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Issn 1441-5429

Discussion paper 22/09

The Determinants of Inward Foreign Direct Investment: the Case of Malaysia

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ABSTRACT

This study empirically explores the role of corruption, and the impact of China joining the WTO in 2001 on inward foreign direct investment (FDI) in Malaysia. From the empirical tests, this study suggests:- (1) FDI and its determinants are cointegrated; (2) Openness, interest rate, inflation rate, the joining of China into the WTO, and the level of corruption are the major determinants explaining inward FDI in Malaysia, both in the long-run as well as short- run. In general, these findings do provide the policymakers with empirical information about the policy formation on the variables those stimulating FDI in Malaysia.

Keywords: Corruption; Foreign Direct Investment; Malaysia

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I. INTRODUCTION

Since the 1980s, FDI in the global economy has been experiencing rapid and steady growth (Chakrabarti, 2001; Huang, 2002). The inward stock of FDI to developing countries (as a share of GDP) rose from 12.4% in 1980 to 29.3% in 2000, and 31.4% in 2003 (but, it decreased to 26.4% in 2004) as reported by UNCTAD(2004 annex table B-6; 2005 annex table B-3) More precisely, Malaysia, Thailand and the Philippines are among the Association of Southeast Asian Nation (ASEAN) founding countries described as the most popular destinations for FDI (Ismail and Yussof, 2003). The late 1980s witnessed the period of most intense foreign investment activity when firms from Japan and the Newly Industrializing Economies (NIEs) were seeking production bases abroad to escape appreciating home currencies and loss of preferential access to many Organization of Economic Cooperation and Development (OECD) markets (Thomsen, 1999). It initiates the continuing research in examining the causes and consequences of foreign ownership since FDI has become an important source of funds for many developing nations (Moosa, 2002). As Table 1 shows, there are many factors have been identified and tested either from the microeconomics or macroeconomics perceptive in studying the determination of (FDI) using country-wise data. And, the results are varying among the studies. Interestingly, the literature on empirical determinants of FDI in Malaysia is not only wide and varied, but also controversial such as Yusop and Choong (2002), Ismail and Yussof (2003), and Choong and Lim (2007)

Yusop and Choong (2002) examine the factors (GNP, exchange rate, interest rate differential, current account deficit, uncertainty, and inflation) influencing the FDI on the Malaysian manufacturing sector for the period 1965-1999. The FDI and its determinants are cointegrated. In the short-run, the GNP, current account deficit, and inflation are found to be crucial in the FDI. In addition, Ismail and Yussof (2003) investigate the relationship between labor market competitiveness and FDI inflows for three ASEAN member countries, namely Malaysia, Thailand, and the Philippines. The study finds that market size and openness are important determinants, while manufacturing wage rate is not a matter for FDI determination in Malaysia - manufacturing sector over the period 1985-1999. In recent, Choong and Lim (2007) re-examine the role of market size, skilled labor and liberalization process on the FDI in Malaysia. The study covers annual data between 1970 and 2001. The results suggest that local market size is significant variable, and the competitor's market size - China shows a negative impact on the FDI inflow. And, the skilled labor and liberalization process have an positive impact on the inflow of FDI in Malaysia.

Table 1: Summary of Selected Empirical Studies: Determinants of FDI

Determinants of FDI	Impact on FDI:- Positive	Negative	Statistically insignificant
ECONOMICS			
Market size & return on investment	1. Schneider & Frey (1985) 2. Ancharaz (2000) (non-SSA) 3. Chakrabarti (2001) 4. Asiedu (2002) (non-SSA) 5.Eicher (2002)	1.Choong & Lim (2007) [Market size of competitor – China]	1. Urata & Kawai (2000) 2. Asiedu (2002) (SSA)

	6. Ismail & Yussof (2003) 7. Choong & Lim (2007)		
Wages		1. Schneider & Frey (1985) 2. Lucas (1993) 3. Hassan (2000) 4. Urata & Kawai (2000) 5. Chakrabarti (2001)	1. Eicher (2002) 2. Ismail & Yussof (2003)
Skilled labour	1. Ancharaz (2000) 2. Choong & Lim (2007)	1. Ismail & Yussof (2003)	1. Schneider & Frey (1985) 2. Urata & Kawai (2000)
Openness	1. Ancharaz (2000) 2. Asiedu (2002) 3. Eicher (2002) 4. Ismail & Yussof (2003)	1. Chakrabarti (2001)	
Infrastructure	1. Ancharaz (2000) 2 Urata & Kawai (2000) 3. Asiedu (2002) (non-SSA) 4. Eicher (2002)		1. Asiedu (2002) (SSA)
Country's level of development (GDP or GNP) and growth	1. Schneider & Frey (1985) 2. Ancharaz (2000) 3. Hassan (2000) 4. Chakrabarti (2001) 5. Yusop & Choong (2002) 6. Chowdury & Mavrotas (2005)		
Balance of payments deficit		1. Schneider & Frey (1985) 2. Yusop & Choong (2002)	
Trade balance (exports-imports)		1. Hassan (2000) 2. Chakrabarti (2001)	
Tax rate	1. Chakrabarti (2001)	1. Lucas (1993) 2. Hassan (2000)	
Inflation rate		1. Schneider & Frey (1985) 2.Urata & Kawai (2000) 3.Yusop & Choong (2002)	
Real exchange rate (real depreciation)		1. Ancharaz (2000) 2. Chakrabarti (2001)	
Price of capital (interest rate)	1. Ismail & Yussof (2003)		
R&D expenditure		1.Ismail & Yussof (2003)	
Domestic consumption spending	1. Lucas (1993)		
Foreign exchange reserves coverage	1. Lucas (1993)		
Liberalization process	1.Choong & Lim (2007)		
POLITICAL			
Bilateral aid from Western countries & multilateral aid	1. Schneider & Frey (1985)		
Political stability and transparency	1.Schneider & Frey (1985) 2. Ancharaz (2000)		

	3. Eicher (2002)		
Corruption		1. Hines (1995) 2. Eicher (2002) 3. Smarzynska & Wei (2002)	1. Wijeweera & Dollery (2009)
Government size		1. Ancharaz (2000)	
Good governance	1. Urata & Kawai (2000)		

The main objective of this study is to empirically examine and estimate the influences of a group of key determinants of FDI in Malaysia both in the long-run and short-run. Beside the conventional variables such as market size, openness, infrastructure, interest rate, exchange rate, and inflation rate, this study extends the works by Yusop and Choong (2002), Ismail and Yussof (2003), and Choong and Lim (2007) with incorporating two potentially factors viz. the level of corruption (capturing political position), and the event of China joining the WTO in 2001. Tentatively, impressionistic justifications of including these two additional variables as determinants to FDI are documented below.

1. *Corruption variable* - From the microeconomics perception, political stability and risk are generally considered by foreign investors in deciding whether to invest or not in a particular location (Dunning, 1993; Moosa, 2002). Generally, political risk refers to political actions that may have adverse impact on the operations of companies, such as governmental takeover of property, operational restrictions impeding their abilities to undertake certain actions, and riots that disrupts sales or causes damage to property or personnel (Daniels, *et al.,* 2002). And, these political risk factors may negatively affect the cash flows of FDI projects in which an MNE perceives the political situation of a country to have adverse effects on the economic viability of its value-added activity, it will likely reduce investment into the particular country (Dunning, 1993). One of the sources of political risk is corruption, which is classified under social instability (Dunning, 1998; Wafo, 1998; Moosa, 2002). Myrdal (1968) has argued that bribes contribute to inefficiency and the possibility of collecting bribes provides the wrong incentives to create artificial bottlenecks. Literature survey shows that the corruption variable which represents political risk has a negative impact on economic growth which will then lead to less inward FDI via. *Sanding the wheel* effects (King, 2003; Daniels, *et al.,* 2002; Moosa, 2002; Myrdal, 1968). In addition, there are several theoretical justifications described by Smarzynska and Wei (2002) about the influences of corruption on inward FDI viz. corruption makes local bureaucracy less transparent and hence acts as a tax on foreign investors; corruption affects the decision to make on a local partner; corruption increases the value of using a local partner to cut through the bureaucratic maze; and corruption decreases the effective protection of investor's intangible assets and lowers the probability that disputes between foreign and domestic partners will be adjudicated fairly, which reduces the value of having a local partner (see Smarzynska and Wei, 2002). Hines (1995), Eicher (2002), and Smarzynska and Wei (2002) found negative effects of corruption on FDI that is corruption reduces inward FDI, while Wijeweera and Dollery (2009) found no statistically significant impact of corruption on FDI.

2. *China jointing WTO in 2001* - Policymakers throughout the region are convinced that the rise of China has contributed to the *hollowing out* phenomenon, with foreign and

domestic investors leaving their countries and investing in China instead. According to the statistics released by the Ministry of Foreign Trade and Economic Co-operation – China (MOFTEC, 2006), a year after China jointing WTO, FDI in China has been reported to reach a new high of US$46.85 billion. Consequently, China has been taking steps to liberalise its trade investment regime as a more open economy would attract more foreign investment; thus by adopting a more open attitude towards FDI, foreign investors could more easily gain access to the large Chinese market which serves as a great market potential for their products (Dunning, 1993). Observably, the bulk of FDI would be concentrated in China, leaving other countries to experience a drop in inward FDI. Therefore, this issue plays an influential role in affecting inward FDI to a small open economy such as Malaysia, at least empirical consideration.

By and large, this study contributes to the literature, knowledge and economic policymaking in the following ways. Firstly, from the literature search, the existing studies on inward FDI in Malaysia have not included these two variables into consideration - corruption, and China jointing WTO (i.e. Yusop and Choong, 2002; Ismail and Yussof, 2003). The relationship between these variables and inward FDI in Malaysia is ambiguous. This study not only examines and estimates the conventional determinants of FDI but also a check on the impacts of China jointed WTO in 2001, and the corruption variables in which they are not previously included in the existing studies (i.e.Yusop and Choong, 2002; Ismail and Yussof, 2003). Thus, this study does provide a better understanding about the influences of corruption and China jointing WTO in 2001 to the inward FDI in Malaysia, at least from the empirical dimension. Secondly, most of the existing studies that considered corruption variable(s) (i.e. Hines, 1995; Eicher, 2002; Smarzynska and Wei 2002) except for Wijeweera and Dollery (2009) have employed firm-level data from the perception of microeconomics. However, this study provides a better understanding about the influences of corruption on FDI in macroeconomics perception via aggregate macroeconomics variables for the case of Malaysia. Thirdly, this study examines the impacts of China jointing WTO and corruption on the inflow of FDI in Malaysia. It provides a cleaner visual of the effects of inclusion of the two variables into FDI models, systematically. Fourthly, this study applies the mostly-applied time series economics methods - the ARDL approach to cointegration tests (or bounds testing procedure) (Pesaran, *et al*., 2001), and error correction models (ECM) (Engle and Granger, 1987) to FDI equations. In general, these methods have the advantageous of pre-testing problem i.e. unit root tests, in which the unit root tests can be ignore since the critical values stimulated are applicable for all $I(1)$, $I(0)$, or mixture integrated variables. Moreover, the ECM approach is appropriate for the case of small sample study as such the present study. According to Ghatak, *et al.*, (1997), empirical analysis in small samples have shown that statistically significant error-correction terms provide further evidence to support the presence of a '*genuine*' long-run relationship. Finally, based on the results and findings obtained from the analyses, this study does highlight the importance of factors those explaining the inward FDI in Malaysia, especially the influences of the China jointed WTO, and the corruption.

Next section provides a brief description about the models, variables, and unit root tests results. Section 3 reports and discusses the results. Section 4 concludes the study.

II. MODELS, DATA AND UNIT ROOT TEST

This section describes the models employed in this study, and discusses the data and unit root properties of the variables in the FDI determination equations. At first, this study does not develop or propose a new framework to examine the determination of FDI in Malaysia, rather to extend the existing models (i.e. Yusop and Choong, 2002; Ismail and Yussof, 2003) by further incorporating two relevant variables, namely corruption, and China jointed WTO. Basically, the initial model of FDI determination is gathered through the literature can be written as Model 1 which is constructed based on the variables used in the existing studies, and due to their availability from the official databases (i.e. International Financial Statistics, Economic Report, Key Indicators, and so on). The expected relationships (either positive or negative) between FDI and the determinants in accordance with economic theory and common empirical findings are indicated in superscript form.

Model 1 (basic model)
$FDI = FDI(GDPC^{(+)}, O^{(+)}, INS^{(+)}, IR^{(-)}, ER^{(+)}, INF^{(-)})$

The remaining specifications are to consider the influences of China jointed WTO in 2001, and corruption variables, sequentially. Model 2 includes a zero-one dummy to capture China jointed WTO in 2001 (CW), while Model 3 only adds corruption variables (CI and CD). Model 4 looks at the overall (all) factors those expected to determine inward FDI in Malaysia.

Model 2 (China WTO)
$FDI = FDI\ (GDPC^{(+)}, O^{(+)}, INS^{(+)}, IR^{(-)}, ER^{(+)}, INF^{(-)}, CW^{(-)})$

Model 3 (corruption)
$FDI = FDI(GDPC^{(+)}, O^{(+)}, INS^{(+)}, IR^{(-)}, ER^{(+)}, INF^{(-)}, CI^{(+,-)}, CD^{(+,-)})$

Model 4 (China WTO and corruption)
$FDI = FDI(GDPC^{(+)}, O^{(+)}, INS^{(+)}, IR^{(-)}, ER^{(+)}, INF^{(-)}, CW^{(-)}, CI^{(+,-)}, CD^{(+,-)})$

where FDI = inflow of FDI; GDPC = GDP per capita; O = trade openness; INS = infrastructure; IR = interest rate; ER = exchange rate; INF = inflation rate; a zero-one dummy variable captures the event of China joining the WTO (CW), and also corruption levels (corruption index increase indicates less corruption CD, and corruption index decrease indicates more corruption CI).[†]

Due to data availability from several official sources as mentioned above, the data cover annual observations from the year of 1970 to 2005. The variables' definition and their sources are described as below. **FDI** denotes inflow of real FDI that is nominal FDI divided by GDP deflator index. Inward FDI data (measured in Rigggit million) are obtained from Key Indicators 2006 (Asian Development Bank, 2006). **GDPC** is an indicator of market size (nominal GDP divided by population in midyear estimates and then converted to real terms (divided by GDP deflator index). Data are obtained from IFS (International Monetary Fund, 2006). **O** refers to level of trade openness to an economy, which is based on the ratio of exports and imports of goods and services to GDP. **INS** is the ratio of development and operating expenditure of the government on infrastructure to GDP. The data on development and operating expenditure which proxies the level of infrastructure are taken from the various issues of Economic Report

[†] The determinants considered in these models are subjected to the data availability for the context of Malaysia. Again, not all of the variables listed in Table 1 are included.

(Ministry of Finance, Malaysia). **IR** is the average lending rate (proxy to interest rate), and it is measured in real terms. **ER** is the period average of exchange rate in terms of Ringgit per $US. **INF** is the inflation rate. **CW** is a zero-one dummy variable which captures the event of China joining the WTO. The years when China has not joined the WTO were assigned zero while the years when it joined WTO, from 2001 onwards, were assigned one. **CD** represents corruption decreases, while **CI** represents corruption increases over the respective years. Appendix A discusses the corruption data and also documents the explanation of using zero-one dummy variables to capture corruption in Malaysia. All relevant variables are measured in real term (in Ringgit) and the implicit price deflators are in 2000 constant prices.

Table 2 presents the results of the unit root tests i.e. ADF and PP tests in order to identify the degree of integration, *I*(d) of the variables, especially to assume the dependent variable, FDI is nonstationary or *I*(1). Both unit root tests consistently suggest that all the variables are nonstatioanry or in *I*(1) processes. Conversely, although the ARDL procedure for cointegration testing (Pesaran, *et al*, 2001) can be applied without the pre-testing procedure (i.e. unit root tests) on the individual variable(s), but the dependent variable should be confirmed (tested) as nonstatioanrly or *I*(1) variable. Besides, the ARDL approach to cointegration, this study also considers other testing approaches for comparison purpose - Engle and Granger (1987) residual based approach, and Johansen's (Johansen, 1988; Johansen and Juselius, 1990) multivariate cointegration test (system approach). Since these methods of cointegration (i.e. ARDL testing procedure, Engle-Granger tests, Johansen's multivariate tests, and ECM tests) are widely applied, and well documented in the literature, this study does not discuss them in details about their testing procedure, hypotheses, and interpretation.[‡]

Table 2. Results of ADF and PP Unit Root Tests

Variables	ADF test (Dickey and Fuller, 1979)		PP test (Phillips and Perron, 1988)		Conclusion at 1% level
	Level	First difference	Level	First difference	
*Ln*FDI$_t$	-2.17 (0)	-7.24 (0)	-2.17 (0)	-7.16 (2)	*I*(1)
	[0.49]	[0.00]***	[0.49]	[0.00]***	
*Ln*GDPC$_t$	-1.86 (0)	-4.81 (0)	-2.00 (2)	-4.82 (1)	*I*(1)
	[0.65]	[0.00]***	[0.58]	[0.00]***	
*Ln*O$_t$	-3.13 (1)	-5.27 (0)	-3.34 (3)	-7.50 (17)	*I*(1)
	[0.12]	[0.00]***	[0.08]	[0.00]***	
*Ln*INS$_t$	-3.14 (0)	-7.52 (0)	-3.14 (0)	-7.74 (2)	*I*(1)
	[0.11]	[0.00]***	[0.11]	[0.00]***	
*Ln*IR$_t$	-2.16 (1)	-4.52 (0)	-1.45 (5)	-4.36 (7)	*I*(1)
	[0.50]	[0.00]***	[0.83]	[0.00]***	
*Ln*ER$_t$	-2.39 (0)	-4.46 (0)	-2.39 (7)	-4.35 (6)	*I*(1)

[‡] In general, cointegration testing approach is used to test whether there is equilibrium (or long run relation) exists between the FDI and its determinants as suggested by the theory – at least one long run relations. From the econometrics methodology, the standard statistical inferences of OLS will no longer be valid if the involved non-stationary time-series data are not cointegrated or do not have any long-run relationship i.e. 'spurious regression' (Engle and Granger, 1987).

	[0.38]	[0.00]***	[0.38]	[0.00]***	
LnINF$_t$	-3.15 (0)	-5.89 (0)	-3.20 (2)	-6.06 (5)	$I(1)$
	[0.11]	[0.00]***	[0.10]	[0.00]***	

Notes: The values in ( ) under both tests indicate the lag lengths. Values in [ ] are Mackinnon's (1996) one-sided p-values. *** denotes significance at 1%.

If there is a long-run relation or equilibrium between FDI and its determinants, the static (long-run) regression equations can be estimated by OLS procedure as following:

Model 1 (basic model)

$$LnFDI_t = a_0 + a_1 LnGDPC_t + a_2 LnO_t + a_3 LnINS_t + a_4 LnIR_t + a_5 LnER_t + a_6 LnINF_t + e_t$$

Model 2 (China WTO)

$$LnFDI_t = a_0 + a_1 LnGDPC_t + a_2 LnO_t + a_3 LnINS_t + a_4 LnIR_t + a_5 LnER_t + a_6 LnINF_t + a_7 CW + e_t$$

Model 3 (corruption)

$$LnFDI_t = a_0 + a_1 LnGDPC_t + a_2 LnO_t + a_3 LnINS_t + a_4 LnIR_t + a_5 LnER_t + a_6 LnINF_t + a_7 CD + a_8 CI + e_t$$

Model 4 (China WTO and corruption)

$$LnFDI_t = a_0 + a_1 LnGDPC_t + a_2 LnO_t + a_3 LnINS_t + a_4 LnIR_t + a_5 LnER_t + a_6 LnINF_t + a_7 CW + a_8 CD + a_9 CI + e_t$$

where e is residual and Ln is natural logarithm. The log-log specification is employed so that the estimated parameters can be directly interpreted as elasticities.

Then, error-correction model (ECM) can be estimated in order to capture the short-run (dynamics) effects of the determinants on FDI in Malaysia. Again, the error correction term, EC_{t-1} tells the speed of adjustment (see Engle and Granger, 1987) toward equilibrium. They are written as follows.

Model 1 (basic model)

$$\Delta LnFDI_t = a_0 + \sum_{i=1}^{m} a_{1i} \Delta LnFDI_{t-i} + \sum_{i=1}^{m} a_{2i} \Delta LnGDPC_{t-i} + \sum_{i=1}^{m} a_{3i} \Delta LnO_{t-i} + \sum_{i=1}^{m} a_{4i} \Delta LnINS_{t-i} + \sum_{i=1}^{m} a_{5i} \Delta LnIR_{t-i} + \sum_{i=1}^{m} a_{6i} \Delta LnER_{t-i} + \sum_{i=1}^{m} a_{7i} \Delta LnINF_{t-i} + a_8 EC_{t-1} + u_t$$

Model 2 (China WTO)

$$\Delta LnFDI_t = b_0 + \sum_{i=1}^{m} b_{1i} \Delta LnFDI_{t-i} + \sum_{i=1}^{m} b_{2i} \Delta LnGDPC_{t-i} + \sum_{i=1}^{m} b_{3i} \Delta LnO_{t-i} + \sum_{i=1}^{m} b_{4i} \Delta LnINS_{t-i} + \sum_{i=1}^{m} b_{5i} \Delta LnIR_{t-i} + \sum_{i=1}^{m} b_{6i} \Delta LnER_{t-i} + \sum_{i=1}^{m} b_{7i} \Delta LnINF_{t-i} + b_8 CW + b_9 EC_{t-1} + u_t$$

Model 3 (corruption)

$$\Delta LnFDI_t = c_0 + \sum_{i=1}^{m} c_{1i}\Delta LnFDI_{t-i} + \sum_{i=1}^{m} c_{2i}\Delta LnGDPC_{t-i} + \sum_{i=1}^{m} c_{3i}\Delta LnO_{t-i} + \sum_{i=1}^{m} c_{4i}\Delta LnINS_{t-i} +$$
$$\sum_{i=1}^{m} c_{5i}\Delta LnIR_{t-i} + \sum_{i=1}^{m} c_{6i}\Delta LnER_{t-i} + \sum_{i=1}^{m} c_{7i}\Delta LnINF_{t-i} + c_8 CD + c_9 CI + c_{10} EC_{t-1} + u_t$$

Model 4 (China WTO and corruption)

$$\Delta LnFDI_t = d_0 + \sum_{i=1}^{m} d_{1i}\Delta LnFDI_{t-i} + \sum_{i=1}^{m} d_{2i}\Delta LnGDPC_{t-i} + \sum_{i=1}^{m} d_{3i}\Delta LnO_{t-i} + \sum_{i=1}^{m} d_{4i}\Delta LnINS_{t-i} +$$
$$\sum_{i=1}^{m} d_{5i}\Delta LnIR_{t-i} + \sum_{i=1}^{m} d_{6i}\Delta LnER_{t-i} + \sum_{i=1}^{m} d_{7i}\Delta LnINF_{t-i} + d_8 CW + d_9 CD + d_{10} CI + d_{11} EC_{t-1} + u_t$$

where EC_{t-1} is the error-correction term, and $i = 0, 1, \ldots, m$. Again, the equations are estimated by OLS procedure.

III. EMPIRICAL RESULTS

Table 3 reports the results of ARDL testing procedure to cointegration. Eventually, one- and two-year of lag length are used since the data are annual data as well-practiced in many empirical works (See Sinha and Sinha, 1998, p. 440; Tang, 2002, p.54). The *F*-statistics especially for two-year lag length are greater than the upper bound critical values at 1% per cent level, and the null of no cointegration can be rejected. The bounds tests suggest that inward FDI in Malaysia and its determinants are cointegrated even with or without the inclusion of China jointed WTO, and corruption variables. In order to reaffirm the finding evidenced by ARDL approach, this study has also considered the Engle-Granger tests, and the Johansen's multivariate test. The Engle-Granger tests show a cointegration relation among inflow of FDI, market size, openness, infrastructure, interest rate, exchange rate, and inflation, after considering the event of China joining the WTO in 2001 and inclusion of corruption variables. Meanwhile, the Johansen's multivariate tests further confirm cointegration (The results are not reported here but available upon request).

Table 3. Results of Wald Tests *F*-statistics via Bounds Testing Procedure (ARDL)

	Lag:-		Critical values (at 1%)	
	One	Two	*I*(0)	*I*(1)
Model 1	3.06	5.59	3.267	4.540
Basic model			($k = 6$)	
Model 2	5.76	6.46	3.027	4.296
China WTO			($k = 7$)	

Model 3 Corruption	4.19	8.07	2.848 (k = 8)	4.126
Model 4 China WTO + Corruption	5.47	6.46	2.716 (k = 9)	3.989

Notes: The critical values are obtained from Pesaran and Pesaran (1997) page 478 Appendices under Case II. k is the number of independent variables except for dummy variables.

Once a cointegration relation (at least one) is confirmed, FDI equations can be estimated. Table 4 reports the OLS estimates of FDI models 1-4. In this study, the long-run relation of FDI models is estimated by OLS rather of other estimators such as Johansen, DOLS, and so on since Abeysinghe and Tan (1999) suggest that in small samples OLS may still be the best choice as this study. From the respective *p*-values, the significant variables which affect the level of inward FDI in Malaysia in the long-run are openness, interest rate, inflation, and the joining of China into the WTO and corruption. Both corruption dummy variables (CD and CI) have negative impacts on the level of inward FDI in the long-run.[§] Comparing the R-square and DW-d statistics, there is no spurious estimation problem (R-squares have lower values).[**]

Table 4. Results of OLS Estimates

Variables	Model 1 Basic model	Model 2 (China WTO)	Model 3 (corruption)	Model 4 (China WTO & corruption)
$Ln\text{GDPC}_t$	0.29	0.06	0.41	0.31
	(0.78)	(0.94)	(0.71)	(0.63)
$Ln\text{O}_t$	2.64	2.96	2.51	2.75
	(0.06)*	(0.01)***	(0.09)*	(0.00)***
$Ln\text{INS}_t$	-0.40	-0.30	-0.19	0.46
	(0.26)	(0.28)	(0.66)	(0.11)
$Ln\text{IR}_t$	1.34	1.21	1.48	1.66
	(0.03)**	(0.01)**	(0.02)**	(0.00)***
$Ln\text{ER}_t$	-2.47	-2.23	-1.94	-0.25
	(0.01)***	(0.00)***	(0.08)*	(0.72)
$Ln\text{INF}_t$	0.21	0.18	0.23	0.25
	(0.10)*	(0.07)*	(0.10)*	(0.00)***
CW	-	-1.74	-	2.41
		(0.00)***		(0.00)***
CI	-	-	-0.20	-0.61

[§] A simple linear regression (OLS) that regressing log of FDI on corruption index shows that the estimated coefficient of corruption index is -3.14 (with a *p*-value of 0.03) over the annual period 1980-2005.

[**] Since there are quite a number of significant variables in all four models, it seems to show that multicollinearity is not a problem here. This can be checked with results of correlation coefficients. Looking at the results of multicollinearity test performed on all the independent variables in level (as available from author upon request), the variables which showed some degree of multicollinearity are exchange rate and market size, exchange rate and interest rate, exchange rate and openness, market size and openness, as well as interest rate and openness. As discussed earlier, statistical correlation of these variables have no theoretical basis. Besides, as a rule of thumb, multicollinearity may be considered harmful only if the correlation coefficient is more than 0.9 (Darnell, 1994). Otherwise, it might not be harmful. Also, one way to handle multicollinearity problem is to use ratios, as have been adopted in this study by using GDP per capita as an indication of market size.

			(0.49)	(0.00)***
CD	-	-	-0.24	-0.86
			(0.46)	(0.00)***
C	-7.42	-6.91	-8.91	-11.75
	(0.07)*	(0.03)**	(0.05)*	(0.00)***
R-squared	0.78	0.87	0.78	0.93
Adjusted R-squared	0.73	0.84	0.72	0.90
Standard error of regression	0.47	0.37	0.48	0.29
DW statistics	1.63	1.42	1.75	1.85
F-statistic	16.77	26.56	12.12	35.69

Notes: *p*-values of the variables are shown in ( ). *, **, and *** denote significance at 10%, 5%, and 1% respectively.

Table 5 illustrates the results of ECMs (the initial estimates of the ECMs are available upon request). Only one error correction term (EC_{t-1}) (based on FDI equation) is included even there are more than one cointegrating vector(s) as suggested by Johansen's multivariate tests because the study examines the FDI equation rather than of other equations from the variables (i.e. inflation equation, exchange rate equation, growth equation, and so on). More precisely, China joining WTO has a negative impact on inward FDI in Malaysia. On the other hand, higher corruption (CI) has a significant positive impact on inward FDI (more corruption encourages FDI) while lower corruption (CD) is statistically insignificant. On the other hand, the significance of the error-correction terms (EC_{t-1}) of these ECMs further reveals three interpretations. Firstly, it reconfirms the presence of a long-run equilibrium relationship among the inward FDI and its determinants. Secondly, the return on investment, openness, infrastructure, interest rate, exchange rate, and inflation rate do jointly Granger-cause the level of inward FDI after incorporating the influences of the joining of China into the WTO, and corruption variables. Finally, the estimated coefficients of the EC_{t-1} indicate the speed of adjustment among the variables toward long-run equilibrium – they (the variables) take approximately one to two and a half years (between 1.2 and 2.6 years) to return to equilibrium. The final ECMs satisfy a battery of diagnostic tests - Jarque-Bera statistic, serial correlation LM test, and the Ramsey RESET tests.

Table 5. Results of ECM – Hendry's General-to-Specific Form (Final Estimates)

Variables	Model 1 Basic model	Model 2 (China WTO)	Model 3 (corruption)	Model 4 (China WTO & corruption)
$\Delta LnFDI_{t-1}$	-	-0.62 (0.00)***	-	-0.60 (0.00)***
$\Delta LnGDPC_t$	7.92 (0.00)***	2.65 (0.07)*	7.57 (0.00)***	2.09 (0.17)
$\Delta LnGDPC_{t-2}$	-	-	-	-2.96 (0.14)
ΔLnO_t	3.98 (0.00)***	2.94 (0.00)***	3.28 (0.00)***	2.46 (0.03)**
ΔLnO_{t-1}	-1.49 (0.14)	-	-1.64 (0.10)	-
$\Delta LnINS_t$	0.33 (0.32)	0.92 (0.00)***	0.47 (0.14)	0.63 (0.02)**
$\Delta LnINS_{t-1}$	0.43 (0.23)	0.80 (0.01)***	-	0.81 (0.01)**
$\Delta LnIR_t$	1.71 (0.05)**	1.29 (0.02)**	1.79 (0.03)**	0.69 (0.20)
$\Delta LnIR_{t-2}$	-	-	-	-2.69 (0.00)***
$\Delta LnER_{t-1}$	2.00 (0.10)	-	2.44 (0.04)**	-
$\Delta LnER_{t-2}$	-	-	-	-1.30 (0.17)

$\Delta Ln\text{INF}_t$	-	-	-	0.09 (0.32)
$\Delta Ln\text{INF}_{t-1}$	-	0.08 (0.26)	0.19 (0.09)*	0.21(0.02)**
$\Delta Ln\text{INF}_{t-2}$	-	-	-	0.31 (0.01)***
CW	-	-1.83 (0.00)***	-	-2.50 (0.00)***
CI	-	-	0.26 (0.18)	0.30 (0.06)*
CD	-	-	-0.22 (0.22)	-
AR (1)	-	0.68 (0.00)***	-	-
Constant	-0.34 (0.00)***	-0.01 (0.70)	-0.31 ((0.02)**	0.04 (0.78)
EC_{t-1}	-0.81 (0.00)***	-0.70 (0.00)***	-0.70 (0.00)***	-0.38 (0.09)*
R-squared	0.71	0.84	0.78	0.91
Adjusted R-squared	0.61	0.77	0.68	0.84
DW statistics	1.97	1.62	2.35	1.61
F-statistic	7.53	11.69	7.98	12.09
Jarque Bera test: Probability	0.22	0.57	0.07	0.43
Serial Correlation LM test:				
Probability F-statistic	0.48 (2)	0.30 (2)	0.39 (2)	0.61 (2)
Probability Chi-square	0.35 (2)	0.15 (2)	0.23 (2)	0.35 (2)
Ramsay RESET test:				
Probability F-statistic	0.27 (2)	0.54 (2)	0.22(1)	0.43 (2)
Probability Chi-square	0.14 (2)	0.36 (2)	0.12(1)	0.16 (2)

Notes: Figures in ( ) are the p-values of the variables. *, **, and *** denote significance at 10%, 5%, and 1% respectively. EC_{t-1} is the error-correction term. For the panel of diagnostic tests, the figures in ( ) show the number of lags selected. The Jarque-Bera statistic for testing normality of the residuals will be used. It has a χ^2 distribution with two degrees of freedom under the null hypothesis or normally distributed errors. Serial Correlation Lagrange multiplier (LM) test concerns the possibility of errors exhibiting autocorrelation. The null hypothesis of the LM test is that there is no serial correlation up to a pre-specified lag order. Ramsey RESET (Regression Specification Error Test) to test for specification errors such as omitting some relevant variables and incorrect functional forms.

Table 6 summaries the estimated coefficients both in the short- and long-run. No obvious difference coefficients estimated among the models both in the long-and short-run. In the long run, the inward FDI in Malaysia is found to be elastic to all determinants (i.e. openness, interest rate, and exchange rate), except for inflation rate, while the China jointing WTO in 2001 and corruption variables are important variables.[††] In the short run, similar observations are found, while CD (decrease in corruption) is statistically insignificant, but high corruption (increases) (CI) does encourage inward FDI in Malaysia (with positive sign). An interesting observation is that the effects of exchange rate variable has been 'crowded-out' when both China jointing WTO, and corruption variables are included in the long- short runs.

Table 6. Summary of Short- and Long-Run of the Significant Determinants of FDI

Variables	Model 1	Model 2	Model 3	Model 4

[††] The term of 'elasticity' is applied for all independent variables except for CW, CI, and CD since they are zero-one dummy variables capturing China jointing WTO in 2001, and the changes of corruption level, respectively.

	Basic model	(China WTO)	(corruption)	(China WTO & corruption)
Long-run				
LnO_t	2.64 (0.06)*	2.96 (0.01)***	2.51 (0.09)*	2.75 (0.00)***
$LnIR_t$	1.34 (0.03)**	1.21 (0.01)**	1.48 (0.02)**	1.66 (0.00)***
$LnER_t$	-2.47 (0.01)***	-2.23 (0.00)***	-1.94 (0.08)*	-
$LnINF_t$	0.21(0.10)*	0.18 (0.07)*	0.23 (0.10)*	0.25 (0.00)***
CW	-	-1.74 (0.00)***	-	2.41(0.00)***
CI	-	-	-	-0.61 (0.00)***
CD	-	-	-	-0.86 (0.00)***
Short-run				
$\Delta LnFDI_t$	-	-0.62 (0.00)***	-	-0.60 (0.00)***
$\Delta LnGDPC_t$	7.92 (0.00)***	2.65 (0.07)*	7.57 (0.00)***	-
ΔLnO_t	3.98 (0.00)***	2.94 (0.00)***	3.28 (0.00)***	2.46 (0.03)**
$\Delta LnINS_t$	-	1.72 (0.00)***	-	1.44 (0.01)***
$\Delta LnIR_t$	1.71(0.05)**	1.29 (0.02)**	1.79 (0.03)**	-2.69 (0.00)***
$\Delta LnER_t$	-	-	2.44 (0.04)**	-
$\Delta LnINF_t$	-	-	0.19 (0.09)*	0.52 (0.00)***
CW	-	-1.83 (0.00)***	-	-2.50 (0.00)***
CI	-	-	-	0.30 (0.06)*

Notes: The respective p-values are shown in ( ). *, **, and *** indicate significance at 10%, 5%, and 1% respectively. The long-run coefficients are taken from OLS estimates reported in Table 4, while the short run coefficient are taken from Table 5 with the sum of the estimated coefficients of the independent variable.

IV. CONCLUSIONS AND POLICY DISCUSSIONS

This study has empirically revisited the determination of inward FDI in Malaysia by further considering two concerns - the event of China joining the WTO in 2001, and the level of corruption. In general, two major observations can be concluded from the empirical models:-

- A cointegration relation exists among inflow of FDI, market size, openness, infrastructure, interest rate, exchange rate, and inflation, after considering the event of China joining the WTO in 2001 and inclusion of corruption variables.

- The trade openness, interest rate, inflation rate, the event of China joining the WTO in 2001, and the level of corruption are significant determinants of inward FDI in Malaysia, both in the long-run and short-run. While, infrastructure also plays a crucial role in FDI flows in the short-run, but not in the long-run. Market size and exchange rate variables seem to be of no significance in the decision-making of foreign investors.

By and large, it is worth to discussing the two variables incorporated in this study i.e. China entered WTO, and corruption variables, in particular what can the government or policymakers benefited from these findings.

It is interesting to note that China jointing WTO event has a negative impact on the level of inward FDI in Malaysia in the short run. However, in the long run this event shows a positive impact on the level of inward FDI as presented by the full model when the corruption variables were included. It can be explained in this way - foreign investors are being attracted and

consequently shift their investments to China, which has a larger and more attractive market, in terms of a huge population and also low cost of labor (Chantasasawat et al., 2004). Nevertheless, in the long run there are mutual benefits for both nations due to each country specializing in supplying the products and services in which they have a comparative advantage in. China's accession into the WTO has increased opportunities for ASEAN states to enter China's market, where it has been estimated that China's net import of selected agricultural products may increase by US$ 1.5 billion a year between 2000 and 2009 (Wattanapruttipaisan, 2003). And, it is expected to be beneficial for agricultural-producing countries like Malaysia. Clearly, it does suggest the Malaysian government or policymakers to implement a close diplomatic exercise in order to enhance the bilateral relationships between Malaysia and China.

Turning to the policy dimension of corruption variable, high corruption (CI, corruption increases) would encourage more inward FDI in the short run. This seems to indicate that foreign investors would continue investing in Malaysia although corruption perceptions have worsened in the short-run. However, this empirical observation does not 'encourage' corruption but to highlight the short run responses of FDI to corruption, and relevant strategies to reduce the corruption level is suggested since other determinants are significantly being considered in decision making by investors. In the long run, the corruption variables have negative impacts on the inward FDI in Malaysia. It can be explained by Teksoz's (2006) study that corruption reduces the inflow of FDI but different forms have separately identifiable effects. Conversely, the policymakers have to monitor and manage the 'decomposition' of corruption since it (low or high level of corruption) does discourage FDI in Malaysia in the long run.

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Appendix A: A Brief Description of Corruption Data

We acknowledge Siong Hook, Law (Department of Economics, Faculty of Economics and Management, University Putra Malaysia) for supplying the corruption indexes data for this study that available from 1980 to 2001 (collected in 2006). The indexes are originally taken from CountryData.com, published by the Political Risk Services Group, under the ICRG Risk Ratings. Accordingly, this measure is more concerned with actual or potential corruption in the form of excessive patronage, nepotism, job reservations, *'favour-for-favours'*, secret party funding, and suspiciously close ties between politics and business. The index has ranged between zero and ten, in which a value of zero refers to most risk, while ten being least risk.

As for the data from 2002 to 2005, the index was computed by using the corruption perception index by Transparency International (http://www.transparency.org/), the world's leading anti-corruption organization. Its scores relate to perceptions of the degree of corruption as seen by business people and country analysts. The study focuses on corruption in the public sector, defined as the abuse of public office for private gain. As similar to the ICRG ratings, this index scores range between zero to ten in which, zero being highly corrupt while ten being highly clean.

In order to standardize the corruption measures from these two different sources, two dummy variables are employed in order to capture the corruption instead, namely

- *CD* indicates corruption decreases (as the corruption index increases) i.e. one represents the index increases from previous year, and zero otherwise.

- *CI* indicates corruption increases (as the corruption index decrease) i.e. one when the index decreases from previous year, and zero otherwise.