A Test on Causality Relationship between Intellectual Property Rights Protection and Foreign Direct Investment in Malaysia

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Abstract

The role of IPR in attracting foreign direct investment has been extensively discussed in quite a number of literatures, but this issue has yet to be discussed in the Malaysian economic context. Recent ARDL cointegration approach is used to investigate the relationship. It is found that the immediate short run effect of IPR to reach the long run convergence is needed as the momentum found to be highly suggestive to promote investment.

Keywords: Intellectual Property Rights, Foreign direct investment, ARDL model

1. Introduction

The role of IPR as a leading factor to attract FDI has been discussed in a number of studies but findings by Lee and Mansfield (1996)[1] are worth considering. According to the authors, a relatively low level of FDI received by developing countries over the past decade was strongly influenced by a weak form of IPR protection, thus leading to less sophisticated technology transfer.

The proposal to upgrade the IPR protection was first discussed during the Uruguay Round in1986. The negotiation platform made available under the General agreement on tariff and trade (GATT) was prolonged for almost eight years and later concluded when the TRIPS agreements was enforced within the World Trade Organization (WTO) in January 1995. Members to the WTO were automatically bound to enforce similar (minimum) standards of IPR protection, made accessible in stages[2]. Despite the time frame given, developing countries are still struggling to meet the requirements.

[1] This study is dubbed as the first empirical evidence investigating technology compositions of US companies in a number of developing countries around the world.

[2] Developed countries given one year to implement the standards, whereas the developing were given until early of 2000. Longer periods were allowable to least developing countries until 2016.

The purpose of this study is to examine the possible relationship between foreign direct investment (FDI) and intellectual property rights (IPR) protection in Malaysia. Specific attention will be on testing the plausible relationship in the short- and long-run. This study hopes to fill some gaps in the literature, as research on IPR as one of the institutional policies to promote foreign investment has yet to be discussed in the Malaysian economic context. The Pesaran et al. (2001) autoregressive distributed lag (ARDL) approach will be used in this paper. The advantages of this method are described in Section 5.

The remainder of this article is organized as follows. Section 2 discusses the background of IPR in Malaysia, followed by related literature in Section 3. Section 4 will explain the data and measurements. Section 5 explains the methodology. The empirical results are presented in Section 6. The last section draws the conclusion.

2. IPR in Malaysia: Some Background

The IPR laws in Malaysia are currently governed by the Intellectual Property Office of Malaysia (MyIPO), an entity under the Ministry of Domestic Trade, Co-operative and Consumerism. Prior to its corporatization in 2003, it was known as the Intellectual Property Division (IPD) under the Ministry of Domestic Trade and Consumer Affairs since year 1990. IPR development in Malaysia was first observed in 1969 when the Copyright Act was first enforced. Since then, lists of IPR law have followed, for instance the Trademark Act 1976 (Regulation in 1997) and the Patent Act 1983 with Regulations enforced in 1986. The amendment of modern Copyright Act done in 1987, followed by the Industrial Design Act 1996 and Regulations in 1999, Geographical Indications Act 2000 (Regulations in 2001) and Layout-design of Integrated Circuit Act 2000.

As global IPR protection standards changed, a series of amendments have been taken. The Trademark Act 1976 has been amended four times, in 1994, 2000, 2002 and the latest in 2011. The Patent Act 1983 was amended in 1986, 1993, 2000, 2002, 2003, 2006, with the latest amendment made in 2011. The Industrial Design Act was amended in 2000 and 2002. The Geographical Indications Act 2000 was amended in 2001. The Copyright Act 1987 has also been amended quite number of times. The first amendment was observed in 1975, followed by 1979, 1990, 1996, 1997, 2000 and the latest in 2002. The Copyright Regulations 1987 however has been improved with the inclusion of the import prohibition notice in the year 1987, followed by another two amendments in 1999 and 2000.

At the international level, Malaysia is currently a member of six WIPO treaties[3] and nine WIPO bodies[4]. Malaysia is also the founding member of the WTO since 1995 by virtue of its membership in the GATT (General Agreements on Tariff and Trade) since 1957. As a member of the WTO, Malaysia is also bound to the WTO-TRIPS agreement in which compliance to the minimum standard was achieved in 2002, after a delay of almost two years. As one of the developing countries and member of the WTO, Malaysia's response to the TRIPS will accelerate the process of economic growth. However, in order to suite the changes on new IPR regime, a comprehensive policy approach is seriously in need to be implemented so that sustainable economic growth can be effectively achieved in the future.

3. Literature Review

For the past two decades, economists have formed different views on how IPR protection might possibly affect the macro and micro economics foundation. Despite massive efforts taken to estimate the impact of IPR through various refined methodologies and techniques, economists are still unsuccessful in getting a clear picture. This in turn raises the question of"are IPR really help to improved economic performance?".

The reform of global IPR policy as triggered by the enforcement of TRIPS agreements within the WTO in 1995 has led to serious efforts to safeguard innovated technology, the crucial elements for higher growth achievement. The intersection of IPR protections to economic growth have been discussed in quite a number of researches with different views observed in the past.

Economists believe that stronger IPR protection will stimulate higher economic growth (Gould and Gruben 1996) disseminated through a greater impact on FDI (Seyoum 1996) and international trade activities (Maskus and Penubarti 1995). However, despite the impressive findings, economists still, encountered a reverse outcome under certain circumstances.

[3] http://www.wipo.int/treaties/en/showResults.jsp?search_what=C&country_id=124C
[4] http://www.wipo.int/treaties/en/showResults.jsp?search_what=B&country_id=124C

In the past, although evidence showed that higher economic growth could be attainable with stronger IPR level, the interplay between stricter enforcement and higher economic openness is strongly needed (Gould and Gruben 1996). Moreover, as empirically found by Ostergard (2003), a strong IPR did not always correlate to higher economic growth for the case of developing economies. In addition, the marginal impact of IPR has almost disappeared and a negative instead of positive sign was portrayed most of the time. Statements on strong IPR protection, an important element in fostering a significant research base has always been synonymous to developed economies rather than the developing because the protection incentives mechanism in developing nations is still in question (Ginarte and Park 1997).

A consistent criticism on the sub-standards of IPR protection in the developing region was noted by the developed nations long before the request to improve the standards was officially proposed for the first time in 1986. However, negotiations dragged on for eight years before it was finally tabled as an official agreements enforced under the WTO in 1994. The developed nations believed that continuous improvement on IPR is the key strategy for future economic development, the missing element left untouched by the developing.

Under some cases, as pointed by Gould and Gruben (1996) and Ostergard (2003), that strategy did not always work as expected. In addition, according to Glass (1997), a weaker IPR protection neither distracted nor deterred the opportunities of developing nation to advanced.

The economic success of the East Asian Newly Industrialized Countries (NICs) or the Asian Tigers (i.e South Korea, Singapore, Taiwan and Hong Kong) is the example. As Glass (1997) explains, the Asian Tigers' success in penetrating the world exports market was not only due to the abundances of resources advantages, but was also triggered by improvements on the comparative imitation advantage technology as a result of weaker IPR protection. This explains the over-production among the NICs, although the technological frontier was led by the developed nations.

In addition, besides other comprehensive trade incentives offered to lure incoming investment (FDI), IPR protection was found to be more flexible options under some circumstances. The flexibility of IPR was discussed in a study conducted by Yang and Cheng (2008). They found that a government tended to experience the trade-off between offering optimal tariff and level of IPR if the market size of a country was huge but flexibility between the two was suggested under a small market mechanism, the optimal optional strategy for a successful FDI attraction among the developing.

The growth of Chinese GDP over the past decades has been impressive and this has fascinated economists around the world. This impressive development has been recorded since China openly promoted free market mechanism in 1979. For almost three decades, China's economy is dubbed as the world's fastest growing economy besides India. For the case of law protecting the IPR in China, the system offered is significantly similar to those in most countries but deficiencies in enforcing the IPR has prompted serious threats on imitation incidences.

Despite, imperfect IPR laws, China's growing economic achievement for the past decades was strongly dominated by larger market demand (Hu 2010), thus leading to substantial competitions among the foreign players. Additionally as noted by Sun (2003), an increase in foreign technology involvements has boosted China's economy as they made serious efforts to mitigate the deficiencies by signing as the WTO member in 2001.

This giant steps has provided China with greater opportunities to offer extensive protection as proposed under the TRIPS, a convincing signal to foreign investors (Liu 2005). Despite encountering imperfections on IPR laws, a greater innovation opportunity as a result of comprehensive IPR reforms has made China's economy grow tremendously (Yueh 2009). This eventually increases the competitive edge in the economy (Hu 2010).

4. Data and Measurement

The series used in this study are inward foreign direct investment (FDI), intellectual propertyindex (IPR) and gross domestic product (GDP) in Malaysia observed between 1970 and 2005. The intellectual property index is adopted from Park (2008) and gross domestic product (GDP) was gathered from World Development Indicator (WDI) World Bank, CD-ROM. The FDI data are gathered from UNCTAD. All data (except the IPR indexes) has deflated into real terms to minimize the price effect and expressed in natural logarithm form.

5. Methodological Framework

The method used is based on Pesaran et al. (2001) ARDL model, a recent approach to test the cointegration. In contrary to the approach developed by Johansen (1988, 1995) and Engle and Granger (1987), this approach allows different levels of integration of series with unrestricted lag structures imposed on each variables thus producing unbiased and efficient estimation. The entire estimation will be conducted using Microfit (Ver 4.1).

The representations of the ARDL{p,q} specification model with unrestricted constant (Pesaran et al. 2001, Case III) are presented in Equation (1). The optimal lag length {p,q} is determined by Schwartz Bayesian Criteria (SBC). The long-run cointegration hypotheses are denoted by testing the null hypothesis of $H_0: \sum_{i=1}^{2} \delta_i = 0$ in (1). Two sets of critical values were used in which one refers to the *I*(1) series, the *upper bound* and the other one for the *I*(0) series, the *lower bound*. An evident of long-run cointegration relationship exists if null hypothesis is rejected.

$$\Delta y_t = \alpha_0 + \sum_{i=1}^{p} \theta_i \Delta y_{t-i} + \sum_{i=1}^{q} \omega_i \Delta z_{t-i} + \delta_1 y_{t-1} + \delta_2 z_{t-1} + \varepsilon_t \qquad (1)$$

Once the variables believed to cointegrate, the equations estimating the long run relationship are specified as (2)[5].

$$y_t = \alpha_0 + \sum_{i=1}^{p} \theta_i y_{t-i} + \sum_{i=1}^{q} \omega_i z_{t-i} + \mu_t \qquad (2)$$

The ECM-ARDL {p,q} with the combinations of short- and long-run elements are derived in (3). The coefficient η, θ and ω denoting the long run speed of adjustment and short run dynamics to achieve the convergence as shown in (3). The ECT_{t-1} component entering (3) were derived from (2). The effect of z_t is said *Granger* cause y_t are denoted by the significant value of $\sum_{i=1}^{q} \omega_i(.)$ as observed in (3).

$$\Delta y_t = \alpha_0 + \sum_{i=1}^{p} \theta_i \Delta y_{t-i} + \sum_{i=1}^{q} \omega_i \Delta z_{t-i} + \eta ECT_{t-1} + \varphi_t \qquad (3)$$

As seen in Section 3, the impact of IPR is noticeable when certain conditions are met (Gould and Gruben 1996; Seyoum 1996; Maskus and Penubarti 1995; Yang and Cheng 2008; Hu 2010). The relationship of IPR to FDI sometime relies upon the market size or GDP and intuitively IPR reforms are also reflected by the size of GDP. As GDP increases the budget allocated to improve the IPR system will also increase, thus leading to an increase in FDI. Furthermore an increase in FDI is also reflected by stronger market demands as portrayed by larger size of GDP, thus leading to a mixed relationship between IPR, FDI and GDP in the system.

In this study, instead of investigating the possible impact of the relationship between GDP and IPR using an auxiliary equation to capture the endogeneity of GDP towards IPR and FDI, we use ratio FDI-to-GDP as the dependent variable. The use of FDI-to-GDP ratio is perhaps the alternative approach to capture the endogeneity characterized by the GDP in the system.

6. Estimation Results

The unit root test is shown in Table 1. All series except IPR is stationary at first difference for ADF (Dickey and Fuller 1979), KPSS (Kwiatkowski et al. 1992) and DF-GLS (Elliott et al. 1996) test. All unit root tests consistently report the similar results. The results in Table 1 show that there is a mixture of *I* (1) and *I* (0) of the underlying regressors.

Testing for the existence of any cointegration as highlighted by (1) is shown in Table 2. The result show that cointegration indeed exist between FDI/GDP and IPR as signified by the significant *wald* test value. In addition, comparing this test value with the respective critical value to Narayan (2004)[6] studies reveal that the null hypothesis of no cointegration is consistently rejected at 1% level respectively.

[5] The estimations is subject to provided that all the variables are integrated of order 1, *I*(1).

[6] The critical value is robust for small sample size between 30 to 80. The reported critical value at 10%, 5% and 1% are (2.676, 3.586), (3.272, 4.306) and (4.614, 5.966) respectively.

The result of the error correction-ARDL model is presented in Table 3. The significant lagged error term, ECT_{t-1} as exhibited in Table 3 was observed on the specified model at the suggested lag structure. In addition, no further test was conducted for *lnIPR* model since a hypothesis of no cointegration was observed in the system (see Table 2). The long run effect observed from the specified model is highly significant, with the speed up convergence rate to reach the steady state is recorded above-average at 64%. In terms of causality, this study found a significant causal effect from IPR to FDI/GDP. The significant LR effect in the model might be contributed by the flexibility of IPR to absorb FDI-to-GDP fluctuates over time in the convergence process.

7. Conclusion

This study discussed the possible interaction between FDI-to-GDP ratio and IPR in the context of Malaysian economy. It was found that both variables are cointegrated. It also found that IPR significantly affected the increasing ratio of FDI-to-GDP in the short-run and significantly explained the long-run effect, with an adjustment speed recorded to reach to around 64% on average. Indirectly, higher growth in the economy might be attainable through the FDI, which is reflected by improvement on IPR protection system. The moderate SR effect of IPR to reach the LR convergence is needed as the momentum was found to highly promote future FDI-to-GDP growth.

References

Dickey, D. and Fuller, W. (1979). Distribution of the estimators for autoregressive time series with a unit root. Journal of the American Statistical Association, 74:427 – 431.

Elliott, G., Rothenberg, T. J., and Stock, J. H. (1996). Efficient tests for an autoregressive unit root. Econometrica, 64(4):813–836.

Engle, R. F. and Granger, C. W. J. (1987). Co-integration and error correction: Representation, estimation and testing. Econometrica, 55(2):251–276.

Ginarte, J. C. and Park, W. G. (1997). Determinants of patent rights: A cross-national study. Research Policy, 26(3):283 – 301.

Glass, A. J. (1997). Product cycles and market penetration. International Economic Review, 38(4):865–891.

Gould, D. M. and Gruben, W. C. (1996). The role of intellectual property rights in economic growth. Journal of Development Economics, 48(2):323 – 350.

Hu, A. G. (2010). Propensity to patent, competition and china's foreign patenting surge. Research Policy, 39(7):985 – 993.

Johansen, S. (1988). Statistical analysis of cointegration vectors. Journal of Economic Dynamics and Control, 12(2-3):231 – 254.

Johansen, S. (1995). Identifying restrictions of linear equations with applications to simultaneous equations and cointegration. Journal of Econometrics, 69(1):111 – 132. Annals of Econometrics: Bayesian and Classical Econometric Modelling of Time Series.

Kwiatkowski, D., Phillips, P. C. B., Schmidt, P., and Shin, Y. (1992). Testing the null hypothesis of stationarity against the alternative of a unit root : How sure are we that economic time series have a unit root? Journal of Econometrics, 54(1-3):159 – 178.

Lee, J.-Y. and Mansfield, E. (1996). Intellectual property protection and U.S. foreign direct investment. The Review of Economics and Statistics, 78(2):pp. 181–186.

Liu, W. (2005). Intellectual property protection related to technology in china. Technological Forecasting and Social Change, 72(3):339 – 348. Managing Emerging Technologies in Asia.

Maskus, K. E. and Penubarti, M. (1995). How trade-related are intellectual property rights? Journal of International Economics, 39(3-4):227 – 248.

Narayan, P. K. (2004). Reformulating critical values for the bounds f-statistics approach to cointegration: An application to the tourism demand model for Fiji. Monash University Working Paper Series, 02/04

Ostergard, R. L. (2003). The Development Dilemma: The Political Economy of Intellectual Property Rights in the International System. New York: LFB Scholarly Publishing.

Park, W. G. (2008). International patent protection: 1960-2005. Research Policy, 37(4):761-766.

Pesaran, M., Shin, Y., and Smith, R. J. (2001). Bounds testing approaches to the analysis of level relationships. Journal of Applied Econometrics, 16(3):289–326.

Seyoum, B. (1996). The impact of intellectual property rights on foreign direct investment. The Columbia Journal of World Business, 31(1):50 – 59.

Sun, Y. (2003). Determinants of foreign patents in China. World Patent Information, 25(1):27-37.

Yang, Q. and Cheng, L. (2008). Import tariff, intellectual property right protection and foreign merger. Economic Modelling, 25(6):1225 – 1231.

Yueh, L. (2009). Patent laws and innovation in China. International Review of Law and Economics, 29(4):304 – 313.

Table 1: The Unit Root test

Series	term	ADF	DF-GLS	KPSS
$lnIPR$	const +trend	-0.246(3) -6.947***(6)	-0.424(3) -6.113***(6)	0.777***(3) 0.076(3)
$\Delta lnIPR$	const +trend	-4.245***(6) -3.675***(6)	-2.585***(6) -3.857***(6)	0.068(3) 0.068(3)
$ln(FDI/GDP)$	const +trend	-0.968(6) -2.616(3)	0.576(3) -2.776(3)	0.786***(3) 0.081(3)
$\Delta ln(FDI/GDP)$	const +trend	-4.305***(0) -4.148***(0)	-3.388***(0) -3.986***(0)	0.098(2) 0.064(2)

Figure in parenthesis denoted lag length used in the unit root estimation
KPSS testing unit root stationarity of series at H_0 instead of H_1
*,**,*** significant level at 10%, 5% and 1% respectively.

Table 2: The ARDL Bound test

ARDL model	Lag(p,q)[o]	*Wald stat*	Diagnostic test		
$\Delta ln(FDI/GDP)$	(0,0)	13.91***	LM[a](1):0.87	Ramsey[b](2):0.07	HET[c]:0.89
$\Delta lnIPR$	(3,0)	0.42	LM[a](1):0.16	Ramsey[b](2):0.17	HET[c]:0.09

[a] Lagrange Multiplier test residual serial correlation
[b] Specification test
[c] Heteroscedasticity test
Value denoted at the selected lag structure is the χ^2 significant value
Asymptotic critical value at 10%, 5% and 1% are (3.17 1.14), (3.79 4.85) and (5.15 6.36) respectively.
[o] Equation lag optimized using SBC

Table 3: The Error Correction Representation ARDL

ECM-ARDL Model	Lag(p,q)[o]	*t* stat	χ^2 stat	Diagnostic
$\Delta ln(FDI/GDP)$ $\Delta lnIPR$ $const$ ECM_{t-1}	(1,1)	 12.156** -0.785** -0.642***		$\bar{R}^2$: 0.267 SBC: -28.73 DW:1.868
$\Delta lnIPR \nRightarrow \Delta ln(FDI/GDP)$			4.324**	

$ECT = ln(FDI/GDP) + 0.537lnIPR + 1.22const$
*,**,*** indicate significance at 10,5 and 1 percent level, respectively
[o] Equation lag optimized using SBC.