UNIVERSITI PUTRA MALAYSIA

GROWTH EFFECT OF FOREIGN DIRECT INVESTMENT AND INNOVATIVE ACTIVITY IN DEVELOPING COUNTRIES

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GROWTH EFFECT OF FOREIGN DIRECT INVESTMENT AND INNOVATIVE ACTIVITY IN DEVELOPING COUNTRIES

By

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Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in Fulfilment of the Requirements for the Degree of Doctor of Philosophy

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Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfilment of the requirement for the degree of Doctor of Philosophy

GROWTH EFFECT OF FOREIGN DIRECT INVESTMENT AND INNOVATIVE ACTIVITY IN DEVELOPING COUNTRIES

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NURNADDIA BT NORDIN

February 2017

Chair: Associate Professor Wan Azman Saini Wan Ngah, PhD
Faculty: Economics and Management

This dissertation focuses on three important issues which are related to growth performance and innovative activity in developing countries. This study is strongly driven by recent literature which reveals ambiguous findings on the factors which influence economic performance across countries. The first objective of this study is to analyse the role of labour mobility in moderating the impact of foreign direct investment (FDI) on economic growth. It tests whether countries with high level of labour market flexibility can benefit from FDI inflows more efficiently. It uses panel observations from 80 developing countries spanning over the 2000-2012 period. Threshold regression was employed to examine the influence of labour market flexibility on the impact of FDI on output growth. This methodological approach is chosen because it is flexible enough to accommodate the possibility that the impact of FDI "kicks in" only after host countries have achieved a certain level of labour market flexibility. The result suggest that there is a threshold effect in the FDI-growth relationship such that the positive impact of FDI kick in only after host countries achieve a certain level of quality in term of labour market flexibility. This finding is consistent with the view that host countries must have absorptive capacity in order to benefit from FDI inflows. Therefore, policymakers should weigh the cost of policies aimed at attracting FDI versus those that seek to improve the flexibility of labour market. The second objective of this study is to examine factors that influence innovation in developing countries. To evaluate this objective, a sample of 52 developing countries is used over the 2000-2010 period. The generalized method of moments (GMM) panel estimator is employed to test this objective. Generally, there are six factors examined in this study namely, human capital, regulation, trade openness, trademarks, patents and stock market. The empirical results reveal that trade openness, patent and human capital are important in influencing innovation activity in developing countries. Among these factors, trade openness appears to be the most important determinant. This suggests that developing countries are able to further

enhance their innovation activity with more trade. Thus, the government should focus on promoting trade liberalization because it is expected to bring tremendous benefits for innovation community. Moreover, investments in human capital development by providing education and training and also improvement in patent protection will also benefit domestic innovation. Finally, the third objective of this study is to examine the role economic freedom plays in R&D spillovers (i.e. the impact of research and development activity (R&D) on total factor productivity (TFP) for the ASEAN-5 countries. The dynamic ordinary least square (DOLS) panel estimator is employed using data from 1996 to 2012. There are three important conclusions that can be drawn from the reported results. First, foreign R&D is more important for productivity improvements than domestic R&D. Second, import is the main channel for international R&D spillovers. Third, economic freedom plays an important role in moderating both domestic and foreign R&D spillovers. Therefore, policymakers and government should play an important role in promoting trade liberalization and other policies that enhance freedom of economic activities as both are expected to boost domestic productivity.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia
sebagai memenuhi keperluan untuk ijazah Doktor Falsafah

KESAN PERTUMBUHAN OUTPUT OLEH PELABURAN LANGSUNG ASING DAN AKTIVITI INOVASI DI NEGARA SEDANG MEMBANGUN

Oleh

NURNADDIA BT NORDIN

Februari 2017

Pengerusi: Profesor Madya Wan Azman Saini Wan Ngah, PhD
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Disertasi ini memberi tumpuan kepada tiga isu penting yang berkaitan perkembangan ekonomi dan aktiviti inovatif di negara-negara sedang membangun. Kajian ini didorong oleh penemuan hasil kajian-kajian baru yang mendedahkan ketidakpastian hubungan mengenai faktor-faktor yang mempengaruhi prestasi ekonomi di seluruh negara. Tujuan pertama kajian ini adalah untuk menganalisis peranan fleksibiliti pasaran buruh dalam mempengaruhi kesan pelaburan langsung asing (FDI) ke atas pertumbuhan ekonomi. Ia menguji sama ada negara yang berada pada tahap fleksibiliti pasaran buruh yang tinggi boleh mempengaruhi FDI keatas pertumbuhan ekonomi. Data panel digunakan yang terdiri daripada 80 negara sedang membangun sepanjang tempoh 2000-2012. Anggaran ambang (*threshold*) telah digunakan untuk mengkaji tahap fleksibiliti pasaran buruh dalam mempengaruhi hubungan FDI dan pertumbuhan ekonomi. Kaedah ini dipilih kerana ia cukup fleksibel untuk menganggarkan nilai ambang dan kemungkinan kesan FDI hanya dapat dilihat selepas negara tuan rumah mencapai satu tahap fleksibiliti pasaran buruh. Dapatan kajian menunjukkan bahawa terdapat kesan ambang dalam hubungan FDI dan pertumbuhan ekonomi di mana kesan positif keatas FDI hanya diperolehi selepas negara tuan rumah melepasi satu tahap fleksibiliti pasaran buruh. Penemuan ini adalah konsisten dan negara tuan rumah mestilah mempunyai keupayaan penyerapan untuk mendapat lebih faedah daripada aliran masuk FDI. Oleh itu, pembuat dasar harus membandingkan kos dasar yang ditujukan untuk menarik FDI dengan usaha untuk meningkatkan fleksibiliti pasaran buruh. Tujuan kedua kajian ini adalah untuk mengkaji faktor-faktor yang mempengaruhi inovasi di negara-negara sedang membangun. Untuk menilai isu ini, sampel 52 negara-

negara sedang membangun telah digunakan bagi tempoh 2000-2010. Kaedah dinamik panel momen teritlak (GMM) diguna untuk menganalisis objektif ini. Secara umumnya, berikut adalah enam faktor yang dikaji dalam kajian ini iaitu, modal insan, peraturan, keterbukaan perdagangan, tanda dagangan, paten dan pasaran saham. Hasil kajian menunjukkan bahawa keterbukaan perdagangan, paten dan modal insan adalah penting dalam mempengaruhi aktiviti inovasi di negara-negara sedang membangun. Daripada faktor-faktor ini, keterbukaan perdagangan merupakan faktor yang paling penting. Ini menunjukkan bahawa negara-negara sedang membangun dapat meningkatkan lagi aktiviti inovasi mereka dengan perdagangan. Oleh itu, kerajaan perlu memberi tumpuan kepada usaha menggalakkan liberalisasi perdagangan kerana ia dijangka memberi manfaat besar kepada perkembangan inovasi. Di samping itu pelaburan dalam pembangunan modal insan dengan menyediakan pendidikan dan latihan dan juga meningkatkan undang-undang perlindungan paten juga akan memberi faedah kepada inovasi dalam negara. Tujuan terakhir kajian ini adalah untuk mengkaji peranan kebebasan ekonomi dalam mempengaruhi limpahan R&D (iaitu: kesan aktiviti penyelidikan dan pembangunan (R&D) keatas jumlah faktor pengeluaran (TFP)) bagi negara ASEAN-5. Panel dinamik kuasadua terkecil biasa (DOLS) digunakan dan data sepanjang tempoh 1996 hingga 2012 telah digunakan. Terdapat tiga kesimpulan penting yang boleh diambil daripada analisis kajian. Pertama, R&D antarabangsa adalah lebih penting untuk peningkatan produktiviti daripada R&D domestik. Kedua, saluran import adalah saluran paling penting bagi limpahan R&D antarabangsa. Ketiga kebebasan ekonomi memainkan peranan yang penting dalam mempengaruhi kesan limpahan bagi R&D tempatan dan antarbangsa. Oleh itu, dasar dan kerajaan perlu memainkan peranan yang penting dalam menggalakkan liberalisasi perdagangan dan dasar-dasar lain untuk meningkatkan kebebasan aktiviti ekonomi kerana kedua-duanya dijangka meningkatkan produktiviti dalam negara.

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I certify that a Thesis Examination Committee has met on 7 February 2017 to conduct the final examination of Nurnaddia bt Nordin on her thesis entitled "Growth Effect of Foreign Direct Investment and Innovative Activity in Developing Countries" in accordance with the Universities and University Colleges Act 1971 and the Constitution of the Universiti Putra Malaysia [P.U.(A) 106] 15 March 1998. The Committee recommends that the student be awarded the Doctor of Philosophy.

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This thesis was submitted to the Senate of Universiti Putra Malaysia and has been accepted as fulfilment of the requirement for the degree of Doctor of Philosophy. The members of the Supervisory Committee were as follows:

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This is to confirm that:

- the research conducted and the writing of this thesis was under our supervision;
- supervision responsibilities as stated in the Universiti Putra Malaysia (Graduate Studies) Rules 2003 (Revision 2012-2013) are adhered to.

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Supervisory Committee: _____

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Supervisory Committee: _____

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Supervisory Committee: _____

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LIST OF ABBREVIATIONS

ADF	Augmented Dickey Fuller
AR	Autoregressive Process
ASEAN	Association of South East Asian Nations
DOLS	Dynamic Ordinary Least Square
EF	Economic Freedom
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
GCR	Global Competitiveness Report
GMM	Generalized Method of Moment
GNI	Gross National Income
HM Treasury	Her Majesty Treasury
IMF	International Monetary Fund
IPR	Intellectual Property Right
LMF	Labor Market Flexibility
MNC	Multinational Corporation
OECD	Organization for Economic Cooperation and Development
OLS	Ordinary Least Squares
P-DOLS	Panel Dynamic Ordinary Least Square
PP	Phillips Perron
R&D	Research and Development
TFP	Total Factor Productivity
UNCTAD	United Nation Conference on Trade and Development
WDI	World Development Indicators

CHAPTER 1

INTRODUCTION

1.1 Background of the Study

One of the important issues that economists have to address is why some countries grow faster than the others. Over the years, they have attempted to find out reason for this phenomenon and inquired on policies which are necessary for the nations to maintain and promote sustained output growth in the long run. The literature on this issue is filled with a lot of controversies in both theoretical and empirical. Nevertheless, several recent studies reveal that there are more than sixty different variables which are able to improve our understanding of variations in long-term growth performance across countries (Durlauf, Johnson and Temple, 2005; Sala-i-Martin, 1997).

The growth literature has highlighted that factor accumulation alone cannot adequately explain differences in growth performance across countries. Recently, economist have recognized that technological progress appear to be the key explanation for differences in output growth and productivity across countries. Countries with high level of technology and those who specialize in technological progressive activity are expected to enjoy high rate of productivity growth compared to others (Grossman and Helpman, 1991 and Lucas, 1993). In the neo-classical growth models, the long-run rate of growth is exogenously determined by either the savings rate (the Harrod–Domar model) or the rate of technical progress (Solow model). However, the savings rate and rate of technological progress remain unexplained. More specifically, the neo-classical growth model treats productivity improvements as an 'exogenous' variable, they are assumed to be independent of the amount of capital investment. According to these models, the main factor that promotes output growth is improvement in capital-labour ratio. However, increase in capital investment will not have a permanent impact on the output growth rate.

Recently, several endogenous growth models have been proposed and they provide a novel way in dealing with technological progress (i.e. Romer, 1990; Barro and Sala-i-Martin, 1995, among many others). These models emphasize that the creation of new knowledge and technology (or total factor productivity growth) is the ultimate source of long-run growth. The theory also focuses on positive externalities and spillover effects of a knowledge-based economy which lead to economic development. According to these models, innovation efforts such as investment in research and development (R&D) activity and human capital accumulation will have permanent impacts on productivity growth and this is expected to allow countries to enjoy sustained growth in the long run. Therefore, policy measures such as subsidies for research and development or education are viewed as critical for sustained economic development. Although

innovation efforts have been highlighted as an essential element of sustained economic development, not many countries have actively involved in R&D activity. In fact, only a few of developed countries invest significantly in R&D activity and they are responsible for the most of the global R&D investment. As shown in figure 1.1, the main source of global R&D investment is developed countries who contributed 74% of global R&D investment during the 1996-2012 periods. The highest contribution by developed countries was recorded in 2012 at 85.6% of global R&D investments. Furthermore, among the developed countries, the major source of global R&D investment is the Organization of the Economic Co-operation and Development (OECD) countries (see figure 1.2). Specifically, this group contributes approximately 94% of total gross domestic expenditure in R&D investments by the developed countries during 1996-2012 periods.

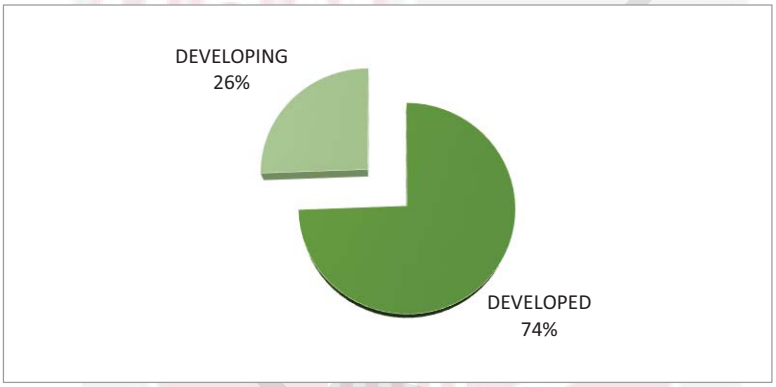

Figure 1.1: Share of Global Gross Domestic Expenditure on Research and Development for Developed and Developing Countries during 1996-2012.
(Source: Own calculation using data from the World Development Indicators database)

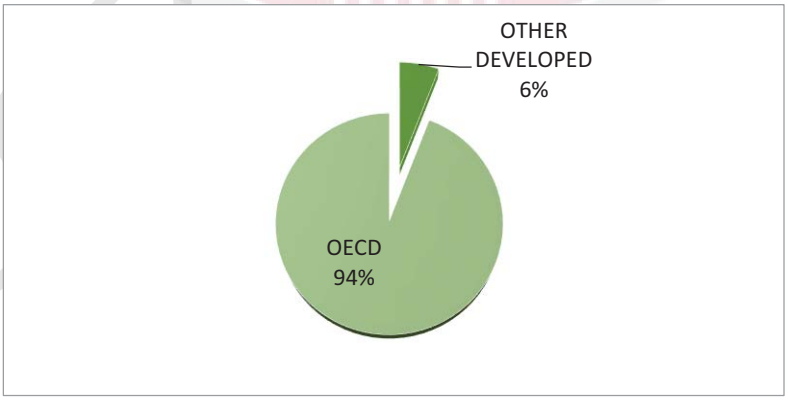

Figure 1.2: Share of Global Gross Domestic Expenditure on Research and Development for Developed and OECD Countries during 1996-2012
(Source: Own calculation using data from the World Development Indicators database)

This observation suggests that developing countries that hardly invest in R&D activity and lag behind developed countries in R&D activity may boost their productivity through interaction with R&D leaders. It has been widely recognized that productivity difference is the main determinants of output variations across countries, and technology improvement appears to be the key factor in explaining productivity (Grossman and Helpman, 1991; Howitt, 2000; Rivera-Batiz and Romer, 1991). Moreover, several studies reveal that technology spillovers from foreign countries are important because it determines the pace at which the world's technology frontier may be expanded in the future. In fact, recent evidence show that many countries benefit significantly from international spillovers (Klenow and Rodriguez-Clare, 2005) and their major source of productivity growth is actually from abroad (Keller, 2004).

Several channels has been identified to be important in transmitting technology across borders and inward foreign direct investment (FDI) by multinational corporations (MNCs) is one of them (Gorg and Greenaway, 2004; Javorcik, 2004; Hale and Long, 2006; Blalock and Gertler, 2007; Yao and Wei, 2007; Liu, 2008 and Bhavan, Xu and Zhong, 2011).[1] FDI is regarded as an important channel for host countries to access new technology available at the world frontier and it therefore becomes a key ingredient for development strategy in many countries (i.e. especially the developing ones). FDI is growth-enhancing because of its positive externalities such as transfer of new technology, the introduction of new processes, management techniques, and technical know-how in the local market, employee training, and international production networks. These expectations have led many countries to provide various incentives (both fiscal and financial) to MNCs. Barriers to free flows of foreign capital are also removed. Several recent studies reveal that developing countries benefit enormously from FDI flows (Balasubramanyam, Salisu and Sapsford, 1996 and Borensztein, De Gregorio and Lee, 1998, among many others).

According to Crespo and Fontoura (2007) knowledge spillovers via FDI may be transmitted through five channels: (1) demonstration or imitation; (2) labor mobility; (3) export; (4) competition and (5) backward and forward linkages. Demonstration or imitation is the main channel of technology spillovers from FDI (Wang and Blomstrom, 1992; Borensztein *et al.*, (1998)) where domestic firm imitate the advance technology that was successfully used by MNCs. Fosfuri, Motta and Ronde (2001) and Glass and Saggi (2002) suggest the role of labor mobility FDI spillovers in which domestic firms may benefit from new technology by hiring workers who had previously worked with MNCs and know about new technology used by MNCs. In this way, local firms are able to access new technology which is available at the world frontier that may boost their productivity. The third channel of technology spillovers is through export where domestic firm may follow the export process of MNCs through imitation or collaboration with them. Export process involves high cost and in many cases

[1] Other channels includes import (Coe and Helpman, 1995; Kneller and Stevens, 2006; Madsen, 2008), export (Falvey, Foster and Greenaway, 2004), outward FDI (Pottelsberghe De La Potterie and Lichtenberg, 2001; Bitzer and Kerekes (2008) and flow of patent (Eaton and Kortum, 1999).

only MNC can afford it (Greenaway, Sousa and Wakelin, 2004). Through this export activity domestic firms are expected to improve their productive efficiency (Aitken and Harrison, 1997 and Kokko, Zejan and Tansini, 2001).

Wang and Blomstrom (1992) and Markusen and Venebles (1999) discuss how competition in domestic market may have important impact on technology spillovers. Competition introduced by MNCs may force domestic firms to be more efficient with resource utilization. It may also force the firms to adopt a new technology that will improve productive efficiency. The last channel of technology spillover from FDI is through backward and forward linkages with domestic firms. Backward linkages are the relation with domestic firms who serves as suppliers to MNCs. According to Lall (1980), domestic firms may benefit from MNCs through technical support provided by MNCs to improve the quality of production, through introduction of new innovation or labour trainings. Spillovers through forward linkages occur when MNC's provide higher quality inputs to the domestic firms, leading to greater efficiency of local firms.

Since FDI is expected to bring many benefits to host countries, policy makers have lifted many restrictions imposed on FDI flows. World Investment Report (2015) provides a summary of policy changes by all countries. Table 1.1 shows the changes in national investment policies made by countries from 2005 to 2014. Generally, most countries continue to liberalize and promote foreign investment rather than imposing restrictions and regulations as a mean to promote sustained economic growth. During this period, an average of 54 countries introduced changes in national investment policies with an annual average of 94 regulatory changes. For instance, in 2014 a total of 37 countries introduced changes in national investment policies with 63 regulatory changes. Of these changes, 47 changes are related to the investment liberalization and promotion policies while only 9 restrictive regulatory policies were implemented. Generally, investment policies undertaken by most countries continue to be favourable to foreign investors despite the slow growth of global economic activities.

Table 1.1: Changes in National Investment Policies, 2005-2014

Item	Number of countries that introduced changes	Number of regulatory changes	Liberalization /promotion	Restriction /regulation	Neutral/ indeterminate
2005	78	144	118	25	1
2006	71	126	104	22	-
2007	50	79	58	19	2
2008	41	68	51	15	2
2009	47	88	61	23	4
2010	55	121	80	37	4
2011	49	80	59	20	1
2012	54	86	61	20	5
2013	59	87	61	23	3
2014	37	63	47	9	7
Average 2005-2014	54	94	70	21	3

(Source: World Investment Report 2015)

As a result of continuous efforts by many countries to attract more FDI, there has been substantial increase in the flows of FDI during the past few decades. Figure 1.3 illustrates global FDI flows as well as flows into developed, developing and transition economies over the 1970 to 2014 periods. The figure shows that FDI inflows into developing countries have increased from $3,854.46 million in 1970 to $753,939.80 million in 2014. Over the periods, FDI inflows grow at an annual average of 13% with the highest growth rate of 55% was recorded in 1999. For the first time in history, the amount of FDI inflows into developing countries has surpassed the amount of FDI received by the developed countries in 2012. However, the global economic uncertainty and elevated geopolitical risks has affected FDI flows negatively with a drop in global FDI flows by 16% in 2014 to $1.56 trillion. In the case of developed countries, reduction in FDI inflows was even worse with 28% to $499 billion. The biggest drop was recorded for the United States by 40%. Transition economies were also affected by the uncertainty with a reduction in FDI inflows by 52%.

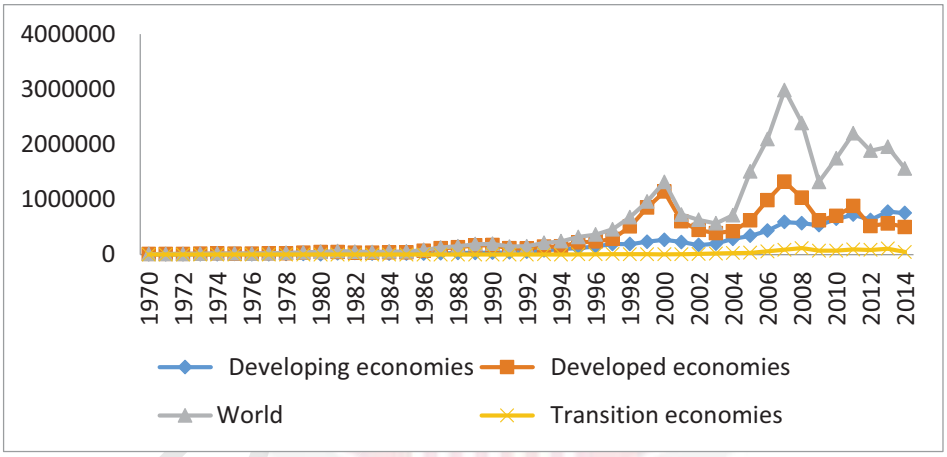

Figure 1.3: Foreign Direct Investment Inflows (Millions of Dollars), 1970 – 2014.

(Source: World Development Indicators)

Despite of poor performance of developed and transition economies in attracting FDI in recent years, FDI inflows into developing countries increase substantially, reaching $753 billion in 2014 compared to $499 billion and $48 billion received by developed and transition economies respectively and five developing countries appear in the top 10 FDI recipients in the world (see table 1.2). The five developing countries are China, Hong Kong, Singapore, Brazil and India. China became the largest recipient of FDI in the world in 2014 with $129 billion, Hong Kong at the second place with $103 billion and the United States is ranked third with $92 billion inflows of FDI. The other countries receive between $30 - $72 billion worth of investment by MNCs.

Table 1.2: Inflows of Foreign Direct Investment in top 10 host economies 2013 and 2014 (Billion of Dollar)

Country	2014	2013	Country	2013	2014
China	129	124	Brazil	62	64
Hong Kong	103	74	Canada	54	71
United States	92	231	Australia	52	54
United Kingdom	72	48	India	34	28
Singapore	68	65	Netherlands	30	32

(Source: World Investment Report 2015)

In addition to the much-needed capital and new technology that MNCs brings, FDI is also expected to help promote domestic innovation capacity.[2] Innovation is the main driver for economic growth and research and development (R&D) activity is one of the key strategies to secure technological potential. R&D leads to the growth of new knowledge that can increase the efficiency with which inputs to production such as capital and labour are translated into outputs. This is one of reasons why less developed countries should pay more attention to R&D activity as it has been widely accepted that R&D is one of the central drivers for productivity improvement. Figure 1.4 shows the total global R&D expenditure (in billion U.S dollar). Total gross expenditure of R&D in 2011 is $1340.2 billion or 1.65% of world GDP. The global R&D expenditure shows incremental change in 2012 with 11.65% growth rate or $176.8 billion and the spending continue to increase in 2013 by 2.8% with $1559 billion investments. In 2014, global R&D spending has increased significantly by 15.7 %, reaching $1803.1 billion.

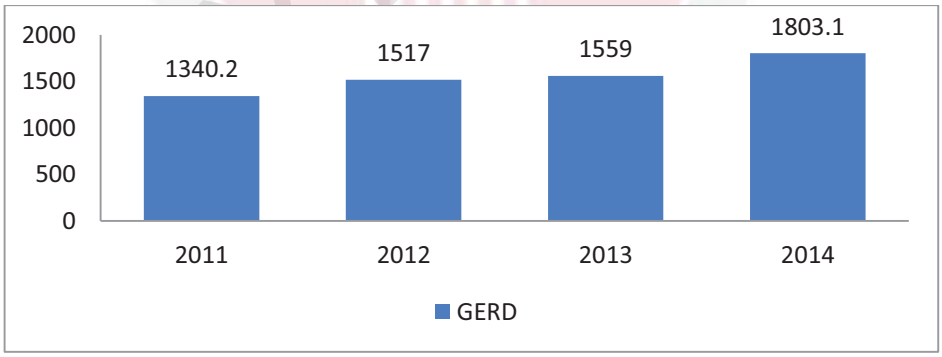

Figure 1.4: Global R&D Spending, 2011 - 2014
Note: GERD = Gross expenditure of research and development
(Source: UNESCO Science Report, 2015)

[2] According to UNCTAD (2007), innovation is defined as a new or improved product, process or marketing change that introduced to market and the structure of innovation may be in technological or non-technological nature.

As reported by the UNESCO, total R&D expenditure in the world is concentrated in triad countries (the United States, the European and Japan) and China. Table 1.3 shows the share of total global R&D spending for the Americas, Europe, Asian and rest of the world. The global R&D spending is driven by Asian countries in particular China and Japan. As shown in the table, total R&D spending by Asian countries in 2011 to 2014 is slightly higher than investments by Americas and European countries. In 2011, total R&D spending by China and Japan were respectively 12.7% and 11.2% of total global R&D spending. The overall R&D spending by Asian countries is 34.9% or $487.1 billion compared to Americas 34.8% or $485.4 and European countries contribute 24.6% or $342.9 billion of global R&D spending. The role of Asian countries in global R&D spending continue to increase as the value of total R&D spending in 2012 is $518.6 billion which contribute 36% of total global R&D spending. This value continues to grow until 2014 with the growth rate of 7% and 14.14% in 2013 and 2014, respectively.

Table 1.3: Total Global Research and Development Spending, 2011 to 2014.

		Americas		Europe		Asian		Rest of World
Year	**Items**	**(21)**	United States	**(20)**	**(34)**	China	Japan	**(36)**
2011	Share of total global R&D (%)	**34.8**	29.6	**24.6**	**34.9**	12.7	11.2	**5.7**
	GERD PPP (Billions U.S. $)	**485.4**	412.4	**342.9**	**487.1**	177.3	156	**78.8**
	R&D as % of GDP	**2.05**	2.7	**1.87**	**1.75**	1.55	3.47	**0.86**
2012	Share of total global R&D (%)	**34.3**	29	**24**	**36**	13.7	11.1	**5.7**
	GERD PPP (Billions U.S. $)	**494.9**	418.6	**346.7**	**518.6**	197.3	159.9	**82.3**
	R&D as % of GDP	**2.04**	2.68	**1.88**	**1.77**	1.6	3.48	**0.87**
2013	Share of total global R&D (%)	**34**	31.4	**22.4**	**38.3**	16.5	10.5	**5.4**
	GERD PPP (Billions U.S. $)	**507.6**	423.7	**349.5**	**554.6**	220.2	161.8	**86.4**
	R&D as % of GDP	**2.04**	2.66	**1.88**	**1.79**	1.65	3.48	**0.87**
2014	Share of total global R&D (%)	**33.9**	31.1	**21.7**	**39.1**	17.5	10.2	**5.3**
	GERD PPP (Billions U.S. $)	**504**	465	**351**	**633**	284	165	**87**
	R&D as % of GDP	**2.5**	2.8	**1.8**	**1.9**	2	3.4	**0.9**

Note: The number in parenthesis indicates the number of countries in that group; GERD: Gross Expenditure on Research and Development; PPP: Purchasing Power Parity.
(Source: UNESCO Science Report, 2015)

Unfortunately, due to the unsettled economic problems in Europe and the United States, total R&D spending for these two major groups has been declining since 2012. Output growth has been slow with less than 2% recorded for the United States while in Europe negative growth were recorded in 2012 and 2013. However, average output growth for China has been at around 7% for the past few years. Among developed countries, seven major economies namely Canada, Japan, France, Germany, Italy, United Kingdom and United States appear to be the top spender in R&D investments where they contribute around 50% to 60% of total global R&D expenditure. Table 1.4 shows the value of R&D spending by these economies in 2011 to 2014.

Table 1.4: Total Research and Development Expenditure by Major Developed Economies.

	2011		2012		2013		2014	
	R&D as % of GDP	GERD PPP Billions U.S. $	R&D as % of GDP	GERD PPP Billions U.S. $	R&D as % of GDP	GERD PPP Billions U.S. $	R&D as % of GDP	GERD PPP Billions U.S. $
United States	2.7	412.4	2.8	447	2.8	450	2.8	465
Japan	3.4	156	3.4	160	3.4	163	3.4	165
Germany	2.85	89.5	2.87	90.9	2.85	91.1	2.9	92
France	2.21	49.6	2.24	50.4	2.24	50.6	2.3	52
United Kingdom	1.81	41.4	1.84	42	1.84	42.4	1.85	44
Canada	1.9	27.6	1.9	29	1.9	29	1.9	30
Italy	1.3	24.3	1.3	23	1.2	22	1.2	22
Total R&D expenditure by developed countries	2.31	800.8	2.33	842.3	2.31	848.1	2.33	870

(Source: UNESCO Science Report, 2015)

As reported in UNESCO Science Report 2015, Asian becomes the largest region for the R&D spending with rapid increases in R&D activities in China and Japan. Other Asian countries have also shown some improvement in this activity in recent years. Table 1.5 shows R&D expenditure by Asian countries. As shown in table 1.5, high income Asian countries which are Korea, Israel, Qatar, Singapore and Taiwan (except Saudi Arabia) indicates that the total expenditure on R&D activity is between two to five percent of total GDP. The countries listed in table 1.5 are among the top 40 countries in global R&D spending as reported in UNESCO Science Report 2015. Furthermore, global share of R&D expenditure for Asian countries in 2014 was 34.9%.

Table 1.5: Total Research and Development Expenditure for Asian countries

	2011		2012		2013		2014	
	R&D as % of GDP	GERD PPP Billions U.S. $	R&D as % of GDP	GERD PPP Billions U.S. $	R&D as % of GDP	GERD PPP Billions U.S. $	R&D as % of GDP	GERD PPP Billions U.S. $
China	1.55	177.3	1.6	197.3	1.65	220.2	2.0	284
Japan	3.47	156	3.48	159.9	3.48	161.8	3.48	165
Korea	3.4	53.5	3.45	55.8	3.45	57.8	3.6	63
India	0.85	38.4	0.9	40	0.85	42	0.9	44
Indonesia	0.15	1.7	0.2	2.4	0.25	3.2	0.25	3.2
Iran	0.79	7.9	0.79	7.9	0.8	8	0.8	9
Malaysia	0.7	3.2	0.7	3.3	0.75	3.7	0.8	5
Singapore	2.6	8.3	2.65	8.6	2.7	9	2.7	9
Pakistan	0.67	3.3	0.69	3.6	0.7	3.8	0.7	4
Qatar	2.8	5.2	2.8	5.5	2.8	5.8	2.7	6
Taiwan	2.35	20.8	2.38	21.4	2.4	22.4	2.4	23
Israel	4.2	10	4.2	10.3	4.2	10.6	4.2	11
Saudi Arabia	0.3	2	0.3	2	0.3	3	0.3	3
Total Asian R&D expenditure	**1.83**	**487.6**	**1.85**	**518**	**1.87**	**551.3**	**1.91**	**629.2**
Total Global R&D expenditure	**1.76**	**1394**	**1.77**	**1459.0**	**1.8**	**1558**	**1.8**	**1803.1**

(Sources: World Development Indicators and UNESCO Science Report, 2015)

Over the past few decades, the role of institution in explaining economic performance has been extensively analysed. North (1990) defines institution a rules that structure political, economic and social interactions, which covered formal rules formal rules (e.g. constitutions, laws, and property rights sustained through courts, and the police) and informal constraints (e.g. sanctions, taboos, customs, traditions, and codes of conduct). Institutions provide the incentive structure of an economy that shapes the direction of economic change towards growth. A number of empirical studies confirm the important role of institutions for economic performance. Knack and Keefer (1995) indicates the positive and significant of economic performance with institutional quality (political stability, property rights and bureaucracy). Meanwhile, Demetriades and Law (2006) stressed that institutional quality is cirtically important in explaining the growth performance of low income countries.

Although the role of institution in economic development has been extensively tested, one aspect of institutional quality which is often neglected in the literature is the role labour market. Labour market is expected to help foster economic performance in various ways. Country with flexible labour market (i.e. worker can move freely across firms) are expected to not only be able to attract more FDI inflows (Haaland, Wooton and Faggio, 2003 and Javorcik and Spatareanu, 2005) but may also play an important role in moderating the impact of FDI on output growth. FDI is widely believed to an important element for development process in many countries. Generally, one would expect that host countries may reap significant benefits associated with FDI inflows if workers are allowed to move freely across firms. When labour market is flexible, workers who were trained with latest technology while they were with MNCs and this may benefit host countries when they join local firms. Figure 1.5 illustrates the average data for labour market regulation index for developed and developing countries over the 2000-2010 period. The index ranges from 0 (no freedom) to 10 (full freedom). Countries with higher score (i.e. less regulations) are expected to experience more freedom with labour movement across firms. Interestingly, the figure shows that the index of labour market regulation exhibits an increasing patterns starting from 2001. During that period, the index of labour market regulation increase from 5.2 to 6.0 for World, while for developed countries increase from 5.0 to 6.24 and developing countries increase from 5.4 to 5.9. This index appear to be increasing over time and in 2009 the index is at highest rate with 6.95 which suggests that the regulation of labour market (minimum wages or other wage controls, limits on hours worked or other workplace conditions, restrictions on hiring and firing, and other constraints) have been improving over time. Thus, countries with higher index of labour market regulation (i.e. labour market is more flexible) is expected to encourage more inflows of FDI and increase country growth rate.

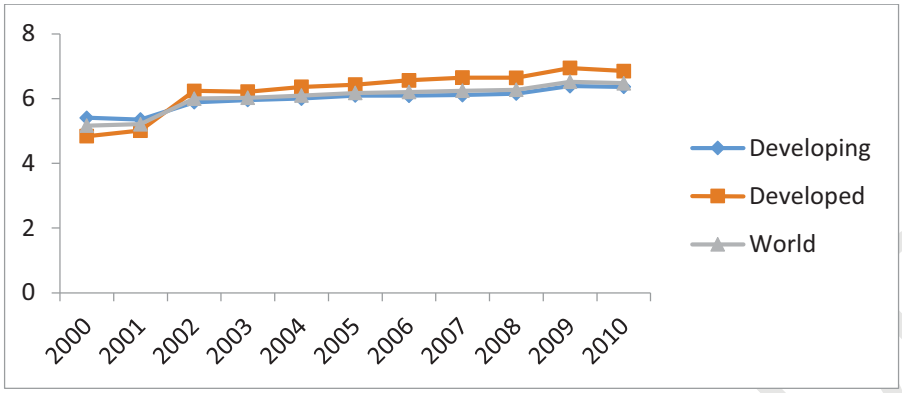

Figure 1.5: Labour Market Regulation of World, Developed and Developing Countries

(Source: Own calculation based on Economic Freedom of the World)

Investment in R&D activity is widely accepted as one of the important factors for productivity improvements (Coe and Helpman, 1995 and Jugsoo, 2002), besides other factors such as trade openness, financial development, human capital, education and infrastructure. Since R&D is important for productivity growth, issues related to R&D spillovers has been widely discussed among the researchers in recent literature (Agovino *et al.,* 2016; Ikeuchi, Kim and Kwon 2016; Jiang, Qian and Yao, 2016). However, it should be noted that knowledge spillovers from R&D activity is not an automatic process but requires other intervening factors that moderate the process. As argued by Liu and Buck (2007), one possible reason for the failure of host countries to benefit from R&D spillovers is because they do not have sufficient absorptive capacity.

Several recent studies suggest that only countries with a better quality of institutions (such as better economic freedom[3] benefit more from FDI inflows (Azman Saini, Baharumshah and Law, 2010). They argued that economic freedom is found to be an important driver for economic growth in long run. By using panel data of 85 countries over 1974 to 2005 periods, they stated that FDI has no direct effect on economic growth; however the impact FDI on economic growth is contingent with the level of economic freedom. Countries that promote freedom of economic activities are able to absorb and adopt new technology as well as other benefits associated with the FDI flows. Apart from this findings, economic freedom has been found to be important for economic growth (De Vanssay and Spindler 1994; De Haan and Siermann 1998; De Haan and Sturm 2000), banking performance (Low *et al.*, 2010, Sufian, 2014), income inequality (Berggren, 1999; Scully, 2002, Carter, 2006), foreign direct investment (Kapuria-Foreman, 2007, Quazi, 2007) and entrepreneurship (Nystrom, 2008).

[3] Economic freedom is defined as an economic activity that is coordinated by personal choice, voluntary exchange, open markets, and enforced property rights. (Economic Freedom of the World, 2016)

Figure 1.6 shows the evolution of economic freedom over time. The figure illustrates the index of economic freedom for the all countries, developed and developing countries over the 1970-2014 period with the index range from 0 (no freedom) to 10 (full freedom). Countries with higher index experience higher economic freedom. Figure shows that the average score have increased from 4.9 to 7.6 in the most recent available year suggesting that the index of economic freedom have been improving overtime. Similar pattern of improvements can be seen across developed and developing countries.

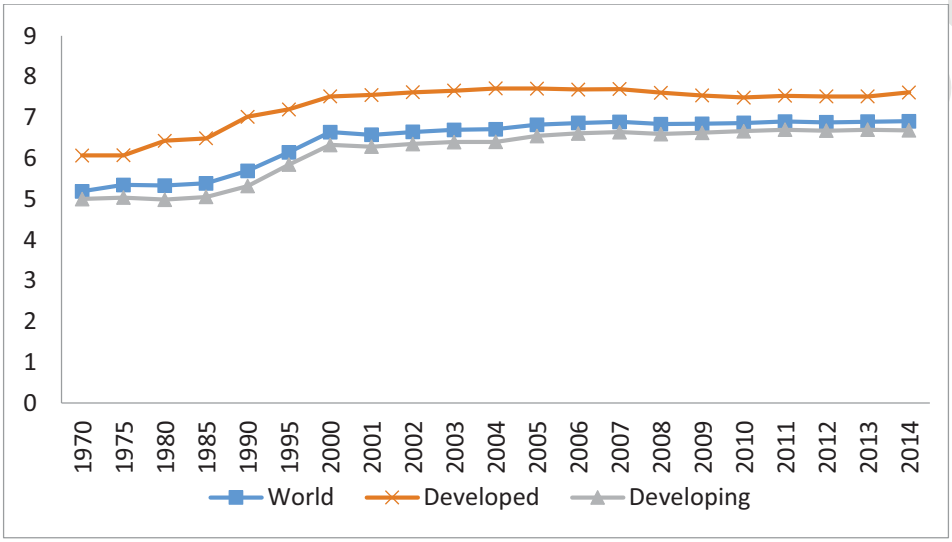

Figure 1.6: Economic Freedom Index

(Source: Own calculation based on Economic Freedom of the World 2016)

Table 1.6 shows the relations between different level of economic freedom index and GDP growth using average data for the 1990-2014 period. The table shows the economic freedom data divided into four quartiles which are ranked from high to the low. The data reveals that countries with more economic freedom tend to grow more rapidly than other countries that have less freedom. In the top quantile, the average growth rate is 3.63% as compared to the least free economies that achieve the growth rate of 1.52%.

Table 1.6: Economic Freedom And Economic Growth, 1990-2014

Level of economic freedom	**1st quintile**	**2nd quintile**	**3rd quintile**	**4th quintile**
Growth rate (% of GDP)	3.63	2.89	2.86	1.52

Note: 1st quintile is freest economies and 4th quintile is least free economies

(Sources: Fraser Institute, Economic Freedom of the World: 2015 Annual Report; World Bank, World Development Indicators)

Beside the impact toward economic growth, the other benefit of economic freedom is on country productivity. Table 1.7 shows the relations between the level of economic freedom and productivity for the 1980-2000 and 2000-2010 periods. Countries that have the economic freedom index more than 7 are grouped as the most free economy and the productivity value in 1980-2000 for this group is 0.33 and 0.35 in 2000-2010. In contrast, the productivity of countries with index of economic freedom less than 7 are lower as compared with the most free economy.

Table 1.7: Economic Freedom and Productivity, 1980-2000 and 2000-2010

Economic Freedom (EF)	1980-2000	2000-2010
EF less than 5	0.19	0.18
EF between 5 and 7	0.27	0.28
EF greater than 7	0.33	0.35

(Sources: Fraser Institute, Economic Freedom of the World: 2015 Annual Report; World Bank, World Development Indicators)

In most of the studies on economic freedom, they have mainly focused on the direct impact of economic freedom. However, economic freedom may act as intervening factors in the knowledge transfer process or is widely known as a factor which promotes absorptive capacity. Among others, Azman Saini *et al.* (2010) reveals that economic freedom plays an important role in enhancing knowledge transfers associated with FDI inflows. This suggests that economic freedom may bring two important impacts: direct effect and secondary impact via its role as moderating factor. Given the important role economic freedom plays in moderating knowledge transfer from FDI, it is logical to think that economic freedom may also play critical role in moderating R&D spillovers.

1.2 Problem Statement

Economic growth and productivity improvement are among the most important issues in the field of economics. In the past decades, economists have attempted to find out the reason why some countries are able to grow faster than the others. Studies by Durlauf, Johnson and Temple (2005) and Sala-i-Martin (1997) identified more than sixty different variables that contribute to the growth performance. One of them is FDI, which is believed to bring positive externalities to the host country. FDI by MNCs has always been linked to new and superior technologies, extensive R&D activity, new managerial techniques, increased capital, job creation and improvement of working conditions, improvement in the quality of human capital, development of industrial sector, broadening of the tax base and better integration into the world markets (Caves, 1974; Perez, 1997; Haddad and Harrison, 1993; Markusen and Venables, 1999; Babic and Strucka, 2001). Based on these positive expectations, many

countries have lifted numbers of restrictions on free flow of capital across border, leading to significant inflows of FDI globally. Global FDI inflows increased from $10.1 billion in 1970 to $1,319 billion in 2000 and reached at its highest record of $2,985 billion in 2007 before it dropped to $1,561 billion in 2014.

According to the World Bank, global FDI flows into developing countries have surpassed the amount of FDI received by the developed countries. As in 2012, developing countries received $629 billion as compared to $516 billion received by developed countries and in 2013 FDI flows into developing countries was $778 billion and only $565 billion FDI flows to developed countries. However due to global economic uncertainty, the flows of FDI dropped in 2014 where developed and developing countries received $753 billion and $499 billion of FDI inflows, respectively. Thus, FDI appears to be an important channel for international knowledge transmission and it therefore becomes a central element of development strategy for many developing countries.

However, empirical evidence suggests that not all countries have benefited from FDI inflows. In fact, the literature reveals that the growth-effect of FDI is ambiguous (Gorg and Greenaway, 2004; Alguacil, Cuadros and Orts, 2011). In some cases, FDI appears to exert positive impacts on growth of host countries but in some other cases, there were no impacts or even negative impacts.[4] This study argues that the ambiguous findings for the growth–effect of FDI are due to the failure to account the contingency effect in the FDI and growth relationship. Several factors has been highlighted in the literature such as financial markets (King and Levine, 1993; Beck, Levine and Loayza, 2000; Hermes and Lensink, 2003; Alfaro *et al*., 2004; Durham, 2004 and Azman-Saini *et al*., 2010), trade regime (Balasubramanyam, Salisu and Sapsford, 1996), human capital (Noorbakhsh, Paloni, Youssef, 2001; Borensztein *et al*., 1998;), economic freedom (Azman Saini *et al*., 2010) and institutional quality (Masron and Abdullah, 2010; Cristina and Levieuge, 2013; and Esew and Yaroson, 2014).

The present study argues that the growth-effect of FDI is possibly influenced by the flexibility of labour market in the host country. This factor is expected to affect FDI spillovers because when market is flexible, managers and workers who were employed and trained by MNCs can easily join local firms and bring along all the knowledge and technology they have acquired while working with MNCs. MNCs is known to be the most technologically advanced firms as they invest substantially in R&D activity. In this way, new technology, skills, managerial and organization best practices may be transferred from MNCs to local firms. This process is expected to enhance the productivity of local firms which eventually lead to the expansion of local economy.

[4]See surveys by Herzer and Klasen. (2008) and Görg and Greenaway (2004). These surveys summarized the empirical results on FDI – growth nexus where they highlighted that the relationship can be either positive, negative or no relationship.

In addition, MNCs is also known to the biggest spenders in R&D and are able to provide extensive training for their workers. In this way, new technology is expected to flow to local firms, leading to the expansion of local activity. Apart from its impact on output growth via transfer of new technology to local firms, FDI may also affect domestic R&D activity. On one hand, FDI is expected to force domestic firms to be more competitive by improving quality, reducing management inefficiencies, and most importantly, adopting new technology as well as boosting investment in R&D sector. On the other hand, FDI may also limits the domestic innovative activity since local firms can simply adopt foreign technology instead of investing on a new one.

Apart from FDI, domestic innovation activity may also be influenced by other factors like market structure, regulation, human capital, intellectual property rights and trade openness and others. However, little is known about factors which drive innovation activity, especially for developing countries. This information is critically important for policy makers to ensure that the right policies are implemented so that countries can reap maximum benefit from innovation activity. This may also provide invaluable insights into why many countries (especially the developing ones) are not involved actively in R&D activity.

Although the new growth models predicts that innovation activity is a major source of productivity improvements, only a handful of rich countries involve actively in R&D activity. In fact, the main source of global R&D investment is the high income countries, where they contribute around 48 percent to 60 percent of global R&D investment. According to UNESCO Science Report (2015), there are only seven major developed countries (United States, United Kingdom, Japan, Germany, France, Canada and Italy) that are actively involved in R&D investment. In 2014, this group contributed $870 billion which represent 48.25% of the world R&D expenditure.

This suggests that less developed countries which hardly invest in R&D activity and lags behind the technology frontier must boost their productivity by interacting with R&D leaders. In this way, other countries may benefit from R&D activity done by R&D leaders via R&D spillovers. According to literatures, there are several channels of for R&D to have an impact on domestic productivity which can be grouped into domestic and foreign R&D channels. In the case of foreign R&D, the channels include inward FDI, outward FDI, import, export, geographical proximity, international students flows and general channel. The findings, however, reveal mixed evidence but generally many found that import is the most effective channels for foreign R&D spillovers. However, the importance of other channels are different across different studies.

Recently, some studies reveal that knowledge spillovers like R&D are not an automatic process. It requires some intervention by the host countries. In other words, the process requires that host country poses some quality in order to

benefit from foreign knowledge. It require domestic firm to be able to absorb and internalise foreign knowledge. Therefore, R&D spillovers may be sub-optimal if domestic firms are not able to absorb and internalize new knowledge created others. Recently, several studies suggested that only countries with better quality of institutions (i.e. higher level of economic freedom) benefits from knowledge spillovers because in such an environment firms are more willing to engage in risky activities like the adoption of a new technology. Although the importance of absorptive capacity in FDI spillovers was tested in recent literature, there is however lack of evidence on the role of absorptive capacity in the context of R&D spillovers. Therefore, the next logical step is to test the role of institutions (i.e. economic freedom) in moderating R&D spillovers on productivity. The finding is expected to help policymakers in devising specific policies related to R&D activity and also the quality of institutions.

1.3 Research Objectives

The general objective of this study is to examine interrelationship among labour market flexibility, economic freedom, FDI, R&D and innovative activity in developing countries. Specifically, this study intends:

i. to examine the role of labour market in moderating the FDI-growth effect.

ii. to provide an empirical assessment of trade openness and intelectual property rights (IPRs) as a determinants of innovation.

iii. to investigate the role of economic freedom in moderating R&D spillovers on productivity.

1.4 Significance of the Study

This study provides important contributions to the existing literature in several aspects. First, it provides empirical evidence of the potential role of labour market flexibility in moderating the growth effect of FDI. This issue has not been examined in the past. So, the literature has focused mainly on the role played by other factors such as human capital, institutional quality, economic freedom, trade policy and financial market. Therefore, this study examines how labour market flexibility will make a difference to the ways FDI affects output growth. The finding is expected to reveal new insights on the intricate link between FDI and output growth for developing countries. Secondly, this study fills the existing gap in the literatures by evaluating the determinants of innovation in developing countries. It has been widely accepted that innovative activity such as R&D is one of the most important sources of productivity growth. However,

most of the studies only focused about innovation mainly on the developed countries (especially OECD countries). Little is known about innovative activity in developing countries. This study constitutes an attempt to fill this gap by assessing factors that influence innovation activity in developing countries. Finally, this study provides new evidence of the role of economic freedom in R&D spillovers from developed countries to developing countries. Most of the previous studies have focuses on spillovers within developed countries (especially OECD countries), with a strong emphasis on direct spillovers. Little is known about how R&D activities in developed countries affect the productivity of less developed countries. Also, the possible role of economic freedom in moderating the process is not known. This chapter fills this gap in the literature by assessing the role of economic freedom in R&D spillovers from developed countries to ASEAN countries.

1.5 Organization of the Study

This dissertation contains five chapters. The first chapter provides some background information about the issues examined in this dissertation. It also highlights the problem statement and three important issues tested in this study. Chapter 2 reviews both theoretical and empirical literature on issues related to the growth-effect of foreign direct investment (FDI), research and development (R&D) activity and R&D spillovers. Chapter 3 describes model specifications, estimation procedures and data set. Three panel estimators are employed namely, threshold regression, generalized method-of-moment estimator (GMM), and dynamic ordinary least square estimator (dynamic OLS). Chapter 4 presents the empirical results and its interpretations. Finally, conclusions and policy recommendation are presented in Chapter 5.

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