpleasant governance and less liberalization economic reforms. By contrast, inward FDI positively related to innovation activities in the long-run. This result showed that inward FDI plays a crucial role in promoting innovation in Malaysia. This result has supported the previous studies attempted by Cheung and Lin [9], Fu [15], Girma et al. [16] and Liu [28], who found that FDI is significant determinant of innovation. Thus, in order to attract FDI and make FDI work for development, governments need to address a series of market failures related to the market for skills and technology, and need to overcome information barriers.

The negative effect of human capital in the short-run shows that innovation will not take place in short period of time because it requires more time for human capital to generate new methods and techniques in order to produce new technology in the country [37]. On the other hand, the positive effects of the interaction between inward FDI and human capital on innovation activities shows that human capital is a crucial absorptive tool [10,14] in mediating the effect of inward FDI. This implies that FDI will only serve as a crucial driver for innovative activities if there are the strength of local absorptive capacity and other complementary assets in the host region [15].

5. Conclusion

Government planning is the most crucial agenda in determining the direction of an economy. The literature regarding on the impact of inward FDI and human capital apparently is insufficient in contributing the betterment of the fiscal policy in such economy. In most developing countries, the governments have liberalized their FDI regime to some degree; some have started earlier and advanced further than others. However, host country governments cannot simply stand back and assume that liberalization is sufficient to ensure that FDI will come to their country in the right quantity that FDI will have positive effects on the country. In order to attract FDI and thus to make FDI work for the development of the country, a series of market failures related to the market for skills and technology need to be address by the government and therefore to overcome information barriers.

The findings suggest that Malaysia were probably lack in terms of innovation capacity, per capita income growth and in implementation of financial liberalization policies in financing the R&D activities. Numerous research studies had shown that country that surges its internal capability [43] can effectively assimilate and utilize knowledge from outside. With respect to knowledge institutions, it may be argued that countries that are able to utilize and assimilate this kind of sophisticated knowledge will be in a better position to adjust more rapidly to the changing environment [47]. Malaysia would benefit probably more from technological transfer if the government shifts from the old trend assembly of goods and products into the knowledge-based economy which concentrates on research, knowledge and skills. Hence, the policy maker as well as the education affiliates should evolve in developing a more conducive education system to support human capital development in developing and sustaining the supply of skilled human capital to contribute to country's ambition to become a fully developed and modern nation by the year 2020.

Although this paper has brought a better understanding on how inward FDI affect innovation activities and how human capital act as an absorptive capacity, some limitations still remain. Notably, innovation process can occur at any stage and in various natures. This study only includes specific factors that lead to innovation activities and with the lacking of reliable data limits the scope of this study. Therefore, further research should examine the level of education attainment that possesses the highest innovation climate in order to capture the threshold dimension. Thus, studies on innovative of work behavior and innovation of climate among human capital should be further analyzed.

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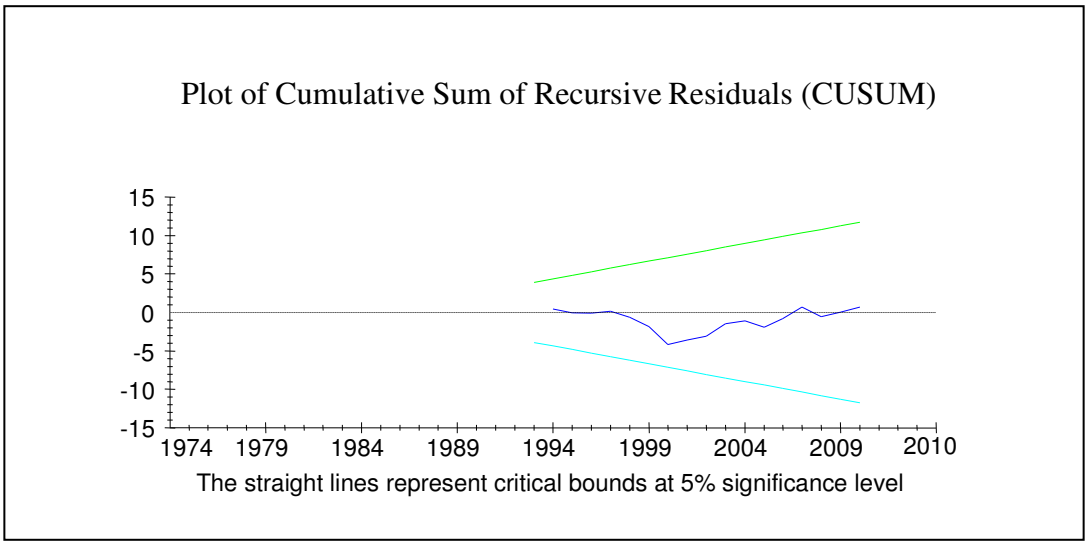
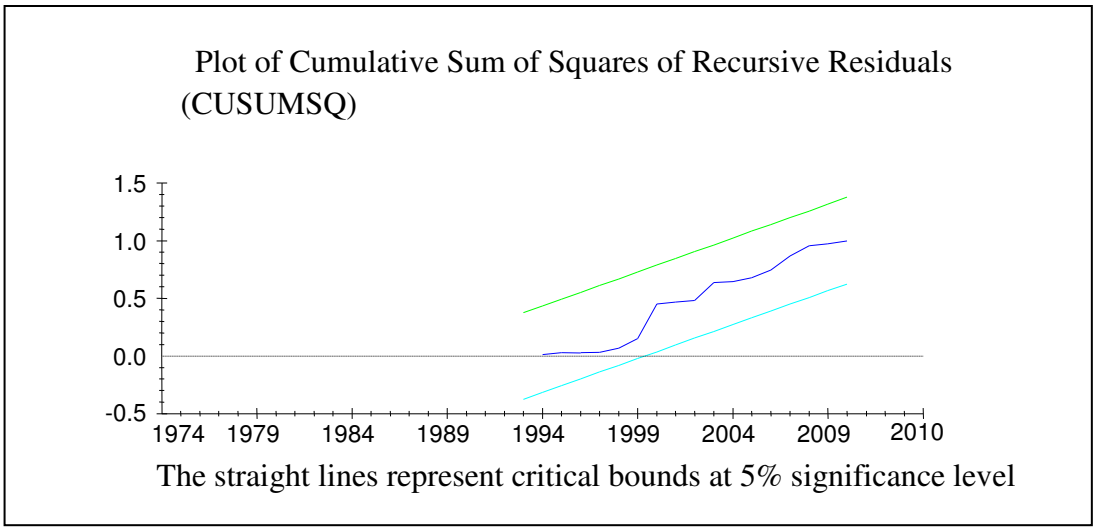
Appendix A

The plots of CUSUM and CUSUM of Squares statistics for Model (6)





Appendix B

The plots of CUSUM and CUSUM of Squares statistics for Model (9)