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Foreign Direct Investment in Taiwan: Post–1980s

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Abstract

The aims and objectives of my thesis are to research the foreign direct investment (hereinafter, FDI) in Taiwan post-1980s when it started to experience an economic transformation from traditional manufacturing into high-technology manufacturing and service industries. For instance, the Taiwanese government introduced the Six-year National Development Plan, Asia-Pacific Regional Operations Centre (APROC), and relevant incentive polices since 1990s in order to attract export-oriented FDI, and develop further economic and industrial development. Since then there was a drastic change in Taiwan's economic structure and industrial activity along with an increasing amount of investment from foreign investors. Hence, this thesis empirically investigates the determinants of FDI (Chapter 5), evaluates the impact of FDI on economic growth (Chapter 6), and assesses the dynamic interaction between FDI and macro-economic variables (Chapter 7). The dataset used for thesis covers the period from 1990 to 2010, and involves industry-level data in Taiwan. The key findings of this thesis could be summarised into three points. First, by employing both the static and dynamic panel data approaches, Chapter 5 suggests that the market size, the employment level, and the exchange rate remain to be significant factors to explain FDI inflows to Taiwan, while the wage cost and the political stability are not significant factors of investment decision-making process for foreign investors. The results imply that foreign investors no longer regard Taiwan as a country with the supply of cheap labour for mass production, but one with the supply of highly skilled and sophisticated talents for high-end manufacturing and service industries. Further, foreign investors no longer regard political instability as a major concern for Taiwan since it has had a stable political environment democratically and diplomatically. Second, by applying the Granger causality test, Chapter 6 suggests that the two-way feedback between FDI and GDP is significant both at overall- and industry-levels, while the one-way feedback (from FDI to GDP) is significant at the cross-industry level. In the first case, it is therefore believed that FDI and GDP are mutually enhancing in the long term in the overall economy, manufacturing and service industries. In the second case, it reflects that GDP growth in manufacturing and service industries has been induced not only by the inward FDI in its own industry but also by inward FDI in the other one. Third, by utilising the vector autoregression (VAR) methodology, Chapter 7 confirms the existence of the two-way causal and dynamic interactions among FDI, GDP and Exports. This two-way feedback result is not only in line with the key findings mentioned above, but also implies that FDI could be a fundamental driver of economic growth in Taiwan, and be considered a close proxy for the degree of openness of the macro-economic policy and position of the Taiwanese government. In addition, while FDI, GDP and Exports are all found to positively affect employment; the reverse relationship is relatively insignificant.

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1. Introduction

1.1. Introduction of FDI

In the past decade there has been considerable interest in the 'forces for globalisation'. Of these, the international trade in goods and services and the increase in international production through multinational corporations have been identified as being important factors (Bora, 2001). According to the World Investment Report published in 2010 by the United Nations Conference on Trade and Development (UNCTAD), global foreign direct investment (FDI) flows are expected to reach \$1.6-2 trillion in 2012, compared to \$1.1 trillion in 2000 and \$159 billion in 1991. Further, the annual growth rate of the international trade in both output and goods and services has been exceeded by the growth rate of FDI flows during the past decade. Several issues on policy and economy have been raised by such rapid growth in FDI at the country and cross-country level. Since multinational enterprises and FDI were widely considered to have utilised their economic and technological strengths to take advantage of developing countries during the 1960s and 1970s, developing countries treated them with suspicion. On the other hand, several developed countries also enact regulation and legislation in an attempt to control and monitor the FDI flows and the investment activities of multinational enterprises during the same period. The concerns emanating from both developing and developed countries during the last decade were more focused on the issue of economic sovereignty than economic exploitation. More recently, most developing and developed countries have been receptive to FDI in terms of their policy direction, and, hence, each government has started to actively seek a better and more comprehensive understanding of the determinants, impacts and implications of FDI, which could be evidenced by the considerable discussion on the issue of incorporating rules on investment taken place in the World Trade Organisation (WTO). As such, it is necessary to examine and evaluate the role acted by FDI in areas including country development, economic growth, national

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employment, international trade and technology transfer. Researching and comprehending these transmission channels of the impact of FDI could help a country to develop the appropriate commercial and economic policies.

In association with international trade which has been the major mechanism linking countries' economies over the past decades, FDI is a similar mechanism in order to create cross-national economic activities. Hence, these two mechanisms reinforce each other. It is believed that the trade effects of FDI are based on whether the FDI is intended to utilise strategic assets such as research and development (R&D) capabilities or locational comparative advantage or whether it is aimed to gain accesses to local consumer markets or top natural resources. It is undeniable that FDI plays a significant role in the economic development and growth of a host country where economic and technological capability are the major driving factors for the growth of international production capacity, though this is also driven by the ongoing liberalization of FDI and trade policies. Most developing countries therefore require FDI and technological force to facilitate technology transfer and then reduce the technology gap (TGAP) between themselves and developed countries. Blomstrom (1989) argued from this perspective that the spillovers or external effects of FDI are the most significant channels for the dissemination of modern technology. Hence, globalisation through direct or indirect FDI provides valuable opportunities for developing countries to have greater industrial and technological development.

The changes in international political environment and global economic structure over the last few decades have led to a dynamic trend and renewed interest in FDI. Firstly, according to Chakrabarti (2001), there has been a rapid and steady growth in global FDI flows since the late 1980s which could be shown by aggregate net inflows of FDI, based on current US

dollars, increased nearly six times from $53 billion in 1985 to $315 billion in 1996. Secondly, there was a sudden increase in FDI flows into the USA between 1985 and 1987 when aggregate net inflows of FDI, based on current US dollars, increased nearly three times within as many years from $20 billion to $58 billion. Finally, during the 1980s, there was a large number of less developing countries were effectively shut out of the international capital markets following the breakdown of normal financial relations in 1982–1983 and the borrowing binge of the 1970s, a.k.a. debt-overhang. These financial constraints quickly led to a sharp decline in investment and economic growth rates in these economies, particularly severe for those who were heavily indebted. On the other hand, as summarised by Louzi and Abadi (2011), international trade did grow more rapidly than FDI in 1970s, and hence international trade was by far more important than most other international economic activities. However, this changed drastically in the middle of the 1980s when world FDI flows started to increase sharply. During this period, the FDI flows from developed to developing countries came to play a more important role in international economic activities by establishing marketing, transferring technologies, and procuring networks for international sales channel and efficient production. Even though foreign investors in the home country benefit from allocating their assets and utilising resources efficiently, FDI recipients in the host country benefit from accruing technological force and from involving themselves in trade network and international production.

FDI also provides necessary resources to developing nations, including access to markets, brands, capital, entrepreneurial experience, managerial skills, and technology etc. These resources are essential for developing countries, particularly for less-developing ones, to industrialise and create jobs. Hence, most developing countries have started to recognise the potential and underlying values of FDI, liberalise investment regulations and begin

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investment promotional campaigns to attract foreign investors. Globalisation arrangements and regional integration agreements drive the changes in the pattern and level of FDI flows, and further reduce investment and transaction costs. Since the progressive liberalization of FDI polices and the implementation of more outward-oriented policies in those developing countries, FDI flows to them started to pick up in 1980s. From 1991 to 2009, global FDI flows have increased by 25 percentages. Developing countries as a group have shown a collective increase of 22 percentages in FDI at consistent prices, according to the World Developing Report (2010). All of these results prove that FDI has increased in importance as a reliable source of capital flows and economic development for the less-developing countries. With this background, it is not surprising that a large number of empirical studies have been conducted on the driving factors and determinants attracting FDI for countries.

It is undeniable that FDI has innumerable different kinds of impact on the recipient country's economy. These potentially include degree of development, employment rate, economic growth, general welfare, national income, price level, and production capacity. It is also one of the potential and significant factors that lead a developing country to the globalization within the world economic system. Furthermore, according to UNCTAD (2006), the enormous increase in FDI flows across countries is one of the clearest signs of the international economy's globalisation over the past 20 years. As such, it could be concluded that FDI is one of the keys to developing countries having a successful industrial development and economic growth, since the very essence of economic development is the rapid and efficient transfer and adoption of "best practice" across borders (Kok and Ersoy, 2009). In terms of factors influencing foreign investors to conduct FDI, there are generally three broad groups according to Christiansen and Ogutcu (2002): the profitability of the projects; the ease with which subsidiaries' operations can be integrated into investors' global

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strategies; and the overall quality of the host country's enabling environment.

Even though the underlying potential of FDI in the development process of emerging countries has been recognized by official authorities and academic literature, there is still one fundamental issue waiting to be resolved: the determinants of FDI (see Tsai, 1994). Some researchers, such as Riedel (1987), argue that developing countries play passive role in determining the direction and volume of FDI. However, from the perspective of emerging countries, those determinants might be under control of the host country and manipulated in order to attract FDI from foreign investors. This could be an important issue for politicians in developing countries since steps to encourage FDI have been taken by certain governments, such as offering taxation incentives to foreign firms who conduct investment in the country, or establishing investment promotion agencies in the foreign countries. However, even though a large number of empirical studies have been conducted as to the relative significance and the impact of the potential determinants of FDI, no consensus has been arrived at. This could be partially explained by the absence of any widely accepted set of explanatory variables that can be regarded as the "true" determinants of FDI (Kok and Ersoy, 2009), and by the wide differences that exist in perspectives, methodologies, sample-selection and analytical tools (Chakrabarti, 2001). Regarding the former explanation, the empirical results are typically sensitive to those true determinants suggesting a lack of robustness. For instance, determinants such as exchange rate, labour costs, R&D, tax, trade balance, and trade barriers have been examined to have both positive and negative impacts on FDI flows. Further, Chakrabarti (2001) concluded that "the relation between FDI and many of the controversial variables (namely, tax, wages, openness, exchange rate, tariffs, growth and trade balance) are highly sensitive to small alterations in the conditioning information set". In addition to the latter explanation, empirical research forms examples of 'data mining' and

'measurement without theory': variables are searched for that demonstrably have a significant influence on FDI, and the results are explained *ex post*. The statistical and theoretical weaknesses have led to diverse results in empirical studies where researchers only considered a small number of variables at one time in order to build a statistically significant relationship between inward FDI and host countries and a certain variable or a specific set of variables of interest. As a result, the primary objective of this thesis is to identify and evaluate significant determinants of FDI that drive capital flows to Taiwan within a globalised context. The secondary objective is to conduct an econometric research on FDI in Taiwan based on sound theoretical framework and empirical evidence. Since FDI flows are one of the major factors driving globalisation in a country, it is felt that my research on its determinants would contribute to Taiwan's process of economic, financial, industrial and political development.

1.2.   Introduction of Topics

While international trade has traditionally been the major mechanism linking cross-countries' economies in order to develop a worldwide economic system, FDI is a similar mechanism linking national economies; thus, both of these two mechanisms reinforce and strengthen one other. FDI has enormous effects on a host country's economic development, impacting on economic growth, price levels, productivity, national income, employment etc. FDI is also one of the significant factors helping the economies of host countries, especially less-developed countries (LDCs), to progress into internationalization and globalization stage. Furthermore, according to the United Nations Conference on Trade and Development (UNCTAD, 2006), the enormous increase in FDI flows across countries is one of the clearest signs of the international economy's globalization over the past 20 years. FDI outflows represent the degree of control over global resource and market; and FDI inflows reflect not only the amount of capital that the host countries obtain from the global investment, but also

the degree of integration with the world economy. Thus, Kok and Ersoy (2009) conclude that FDI is key to successful economic growth in LDCs, since the fundamental principle of economic development is the rapid and efficient transfer and adoption of "best practice" across borders, be it technological expertise or managerial experience. With the integration of the worldwide economy and economic interaction between countries, FDI has grown rapidly in the last 20 years. However, according to the UNCTAD's World Investment Report 2009, amid a sharpening financial and economic crisis, global FDI inflows fell from a historic high of $1,979 billion in 2007 to $1,697 billion in 2008, a decline of 14%. A slow recovery is expected in 2010, but should speed up in 2011. The crisis has also changed the investment landscape, with developing and transition economies' share in global FDI flows surging to 43% in 2008.

Much empirical research on FDI in Taiwan has been conducted to evaluate its nature, determinants and impacts. For instance, Liou (2003) found that multinational firms no longer regard Taiwan as a manufacturing country, but as a centre for research and development (R&D) and foreign operation. He also pointed out that an improving cross-strait relationship is a significant factor in attracting FDI from foreign companies. Lin (1998), using panel data analysis, concluded that many factors, including bilateral trade amount and cultural difference, have a positive relationship with FDI. By contrast, factors including geographical distance, relative returns on capital and the foreign exchange rate have a negative relationship with FDI. Du (1995), using regression analysis, found eighteen factors attracting FDI in Taiwan, including political stability, social environment, rapidity of economic growth, and technique quality. Tsai (1991), using time-series data analysis, concluded that it is the supply-side factors that attract FDI in Taiwan rather than demand-side ones. Neither economic performance or labour costs are found to be significant determinants of FDI, which is

contradictive to Riedel (1975) who stated that cheap labour costs is the major and significant determinant attracting FDI from Hong Kong, Japan and USA to Taiwan.

However, there are still several gaps in the existing literature. Most previous research has been conducted on the determinants of FDI in Taiwan rather than on industry-level FDI. For instance, Tsai (1991) employed regression analysis using level variables for identifying the demand-side determinants of FDI based on the data period from 1958 to 1985. Further, previous research has focused on the overall impact of FDI on Taiwan's economic growth rather than on industry-level FDI (e.g. Tsai, 1994; Read, 2002). It tends to ignore the separate contribution of FDI on different industries to the country's economic growth and development as the overall Taiwanese economy has transformed from a manufacturing-focused economy into a balanced economy with manufacturing and service industries. As such, it is increasingly important to evaluate whether growth effect of FDI varies across industries, and whether FDI and economic growth reinforce each other. Lastly, since FDI in Taiwan has played a significant role in the country's economic transformation and development, and the transfer of technology has also made a major contribution to the country's economic industrialization, the dynamic interaction among FDI and macro-economic variables should be further studied in order to investigate the strength of causality among them. Therefore, the first section in the thesis 'Modelling the Determinants of Industry-Level FDI' is intended to identify major factors driving the industry-level FDI inflows to Taiwan, and assist country's government to implement reforms in a right direction. The second section, 'Evaluating the Impact of Industry-Level FDI on Economic Growth' attempts to address whether or not the growth impact of FDI differs between manufacturing and service industries in Taiwan. The third section 'Framing the Dynamic Value-Chain Interaction among FDI and Macro-economic Variables' aims to conclude which types of

dynamic interaction exist among these macro-economic variables, whether they are value chain reaction or multiplier effects, and whether a stationary long-run relationship tends to appear.

1.3.   Research Structure

The research process and structure of thesis are shown as following:

Table 1: Thesis Structure and Research Process

Foreign Direct Investment in Taiwan: Post 1980s
1. Identify factors driving the industry-level FDI in Taiwan
2. Evaluating whether growth effect of FDI differs across industries
3. Assessing dynamic interrelation and multiplier effects among FDI and macro-economic variables

Literature Reviews on FDI Theories	Literature Reviews on Determinants of FDI	Literature Reviews on FDI Empirical Methodologies

Modeling the Determinants of Industry-Level FDI	Evaluating the Impact of Industry-Level FDI on Economic Growth	Framing the Dynamic Value-Chain Interaction among FDI and Macro-economic Variables

Research Data Collection, Processing, and Fundamental Descriptive Analysis	Defining Variables, Establishing Empirical Models and Testing Model's Validity

1. Empirical Results Analysis
2. Research Contributions
3. Research Limitations

2. An Overview of the Taiwanese Economy and its Foreign Direct Investment

2.1. Taiwan's Economic Position in Global Context

Taiwan is a geographically small country in many respects compared with other countries worldwide, but it is an economically big country in terms of economic activities and industrial development. Following table is to show the ranking of Taiwan compared with other 192 countries in terms of area, population, population density, the GDP level, and the GNI per capita level.

Table 2: Description of Taiwan

Unit Country	Area 1000 km2	2010 Ranking	Population millions	2010 Ranking	Pop. Density Person/km2	2010 Ranking	GDP US$ billion	2010 Ranking	GNI per capita US$	2010 Ranking
Four Asian Tigers										
Taiwan	36	137	23	50	639	16	430	24	27,122	30
Singapore	1	189	5	116	7,148	3	208	42	55,380	4
Hong Kong SAR	1	182	7	101	6,349	4	224	37	47,130	7
Korea, Rep	99	109	48	25	487	23	1,014	14	29,010	25
ASEAN (Major)										
Malaysia	330	67	28	41	86	117	237	36	14,110	57
Thailand	513	51	65	20	125	90	318	30	8,120	88
Philippines	300	73	94	12	307	45	199	43	3,950	118
Indonesia	1,905	15	237	4	121	92	706	18	4,170	117
BRIC										
Brazil	8,514	5	192	5	23	193	2,087	7	10,920	71
Russian Federation	17,098	1	143	8	8	223	1,479	11	19,190	44
India	3,287	7	12	2	368	33	1,721	9	3,560	123
China	9,640	3	13	1	140	80	5,926	2	7,570	91

Source: The World Bank, International Monetary Fund, and Council for Economic Planning and Development, Executive Yuan, Taiwan

Even though Taiwan's area is only 36,000 km^2, ranked 137th, and its population is 23 million, ranked 39th, its population density, however, is 639 person/km^2, ranked 4th, and its GDP level is $430 billion ranked 24th. Further, Taiwan's aggregate economic activities surpassed any of the ASEAN major countries, such as Malaysia and Thailand, and some of the countries in the European Union, including Austria, Demark, Finland, Ireland, Norway, and Portugal etc. Few people have been aware that Taiwan's economic size is as much as 25% of that of India, and 30% of that of Russian Federation. The country's GNI per capita, ranked 30th, and is comparable with some OECD countries such as Chile, Mexico, and Poland.

Taiwanese economy has experienced a rather high average growth rate in the past five decades. According to Chen (2000), the agricultural sector accounted for 30 percentages of total Taiwan's GDP in the 1950s, and the finished and processed major exports agricultural products accounted for 80 percentages of total exports. However, as Taiwanese economy took off later because of Nineteen-Point Programme for Economic & Financial Reform in 1960s and Ten Major Developments Policy in 1980s, it transformed itself into a newly industrialized country with a two digit GDP average growth rate in the manufacturing sector. During this period, Taiwan annually exported 240 million units of mini-motor, accounting for 70% of world mini-motor exporting market; 80 million bicycle tires, accounting for 50% of world bicycle tire exporting market; 3.16 million sets of sewing machines, accounting for 80% of world sewing machine exporting market(see, Duan, 1989).In 1990s, the major Taiwanese economic and manufacturing activities advanced steadily from low-technology manufactured goods above to high-technology manufactured goods including electrical machinery products and information and communication products. During this period, Taiwan reached the rank of "number three producer of information technology worldwide, only behind the United States and Japan" (Underwood, 1999).In 2000s, Taiwan's global production shares by volume of computing equipment ranked number one in the world according to Hsiao (2005), such equipment including case (75%), graphics card (31%), keyboard (65%), mouse (60%), monitors (58%), motherboard (66%), notebook PC (39%), scanner (85%), SPS (66%),sound card (49%), video card (40%) etc.

In terms of Taiwan's international competitiveness in global economy, both of the World Economic Forum (WEF) and the International Institute for Management Development (IMD) are the major international organisations who conduct the annual research on each nation's

competitiveness in the global context. WEF defines competitiveness as the set of institutions, policies, and factors that determine the level of productivity of a country, and the concept of competitiveness therefore involves static and dynamic components. While the static components determine a country's ability to sustain a high level of income, the dynamic components determine a country's returns on investment for investors and its economic growth potential. Since 2005, WEF has employed Global Competitiveness Index (GCI) out of 7 to evaluate country's competitiveness, and there are twelve pillars within GCI analysis including Institutions, Infrastructure, Macroeconomic Environment, Health and Primary Education, Higher Education and Training, Goods Market Efficiency, Labour Market Efficiency, Financial Market Development, Technological Readiness, Market Size, Business Sophistication, and Innovation etc. Following figure is the Taiwan's GCI and its rank for past six years which is compared with the global average:

Figure3: Taiwan's Growth Competitiveness Index (GCI) 2005 - 2011
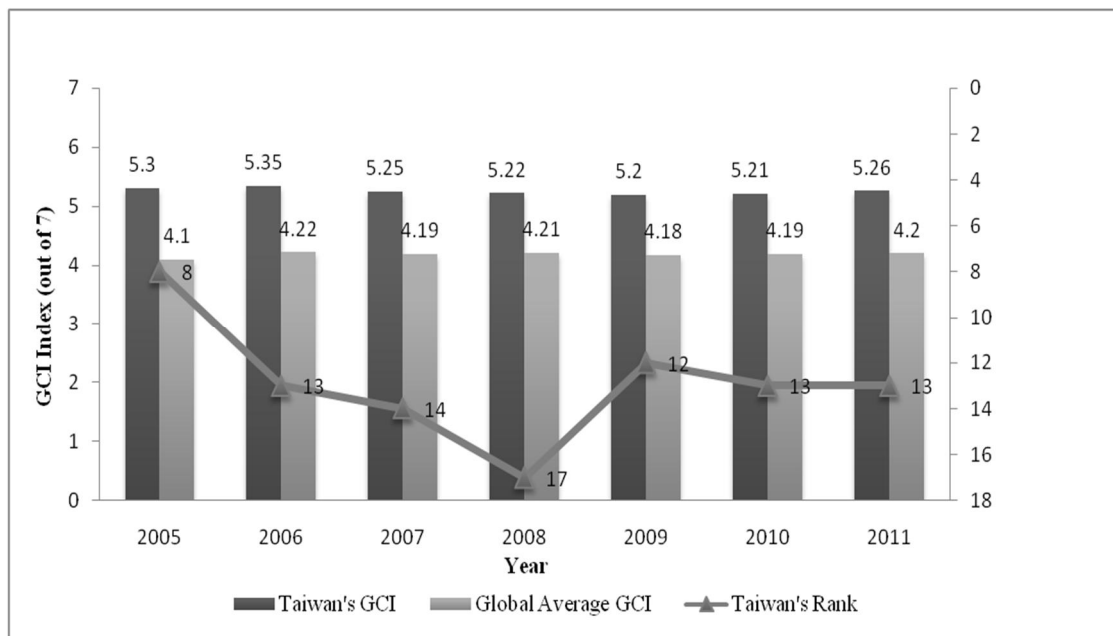
Source: World Economic Forum Database

As shown, Taiwan's GCI has been well above the global average since WEF started to use the

new methodology in 2005, and its rank has also maintained within Top 20 out 142 countries. In WEF's 2011 reports, it states that Taiwan's prowess in innovation is undeniable which is ranked 9th in the worldwide since Taiwan obtain the largest number of United States Patent and Trademark Office (USPTO) where the granted patents on a per capita basis is more than the United States. In addition to Taiwan's first-class Research & Development, the quality and presence of its business clusters in high-end manufacturing help itself to maintain the top position on the related indicator .The economy and industry's capacity for innovation development is also further supported by high enrolment rates and first-rate quality of country's higher education system which is ranked 10th in the worldwide.

Besides WEF's Growth Competitiveness Index, IMD publishes the World Competitiveness Yearbook (WCY) ranks which analyse each nation's capability to create and maintain an environment where multinational and national enterprises could manage their business operations and be competitive. In WCY, there are two general fields to be researched and analysed. The first field is the Competitiveness of Enterprises since IMD assumes that the private and state-owned enterprises are the major sources of wealth creation for a country. The second field is the Competitiveness of Nations which evaluates a national environment in which enterprises operate would improve or deter their capability to be competitive internationally or nationally. Therefore, the methodology that IMD employs divides national competitiveness and environment into four areas, including Economic Performance, Government Efficiency, Business Efficiency, and Infrastructure. In turn, each of these factors is further divided into another five factors which highlight every perspective of the areas to be analysed. Economic Performance includes domestic economy, international trade, international investment, employment, and price; Government Efficiency includes public finance, fiscal policy, institutional framework, business legislation, and societal framework;

Business Efficiency includes productivity, labour market, finance, management practices, and attitude and values; Infrastructure includes basic infrastructure, technological infrastructure, scientific infrastructure, health and environment, and education. Taken all together, there are a total of 20 factors featured by WCY. Following figure is the Taiwan's ranking WCY for past five years which is compared with that of East Asian courtiers and ASEAN:

Figure4: Taiwan's Ranking in IMD's World Competitiveness Yearbook 2007 – 2011
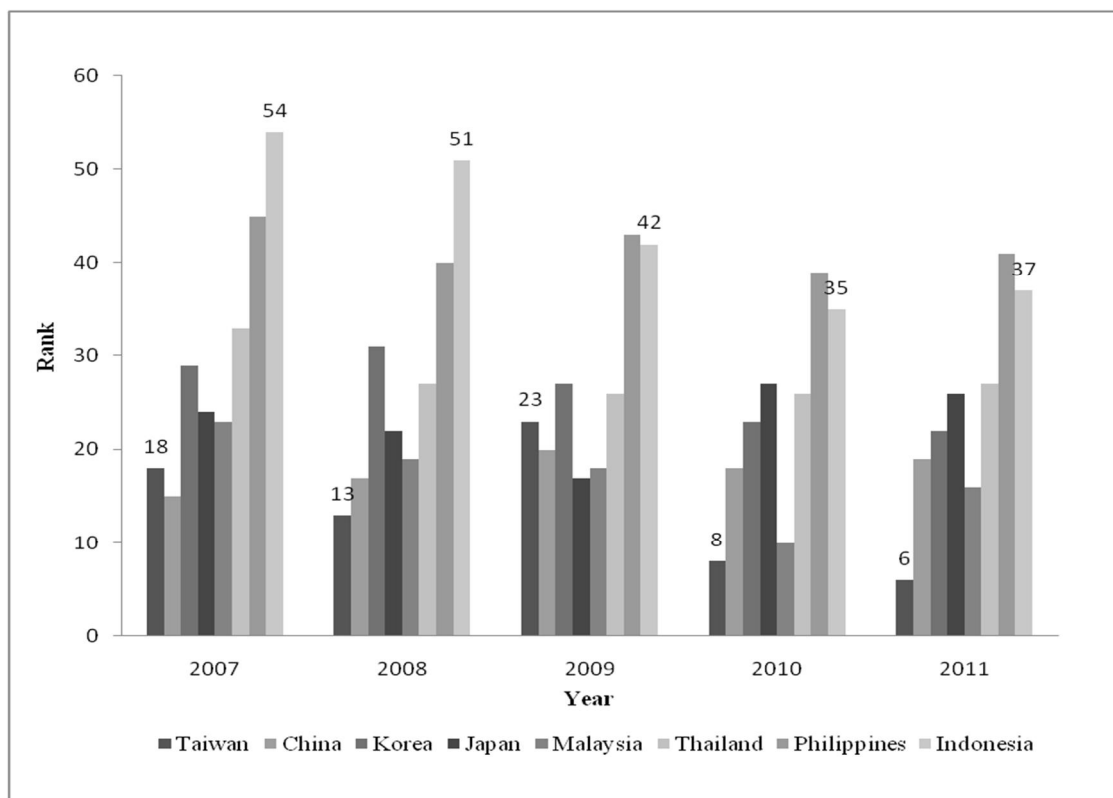
Source: International Institute for Management Development (IMD) Database

As shown above, Taiwan's rank in WCY has been improving in the past five years, especially compared with Japan, well-developed country, developed country, Korea, and other developing countries, such as China, Malaysia, Thailand, Philippines and Indonesia. WCY suggests that Taiwan has an increasing role in the global economic activity and development, and it also provides the business environment that attracts multinational enterprises to invest in and realise the return on investment.

2.2.   Introduction of FDI in Taiwan

In the early 1950s when the newly independent former colonies and semi-colonies were still recovering from the Second World Wars and horror of imperialism, Hsiao and Hsiao (1996) consider that Taiwan might be the first and only developing country in the world at the time to invite much-suspected FDI with open arms since they believe that émigré regime of the Republic of China on Taiwan had no roots in Taiwan and wanted to break its isolationism internationally and domestically. After seeing successful results in Taiwan, it is widely known that Korean then followed such route, along with other ASEANs, such as Singapore, in the 1980s.

Until liberalisation in the mid-1980s, FDI inflows to Taiwan were still highly constrained by restrictions on ownerships as well as foreign exchange controls over remittances of profit and barriers on entry to protected economic activities. Annual inflows varied between $100 and $500 million per annum between 1970 and 1980 (Read, 2002). However, after Taiwanese government lifting the restrictions on inward FDI in 1985-6, there was an immediate surge in the magnitude of FDI inflows from both of the foreign nationals and overseas Chinese, pushing the total inflows tripling from $566 in 1984 million to $1.46 billion in 1987, and further doubling to $2.4 billion in 1990. Following two figures are the trend in FDI inflow of Taiwan and investor types from 1980 to 2010:

Figure5: Inward FDI Trend and Structure of Investors in Taiwan from 1980-2010
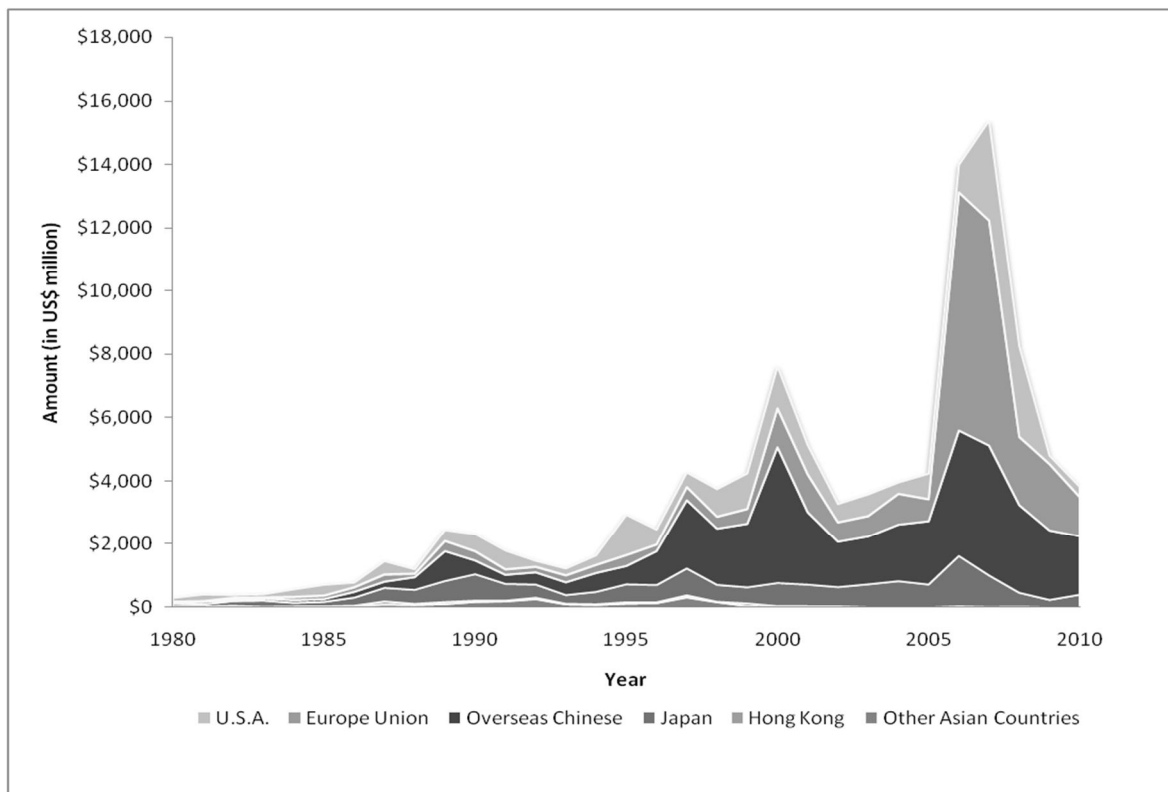
Source: National Income in Taiwan Area, the Republic of China.

Until the liberalisation in the mid-1980s, the inward FDI to Taiwan were mainly constrained by government to the reserved and protected certain industries with ownership restriction, and to the controls over remittance of profit through foreign exchange market. In period between 1970s and 1908s, annual inward FDI ranged from $100 to $300 million dollar, of which significant proportion was made by overseas Chinese and focused on the basic labour-intensive manufacturing industry. It is undeniable that Taiwan's liberalisation of FDI restrictions in 1985 did lead to an instantaneous increase in the level of FDI inwards. Total inflows of inward FDI doubled from $700.4 million in 1986 to $1.4 billion in 1987, and further increased to $7.6 billion in 2000. While the origins of this FDI inflows has been mainly the three key industrialised regions of the Overseas Chinese, USA and Japan from 1980s to early 2000s, but inflows from Europe Union became a major source of FDI,

increasing from $685 million in 2005 (16.19%) to $7.5 billion in 2006 (53.73%).Even though the magnitude and share of inflows from USA, Japan, Hong Kong and other Asian countries such as Korea, Singapore and Malaysia, increased in the early 1990s, their importance kept decreasing in 2000s as FDI inflows from Europe Union and overseas Chinese continues to grow and their rates of growth has been higher relative to those of other countries.

The sectoral evolution of the distribution of inward FDI is a reflection of the structural transformation of the economy during the industrialisation process, although subject to legal restrictions regarding certain industrial activities designated as sensitive (Read, 2002). Prior to the mid-1970s, the inward FDIs to Taiwan mainly flowed to the basic labour-intensive manufacturing sectors, such as textile and clothing. Since then, there was a major structural and economic into the chemical, electronic, electric and relevant manufacturing sectors from the 1970s onwards and, subsequently and recently, FDI has flowed into the service sectors, especially finance, insurance and real estate sectors. However, as shown in the following table, even though there has been an increasing trend in FDI inflows to financial service sectors in the past decade, the high-technology manufacturing sectors still remain to be the major investment targets for foreign investors, accounting for an average of 40% of FDI in Taiwan. Of aggregate FDI inflows 1952-2000, $28 billion was in Electronics & Electrical relevant sectors, and $31.1billion in Finance & Insurance. Within these investments, the sectoral pattern of FDI by overseas Chinese differs substantially from that of non-overseas Chinese. While the major proportion of FDI made by overseas Chinese has concentrated in the Finance & Insurance, the major proportion of FDI made by non-overseas Chinese has focused on Electronics & Electrical relevant sectors. On the other hand, it is argued by Okamoto (2001) that the role of multinational firms, whether through technology transfer or FDI, has already declined since 1990s in terms of output, exports and employment. The

major proposed explanation for such decline in their importance is related to the dynamic growth of domestic high-technology sectors which is based on domestic R&D and high-quality human capital along with technological spillovers from existing foreign companies.

Table 6: Summary of Inward FDI in Taiwan by Industry Classification from 1952-2010

Industry Classification	Number of Project	FDI amount ($ million)	% of Total FDI	Rank by FDI %	Average FDI per project ($ million)	Rank by FDI per Project
Service Sectors						
Finance, Insurance and Real Estate	2,766	31,136.9	28.1%	1	11.26	2
Wholesale and Retail Trade	7,253	10,160.7	9.2%	3	1.40	17
Information and Communication	1,210	5,462.4	4.9%	7	4.51	6
Professional, Scientific and Technical Services	1,861	4,985.9	4.5%	9	2.68	13
Accommodation and Food Services	1,617	1,873.6	1.7%	13	1.16	18
Transportation and Storage	466	1,448.7	1.3%	16	3.11	11
Subtotal	**15,173**	**55,068**	**49.6%**		**24**	
Manufacturing Sectors						
Electronic Parts and Components Manufacturing	1,905	16,042.8	14.5%	2	8.42	3
Others Manufacturing	2,938	6,843.6	6.2%	4	2.33	14
Computer, Electronic and Optical Products	1,451	6,284.7	5.7%	5	4.33	7
Electrical Equipment Manufacturing	1,266	5,731.8	5.2%	6	4.53	5
Chemicals	806	5,072.8	4.6%	8	6.29	4
Basic Metal and Fabricated Metal Manufacturing	1,042	4,494.8	4.1%	10	4.31	8
Non-metallic Mineral Products Manufacturing	308	3,783.5	3.4%	11	12.28	1
Machinery and Equipment Manufacturing	792	2,281.9	2.1%	12	2.88	12
Food, Beverage, and Tobacco Manufacturing	546	1,832.9	1.7%	14	3.36	9
Construction	824	1,486.7	1.3%	15	1.80	16
Rubber and Plastic Products Manufacturing	473	1,047.0	0.9%	17	2.21	15
Textile Mills	250	839.2	0.8%	18	3.36	10
Subtotal	**12,601**	**55,742**	**50.2%**		**56**	
Agriculture Sectors						
Agriculture, Forestry, Fishery and Animal Husbandry	134	120.0	0.1%	19	0.90	19
Total	**27,908**	**110,930**	**100%**		**81.13**	

Source: National Statistics, Republic of China (Taiwan)

2.3.   Introduction of FDI Contribution to Taiwan

FDI has been perceived by East Asian countries as most important capital inflows, both in terms of its size and impacts, compared to other types of capital inflows, especially short-term ones which could cause economies instability in the host country. Several studies have concluded that FDI is a long-term capital inflow and has the smallest fluctuation compared to other types of capital flows (Corsetti 1998; Turner 1991; Sarno and Tylor 1999; Claesssens et al. 1995 and Wiboonchutikula et al. 2001). According to Athukorala and Hill (2001), FDI has

played a key role in economic dynamism in East Asia from 1970s to 1990s, especially the Asian financial crisis in mid-1997. There were two major trends implied by FDI investment patterns relevant to its impact on East Asia. Firstly, FDI flows were increasing much faster than international trade flows, which in turn were increasing much more quickly than world GDP. Secondly, there was a major shift in FDI flows away from traditional import-substituting activities to export-oriented production, particularly the activities in vertically integrated high-tech industries. Thirdly, despite that Organisation for Economic Co-operation and Development (OECD) countries, including Japan, the USA and Europe, remained to be the major investors of FDI, some East Asian newly industrialized countries (NICs), such as Four Asian Tiger: Hong Kong, Singapore, South Korea, and Taiwan, had gradually become important investors to the region with sizeable outward investments. As a matter of fact, Asian financial crisis, contrary to some pessimistic expectations from the market, did not cause a major discontinuity in FDI from major OECD countries, despite a modest decline in inflows immediately after the crisis, and a sharp decline in FDI inflows to Indonesia mainly because of non-economic factors. Compared to other forms of capital inflow, the resilient and stable flows of FDI to those countries affected by the crisis seemed to have suggested a more solid commitment to countries with an open FDI policy.

Economic Growth

There is a large number of literatures has focused on the question of how inward FDI affects host countries and what its impacts are. For the former question, endogenous growth theory explains host county's growth by endogenising technological change, and considers FDI and international trade to be major channels for transmitting ideas and new technologies. In the endogenous growth model, FDI is assumed to be more productive than domestic investment, and reasoning behind this is that FDI encourages the incorporation of new technologies in the

production function of the host economy (Borensztein, De Gregorio, and Lee 1998). Furthermore, Brems (1970) suggested that FDI increased the capital stock and, thus, growth in a host economy by financing capital formation based on Solow-type standard neoclassical growth models. These theories and empirical findings confirm that FDI would encourage host country's economic growth and stability rather than have a negative impact on them. For the second question, Lipsey and Fredrik Sjöholm (2004) argued that foreign firms conducting FDI are usually assumed to possess technology and know-how superior to those of domestic firms in host country, and higher-quality goods and services could be produced at either lower prices or in greater volume than previously available, resulting in higher consumer welfare. Besides, inward FDI could add to the capital stock of the host country, thereby raising country's output level.

In the case of Taiwan, Chan (2000) suggested that FDI has appositive impact on Taiwan's economic growth by channel of technology transfer induced by FDI, which are possible from theoretical foundation and reasoning. Even though he found a causal relationship from exports and fixed investment to the country's economic growth, the postulation that FDI has an impact on the growth through inducing more exports and fixed investment is not supported by his result. Chan's view on technology transfer is supported by Findlay (1978) and Wang (1990) who suggested that FDI would promote economic growth through its effect on technology adoption (see Kozumi and Kopecky 1980; Wang and Blomstrom 1992; Malley and Moutos 1994). Beside, Borensztein, De Gregorio, and Lee (1998) concluded that FDI affects economic growth through technology diffusion by conducting a cross-country regression analysis which includes industries in Taiwan. Among previous specific researches on Taiwan, Ranis and Schive (1985) found the empirical evidence that FDI played an important role in Taiwan's early economic development, and confirmed that it is an efficient

channel of technology transfer from overseas to Taiwan during the period from 1952 to 1980 by industrial case study. By using data for 11 countries in East Asia and Latin America, Zhan (2001) found FDI to boost economic growth in 5 countries including Hong Kong, Indonesia, Singapore, and Taiwan in East Asia and Mexico in Latin America. He concluded that the impact of FDI on host economy country-specific, and FDI potentially promoted economic growth in a country which adopt policy of trade regime liberalisation, enhance education and hence the quality of human capital, encourage export-oriented FDI, and maintain macroeconomic stability. By classifying East Asian countries based on level of economic development, Kotrajaras et al. (2011) researched on the data from 1990 to 2009, and found evidence that FDI has a significantly positive relationship with economic growth in Taiwan, classified as a high-income country, since it has several appropriate economic factors such as low level of corruption, high degree in trade openness, and high level of education, government expenditure on investment in infrastructure and financial development. Moreover, Wang (2003) conducted empirical research on the impacts of different sector-level FDI inflows on host country's economic growth by employing data in 12 Asian economies, including Taiwan, over the period from 1987 to 1997. His results suggested that manufacturing-sector FDI inflow in had a significant and positive impact on host country's economic growth, whereas non-manufacturing-sectors FDI inflows did not play a significant role in contributing economic growth in host country.

Economic growth in developing countries, according to the hypothesis proposed in the early 1960s by Bhagwati, is the principal driver of poverty reduction which will lead to poverty decline no matter what the reasons are (Bhagwati and Srinivasan, 2002; Dollar and Kraay, 2002, 2004). In associated with strong empirical regularity that country's rapid growth could be achieved by efficient methods of openness to international trade and investment, there is

increasing empirical evidence suggesting a significant relationship between poverty alleviation and rapid growth. Such evidence leads to a growing consensus that integration of a developing country into global economic and international trade system might be an essential factor for poverty reduction, even though there is no simple relationship between openness and poverty (Agenor, 2004; Bhagwati, 2005; Sharma, 2003; Srinivasan, 2001; Winter, McCulloch, and McKay, 2004). By using time series data for Taiwan from 1964 to 2003, Tsai and Huang (2006) found that its policy of trade liberalization helped to alleviate poverty in the country through both income and distribution effects, in the long term and short term. They also confirmed that an increasingly open trade regime in Taiwan not only brought about remarkable economic growth, but also worked to raise the income share of the poorest quintile in Taiwan. This result held against the adverse view on income distribution effect of liberation, especially after the mid-1908s when Taiwanese economy was drastically liberalized.

Productivity

In addition to economic growth and poverty reduction, Ng (2006) considered that FDI has been playing an important role in the development process of many countries since it provides those countries with both necessary capital and technology. From his point of view, there are broadly two channels through which FDI can flow. One is by providing organizational know-how and advanced technology that would assist to increase the productivity or efficiency of investment, and the other is by providing capital to build up the productive capacity in the economy. Further, numerous endogenous growth models emphasised that technology transfer is from the North to the South is a vehicle for productivity growth of the South (Segerstrom, 1991; Grossman and Helpman, 1991). According to Haddad and Harrison (1993), among several channels of technology transfer,

FDI has been regarded as a primary contributor to the host country's productivity growth. Productivity growth is one of the most significant beneficial effects off foreign investment being related to technology spillovers across domestic firms and sectors (see Blomstrom and Persson, 1983). Empirical studies from both developed and developing countries are supportive to the positive spillover effects hypothesis (see Caves, 1974; Globerman, 1979; Blomstrom and Persson, 1983; Haddad and Harrison, 1993). In the case of Taiwan, by using its manufacturing firm-level data taken from the random sampling data file of The Report on 1991 Industrial and Commercial Census for Taiwan Fukien Area published by the Directorate-General of Budget, Accounting and Statistics, Executive Yuan, Republic of China., Chuang and Lin (1999) confirmed that FDI and R&D have a positive impact, or spillovers effect, on productivity especially for domestically-owned and export-oriented firms. Further, Ng (2006) conducted Granger causality test (1969) on the data period from 1970 to 2000, and found empirical evidence of one-way Granger causality from the change in FDI inflows to total factor productivity (TFP) growth at the aggregate level in Taiwan.

2.4. Potential Arguments for and against FDI Impact on Taiwan

There are a growing number of scholastic literatures which focus on how inward FDI affects the host country, and what the positive and negative impact would be. Even though a wide range of empirical research from almost every perspective has been conducted, there is still little sign of convergence on such issue. Hence, it could be realised that the impacts of FDI conducted by multinational companies operating in host countries have constituted a highly controversial issue and research conclusion. In the book of Foreign Direct Investment, Moosa (2002) summarizes arguments for and against FDI that could be applied into Taiwanese case.

Arguments for FDI

FDI inflows are less volatile than portfolio investment flows, since FDI suggests a long-term commitment to the investment project and it provides a significant source of funds and capitals for developing countries and transitional economies. It also involves the transfer of financial capital and advanced technology to the host county, and boosts the host country's economic growth through these technological spillovers and capital transfer (see De Andrade-Castro and Teixeria, 1999; Zhang, 1999b; Chen and Ku, 2000; Fan and Dickie, 2000; Asafu-Adjaye, 2000; Berthelemy and Demurger, 2000; Kearns and Ruane, 2001). On the other hand, FDI would boost host country's productivity and employment if it is an export-driven one, the underlying conditions allow the installation of new plants and production facilities designed to achieve economies of scale, and it provides workers with professional training in order to increase their skills and productivity (see Yabuuchi, 1999; Glass and Saggi, 1999b; Chuang and Lin, 1999; Barrel and Holland, 2000; Djankov and Hoekman, 2000; Hsu and Chen, 2000; Walkenhorst, 2000). Moreover, FDI would contribute to fill the gap between saving and foreign exchange by offering financial capital provides a vehicle for reviving the domestic capital market through which domestic savings can be channelled to finance domestic investment, and improve the capital account of the host country (see Bosworth and Collins, 1999). Lastly, FDI could provide domestic firms with increased opportunities by establishing potential relations with local suppliers for locally-produced goods and services, and boots the degree of competitiveness in the host market (see Bonelli, 1999; Okamoto, 1999, Stone and Jeon, 2000; Mucchielli et al., 2000; Chen, 2000).

Arguments against FDI

In some certain circumstances, FDI represents a concept of colonialism since it may result in a loss of sovereignty, in compromising national security and in jeopardizing the national independence of the host country, especially when multinational companies who conduct FDI

and have the sheer size are powerful financial and political negotiators and are likely strike favourable terms in bilateral negotiations with a government with poor financial and economic position (see Fung et al., 1999; Heinrick and Konan, 2000). Foreign firms who conduct FDI could reduce employment through divestment and closure of production facilities since they exist and operate primarily because of market imperfections in the host country. Further, foreign firms may worsen income distribution and wage inequality in the host countries by paying domestic workers low wages and foreign workers high salaries (see Driffield and Taylor, 2000; Henneberger and Ziegler, 2000) On the other hand, some foreign firms with large size who are sufficiently vertically integrated may limit the development with strong relations with local suppliers because of inter-subsidiary transactions, or who are sufficiently horizontally integrated may decrease the market concentration and increase the possibility of monopolistic or oligopolistic practices (see Heinrich and Konan, 2000). Moreover, FDI may not act as a role of foreign capital provider because it could a relatively expensive source of financial capital, foreign firms may obtain necessary funds from the local capital market which could possibly crow out investment in domestic firms, and foreign firms' capital contribution may have a non-financial form (see Bosworth and Collins, 1999).

3. Literature Review and Discussion

3.1. Definition of Foreign Direct Investment

Foreign investment is defined as a transfer of funds or materials from one country (called the capital exporting country) to another country (called the host country) in return for a direct or indirect participation in the earnings of that enterprise.[1] International capital mobility is usually divided into long-term capital mobility and short-term capital mobility. The long-term capital mobility can be further divided into Foreign Direct Investment (FDI) and Foreign Portfolio Investment (FPI). Following column is to show the comparison between FDI and FPI.

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[1]The Encyclopedia of Public International Law,Vol. 8, p. 246

Table 7: Comparison between FDI and FPI

Type	Definition	Characteristics	Regulations
Foreign Direct Investment	Direct investment is a category of cross-border investment associated with a resident in one economy having control or a significant degree of influence on the management of an enterprise that is resident in another economy.[2]	Involving in investment and control, and focusing on the lasting interest, and management control	In Taiwan, investment is regarded as FDI when an investor directly owns equity that entitles it to 10 percentages or more of the voting power in the direct investment enterprise; otherwise, it is regarded as FPI.
Foreign Portfolio Investment	Indirect investment is to purchase equity stocks or corporate debts of an enterprise that is resident in another country.	Involving only in financial investment, and investors do not directly involve in enterprise operation, but receive the agreed coupons or participate in dividends distribution.	

Both foreign direct investment and foreign indirect investment include capital inflows and outflows. Compared with foreign indirect investment, foreign direct investment not only includes capital infusion, but also involves other necessary factors of corporate function, such as human capital management.

3.2. Theories of Foreign Direct Investment

3.2.1. Foreign Direct Investment Theories (A)

Generally speaking, foreign investments from enterprises could be broadly divided into Foreign Direct Investment (FDI) and Foreign Indirect Investment (FII). The former means that domestic companies directly invest foreign businesses and actively involve in the

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[2]Balance of Payment and International Investment Position Manual, 6th edition, IMF, p.100

managements of operation; the latter one means that domestic companies invest the capitals into the foreign capital markets in order to obtain the investment returns, instead of actively involving in the managements of operation. Because foreign direct investments involves in the investment of production factors, including capital, techniques, management resources, and other production inputs etc., the resulting effects could be a major concerns for the public. Following paragraphs mainly focuses on the theories regarding the foreign direct investment.

According to the Braunerhjelm and Svensson (1996), the theoretical foundation of FDI is rather fragmented because it consists of different fields and aspects of economics to elucidate the FDI pattern for foreign investors. Although there are numerous theories for foreign direct investment in the academic literatures and each has its own background and assumptions, those theories can be classified as two categories based on the investment motivations, categories including Expansionary FDI and Defensive FDI. Domestic companies conduct FDI with the intentions to expand the operations and maximize the profit growths via expanding the sales markets, diversifying the risks of investment and operation, obtaining the innovative techniques, controlling the international resources, and taking advantages of tax incentives etc. Academic theories regarding the expansionary FDI include the Monopolistic Advantage Theory by Hymer (1960); Financial Theory by Aliber(1970) and Rugman (1979); Transaction Cost Theory by Coase (1937) and Williamson (1991); and Internalization Theory by Buckley and Casson (1976).

On the other hand, Chen and Ku (2000) argued that when domestic companies gradually lose their comparative advantages because of the changes in the economic environments, they would choose to conduct defensive FDI in order to lower the total production costs and

maintain the competiveness of product by building the manufacturing plants in local countries and taking advantages of the cheap costs of labours, lands, and resources. Academic theories regarding the defensive FDI include Product Life Cycle Theory by Vernon (1966) and Macroeconomic Approach by Kojima (1973).

In addition to the expansionary FDI and defensive FDI, Dunning (1981) proposed the Eclectic Theory, which is the combination of the Monopolistic Advantage Theory, Product Life Cycle Theory, and Internalization Theory. The Eclectic Theory discusses Local advantages, Ownership advantages, and Internalization advantages. Detailed theories are presented as following:

3.2.1.1. Expansionary Foreign Direct Investment

3.2.1.1.1. Monopolistic Theory

The traditional theory of international trade and finance has explained firms of a certain country invest overseas. However, FDI could not be explained by neoclassical version of comparative advantage because of the unrealistic assumptions. For instance, In the Ricardian version, it assumes that there are two factor, two commodities, two country model in which productive factors are perfectly mobile domestically but perfectly immobile internationally. Emmanuel (1972) point out that Ricardian's model also assumes a perfectly competitive market where goods move freely between those two nations. Since Ricardian's model assumes that the labour cost is the only relevant factor of production, it is unable to explain the possibility of FDI or any other type of international expansion and production. On the other hand, the Heckscher–Ohlin–Samuelson' model modifies Ricardian's by replacing labour cost with differences in factor endowment as the cause of FDI and international trade. Such model not only assumes the same production function for each good in both countries

while preserves the assumption of international immobility for productive factors, but also assumes away the possibility of absolute advantage. But this model still remains to be unrealistic and is unable to provide the answer to the cause of international production.

The major breakthrough came in Hymer's Ph.D. dissertation at Massachusetts Institute of Technology in 1960[3]. Hymer is the first one not only to analyse FDI from the perspective of industrial organization theory, but also to distinguish between portfolio investment and direct investment. Portfolio investment, also indirect investment, refers to investment with no control over the operating entity, while direct investment refers to the investment associated with control over the management. Hymer (1976) believe that there are two reasons for investors to choose FDI in order to obtain the direct ownership of the foreign enterprises: (1) to ensure the safety of the investment and (2) because the investors have certain types of advantage with which they wish to exploit that in local market. As Hymer (1976, p. 25) explained:

> If the markets are imperfect, that is, if there is horizontal or bilateral monopoly or oligopoly, some form of collusion will be profitable. One form of collusion is to have the various enterprises owned and controlled by one firm. This is one motivation for firms to control enterprises in foreign countries.

Hymer focuses on the market imperfectness, and regards the foreign direct investment as a firm behaviour under the monopolistic market. The factors forming the monopolistic market include differentiated advantage of each company in the market, incompleteness of market structure, and restrictions of government regulations. With respect to the reason why

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[3]Hymer's dissertation was published in 1976.

companies still conduct foreign direct investment even when being disadvantaged at foreign market information, Haymer argues that this is because companies have the intangible assets, including the production techniques, innovation capabilities, patents, brands, and management experiences etc. Because these intangible assets belong to corporate internal public goods and without excludabilities, companies could obtain the monopolistic positions in the foreign market and higher profits. Following the work of Hymer, Kindleberger (1969) believe that investors must possess certain advantages in order to earn enough investment return through FDI because "in a world of perfect competition for goods and factors, direct investment cannot exist" (p. 13). Under conditions of perfect markets and factors, no firm can possesses an advantage that would justify direct investment. Furthermore, Cave (1974) and Horst (1972) not only support the Haymer's idea on technique advantages, but also emphasizes on the scale of enterprise and product differentiation.

3.2.1.1.2.   Currency Area Hypothesis

Aliber (1970, 1971) proposes another strand of FDI theory to explain why a firm tends to exploit a foreign market by direct investment rather than through portfolio investment such as exporting or licensing, because he believes that the industrial organization theory put forward by Hymer and Kindleberger and further extended by Caves could not provide the explanation to such question. Aliber hypothesizes that the pattern of FDI can be explained in terms of the relative strength of various currencies. His hypothesis postulates that a firm located in a country with strong currency tends to conduct FDI, while a firm located in a country with weak currency doesn't. This is because Aliber maintains that investor tends to ignore the exchange risk on the foreign earnings from local country, a firm in a hard currency area is able, based on reputation, to borrow at lower costs and capitalise the earnings on their FDI in soft currency areas at higher rates than the local firms. Essentially, the fundamental

assumption is that there is a bias in capital markets, which arises because the income streams from foreign country with weak currency are associated with foreign exchange risk. Therefore, the firms are located in a strong currency area and the market is subject to a bias in evaluating the currency premium on weaker currencies, suggesting that such firms may be positioned themselves to efficiently hedge the foreign exchange risk.

Several academic literatures have empirically tested Aliber's hypothesis by examining the relationship between the flows of FDI and the value of currency in host country. If the hypothesis is valid, then undervaluation brings the inflow of FDI into the host country, while overvaluation is associated with outflow of FDI. Empirical researches supporting such hypothesis include Alexander and Murphy (1975), Logue and Willet (1977), and Sachchamarga (1978). However, other studies found contradictory result that the devaluation of the currency in host country is like to discourage the inflow of FDI into that country. For instance, Scaperlanda (1974) found that the depreciation of the Canadian dollar as opposed to the U.S. dollar had a negative impact on the inflow of U.S. FDI into Canada.

What causes this conflicting result is the fact that the exchange rate is not the sole factor influencing FDI decisions, and the undervaluation or devaluation of the currency in host country may influence the timing of a particular FDI. Although Aliber's assumption that foreign investors tend to ignore the exchange risk on foreign earnings from host country is seemingly to apply to relatively foreign investors with smaller portfolios, it is the institutional investors with larger portfolios dominate the FDI in 20th century. On the other hand, according to the Lizondo (1991), the problem of the hypothesis is that it is unable to explain the cross-investment between currencies areas, for FDI in countries with the same currency are, and for the concentration of FDI in certain industries. Furthermore, Dunning (1973)

suggests that because country risk factor affects the relationship between the firms and their competitors, currency area hypothesis only adds to the industrial organization hypothesis, though it cannot replace it.

As a result, Froot and Stein (1991) put forward another more elaborate theory based on the market imperfections. They argue that it is informational imperfection in the capital market that causes the weak currency area to be associated with FDI inflows into it, and makes the cost of internal financing to be lower than cost of external financing. They found that there is a negative relationship between the real value of US dollar and the FDI inflow into the country. Contrast with the currency area hypothesis's emphasis on over- and under-valuation, Agarwal (1980) believe that the hypothesis should be focused on the depreciation and appreciation because FDI can be viewed as alternative to export. If the home currency keeps appreciating, then the exports produced by the firms in the home country would become less competitive, and be difficult to be sole in the foreign country. In such case, FDI could be a measure used to hedge the firms' economic risk from foreign exchange rate exposure. Cave (1988) argues that the foreign exchange rate affects the FDI through two channels. First, changes in foreign exchange rate would lead to the changes in the investor's cost of goods sold and sales revenue. The net effect of FDI depends upon the certain characteristics of industries being researched. Second, expected short-term exchange rate movement affects the level of FDI. A depreciation of domestic currency that is expected to be reversed in the near future would encourage FDI inflows to profit from capital gain when it appreciates. Besides, Rugman (1979) regards FDI as a tool of international diversification, and internalization of intangible assets as a method to create internal markets in order to circumvent the capital markets imperfections. He believes that the companies would also utilize the International Transfer Pricing to adjust the allocation of liquid assets in different currency area. Strategic

cooperation between parent company and its subsidiary to lower the foreign exchange risks is more capable to earn stable profit than does exporting operation business model.

3.2.1.1.3.   Transaction Cost Theory

The theory of neoclassical portfolio flows is one of the theories proposed by academic literatures to explain the tremendous rise of US foreign direct investment in Western Europe in the years after WWII. According to this theory, the investment capital would move from countries with lower interest rate to those with higher interest rate when there are no barriers for capital movement, or where there are no risks or uncertainties (assuming risk was held equal). Under this assumption, there would be no capital movement across international borders taking place. This theory, however, is not able to answer numerous questions, such as how American companies compete with already-existing European firms when they invest in Western Europe, given the additional cost of conducting business in foreign countries. As a result, Hymer (1960) took one the neoclassical application of portfolio flows to the FDI after WWII, and he found that there are two main features of FDI inconsistent with the neoclassical portfolio flows. The first one is that the multinational firms would tremendously finance their host-country operation through local capital markets with higher interest rate, rather than home capital market with lower interest rate. The second is that there are certain countries with existed substantial concentrations of FDI and multinational enterprises. In an attempt to look for another theory to explain such circumstance, Hymer found two motivators for FDI, which are the intentions to reduce, or minimize, international competition among firms and industry; and the desire to increase investors' investment returns from the utilization of their distinct advantages. Hymer then transported the theory of FDI out of the neoclassical portfolio flows theory, and into the industrial organization with the study of market imperfections. Hymer assumes that foreign investors must possess certain advantages,

in the form of superior technology, firm-level economies of scale, or better products, in order to deal with the additional cost of doing business in host country. His market failure approach then was further developed in the form of transaction cost, internalization and the eclectic paradigms.

According to the Coase (1937), during the course of internationalization, because market imperfection leads to the drastic difference in transaction cost in each country, and the companies would enter into the foreign markets with different entry methods based on the different degree of transaction costs. Furthermore, Williamson (1991) point out that transaction costs results from contracts negotiation, and it can be categorized before and after making contracts. If the transaction cost is too high, it would lead the imperfect market. Besides, the characteristics of uncertainness, distinctiveness, and high frequency for foreign direct investment are able to lower the transaction cost. According to Norman (2001), the fundamental idea underlying the transaction cost theory models was that: "incomplete contracts and missing markets give rise to the possibility of opportunistic behaviour in arms-length exchange (Williamson, 1975) and so to the preference by the firm to replace external contracts by direct ownership and internal hierarchies". Furthermore, there is a subtle, but important difference between Hymer (1960) view on transaction cost theory and Dunning and Rugman (1985) view. In the former one, Hymer believe that multinational companies internalize the pecuniary externalities is due to structural market imperfections in the market for final products. In the latter one, Dunning and Rugman believe that foreign companies internalize non-pecuniary externalities is due to natural imperfections in the market for intermediate products

3.2.1.1.4. Internalization Theory

Recent academic literatures regarding the international trade and economics indicate that the multinational expansion and global strategy are due to the presence of intangible assets. The internalization theory[4] argues that foreign direct investment should occur when a firm can increase its value by internalizing markets for certain of its intangible assets. Such intangible assets are commonly thought to include[5]:

> (1) Technological know-how;
>
> (2) Marketing ability and related consumer goodwill; and
>
> (3) Effective and dedicated management.

The internalization theory holds that the value of intangible assets would increase in direct proportion to the scale and size of the firm's markets. This is because such assets are primarily based on proprietary information; they cannot be transacted and exchanged at arm's length for numbers of reasons resulting from the economics of information and of public goods. Furthermore, intangible assets contain certain characteristics of public assets within a firm to the extent that utilizing such assets in one country would not diminish the use of the assets in other country. This would help to explain why the firms with such intangible assets are more likely to invest in many other countries with multiple plants. Buckley and Casson (1976) believe that the markets for key intermediate products such as research & development skills, human resources, specific techniques, and management expertise are imperfect; there would be significant time lags and transaction costs when linking different activities through international markets. Therefore, firms are encouraged to substitute these external markets by their own internal markets for these products when seeking for profit

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[4] This view is developed in Coase (1937), Hymer (1960: 1976), Caves (1971), Dunning (1973), Williamson (1975), Buckley and Casson (1976), Magee (1977) and Rugman (1981)

[5] See, for example, Helpman (1984).

maximization in the imperfect competition market. Internalizing the market transaction means that the firms establish their own production affiliate in the market. The FDI then results from the internalization of markets across national boundaries, and such process would be continued until the costs and benefits of further internalization are equal to be each other at the margin. Costs of internalization include administrative and communication expenses. Benefits include avoidance of time lags, increase in bargaining power with buyer, minimization of the impact of government intervention through transfer pricing and the ability to use discriminatory prices against the customers. Besides, it is difficult for companies to maintain the buyer-seller relationship because of the technique transfers and the authorizations. As a result, companies would seek for foreign direct investment in order to enhance the internalization of their own distinct advantages.

On the other hand, Root & Ahmed (1979) argued that when the price mechanism of the market are not able to fully reflect the full costs of externalities during the production process, the market then have the insufficient market allocations. The companies could fully utilize the advantages of intangible assets by internalizing the production of cross-nation integration. Rugman (1981) argues that, in avoid of being affected by externalities of imperfect market, multi-national companies would internally build the international system in order to obtain the autonomy of production and resource allocation. Teece (1986, p23) suggests that 'the internalization paradigm developed in the literature to date needs to have transaction costs economics embedded within it if a deep understanding of the multinational enterprise is to evolve'.

3.2.1.2. Defensive Foreign Direct Investment

3.2.1.2.1.   Macroeconomic Approach

Many of the previous academic works are more focused on the topic of FDI outflows from the US to any country around the world such as Hymer-Kindleberger model, but Kojima (1978) then structures the FDI theory by researching on the topic of FDI inflows to US. According to the Kojima (1973, 1975, 1985), he regard FDI as means of transferring capital, know-how, managerial skills, techniques, technology, and other intangible assets from investing firms based in home country to the host country. Such analysing perspective is called 'macroeconomic approach' or 'factor endowment approach'. In their empirical mode, Kojima (1973) and Ozawa (1979) combine macro variables such as industrial policy and trade policy with micro variables like factor endowments and intangible assets. Furthermore, Kojima classifies FDI into two types. The first one is the trade-oriented FDI, which generates an excess supply of exports and excess demand of demands for the home country. Such type of FDI would benefit for both countries in terms of welfare improvements. The second one is the anti-trade-oriented FDI, which not only has an adverse impact on the trade between the countries, but promote the unfavourable restructuring in both countries as well. Based on the experience of Japanese FDI outward, Kojima (1973) and Ozawa (1979) believe that Japanese FDI to US belongs to the trade-oriented one. They argue that because the deteriorations of Japanese macro-economic conditions leads to the gradual erosion of comparative advantages, or even disadvantages, for the their products, Japanese firms would conduct FDI with the purpose of switching the production factory to the host countries with more comparative advantages, in order to allow host country factors be merged with foreign skills or capital, and then produce the products at the lower costs. Kojima argues that Japan, as a capital-exporting country, concentrates its FDI to ensure supply of raw materials and intermediate products for which it does not have a natural comparative advantage, such investment

belonging to trade-oriented FDI. In terms of FDI investment by US, he argues that it has the empirical confirmation of the product life cycle propose by Vernon (1966). Because US firms found that their products have reached the mature stage, it is necessary for them to seek for profitable markets with growing demands in foreign countries, such investment belonging to monopolistic FDI. Compared with Japan, US has a history of transferring industries to host country in which it possesses a natural comparative advantage.

Dunning (1988) suggested that the macroeconomic approach by Kojima may have the limitation in presenting a unified theory with practical implications, because, as Petrochilos (1989, p21) points out, Kojima's approach does not provide the explanation FDI decisions and flows but act as a prerequisite for establish international trade between countries. He also suggests that the foundation of the Kojima's hypothesis is also based on the product life cycle theory and eclectic theory.

3.2.1.2.2. The Theory of Product Life Cycle

Product life cycle provides the basis of explanation for both international trade (Posner, 1961; Hufbauer, 1966) and FDI (Vernon, 1966; Hirsch, 1967), in which Vernon (1966, 1974, and 1979) conducts the outstanding review of the development of such hypothesis. According to Vernon (1971), 'the products go through a cycle of initiation, exponential growth, slowdown and decline – a sequence that corresponds to the process of introduction, spread, maturation and senescence'. Petrochilos (1989) also suggests that product life cycle hypothesis is valuable and useful in that it provides another interpretation of FDI, particularly for the industry manufacturing the products that are featured by advanced technology and high income elasticity of demand. This hypothesis bases upon on mainly four assumptions which were well deliberated by Huckley and Casson (1985, p. 8):

1. Products undergo predictable changes in production and marketing.

2. Information available on technology is restricted.

3. Production processes change over time and economies of scale are prevalent.

4. Tastes differ according to income and, thus, products can be standardized at various income levels.

Product life cycle hypothesis postulates that companies would involve in FDI at a specific stage in the life cycle of the products that are produced as innovation at the initial time. The three stages are specified as following:

1. Innovation stage: because firms have to meet the growing needs for efficient coordination between production lines and R&D as well as the availability of demand for the innovative products, it is necessary for firms to initiate the production site at home country in order to be close to the customers. During the period of innovation stage, the demand for the newly launched products is price inelastic, and the innovating firms are able to charge a relatively high price from the customers without affecting the demand for the product as that much. The products would be improved as time passes because of the feedback from customers. Furthermore, the demands are mainly from the customers based in home country during such stage.

2. Maturity stage: this stage is characterized by the maturity and export of the product to

the countries with the next-highest level of income, such as from US to Europe, because the demand emerges from the customers in these developed countries. Growing demand for the products and increasing degree of competition in these developed countries eventually lead the firms to conduct FDI in order to build production facilities for the innovative product and meet local demand. At maturity stage, foreign countries are importers of the product, while home country is a net exporter.

3. Standardization stage: this stage is marked by a complete standardization of the products and its production know-how and techniques which the innovating firms are no longer exclusively possess them. Fierce price competition from other firms compels the innovator to invest in developing countries with the purpose of seeking for cost advantages, such as labour costs and input costs. At standardization stage, the home country would start to import the product from the production factories based in both domestic and foreign countries. The foreign countries become the net exporter of the products, while home country becomes a net importer.

Therefore, when the product reaches the stage of maturity and standardization, cost of production becomes a significant determinant of FDI. FDI then belongs to a defensive move to maintain the firm's competitive advantages against its foreign and domestic rivals. Empirically, Gruber *et al.* (1967) found a strong association between propensity to invent new products, export performance, FDI and the ratio of local production to exports on the one hand and R&D expenditure of the U.S. industries on the other hand. The relationship between

the ratio of local production to exports and R&D expenditure is interpreted as an indication of the substitution of FDI for exports in host countries in the final stage of a product cycle. Besides, Horst (1972b) conducts an empirical analysis for U.S. exports and FDI in Canada. His research result suggests that the technological intensity of a U.S. manufacturing industry was more closely related to the total sum of that industry's exports to Canada and its subsidiary sales in Canada than it was to either subsidiary sales or exports taken separately[6]. Based on it, he concluded that exports and FDI in local production may be substitutes for one another. According to Host, Canadian tariff policy would affect the firm's decision between the exports and FDI. He also concluded that the lower the Canadian tariff is, the smaller the share of local production in total U.S. sales of an industry in Canada accounts for. Nonetheless, Orr (1975) disputes the latter conclusion of Horst's by using more disaggregated data. In addition, Baldwin (1979) found that the tariff is an insignificant variable. He concluded that the FDI from U.S. manufacturing occurs extensively in the product lines where outputs are differentiated and investors have the opportunity to capture rents based on such product differentiation, and that industries employing relatively large numbers of highly skilled and educated employees tend to conduct FDI.

Vernon (1971, p. 65f) described the product cycle model as a 'deliberate simplification of reality with no presence of capturing the complex sociological, political and idiosyncratic factors influencing the investment behaviours'. Besides, Vernon (1979) admits such circumstance by noting that the simplified product life cycle hypothesis has become less plausible because the technological leadership of US has undermined badly and the income differences between US and other developed countries have levelled down. Hirsch (1976)

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[6] Wolf's study (1977) indicated that thisresults applies for the U.S. multinational firms notonly in Canada but also for their worldwide operations.

generalizes the model for product cycle so that the rigid sequential relation between product innovation, mature and standardization is no longer essential for the validity of the hypothesis. Furthermore, the practical applicability of product life cycle hypothesis is restricted to highly innovative industries [Solomon, 1978] and such hypothesis is an over-simplification of the firm's decision making process [Buckley and Casson, 1976]. In defence of product life cycle hypothesis, however, it should be noted that such hypothesis is based originally on the US experience and offered a grounded explanation for the interaction between production, export and FDI at firm level during the 1950s and 1960s.

3.2.1.2.3.   Eclectic Theory

Dunning (1981) proposed the Eclectic Theory, which includes ownership advantage, location advantage, and internalization advantage, also called OLI theory. According to the theory, these three conditions must be satisfied if firms would like to conduct FDI in foreign country. First, the ownership of certain intangible assets must provide the firm with competitive advantages over other competitors in the similar industry or host country. These intangible assets are called ownership advantage and belong to the distinct advantages that are not available to the other firms in host country, such assets including innovative technology, transferable economies of scale and scope, and access to the finance and raw materials. Only companies with such advantages can conduct foreign direct investment and compete with local businesses in host countries. Second, associated with other advantages, the firm must seek for some other production inputs located abroad in order to make the FDI in the host country more profitable than exporting to that country. These are called locational advantages. Similar with the theory of product life cycle, it argues that because of the labour costs, techniques spillovers, and incentive polices of host countries for the products at different stages, the production factories would change to different countries based on the

changes in comparative advantages. As a result, foreign direct investment is a necessary tool to maintain the competitiveness for the companies in capital exporting countries. Third, the firms must be more profitable to utilize their own advantages than to sell them directly through spot markets, or to lease them through contractual arrangements such as licensing or managerial contracting. The internalization advantages refer to the decision between selling the right of intangible assets to other firms for expansion strategy, or retaining the right to accomplish the expansion strategy within the firm. Internalization advantage emphasizes that, when external transaction costs are large or companies are unable to fully capture the external benefits of intangible assets, foreign direct investment can lead the companies to maximize the profit of intangible assets.

All in all, the eclectic theory specifies that that all of the forms for FDI are able to be explained by the three advantages arising from arising from location, internalization and ownership. The theory acknowledges that these factors might change over the time, and recognizes that it may not be valid itself to generalize the experience from one country to another, if country-specific features and characteristics are significant determinants of FDI decision for multinational enterprises. It is noteworthy that Casson (1990) put forward the integrated theory of FDI, which integrates the theory of trade, theory of firm and the theory of international capital markets. While he considered that the integration of the theory of trade with the theory of international capital markets causes no theoretical problems and the integration of the theory of firm with the theory of the international capital markets is rather straightforward, he mentioned that the integration of the theory of the trade with the theory of firm is lack of the theoretical and empirical foundation. Apart from these, the integration of these theories proposed by Casson still offers solutions to a sophisticated set of problems regarding to FDI.

3.2.2. Foreign Direct Investment Theories (B)

Foreign Direct Investment has registered an immense growth over the past four decades. In contrast with the United Kingdom and the United States were by far the biggest exporters of FDI during the fifties and early sixties, the participation of Germany and Japan into this area since then has significantly intensified the international and global competition for overseas investment opportunities. Nevertheless, the growth of the publication and academic literatures specifically on the determinants of these foreign investments has largely excelled the growth of FDI. Therefore, the growing interest in and importance of the cause and effect of FDI have led to the development of different schools of theories that attempt to explain the underlying rationales why multinational companies involve in FDI, why they choose specific one country rather than others to conduct their foreign investment strategy and expansion, and why they select a particular entry model to enter into the foreign market.

According to the Agarwal (1980, p. 740), by referring to these FDI theories as hypotheses is because 'there is not one but a number of competing theories with varying degrees of power to explain FDI'. Therefore, suggested by Lizondo (1990) following Agarwal (1980) in order to facilitate the discussion, FDI theories may be classified under the following groups: i. Perfect Market Assumption; and ii. Imperfect Market Assumption. The first group is constituted by the hypotheses which assume full or nearly full competition on input factors and/or output products. The second group consists of the hypotheses which assume that market is imperfect by nature, and postulate that the foreign firms investing in local countries have at least more than one comparative advantages over their domestics competitors in the host countries.

3.2.2.1. Perfect Market Assumption

The concept of a perfect economy with the perfect market and competition assumes that prices and quantities in the market are adjusted automatically to bring supply and demand back into the state of equilibrium. As the rate of return on investment capitals in each country is not equalized internationally because of the segmentation in world market, the flows of FDI, in a disequilibrium context, would start to take place until the markets return to stability. This section covers the three hypotheses based on the assumption of the perfect market on national factors and/or product markets. Three hypotheses include the Market Size and Output hypothesis, the Portfolio Diversification Hypothesis, and the Differential Rate of Return Hypothesis.

3.2.2.1.1.   Market Size and Output Hypotheses

The market size hypothesis is based on the foundation of the macro-economics. FDI is considered to be a function of sales or output, which means that the level of FDI received by the host country depends on its size of the market measured by the host country's GDP, or by the volume of sales the foreign firms have in the country. It is argued that the host country would become a potential target for multinational firms to conduct FDI once the market size of that particular country has grown to a level allowing foreign firms to exploit country's economies of scale. According to Balassa (1966), if the size of the market becomes sufficiently large, it has the capacity to allow for the specialization of the input factors of production, and achieve the cost minimization and consequently profit maximization for foreign investors. On the other hand, the output hypothesis is based on the foundation of the micro-economics, and the assumption that there is a positive relationship between the level of FDI by firms and their output (sales) in that local country. Generally speaking, theoretical models of output hypothesis are derived from the neoclassical models of domestic

investment, the most popular of which is proposed by Jorgenson (1963), a generalised form of the flexible accelerator model by Chenery (1952) and Koyck (1954)[7].It is noteworthy that both of these hypotheses are based on the rationale provided by the neoclassical domestic investment theories that foreign firms would increase their investment in response to their sales in host country, namely that the level of domestic investment of a country would increase with the rising level of its GDP. Overall speaking, the output hypothesis is more respected than the other attributing to its strict theoretical foundation and basis, but the market size hypothesis is one of the most popular hypotheses to be empirically researched and examined in the last three to four decades.

In the past few decades, there are numerous academic literatures empirically examining and testing output and market size hypotheses. Stevens (I969)found a statistically significant relationship between the sales of the United States companies in the manufacturing sector in Argentina, Brazil and Venezuela and the flow of FDI from the United States into these countries based on the data from 1957 to 1965.By utilizing the larger sample of developing countries than that by Stevens (I969), Reuber et al. (I973)demonstrated that the flow of FDI, measured by per capita basis, into less developed countries was not correlated with their growth of GDP but with their level of GDP, such conclusion also obtained by Bandera and White (I968) in terms of the FDI from United States into the European Economic Community (EEC) market. Scaperlanda and Mauer (1969) concluded market size hypothesis is statistically and econometrically evident by using the data of United States FDI into the EEC market from the period 1952 to 1966. By constructing the neoclassical profit maximising

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[7]Studies on domestic investment theories includeStevens (1974), Jorgenson (1971), Eisner and Strotz (1963), Simon (1959), and Meyer and Kuh (1957).
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model, Takahashi (1975) incorporated two crucial independent variables, which were the difference between the growth rates of the GNP of the home and host countries and the GNP of the host country, as proxy of the market size. Takahashi's regression model demonstrated that coefficient of the market size is statistically significant, suggesting that it is a significant determinant of United State FDI. Nevertheless, Goldberg (1972) contradicted such conclusion by arguing that FDI can be statistically explained not by the EEC market size but by the EEC market growth. By distinguishing between external and internal determinants of FDI, Schwartz (1976) classified the market size and growth as an external one, and the output (sales) of the foreign subsidiaries of the United State companies as an internal one. He found that United States FDI in both of the European Economic Community (EEC) and Latin American Free Trade Association (LAFTA) markets was significantly related to the output, but there were differences between these two markets with regard to the market size hypothesis. Whereas the growth of the market emerged to be the primary external determinant of United States FDI in the LAFTA region, the absolute size of the market took the position of the most important determinant of United States FDI in the EEC region. Schwartz concluded that the main determinant of an initial FDI is host country's market size or growth, but after then, the subsequent and further investments are based on the output, sales, and profits of the foreign subsidiaries and affiliates.

Other empirical studies directly or indirectly examining on output and market size hypotheses are by Sabirin (1977), Ahmed (1975), Stevens (1972),Moose(1968), and Polk et al. (1966). Despite the differences in assumptions, data characteristics, research methodology, and measurement of variables, it can be concluded that most of these studies are in support of the dependent relation of FDI to the market size/growth of the host countries and/or the output (sales) of the foreign affiliates. However, Agarwal (1980) warned that there might be several

potential weaknesses when interpreting such significant relationship, stated as following:

1. The size and growth of the markets in the host countries are likely to be the influential determinants of locally-oriented FDI, undertaken to produce goods and services for the local market, but not of the export-oriented FDI. However, most of the studies examining these hypotheses statistically fail to distinguish between various types of FDI.

2. Reuber et al. (1973) stated that the level of FDI and the growth of GDP are mutually correlated, but the statistical relationship between the two may not suggest the structural and practical association between them, which means that such relationship may be based on causality.

3. It is highly likely that decisions of firms on initial FDI and expansionary FDI are guided by different determinants and considerations. Barlow and Wender (1955) maintained that the firm is much more willing to take risk for the further investment by using the foreign earnings than for the initial FDI. Richardson (1971a; 1971b) stated that the relative weights of objective and subjective variables in the determination of initial and expansionary FDI differ substantially, and it should highly cautious when examining the traditional determinants of domestic investments to all various kinds of FDI.

4. Great care should be taken when using output statistics to examining the output hypothesis, since such statistics are typically subject to the measurement errors and deficiencies of the reported profits, especially in the developing countries.

5. Both of the market and output hypotheses are mainly based on the assumption of the neoclassical domestic investment theories which are inevitably unrealistic in the real world.

6. Based on the neoclassical domestic investment theories, the output should take into account foreign investments incurred only on property, plant, and equipment (PP&E) in the host country. However, most of the statistics on FDI do not distinguish investment on PP&E and other forms of investments involved in financial assets as well as inventories.

3.2.2.1.2.   Differential Rate of Return Hypothesis

The differential rate of return hypothesis was one of the first hypotheses in attempt to explain the reasons for FDI flows. Being derived from the traditional theory of investment, this hypothesis assumes that the main objective of a company is to maximise profits in a way to equate the expected marginal rate of return on and the marginal cost of capital by adopting the economic marginalist approach. This hypothesis also assumes that investors are being risk neutrality which means that the rate of return is the only variable for the decision making process of FDI. The risk neutrality in such case implies that direct investment in any country, including domestic investment in its own home country, can be a perfect substitute for FDI in any other country. Moreover, the differential rate of return hypothesis postulates that FDI could be estimated by the international differences in rates of return on investment capital. FDI generally flows out of countries with lower returns per unit of capital to those with higher expected returns. While this hypothesis gained a wide popularity when the US FDI into Europe increased significantly in 1950s, particularly at the time when the profit rate of Western Europe earned by US companies were substantially higher than that of US, Hufbauer (1975) pointed out that the growth rate of US FDI into Europe continued to increase even when the difference in rate of return of US and Europe had further decreased in late 1960s.

Several academic scholars found empirical evidence in support of the differential rate of

return hypothesis. Popkin (1965) found that there was a statistically significant association between the ratios of company's foreign to domestic profits and the ratios of its FDI to its domestic investment. Steven (1969) concluded in his research results that this hypothesis was able to explain the FDI in Latin America at a regional level but not for the country level except in the case of Brazil. By conducting a simple linear regression analysis with US FDI data period from 1956 to 1969, Reuber *et al.* (1973) suggested that there was a positive relationship between U.S. manufacturing investment in Brazil, Argentina, Chile, Mexico, Philippines, India, and Indonesia and the rate of return on investment capital with one year time lag; however, such association was econometrically significant in only two cases of countries at a 5 % level. While he also concluded that profitability rate is a fundamental determinant of FDI based on the interviews of management board and executive team in each firm, he was unable to estimate any quantitative measure of the elasticity of FDI in respect to the changes in profit or profit forecasts. Based on the data of manufacturing FDI from the UK and Canada into the US during the period from 1950 to 1971, Blais (1975) demonstrated that the relative rates of return on investment capital was a significantly influential factor of the FDI flows. Given that the 4-year period from 1957 to 1971 was marked by international monetary disturbances, the explaining power of Blais's model was stronger for the period from 1950 to 1967 than for the period of 1950 to 1971.

Whereas a number of studies mentioned above have either partially or wholly supported the differential rate of return hypothesis, many others were unable to find any relationship between the FDI flow and inter-countries differences in returns on investment capital. Weintraub (1967) examined this hypothesis based on the U.S. data and could not perceive any significant relationship relation between the inter-countries differences in the rates of return on investment capital and the flow of US FDI. Although Bandera and White (1968)

pointed out that the adequate rate of return is a pre-requisite condition for the movement of FDI, they rejected the differential rate of return hypothesis on the data of US FDI to European countries from 1953 to 1962. Bandera and Lucken (1972) could not econometric evidence in support of the relationship between relative earnings and allocation of US FDI between European Economic Community (EEC) and European Free Trade Association (EFTA).Hufbauer (1975) compared the yearly difference between foreign and domestic rates of asset expansion with the difference between foreign and domestic rates of return on investment capital for the period from 1955 to 1970, and found no association between these two series. Although employing different measures of profitability, Walia (1976) was unable to find sufficient evidence to support his own hypothesis that the purpose of FDI undertaken by US firms was to seek for the higher rate of profits in the foreign countries.

Before making a conclusion on the differential rate of return hypothesis, it should be recognized that it is faced with various statistical problems when examining this hypothesis. Agarwal (1980) pointed out following statistical weaknesses:

1. The differential rate of return hypothesis assumes that FDI is a function of expected rate of return, which is calculated as the accounting rate of return on investment capital. But such return is based on the reported profit, which are not necessarily equal to the actual one earned by the foreign subsidiaries or affiliates. Such circumstance primarily results from the transfer pricing with the efforts to minimize the tax burden and exchange restrictions for the subsidiaries and parent company. Bhagwait (1967) mentioned that it is rather difficult to obtain systematic evidence on the divergence of reported profits from the actual profits of the subsidiaries, but, in general, the available data and evidence suggests that the reported profit fail to accurately reflect the actual profit.

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Moreover, accounting profit is unable to provide the an objective and reliable measure of rate of return, because it is influenced by the different subjective factors and accounting procedures, for instance the various methods utilized for inflation rate, write-off of fixed assets, and inventory accounting (First-In-First-Out versus Last-In-First-Out).

2. The differential rate of return hypothesis is on the basis of the profits earned during the whole investment period used to examine the hypothesis, whereas the realized profits are related to the accounting period, which are shorter than investment period.

3. Because the differential rate of return hypothesis implies FDI capital flows only in one direction from the country with lower rate of return to the country with higher rate of return but not vice-versa, this hypothesis could not be consistent with observation that countries experience outflows and inflows of FDI simultaneously.

In addition to the statistical weaknesses, it could be questioned that the differential rate of return hypothesis assumes that the main objective of investors is to maximize the profit. It is widely believed that multinational companies may conduct FDI for other various reasons other than profit maximization, especially in the short-term and medium period. For instance, a company may conduct FDI in a country with lower rate of return in order to achieve higher economies of scale in the domestic market, to create barriers to the entry of new market competitors, or to react to the competitor's strategy in the foreign country. Furthermore, Clark (1940) proposed the concept of sales maximization subject to the profit constraints. Marris (1964) incorporated the financial objectives of a company into its decision making process of FDI and concluded that management board would seek for both of the maximum balanced growth rates of sales and capital assets, which would lead the utility functions of managers and shareholders to be compatible in a state of market equilibrium. On the other hand,

Galbraith (1967)introduced that the 'techno-structure' of modern industrial and manufacturing firms attempts to maximize sales subject to the profit constraints because the autonomy is a pre-condition for the survival of the 'techno-structure' and if the earnings is below to a minimum level, then management board and executives would loss the autonomy. According to the behavioural theories of the firm proposed by Simon (1959), and Cyert and March (1963), it suggested that a company would seek for the satisfactory profit other than maximized profit or sales due to the conflict interest between executives, employees, and shareholders. All in all, executives of a firm do have other main objectives deviated from the profit maximization when evaluating FDI decision, but it does not mean that such discretion is unlimited. Even though sometimes it would difficult to draw a distinct line between profit maximization and profit constraint, a minimum profit constraint should be a variable for the decision making process of FDI. Yang (1999) adjusted the rate of return on physical capital to allow for the differences in human capital in an attempt to explain the major flows of FDI into China going to the richer coastal regions instead of the poorer inland regions. Since the difference in the rates of return between rich and poor areas decreased after adjusting for the human capital, Yang concluded that human capital acts as a significant role in equalizing the rates of return on invested capital in these regions.

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3.2.2.1.3.   Portfolio Diversification Hypothesis

Under the portfolio diversification hypothesis, the assumption that investors are being risk-neutral is relaxed and risk becomes another important variable when evaluating the FDI decision. The portfolio diversification hypothesis postulates that an investor considers not only the rate of return but also the inheriting risk in selecting different investment targets to construct the investment portfolios, and such investments are positively related to the returns and negatively related to the risks. This hypothesis argues that the overall risk of the portfolio investments can be reduced through the diversification and the investor's intent of reducing or minimizing the risk would constrain capital mobility between the countries. Hence, the FDI decision by foreign investors is determined and guided not only by the expected rate of return but also by the underlying risk. Although Iversen (1935) is one of the earliest authors mentioned the concept of portfolio diversification hypothesis in his work on international capital movement, such hypothesis was first time to be theoretically formalized by Tobin (1958) and Markowitz (1959). Tobin and Markowitz's theory of portfolio selection argued that portfolio diversification may help the investors to reduce the total risk of investments because each individual investment is not perfectly correlated. Since the correlation between countries is also likely to be relatively small or even near to be unrelated, several academic scholars started to empirically examine this hypothesis when researching on international portfolio selection of FDI.

As far as the aggregate FDI was concerned, Stevens (1969) found empirical evidence to support for the portfolio diversification hypothesis by researching on the FDI in Latin America. While such hypothesis was statistically supported at country level, the empirical evidence was proved to be inferior to that based on the output and market size hypothesis. In an attempt to explain FDI into and from United States, Prachowny (1972) also found the empirical evidence to support for this hypothesis; nevertheless, his method on empirical proxies seemingly remained to be inappropriate and the significance of the risk variable as an independent term of FDI seemed to be questionable. Cohen (1975) stated that large US manufacturing companies with more extensive foreign operations had smaller volatilities in global profits and sales in 1960s, but this result may be an unintended result of corporate actions and strategies taken in to account other factors. By considering the effect of capital price index, wage rates, market size, output, and price level in addition to that of *ex post* rate of return on the in investors' expected one, Blais (1975)constructed the framework of a broader model in order to examine this hypothesis based on the FDI from Canada and UK into the manufacturing sector of the US during the period from 1950 to 1971.The result suggested the factor of relative risks to be an influential determinant for the Canadian FDI but not for the UK FDI. It appeared to be difficult to identify either the differences in behaviours and types of investors between Canada and the UK or the differences in the statistical specifications that caused the inter-country differences in Blais' research results. By defining the sales by overseas subsidiaries plus exports from the parent company as total foreign operations of a foreign firm on the basis of portfolio diversification hypothesis, Rugman (1979) concluded that international diversification of foreign operations did stabilize the profits of US companies over time.

There are several advantages of portfolio diversification hypothesis that make it superior to the differential rate of return hypothesis. Firstly, Agarwal (1980) stated that portfolio diversification hypothesis offers a plausible explanation of cross investment between the countries and industries and does not necessarily depend on the assumption of certainty as does the differential rate of return hypothesis. Secondly, Prachowny (1972) argued that the advantage of portfolio diversification hypothesis is to allow itself to be generalized. Thirdly, portfolio diversification hypothesis takes account of risk factors, which constitutes a significant determinant of FDI decision.

However, according to Agarwal (1980), there are still some weaknesses in the empirical evidence in favour of the portfolio diversification hypothesis, discussed as following:

1. Portfolio diversification hypothesis is unable to explain the reasons why multinational firms are the greatest contributors to FDI and why they prefer FDI to FPI, which could be a better method to build the diversified portfolios in terms of the geographical and sectoral factors. Because of the inefficiencies in the security markets, Ragazzi (1973) argued that the foreign companies prefer FDI as opposed to FPI in the less developed countries, especially the ones with no organized securities markets which cause FDI to be the only form of capital flows in these countries. Ragazzi argued that if the securities market in the less developed countries is proved to be inefficient, then the risk of minority portfolio investment tend to be more higher than that inherent in the overseas operations of foreign affiliates and subsidiaries. Ragazzi's research result implied that if FDI is a substitute for FPI, then the foreign subsidiaries of the firms can is expected to be more diversified than their parent companies. Furthermore, Hufbauer (1975) mentioned that portfolio diversification hypothesis is also unable to explain the

differences in the in the propensities of industries to conduct FDI. Some types of the industries are more internationally oriented than the others and these differences cannot be substantiated in terms of risks and returns alone.

2. According to the domestic investment theory, the investment decisions relate to the trade-off between *ex ante* return and risk, which means that high risk should be compensated by high return and low return could be accepted by low risk. Nevertheless, most of the available statistics for risk and return calculated are *ex post*. Since the ex post data on risk and return are unlikely to represent the actual risk and return, the researchers usually could either derive a proxy for *ex ante* risk and return on the basis of scenario analysis or by utilizing the rational expectation substitution by which the expected values of the variables are considered to be equal to the actual values minus or plus the random error terms.

3. The estimate of risk in the portfolio diversification hypothesis is generally based on the variance of rates of returns, but there are several reasons that cause the risk variable not to be reliably measured. Firstly, risk and return collected from the reported profits and losses are unlikely to be equal to the actual ones because of the transfer pricing and various accounting procedures. Further, the inaccurate measures of risk variable could result from either the inadequate historical date on the past rate of return, or variance and standard deviation calculated from the historical data are conditional which means that the measures rely on the future continuity of the past performances of companies involved. Hence, Moosa and Bollen (2002) recommended that that the concept of realized volatility should be the preferred measure of risk as opposed to the conventional ones such as conditional variance or standard deviation.

3.2.2.2. Imperfect Market Assumption

Imperfect market assumes that output and/or factor markets are imperfect. It was firstly proposed by Stephen Hymer's seminal doctoral dissertation on FDI published in 1976, which was late refined and publicized by Charles Kindleberger (1969). Both of them maintained that foreign companies unavoidably have certain disadvantages compared with local firms when foreign companies establish and operate production plants in a country. Despite that foreign companies do conduct direct investment in one particular country, they definitely possess specific competitive advantages to which current or potential local competitors have no access and which are greater than the costs of disadvantages faced by foreign companies in that host country. It is considered that these competitive advantages enable the foreign firms to not only earn more than at home but also to earn more than the local companies in the host country. The comparative disadvantages of foreign firms includes legal system, institutional framework, ignorance of local customers' tastes, business and other social customs as well as include the costs of operating and managing from a distance such as costs involved in frequent business travelling and technical communication. According to the Agarwal (1976), it is not unusual that foreign companies and manufactures pay or have to pay higher remunerations and wages to both local and foreign personnel and workers, and it is not impossible that foreign firms may be discriminated by public institutions and official authorities in local country. Furthermore, Kindleberger (1969) argued that the comparative advantages which an investing foreign firm has or must have in the local country consists of brand name, marketing skills, economies of scale, patented or nonmarketable technology, special access to markets, government limitation on output or entry, managerial skills, and cheaper sources of financing. These advantages have necessarily to be firm-specific and transferable to the affiliates and subsidiaries in order to enable the foreign firms to conduct FDI. By using the cross-sectional analysis, Martin (1991) confirmed the significance and

importance of market structure, including economies of scale and concentration, as a determinant of FDI in USA.

Other than direct investment, foreign firms with those comparative advantages mentioned above could serve the local markets with exports or by renting, licensing, or selling the managerial, marketing skills or technical. The difference in motivation between direct investment and any of these alternatives for serving the market in the local country would be the centre on which the following various hypotheses have concentrated on, and are discussed as below.

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3.2.2.2.1.   Oligopolistic Reaction Hypothesis

Knickerbocker (1973) hypothesized that FDI is a result of oligopolistic reaction, which means that FDI by one firm would trigger a similar action by other major competitors in the same industry with the purpose to maintain their international market shares. By utilizing the Harvard School of Business Administration data on the manufacturing FDI of 187 American multinational companies collected by Vaupel and Curhan (1969), Knickerbocker constructed an entry concentration index (ECI) showing that the entries of American companies into the foreign markets were bunched in time. This means that the oligopolistic firms attempt to

counter any advantage that the very first firm may benefit from its FDI by following it with their own FDI in order to maintain a competitive equilibrium. By comparing his ECI with the US industrial concentration index, Knickerbocker found that there is a significantly positive correlation between these two indices. Based on this, he concluded that the increase in industrial concentration would cause the increase in oligopolistic reaction in the area of FDI except at very high levels, where the structure of oligopolistic market is highly stable and the firms are capable of avoiding the overcrowding effect in the host country market. Besides, Knickerbocker found that the entry concentration tended to be positively correlated to the profitability of FDI, and that the former one was negatively correlated to the product diversity. It should be noted that Knickerbocker's hypothesis is supported by the observations of the behaviour of firms in the domestic market. On the other hand, Scherer (1967) argues that, after the R&D expenditure of firms declined, the innovative activities of firms were positively correlated to industrial concentration as long as the degree of concentration was moderate. Such evidence supports the Knickerbocker's conclusion that the relationship between industrial concentration index and ECI becomes negative at a very high level of concentration, implying the existence of collusion between firms. Besides, Scherer (1969) found that the domestic investment in the US from 1954 to 1963was characterized by a greater degree of bunching within more concentrated industries. Notably, Flower (1975) examined Knickerbocker's hypothesis by using the data of FDI from Europe and Canada in the US, and found that there was a significant positive relationship between the concentration of FDI in the investing countries, and the concentration in the US.

Lall and Streeten (1977) argued that the typical structure of the oligopolistic competition and equilibrium is the one that none of the market participants could afford to ignore any action taken by others. For instance, an action by one company to establish production facilities in

the foreign country may be interpreted by competitors as a possible threat to the status quo, therefore inducing counter-strikes. Even though the very first action may be prompted by government or other institutions, Lall and Streeten argued that subsequent actions could not be interpreted on the basis of the profit-maximizing behaviours of an individual firm, which is independent of the actions and moves by the rival companies. Based on the Marxist view of international capitalism proposed by Magdoff (1972) and Barratt-Brown (1974) maintained that those actions above are consistent with such point of view that 'it is a growing worldwide battle of competing giant firms, forced to extend continually the scope of their activity'. Veron (1974) identified three categories of oligopolies, which are innovative, senescent and mature, and these different pressures they can generate for the companies concerned. Furthermore, in assessing the motivations for Japanese outward FDI, Kreinin et al. (1999) concluded that 'securing market share is the most salient motivation for FDI'. It is believed that firms belonging to the oligopolistic or monopolistic industries at domestic market are better positioned to have the necessary incentives to devote the resources to research and development.

According to the Agarwal (1980), the implication of the oligopolistic reaction hypothesis proposed by Knickerbocker is that process of FDI is self-limiting, because the initial US FDI and the responding FDI from Canadian and European lead to the reduction the industrial concentration in each host countries respectively, namely that encroachment of each other's home market tends to increase the competition within the industry and decrease the degree of intensity of oligopolistic reaction from the counterparty. Although the process of FDI tends to increase the competition in several industries, such increase competition does result in a corresponding decrease in total level of FDI. Beside, oligopolistic reaction hypothesis only provides the partial explanation of FDI since it not only fails to identify the determinants of

the initial investment taken by the leading investor, but also fails to account for the FDI of companies having widely dispersed categories of their investment. Further, Yu and Ito (1988) argued that not only do the firms in oligopolistic industries consider the activities of their competitors, but also evaluate the similar macro- and micro-economic factors as companies in a competitive industry.

3.2.2.2.2.   Behavioural Hypothesis

When a local firm decides to make foreign investments with the attempt go international, it would face a rather complex environment. Such new environment is complicated in terms of its cultural, economic, and political perspectives; it is also complex because those various perspectives involve many uncertainties under the international context. Markusen (1995, p. 173) described such complexity as: "After all, there are added costs of doing business in another country, including communication and transport costs, higher costs of stationing personnel abroad, barriers due to language, customs, and being outside of the local business and government networks". It is argued that conventional economics is not well-adequate to explain various types of environments faced by the multinational companies, because it excludes the non-economic factors and assumes the rationale of optimizing behaviour on the part of economic agents. As a matter of fact, various theories and paradigms that have emerged since Stephen Hymer finished his doctorate dissertation in 1960 are all unable to adequately explain the issue of complexity for foreign investing environments. Although these paradigms exhibit some improvement over the Heckscher–Ohlin–Samuelson model or the portfolio capital flows hypothesis, they are still exclusively economic in nature, which means that they are regarded as incomplete as they lack the complex perspectives of culture, politics, and economics as opposed to behavioural economics.

Based on the behavioural theory of firm proposed by Cyert and March (1963), Aharoni (1966) maintained that there are three fundamental factors in determining initial foreign investment decision, which are political uncertainty, information collection and project implementation. According to Aharoni, political factors, especially when there is a change, influence the process of information collection by multinational companies, and decision on foreign investment they would make. He argued that the international political uncertainty should be more concerned by multinational companies than cost issue. Contrary to the cost situation which changes in a slower and gradual pace, change in international political situation can be abrupt and drastic: for example, revolutions, imposition of sanctions regimes, coups, demonstration against a certain company or specific industry, and expropriations [See Fitzpatrick(1973)]. While these political changes are difficult to forecast, empirical researches, for example Shihata (1988), have indicated the fact that political risk and uncertainty can discourage multinational companies from conducting foreign direct investment. Besides, political uncertainty would prevent multinational companies from identifying investment opportunities in those potential countries. Further, it would also lead multinational companies to make over-optimistic assessments for decision on FDI. Particularly, enterprises encounter the uncertainties about government policies related to the ownership structure of their subsidiaries in the host countries, to the direct constraints for subsidiaries to operate, to the restrictions on the flow of human capital, technological know-how, and financial capital.

Once the management team of the foreign company starts to evaluate the possibility of FDI, it would collect relevant information for the appraisal of the potential investment project, depending on the strength of initial forces. However, the limitation of the management team's information and understanding of local conditions results in the existence of political

uncertainties during the process of information collection. Thus, the information gap would take the following forms. First, FDI decision makers would find it difficult to build an explicit relationship between their perceptions of international political events and actual impact of the event on their foreign investment decision. Such circumstance is called cognitive dissonance because an individual usually make mistakes in his /her perspective as the information received is inconsistent with his/her existing beliefs. Second, FDI decision makers tend to over-estimate the impacts of government intervention as they relate to the foreign investments made by companies. Such circumstance would lead their FDI decision to be more subjective, general, and superficial. Third, it is common that management team emphasize much more on recent, discontinuous and emotionally-charged events, and less on the rather permanent and continuous political events. Fourth, FDI decision makers might fail to adequately distinguish between the international political environment and events that do not directly impact the multinational companies' international operations and other political environment events that do directly affect.

The last stage of the foreign investment decision is the implementation of the project, which depends on the management team's commitment and capability in removing the natural pessimism of other members of management team in the case of FDI. As pointed out by Aharoni, the goals followed by different persons or agencies participating in the decision-making process of foreign investments tend to be far from the traditional assumption of profit maximisation. Once a local firm has decided to go international, it would encounter various choices, each of which being more complicated than the one firm has to face when it only serves for the domestic market. Thus, an international firm has to make a decision on the nature and location of its production facility, and on the strategy of its distribution facility, which links production to final demand, involving storage, transportation, and retailing.

When evaluating the decision of production facility, the firm has to decide whether it would remain to be local or international, implying a decision between joint venture, exporting, licensing, and FDI. If the firm decides FDI, then it has make a decision between acquired and greenfield FDI, same as applying for joint venture. Regardless of which decision it made on production facility, the firm then has to make a decision between owning its own distribution facility and cooperating with an independent distribution facility in the host country. Overall, the multinational companies can possess either production or distribution facilities, or both of them. Deciding among all these combinations of the production and distribution facility, which involves different types of ownership and locations, would require considering numerous economic factors such as the market size of the host country, economies of scale, and the availability of necessary human resources, and their qualities and level of skills. Although many academic researchers have utilized the concept of net present value to decide which combination makes the most profits, such method is only economic-oriented as it is unable to capture international cultural factors and political uncertainties.

3.2.2.2.3.   Internalization Hypothesis

FDI arises from foreign companies' efforts to replace market transactions with internal ones according to the internalization hypothesis, an extension of the argument proposed by Coase (1937) that certain marketing and operational costs could be saved from the business management by forming a firm. Later, Buckley and Casson (1976) argued that the market for key intermediate factors such as technical know-how, human resources, and management expertise are imperfect, which cost a company significant transaction costs and time lags when it intends to link different activities through these intermediate market. For instance, a firm may consider to buyout a foreign refinery if there certain problems associated with purchasing oil-related products in the market. Hence, the internalization of markets across

countries would lead the firms to conduct FDI, and such investment process would not be discontinued until the marginal costs and benefits of further internalization are equalized. The main advantages of internalization include minimizing the impact of intervention from government via transfer pricing, having the capability to implement the policy of discriminatory prices, and avoiding of bargaining with price, buyer uncertainty, and time lags. It is widely considered that the main motivation of internalization is the existence of externalities in the factors and goods markets.

It is believed that multinational companies would bypass the market for intermediate factors by conducting the FDI. Nevertheless, it is still uncertain whether or not the motivations for bypassing the intermediate market is based upon its operating efficiency in terms of relatively longer time lags, higher transaction costs, or other anything else. Dunning (1977) argued that retaining the exclusive right to use the innovations and inventions created by firms themselves may be the fundamental motivation, because the longer time the firms could use their own innovations exclusively, the greater amount of monopoly rent could be earned by firms themselves. In the case that intermediate products and factors are not usually innovative. The firms are not faced with difficulties of choosing between internal and external markets, but faced with faced with the selection of retaining the intermediate market for their own uses or creating the markets for innovative products. It is not uncommon that firms opt for the former option until other competitors or imitators begin to create the market for such innovative product. Buckley and Casson (1976) attempted to find a systematic and general internalization theory for FDI and multinational companies. However, the theoretical framework proposed by them is not applicable to the FDI conducted by smaller firms operating only in one or two foreign countries or to the short-term period. Rugman (1980) pointed out that internalization hypothesis is so general that it is difficult, if not impossible, to

conduct the empirical verifications and examinations. Further, Buckley (1988) argued that econometrical and statistical testing could not be directly conducted for internalization hypothesis since these testing are mainly based on the simplifying assumptions, and easily lead to the conclusion that process of internalisation is concentrated in industries with relatively high incidence of research and development expenditure, mentioned by Buckley and Casson (1976). Nevertheless, several empirical evidences still suggest that pattern of FDI conducted by foreign firms across national boundaries is fully consistent with the internalization hypothesis. For instance, Martin (1991) found the empirical evidence that there is an impact of transaction costs on FDI in USA.

The internalization hypothesis does provide an explanation for firms prefer to choose FDI rather than importing and exporting from other foreign nations. It also provides rationales for firms not to choose licensing in some circumstance. The firms are able to substitute some external procedures of the market functions with the internal processes, i.e. intra-company transactions, because of the significant transaction costs and time lags for the processes of market purchasing and sales. Furthermore, the internalization processes could help the companies to eliminate the uncertainties. However, it is hardly to have one hypothesis that could explain all types of FDI. Hence,

Caves (1971) argued that different hypotheses are needed to be considered and provide explanations for different types of FDI deserves, where he distinguished FDI between conglomerate, vertical, and horizontal investment. According to Caves, FDI is mostly conducted in the form of either exploiting the raw materials which involves the vertical integration of foreign production plants with the home factories, or producing the similar or same kind of goods abroad as in the home country which involves horizontal expansion. For the vertical integration, the FDI undertaken by firm is an attempt to create the entry barriers

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for new market entrants and minimize the oligopolistic uncertainties. The existing firms may establish the entry barrier for potential competitors by controlling the sources of input. In the case of horizontal expansion, product differentiation is a key element of market structure, where differentiated products could be under protection from the significant cost of physical imitation or exact imitation by trading logos. The technical know-how to produce differentiated products could be transferred from the parent to the subsidiary without additional costs or even with lower costs than the investment returns obtained via FDI. Even though Caves maintained the existence of high rank correlation between the portions of companies in a specific industry with foreign subsidiaries operations and the extent of product differentiation, he still could not provide empirical evidence to support it. It is widely argued that Caves underestimated the significance of FDI specifically in product diversification conducted by companies to diversify the business risks and to implement the expansion strategy.

3.2.2.2.4. Industrial Organization Hypothesis

Industrial organisation hypothesis was proposed and developed by Hymer (1976), and then further extended by Dunning (1988), Caves (1982), and Kindleberger (1969). Industrial organisation hypothesis maintains that a company would face a large number of disadvantages in competing with the local firms when that company establishes an affiliate or subsidiary in other foreign country. These disadvantages mentioned are originated from the difference in cultural dimensions, language barriers, judicial system, wage, and any other inter-country differences. Even if the engagement of a firm in FDI may be accompanied with the disadvantages, some advantages may arise from certain intangible assets such as brand reputation, managerial experiences, patent, technical know-how, and other types of firm-specific factors. According to Kindleberger (1969), the comparative advantages have to be

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firm-specific, which must be transferable to the foreign affiliates or subsidiaries, and should be large enough to offset inherent disadvantages in order for firm to undertake FDI in the foreign country. Moreover, Lall and Streeten (1977) summarized with a detailed list for these advantages which they believed that they become more important when the underlying industry contains monopolistic characteristics. The comprehensive list of advantages is shown as below.

Table 8: Advantage leading to FDI

Advantages	Description
Access to Inputs	Exclusive access to the raw materials arising from the shares of final markets, distribution of the products, processing to the final products, or the production of the material by themselves
Bargaining and Political Power	The capabilities to manage concession and obtain favourable terms from the government in the host countries
Capital	Lower or larger cost of invested capital than smaller or local foreign competitors
Economic of Scale	The financial expertise and business expansion setting up to operate facilities and factories that assist the enterprises to obtain the cost advantages
Management	Superior managerial experiences and expertise in terms of greater entrepreneurial ability to manage risk or to identify profitable opportunities or greater operating efficiency
Marketing	This function involves market research, promotion, advertising, and logistics distribution.
Technology	Practical technology enabling the company to transform the scientific research into commercial production. Such practice involves the functions of designing innovative processes, product differentiation, and other relevant supporting activities.

Source: The table was developed from Foreign Direct Investment Theory, Evidence and Practice by Moosa (2002)

These advantages assist the firms to be successful in competing with local firms in foreign countries. Graham and Krugman (1991) used this rationality to explain the growth of FDI in the USA. Nevertheless, such rationality is unable to provide the basis for an alternative of FDI, which is that firms do not use their advantages by manufacturing the product in the home country and exporting them to the foreign market. But Kindleberger (1969) believed that firms would be more inclined to undertake FDI than exporting if the home production plants could be operated with minimal costs, where additional production for exports

contributes to the rising costs. Besides, production costs could be lowered through the managerial experiences, access to cheap inputs, investment in R&D, transportation network, and technical know-how. Notwithstanding, Aharoni (1966) proposed to utilize the behavioural theory of the company, put forward by Cyert and March (1963), to explain the FDI, where uncertainty, information and commitment these three driving factors influence the initial FDI decision.

FDI may be undertaken by firms when it is difficult to lease or sell their intangible assets. Lall and Streeten (1977) argued that certain types of intangible assets or advantages cannot be leased or sold to other companies is because either they are difficult, if not impossible, to define, value and transfer, or they are inherent in the business organizations. Intangible assets or advantages that could be sold include organizational capabilities, managerial experiences, business philosophy, reputation in the financial capital market, and contacts with governmental officials and other companies (see Lall and Streeten, 1977, p.36).

Although the industrial organization hypothesis does provide the basis to identify the motivation for firms to conduct FDI in foreign countries, it does not offer an explanation why firm select to invest in one specific country rather than the other one.

3.2.2.2.5. Location Hypothesis

The location hypothesis states that the existence of FDI is due to the international immobility of certain production factors, such as natural resources and labours. Such immobility creates the differences between locations in terms of the costs of production factors. Horst (1972) explained the USA FDI in Canada by using the location hypothesis.

Locational advantage of low wages is one of the forms of location-related differences in the costs of production factors. Therefore, the level of wage salaries in the home country relative to those in the host country is a significant determinant of FDI. This is the reason why high-wage countries such as USA tend to invest in low-wage countries with labour-intensive production such as India. It could also be a reason why at the time when multinational companies establish production factories and facilities in North America, they would choose Mexico rather than Canada. However, Wheeler and Mody (1990) believed that high wages may be an indication of high quality of labour where the negative relationship between low wages and FDI may not be held. The activities requiring high quality of labour, such as R&D and banking and finance, are usually relocated to countries with people earning low salaries in these fields. Thus, the differences in the quality and productivity between countries suggest that the wage rates should not be an only variable when determining FDI. Petrochilos (1989) pointed out that the difference in labour productivity and quality between countries can provide the explanation for some international companies conducting FDI into high-wage developed countries.

There are mixed conclusions from empirical researches regarding to the location hypothesis that low cost of labour attracts FDI. Evidence obtained from survey reports does not provide the concrete conclusion, such as Forsyth (1972). Nevertheless, empirical researches by using the cross-sectional and time series data are favoured by academic fields and scholars. Love and Lage-Hidalgo (2000), for instance, researched on whether Mexican market provides itself with an incentive to attract FDI flows from USA or such FDI flows are determined by the low wage costs which are boosted by the Maquiladora industrialization programme. They found empirical evidence to significantly support the hypothesis that differences in real labour cost between Mexico and USA have an important impact on the FDI flows from one nation to

another, supporting for the locational hypothesis and low wage cost hypothesis. Besides, Moore (1993), Culem (1988), Goldberg (1972), Schneider and Frey (1985), and Saunders (1983) pointed out that, given the wage rates in the home country, the flows of FDI could be discouraged by a rise of wage rate in the host country. Further, Riedel (1975) found the evidence to support that relatively lower labour costs could be one of the determinants for export-orientated FDI in Taiwan.

However, other academic researchers found evidence suggesting that higher wage rates could decrease inward FDI and increase outward FDI, such evidence is provided by Barrell and Pain (1996), Wang and Swain (1995), Klein and Rosengren (1994), Bajo-Rubio and Sosvilla-Rivero (1994), Lucas (1993) and Pain (1993). There are some academic scholars found no evidence to support the location hypothesis or even refute it, scholars such as Yang et al. (2000), Wheeler and Mody (1990), Kravis and Lipsey (1982) and Nankani (1979).

Based on the changes in productivity, Yang et al. (2000, p. 47) provides an explanation for this relationship, and argues that it is possible that, when markets are imperfect, profits of productivity do not fully reflect on wage rate, where the wage rate do not rise with productivity correspondingly. When wage rates are adjusted for change in productivity, a rise in wage rates would be accompanied by a decrease in production labour costs. As a result, if FDI flows are attracted by a fall in production labour costs, then it could be seen as if wage rates and FDI are negatively correlated. In regards to the negative relationship between wage rate and FDI, Lucas (1993) provided evidence to explain that a rise in the wage rate of the host country leads to an increase in the production costs, discouraging the production and FDI consequently. However, in terms of the positive relationship between these two factors, it is believed that relative prices of inputs and final products would be increase by the rise in

wage rates, which leads to a shift to a more capital-intensive production methods, and hence to more FDI flows.

It is widely considered that locational advantages are not only in the form of low wages, but also in forms applicable to other inputs of production. For instance, a manufacturing factory in the host country could be built near an input mine, such as coal, if such mineral is one of an important input for the process of production. This is one form of locational advantages as significant cost reduction could be made on the shipping cost for minerals from where it is mined to where it is utilized. An enterprise could avoid the delays in the delivery of mineral shipments as well. Invested capital is also another underlying input of production, especially when capital markets are segmented. It is known that the FDI would flow from one country to another one with lower cost of invested capital. Love and Lage-Hidalgo (2000) used the difference in cost of invested capital between Mexico and USA as one of the independent variables to explain the flows of USA FDI to Mexico. They concluded that difference in cost of capital has an opposite direction of impact from that estimated by traditional financial theory

Furthermore, labour dispute could be another one factor that has a negative impact on FDI. The degree of negative impact on FDI depends on the two types of industrial disputes, which are incidence and severity. By researching the case in Australia, Yang et al. (2000) utilized the number of working days lost to provide an explanation that unexpected result, in terms of the arguments on productivity and factor price changes, is used to explain the negative relationship between wage rates and FDI. By empirically researching with independent variables representing disputes, Tcha (1998) and Moore (1993) found out that even though Tcha found supporting evidence for the importance of labour dispute as a determinant of FDI

from Korea to foreign countries, Moore, by utilizing the German data, found that FDI has a positive relationship with the severity of a strike and demonstration which are measured by the number of workers involved.

3.2.3. Foreign Direct Investment Theories(C)

The following section are to introduce some schools of theories which provide fundamental rationales to identify the relevant factors influencing the propensity of a specific industry or firm to conduct the direct investment in foreign countries, and explain why some countries are more successful than others in attracting FDI from foreign countries and firms.

3.2.3.1. Determinants of Outward FDI

3.2.3.1.1. Hypothesis of Diversification with barriers to international capital flows

According to Agmon and Lessard (1977), they argue that there are two conditions must be met for companies to carry out the international diversification. First, individual and institutional investors have to recognize that multinational enterprises must provide the opportunities for diversification that are not available otherwise. Second, the barriers or costs to foreign direct investment flows are lower than those associated with foreign portfolio investment. Agmon and Lessard examined the hypothetical relationship that stock prices of listed companies with relatively large international and global operations are less sensitive to the factors within domestic market than stock prices of companies with fundamentally domestic operation, but are related more closely to the global maker factors excluding domestic elements. Their empirical results were consistent with the first proposed condition. Later, Errunza and Senbet (1981) developed a model to incorporate the multinational companies' supply services diversification and investor's diversification, activities positively correlated with their stocks prices. Their statistical results suggested that a systematic

relationship lies between excess market values of firms and the extent of international diversification and involvement. Further, such relationship was found to be stronger especially in the periods when the barriers to capital flows are existent in the investment between countries.

3.2.3.1.2. Liquidity Hypothesis

The location hypothesis is based on the a positive correlation between the investment outlays of a firm and internal cash flows, which assumes that cost of internal funds is considered by the investors to be lower than the cost of external ones, according to Meyer and Kuh (1957) and Duesenberry (1958). Barlow and Wender (1955) are the first scholars to propose "gamblers' earnings" hypothesis which applies the liquidity theory of domestic investment to FDI. Later, several scholars and economists have empirically examined, and the evidence and results are mixed.

Many academic literatures have produced empirical evidence in support of the liquidity hypothesis, such as Hoelscher (1975), Kwack (1972), Safarian (1969) and Brash (1966). The empirical testing conducted by Hoelscher (1975) suggested that, based on the accelerator theory of investment, liquidity factor, including a subsidiary's debt capacity, internally generated funds, and repatriation to the parent, has a better performance than a sales revenue factor. Further, by examining the relationship between the U.S. direct investment abroad, and the U.S. corporate cash flow, i.e. net of dividends, Kwack (1972) found out that such relationship are significant and changes in the USA tax policies with the intent of increasing the cash for the government could have stimulating impact on the foreign investment as the cash flow for the corporations is one of the significant sources for FDI. By researching the data of USA FDI in Canada during the period 1957-1965, Safarian (1969) found out that

between60 and 80 percentages of the direct investments are from the internal financial sources of USA subsidiaries and affiliates in Canada, particularly from the net income and depreciation. He also mentioned that the rate of reinvestment of earnings of USA foreign subsidiaries was lower in the rest of the world than in Canada. In addition, Brash (1966) pointed out that when USA companies conduct FDI in Australia, "the most important sources of the funds required for expansion are undistributed profits and depreciation allowances". Nevertheless, he found evidence suggesting that there are differences in the corporate behaviour of joint ventures, UK subsidiaries and USA subsidiaries, in the case which the former two tend to have a higher rate of profit repatriation and a higher rate of dividend payments.

However, there are empirical evidences found by scholars to be against the liquidity hypothesis, such Severn (1972) and Stevens (1969). Severn (1972) researched the cross-section data from 68 manufacturing firms, almost half of the USA FD, during the period from 1961 to 1966, and concluded that top management usually allocate the internally generated funds among the parent and the affiliates in order to maximise profits as a whole. Besides, by examining a sample of 71 USA foreign subsidiaries and affiliates, Stevens (1969) was unable to provide the evidence supporting the hypothesis in the form either that subsidiaries and affiliates tend to have their fixed investment expenditures be determined by the retained earnings, or expansion of foreign operation by subsidiaries and affiliates was financed by the retained earnings.

Beyond the empirical evidence for and against the liquidity hypothesis, there is another strand of economic theory which has a relatively more differentiated support for the hypothesis. For example, Based on the interview data, Reuber et al. (1973) concluded that there should be a

distinction between the cash flows of the subsidiaries alone and those of the parent companies as a whole at the time when evaluating the impact of internal cash flows on FDI in developing countries. It is considered that the internal cash flow of the parent companies might not an important determinant of their FDI in developing countries since such type of investment only accounts for a small portion of the reinvestment possibilities considered by the management team of the firms. In addition, parent companies may have access to the external finance sources with favourable terms in the international capital markets. Apart from that, the internal cash flows of foreign subsidiaries and affiliates in the developing countries still have a significant impact on their further investments, which are strengthened by restrictions imposed by local authorities, such as repatriation of capita land profits. By distinguishing between large, medium and small corporations, Stobaugh (1970) concluded that, based on interview data, the foreign investment behaviour of the large companies are aligned with the hypothesis proposed by Barlow and Wender (1955), where the companies with total turnover of $50 million or more are more inclined to conduct further investments by using the cash flows of the already established affiliates and subsidiaries in the foreign countries.

3.2.3.1.3.   Internal Financing Hypothesis

Based on the gamblers' earnings hypothesis put forward by Barlow and Wender (1955), internal financing hypothesis assumes that multinational companies conduct the initial direct investments with modest amounts of their financial resources, while subsequent business expansions in the later stage are supported and financed by reinvesting profits gained from operations of subsidiaries and affiliates in the host countries. Hence, the hypothesis refers to that the parent companies would utilize the profits generated by their affiliates and subsidiaries to financially support the business expansions of initial FDIs in host countries

where they operates. In addition, the hypothesis infers that there is a positive relationship between investment outlays and the internal cash flows as the cost of internal financing is lower than that of external financing. Froot and Stein (1991) argued that it is the informational imperfections in capital markets that leads internal financing is cheaper than the external one. Further, there are two fundamental reasons in support of the hypothesis to explain the FDI in the developing counties, which are the rudimentary state and inefficiency of financial markets; and the existence of restrictions on the movement of funds across borders.

Internal financing hypothesis has been examined by different methodologies by several academic scholars. For instance, Agarwal (1980) believed that there are some empirical evidences providing the support of the internal financing hypothesis as FDI is found to be determined partly by the internal funds generated by the subsidiaries and affiliates in the foreign countries. Besides, Hoelscher (1975), Kwack (1972), Safarian (1969), and Brash (1966) all have found the supporting evidence for the internal financing hypothesis, in which Brash concluded that 'the most important sources of funds required for expansion are undistributed profits and depreciation allowances'. By using the survey-based research methodology, Reuber et al. (1973) argued that it is necessary to draw a distinction between the cash flows of the subsidiaries or affiliates alone and those of the enterprise as a whole because cash flows of the affiliates or subsidiaries are found to have impacts on the new investment outlays, especially when there are restrictions on profit repatriation in the host countries. Beside, Stobaugh (1970) reached the conclusion that the investment behaviour of small and medium enterprise is tended to align with the hypothesis based on a series of interviews with their members of top management. Nevertheless, by examining the hypothesis with the data on 68 firms, Severn (1972) reached the conclusion that the executive

management teams tend to allocate the internally-generated funds among the parent and subsidiaries/affiliates in order to maximize the profits as a whole concern. Additionally, Stevens (1969) could not find the supporting evidence for the hypothesis by examining the sample of data on 71 USA foreign subsidiaries and affiliates.

It is noteworthy that Hartman (1985) provided a tax-based rationale for the internal financing hypothesis. Because it is the repatriated earnings rather than earnings of the foreign subsidiary that are the typical and traditional resources of the tax liability in the home country for the parent company, Hartman believed that income tax has a different degree of impact on FDI which depends on the required transfers of funds from the foreign affiliate or subsidiary to the parent company. Therefore, required foreign return for an enterprise is managed to set at the level where desired FDI would exhaust the foreign earnings. In the other word, it is necessary for firms to finance their FDIs out of foreign earnings of subsidiaries to the greatest extent. Due to this, Hartman made a distinction between immature and mature foreign projects, where the former ones depend on financing by the parent company without making any further remittances in the future.

3.2.3.1.4.   Other Determinants

Several academic literatures have been conducted to research the characteristics distinguishing multinational firms from national ones which implies that it is multinational firms that mostly undertake FDI. Furthermore, these empirical researches have also attempted to identify explanatory variables which may be statistical determinants of FDI for general companies or industries. The effectiveness of such researches for evaluating the future pattern of FDI could hardly be objected, even though this type of research methodology may often lead to problem of specifying the cause and effect relationship between explaining and

explained variables. It is widely proved that significant variables including foreign trade intensity, R&D expenditure and size of the firm. The empirical and historical evidence for the relationship between foreign trade and FDI could be found in (Wilkins, 1970; 1974). Agarwal (1978) found that there is a significant relationship between German FDI and German foreign trade in regards to both sectoral as well as regional distribution, similar conclusion also reached by Baumann et al. (1977). Rock (1973) found empirical evidence to prove a significant association between USA FDI in the developing countries and trade of these countries with the USA based on the cross-country data. Moreover, by researching on the competition among the UK, USA, Japan and Germany, Roemer (1975) deducted an interesting hypothesis that a country has to get through four stages characterized with respects to changing mutual strength of its trade and investment. The first stage is its share in world exports of manufactures rises; the second stage is that its share in trade stabilises and that in the world FDI takes off; the third stage is that trade share begins to fall; and finally the fourth stage is that its share in world FDI also falls. Further, Rock (1973) argued that companies supply a foreign market with exports at the initial stage, but when the threats to the markets arise from non-tariff or tariff barriers, and when they reach to a critical size, the companies then find themselves necessary to conduct foreign investment in these markets, which means that the FDI is the final stage of the process beginning with the export trades.

Horst (1972 a, p.261) tested several variables mentioned about and concluded that "once inter-industry differences are washed out, the only influence of significance is firm size" when he attempted to distinguish USA multinational firms from the general types of USA manufacturers. The conclusion drawn by Bergsten et al. (1978) is in supportive of Horst (1972a); they argued that USA multinational enterprises would be in search of an alternative for future growth in home county since continued growth potential of these firms is limited

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by antitrust regulations. Juhl (1979b) found that there is a significant positive relationship between propensity to invest in foreign countries and the average size of firm when researching on the FDI of Germany in the less developed countries. By researching on the European cases, although Franko (1976, p. 17) found statistical evidence that the scope of FDI for multinational firms is characterized their know-how, patent advantages, R &D expenditure, and size of the market and sales, he believed that relationship between multi-nationality and size not to be clear as many numbers of small-sized firm still have impressive record of investing manufacturing activity in foreign countries. Franko (1976) then further compare the USA and the continental European multinational companies, he found some remarkable differences in terms of product diversification and export propensity. The continental enterprises tended to be less diversified for their production at home countries than at foreign countries, and European companies with manufacturing factories in several countries have a lower propensity to export than companies with manufacturing factories only in few countries, such phenomenon could not be found in the USA cases. Franko (1976, p. 21 f.) fount that the multi-nationality of the European enterprises was not associated with their advertising and marketing advantages. However, Parker (1978) pointed out that there is no difference in terms of the association between research intensity and multinationality between national and multinational firms of Japan, even though such association between multinationality and research intensity found in the USA firms is applicable to the European cases. By utilizing the data of USA Tariff Commission (1973) for 1970, Lall (1980) found that product differentiation promotes more foreign production than exports by the USA multinational enterprises corporations, and that scale economies, R&D, and patent advantages favour exports more than foreign production by subsidiaries and affiliates. Based on the data for 491 USA companies, Vaupel (1971) found evidence that, compared with the purely national firms, multinational ones incurred higher advertising and R&D expenditure,

resulting in a more diversified companies wither higher net profits, averages sales, export/sales ratio and wage salaries for workers in the USA. Similar conclusion drawn by Vernon (1971), but he put more emphasis on the corporations with larger size which conduct the investment in foreign countries.

3.2.3.2. Determinants of Inward FDI

3.2.3.2.1.   Labour Cost

Labour cost is a relatively recent factor to be researched on and a possible determinant of FDI. According to the labour cost hypothesis, cheap cost of labour supplied by the developing countries is regarded as one of their major comparative advantages in terms of the international trade market in certain types of services and products. It is widely known that FDI would not be concentrated in certain products and services where multinational enterprises have relatively less ownership advantages than the locational advantages of host countries including the cheaper cost of labour in developing countries. However, it is rather easy to over-emphasize the labour cost for the potential growth of FDI in the developing countries as multinational companies are faced with increasing FDI stemmed from industries of labour-intensive manufacturing in less developed countries and the pressure of cost minimization and profit maximization. Furthermore, such type of FDI might be faced with the obstacle and resistance resulting from local competitors which are national companies in the host countries, and from the trade union in the home countries.

Empirical researches based on cross-country and time-series data have provided the evidence in support of the labour cost to be a significant factor of FDI, even though the survey-based researches only provided rather weak evidence in favour of such variable, relevant researches including Halbach (1977), Kebschull (1972), and Forsyth (1972). For instance, by

researching on the industrial level for German FDI in Mexico, Ecuador, Colombia, and El Salvador, Juhl (1979a) found that the impact of differences in wage levels between host and home countries is significantly greater in certain FDI of industries focused on producing labour-intensive services and products than that of other industries. Further, Agarwal (1978) reached the conclusion that there is a significant positive relationship between relative wage costs and German FDI in Nigeria, Brazil, Mexico, Israel, India, and Iran. He divided the share of salaries and wages in value-added per employee in Germany by the corresponding quotient in host countries. Besides, Riedel (1975) argued that the relatively low cost of labour has been one of the major factors for Taiwan to attract the export-oriented FDI, such result also supported by the Donges (1976, 1980) researches on case in Portugal and Spain.

3.2.3.2.2.   Incentives and Tax Policies

It is not uncommon that foreign and domestic tax policies do have impacts on the method how firms are financed and the incentives how they conduct the FDI. Compared with the impact of political instability on the Inward FDI, the impact of tax incentive policies may be much clearer and more obvious, which does not imply that these two hypotheses are necessarily positively correlated with each other. Employing an inter-temporal optimization model, Jun (1989) suggested that there is a positive association between domestic corporate tax rate and the outflow of FDI. Further, there are three channels identified by Jun through which tax policies affect the FDI decision undertaken by multinational enterprises. Firstly, the home country's tax treatment for the domestic income has an impact on the relative profitability of domestic and foreign investment, and the net profitability of domestic investment. Secondly, tax policies have impacts on the relative cost of capital of foreign and domestic investment. Thirdly, the tax treatment for the incomes generated in foreign countries has a direct impact on the net return on Foreign Direct Investment. Slemrod (1989) indicated

that there is a negative relationship between FDI in the USA and US tax rate by statistically examining the impact of home and host country tax policies on FDI.

Apart from the significant relationship between incentive, such as tax rate policy, and FDI, however, Reuber et al. (1973) conducted the research on the such variable and found that even though incentive policies offered by the host countries may provide the limited help for certain small-sized firms which are inexperienced in the less developed countries, the gross impact of incentive policy on FDI is still marginal. Aharoni (1966) conducted the survey-based research and reached the conclusion that firms are not intended fully consider the incentive policy at the initial stage of FDI evaluation, especially for the incentive of income tax exemptions which is found to be insignificant. Robinson (1961), Ross and Cristensen (1959), and Barlow and Wender (1955) found the supporting evidence for Aharoni who proved that the variable of incentive policies is econometrically insignificant. Specifically, several academic scholars have conducted the researches to empirically examine the impact of international tax rate policies on FDI. While Hines and Rice (1994) utilized the cross-sectional data to examine impact of tax rate policies on the international distribution of labour and capital deployed by USA multi-national enterprises in their FDI, Slemrod (1990a, 1990b), Boskin and Gale (1987), Hartman (1981, 1984) employed the time-series data. However, concluded by Hines (1996), these researches were faced with the difficulties in identifying and evaluating the impacts of tax rate policies as a determinant of FDI undertaken by multi-national enterprises. Hines summarized three factors that cause such difficulties. Firstly, suggested by Graham and Krugman (1991) and Glickman and Woodward (1989), it may be possible that there is no significant impact of tax rate policies on FDI. Secondly, it is likely that cross-sectional variation in national tax systems and rate policies has a correlation with several numbers of unobservable and observable factors that are different from one

country to another. Thirdly, because the change in tax rate policies are infrequent and the such change might be endogenous to economically unobservable conditions that influence the determinants of FDI, variation in tax rate policies in time-series data might not be sufficient enough to identify and evaluate the impact of tax rate policies on FDI.

Therefore, Reuber et al. (1973) reached the general conclusion that complicated variation of incentive policies provided by less developed counties increases the costs of FDI implementation in these countries without an effective increase in the flows of investment. The fundamental reason that causes the actual outcome deviating from the original target is that incentive policies including taxation offered by the host counties usually come along with another bunch of disincentives, which include restrictions on fees, size, ownership, dividends, location, royalties, mandatory provisions for local purchases and entry into certain industries, leading the potential benefits of incentives to be offset by the substantial costs of disincentives. According to the Situmeang (1978), incentive policies may be a detrimental factor to the FDI flows if there are certain restrictive conditions for foreign investors to meet in order to be eligible for incentives.

3.2.3.2.3. Political Instability and Country Risk

It is widely considered that political instability in a country has a likely discouraging impact on the inflow of FDI. The risk of political instability arises from that the unexpected amendments of the regulatory and legal frameworks in the host countries might possibly change the economic outcome of already-undertaken investments in a drastic direction. As a result, it could be expect that these two variables could potentially be negative correlated with each other. Therefore, one would expect that these two variables should be negatively correlated. For instance, Ramcharran (1999) utilized the political risk index of Euromoney to

statistically examine the impact of such risk on FDI within 26 countries. Wang and Swain (1995) examined the impacts of specific political events on FDI by using dummy variables to capture such relationship. By incorporating numbers of political and other non-traditional economic variables into a traditional FDI theory based on the maximization of the expected value of the firm, Stevens (2000) suggested that the conventional model is inferior to the model containing additional political and economic variables in explaining USA FDI in Mexico, Brazil and Argentina. Additional political and economic variables include: the debt crisis over the period from 1982 to 1989; specific governments that appear hostile to FDI from the USA; devaluation in a fixed exchange rate system; exchange controls and repatriation restrictions on dividends to the parent firm; pertinent legislation; and the number of years a government is in power. Further, Schneider and Frey (1985) reached the conclusion that not only the econometric models that contain no political factors do not perform better than the models encompassing those variables, but the models using indices designed to capture political and economic factors simultaneously do not perform better than them as well. Other academic literature in supportive of the contention that political risk and country instability could refrain host countries from attracting the FDI from multinational enterprises includes Root (1978), Swansbrough (1972), U.S. National Industrial Conference Board (1969), Aharoni (1966), Basi (1963), Robinson (1961) and U.S. Department of Commerce (1954).

However, the researches with survey-based or cross-sectional evidence produced mixed results. Kobrin (1976), Green and Cunningham (1975) and Bennett and Green (1972) could not find a significant negative relationship between the flows of FDI and political risk and country instability by using cross-country data. Piper (1971) reached the conclusion that political variables are minimal concerned factors to investors and are generally treated

equally in the FDI decisions by those investors as in the case of domestic investment decisions. Reuber et al. (1973) specified that, at least as far as the distribution of the total flows of FDI among the developing countries was concerned, political risk and country instability are relatively insignificant determinants of FDI undertaken in these countries. Situmeang (1978) believed that political risk and country instability were econometrically insignificant to the flows of FDI across all types of sectors, including low and high technology industries, manufacturing and non-extractive, based on the case in The Association of Southeast Asian Nations countries.

Apart from the fact those studies above have utilized different types of data and econometric methods; the fundamental reason of the conflict between the results of these studies is the definition of political risk and country instability. In certain case, political instabilities do not elevate the political risk for FDI undertaken by foreign companies, for instance shift in authorities from extreme leftist to more democratic government or even a dictatorship. Further, according to the (Thunell, 1977), the degree of the political risk resulting from the country instability for FDI depends on the different types of industries and origins. Another fundamental reason that leads to the conflicting result is that usually the governments of the developed countries offer the guarantees on FDI against political risk and country instability which are considered to be beneficial by investors, but several academic researchers have not taken into account of these types of guarantees. Rock (1973), one of the few exceptions, identified two periods for evaluating the impact of political risk and country instability in the less developed countries on USA FDI of manufacturing industries. There is a negative correlation between USA FDI and political risk and country instability in the first period where guarantees from governments for investments were not provided, while such relationship then disappeared and the guarantees from government became a significant

determinant of USA FDI in these developing countries in the second period of time where guarantees were provided. Rock considered that the political risk and country instability have been largely reduced by the American Investment Guarantee Program.

3.3. Determinants of Foreign Direct Investments

According to the Xing (2005), foreign direct investment represents a special form of capital flows involving not only the relocation of capital but also intangible assets such as production know-how and management skills. Numerous studies have examined major determinants of FDI starting from a partial equilibrium firm-level framework based on organization and finance to implement empirical analysis. These literatures then mainly research the relationship between exogenous macroeconomic variables and FDI decision, the major variables include market size of host country, exchange rate, openness of economy, tax policy, difference in capital return, infrastructure, GDP growth rate et cetera. For example, by examining the FDI determinants in China for the period of 1978–1992, Wang and Swan (1995) find that FDI in manufacturing sector is positively related to China's GDP, GDP growth, wages, and trade barriers, but negatively related to interest rate and exchange rate. Braunerhjelm and Svensson (1996) further show that agglomeration, exports, and R&D are important factors affecting Swedish MNCs' FDI location. Moore (1993) concludes that both market size and GDP growth were important determinants of German manufacturing FDI from 1980 to 1990. Moreover, Cheng and Kwan (2000) find that the important determinants of FDI in China are sufficiently large regional market and extensively solid infrastructure, while both Lardy (1995) and De Mello (1999) identify potential market size, low labour cost, incentive policies, economic openness, geographic location, and political stability as primary determinants attracting FDI from abroad. Other studies on the potential determinants of FDI decision have also been extensively researched [Schmitz and Bier (1972); Coughlin et al.

(1991); Friedman et al. (1992); Wheeler and Mody (1992); Jackson and Markowski (1995); Chen (1996); Henley, Kirkpatrick and Wilde (1999); Zhang (2001); Branstetter and Feenstra (2002)]

Root and Ahmed (1978) examined the total 44 factors, including social, economic, and political variables, for the FDI of manufacturing industry in 41 developing countries in order to identify each country's differentiation. Brewer (1993) re-examined the impacts of government policies on market incompleteness and FDI. Porcano (1993) conducted the research on Canada, France, Germany, Japan, UK, and USA, and analyse the impacts of 21 factors on companies of each different countries when making foreign investment decision. In addition, Olibe and Crumbly (1997) selected 13 sample countries from the OPEC, and examine the explanatory variables attracting FDI from USA; variables include fiscal status of each country, population, rate of change in foreign exchange rate, debt ratio, and GDP etc. Sun and Yu (2002) researched on the 30 provinces in China; the variables include GDP, Sale, Domestic Investment, and R&D etc. In summary, the factors possibly affecting FDI are as following:

a. Economic Variables: Gross National Product per capita, foreign exchange rate, money supply, economic growth etc.

b. Condition of Host Country: infrastructure, tax rate, product demand, labour quality and average salary level, political stability, trade restriction, inventiveness, government attitude, and environment regulation etc.

c. Government Policies: the direct impacts of government policies on FDI are from the regulations. Furthermore, government policies would lead to the market inefficiency and

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impacts of government policies on FDI flows also depend upon each individual factor.[8]

According to the Pan-Long Tsai (1991), determinant factors affecting FDI can be categorized with supply-side and demand-side. The summary is shown as following:

a. Demand-side Determinants

Mainly macro-economic variables: political stability, labour cost, market size, regional economic integration, infrastructure, and relevant incentive policies. Previous literature such as Root and Ahmed (1978), Brewer (1993), Porcano (1993), Olibe and Crumbly (1997), Yang, Groenewold and Tcha (2000), Sun and Yu (2002), Pan-Long Tsai (1991) etc.

b. Supply-side Determinants

Mainly micro-economic variables: economic scale, product life cycle, and intangible assets. Previous literature such as Porcano (1993), Sun and Yu (2002).

Based upon the previous studies, determinants affecting FDI are more focus on macro-economic variables. On the other hand, according to the Ioannatos, Petros E. (2000), supply side determinants are considered constant as they cannot change within a given year.[9]. As a result, besides the significant events, the macro-economic variables are the main explanatory variables in the research; Jin-Qing Wen (2000) and Xin-Wei Liu (2002) used the unit root test to examine the time series data, and then conduct the multiple regression analysis.

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[8]Brewer (1993) examined the impacts of government policies on market inefficiency and FDI flows.
[9]. The Asymmetric Global Economy: Growth, Investment and Public Policy p.123

Although a large body of academic literature has been conducted to identify the determinants of FDI, there is no mutual agreement, meaning that there is no commonly accepted set of exogenous variables that can be regarded as the real factors affecting FDI decision. This is because the level of FDI is highly sensitive to the factors mentioned above, suggesting a lack of robustness for the results. For instance, factors such as market size, wage, interest rate, exchange rate, openness of economy, and trade barrier have been identified to have both positive and negative impacts on FDI decision. In terms of these paradoxical results, Chakrabarti (2001) concludes that the relation between FDI and many of the controversial variables (namely tax, wages, openness, exchange rate, tariffs, growth, and trade balance) are highly sensitive to small alterations in the conditioning set. On the other hand, the lack of the mutual agreement over the conclusion reached by the wide range of empirical researches regarding the relative significance and direction of impact of potential factors on FDI can be expounded on the basis of differences in econometric perspectives, research methodology, sample period selection, and analytical methods.

Most of the previous empirical studies on FDI are based upon the utilitarian assumption that foreign companies would select countries as FDI locations that maximize their investment returns. Such approach suggests that certain characteristics of host country would provide the clues regarding the expected return on FDI investment. Unaffected by the other endogenous factors, profit-maximization-seeking investors would choose host countries with specific characteristics that promise the required rate of investment return. Coughlin et al. (1991) assume that a foreign firm will choose to invest in a particular state if and only if doing so will maximize profit, when researching on state characteristics and the location of FDI within the US. The FDI in a particular state depends on the levels of its characteristics that affect profits relative to the levels of these characteristics in the other states. Although adopting

such assumption, other empirical studies have systematically distinguished between economic and political variables of host country as the determinants of investment profitability and FDI decision (Bandelj, 2002).

According to Chakrabarti (2002), we can identify several significant determinants of FDI inflows that have typically received the most attention in the empirical studies, determinants including market size, wage, trade barrier, growth rate, openness, trade deficit, exchange rate, and tax rate etc., discussed as following:

3.3.1. Market Size

Market size has long been widely considered as the most significant determinants of FDI decision. The hypothesis for market size argues that it is necessary for a host country with a sufficiently large market in order to efficiently utilize the resources and exploit the economies of scale, namely as the market size gradually grow to the certain critical value, FDI would start to increase thereafter with the further expansion. As a result, it is widely argued that there is a positive relationship between market size and FDI because it directly impacts the expected return of the investment. Besides, the market size in conjunction with the growth prospects of the host country market are important 'pull' factors and theoretically positively related to the level of FDI flows (Dunning, 1993, and Chandraprapalert, 2000). In fact, one of the major motivations for foreign business to conduct FDI is to seek for the new market opportunity. Assumes that other things being constant, the larger the market size of a particular country is, the more FDI the country would be able to attract. This is because the large market size is likely to increase in demand for the products and services provided by foreign investors. Shatz and Venables (2000), Fund et al. (2000), and many other empirical studies have found such positive relationship. Blomström and Lipsey (1991) found that there

is a significant size threshold effect for firms' decision to invest abroad. Moreover, a huge market size allows the attainment of economies of scale, and transaction costs are thought to be lower in countries with higher levels of economic development (Caves, 1971; Zhao and Zhu, 2000).

3.3.2. Degree of Openness

In terms of international trade perspective, the degree of openness in one country should a relevant factor in determining FDI provided that most of the investment projects move toward the sectors producing tradable goods and services. However, because of the concentration of FDI in the tradable sectors, there has been extensive debate in the empirical studies regarding the influence of economic openness in one country on FDI attraction, such circumstance being drawn mixed conclusions, and reflecting different nature of FDI in each country and different measuring methods used in each empirical research. In terms of the trade an investment regime, the economic openness of the host country is, to some extent to say, one of the most significant factors for host country to attract FDI, this is because a host country with open economy is easier to import capital goods or raw materials necessary for the investment and final products, and thus foreign investors would become more familiar with the investing environment. Furthermore, foreign investors believe that host countries with open economies pursuing FDI and external economic ties are expected to fit more easily into global production and trade patterns, and thus would be more attractive (Vernon, 1966; Root and Ahmed, 1978). Therefore, if measuring openness by the ratio of export plus import to GDP, Singh and Jun (1995) found there is a positive relationship between FDI and openness. The same conclusion is supported by Kravis and Lipsey (1982), Caves (1996), Dees (1998), and Billington (1999). But on the other hand; openness can negatively impact FDI due to the increasing market competition through lowering entry barrier for potential

market entrants, and then discouraging the FDI. Wheeler and Mody (1992) find that, despite Brazil and Mexico have very low ratings in openness, these two countries attracted major US investment in their sample period. While they found that there is a strong positive impact of economic openness on FDI attraction in manufacturing industry, there is a weak negative relationship between openness and FDI in electronic industry. In evaluating the controversial relationship between FDI and openness by using extreme bound analysis, Chakrabarti (2001) argued that the variable of economic openness in one country is highly sensitive to small alterations in the conditioning information set. Therefore, the exact relationship between the economic openness and FDI attraction still remains to be the empirical questions.

3.3.3. Labour Cost

Labour cost is usually measured by wage, and has been the one of the most controversial determinants of FDI. Theoretically, it is widely argued that it may be profitable when companies move the production of labour intensive goods to labour abundant countries, while leaving the headquarters in their home country (Helpman, 1984; Helpman, 1985; and Helpman and Krugman, 1985). Therefore, it has a negative impact on FDI, which means that low labour costs tend to attract FDI. Feenstra and Hanson (1997) find that low labour cost is the major determinant of US investment in Mexico. Similarly, Wheeler and Mody (1992) find labour costs to be significant influence on US electronics assembly manufacturers. However, other studies suggest contrary result. For example, Fung, Iizawa, Lee and Parker (2000) find that average wage costs are insignificant but labour quality (estimated by educational attainment) is significant for US and Japanese FDI in China; while Mody, Dasgupta, and Sinha (1998) find raw labour cost not to be a major factor of determinants for Japanese FDI in China but labour quality is. In the model of Braunerhjelm and Svensson (1999), it reflects that multinational enterprises are inclined to pay a wage premium to their employees in order

to attract workers with high quality, because companies believe that higher wages could reflect higher labour quality. Furthermore, they have adopted the number of research scientists, engineers and technicians per 1000 of the employees (RSET) as the proxy of the labour quality. RSET measures the relative endowment of skilled labour in each province of China and should have a positive impact on FDI. Besides, both Sader (1993) and Lipsey (1999) point out that there is no significant evidence to suggest that low wages, associated with low per capital real income, are the main determinants for FDI decision.

3.3.4. Exchange Rate

The exchange rate is widely regarded as a critical determinant of FDI. According to the currency hypothesis proposed by Aliber (1970), it focused on the country-specific advantages that drive foreign firms to choose to locate in a particular currency country. Aliber argued that certain financial factors can be systematically modelled and fundamentally explain the pattern of FDI, factors including exchange rate, capital market relationship, and preference of the market for holding assets denominated in certain currencies. The appreciation of home country's currency would encourage FDI in host country, especially when lowering capital requirements of FDI in domestic currency unit and reducing the nominal competitiveness of export products. However, the evidence of such relationship is ambiguous at least in terms of inward FDI with a heterogeneous impact of exchange rates on inward FDI observed across countries, types of investment and time. In a few theoretical studies, they have modelled the mechanism that exchange rates affect FDI flows (e.g., Froot and Stein, 1991; Cushman, 1985). Fundamentally, such strand of literature examines how exchange rate movements impact on FDI via two channels, which are the wealth effect channel and relative production cost channel. For the multinational enterprises conducting foreign direct investment, the major benefits of depreciation in host country's currency is relatively lower production costs

because the devaluation would lead to the cost reduction when purchasing inputs locally. Such circumstance is particularly significant for export-oriented FDI, because the segmentation between the production site and product market can help the sale prices and revenues from being affected by the deprecation of host country's currency. By utilizing the static model, Kohlhagen (1977) suggests that, if foreign currencies depreciate, multination enterprises are inclined to increase their production capacity in foreign countries for serving their domestic market with lower-cost products. Based on capital market imperfections, Froot and Stein (1989) built a sophisticated model explaining how currency movements change the relative wealth positions of countries. Imperfect capital markets mean that the internal cost of capital is lower than borrowing from external sources. They concluded that the dollar depreciation would increases the tendency of foreign firms to invest in the United States through lowering their costs of fund for FDI relative to the counterparty firms in the foreign country that experience the devaluation of their currency, and encouraging the foreign firms to aggressively purchase the dollar-denominated foreign assets, which leading to increased firm wealth. By sampling various data of US FDI disaggregated by country source and type of FDI, Klein and Rosengren (1994) confirms that depreciation of host country's currency increases FDI in US. Aguiar (2003), and Blonigen and Feenstra (1996) also reached the same conclusion.

Blonigen (1997) provide another explanation how exchange rate movements affect the changes in FDI level in host country. If FDI by foreign firms is driven by acquiring assets that are transferable within a firm across markets in different countries without a currency transaction, then the depreciation of domestic country currency will lower the price of the assets denominated in foreign currency, but will not essentially lower the nominal rate of return. In other words, he found that the market segmentation gives rise to an advantage on

acquiring firm-specific assets (e.g., technology, managerial skills, etc.) to foreign investors, because depreciation of domestic currency allows foreign firm to sell these transferable assets to other foreign firms operating in global market, compared with domestic firms with no such sales channel. By using the industry level data on Japanese mergers and acquisitions FDI into US to test the above hypothesis, Blonigen finds that the appreciation of the Japanese Yen relative US Dollar resulted in a significant increase in US acquisition FDI activities led by Japanese firms, especially for the high-technology industries where firm-specific assets are likely to have the substantial importance and status. Similarly, Morck and Yeung (1991) found supporting evidence that FDI creates wealth when an expanding firm possesses transferable and/or intangible assets, such as production know-how, superior marketing expertise, innovative patents, consumer goodwill, and brand value. Other empirical studies have also found consistent evidence and conclusion that short-run movement in exchange rates may have the positive impacts on FDI, including Swenson (1994]), and Kogut and Chang (1996). Conversely, Campa (1993) argues that the appreciation of domestic currency would increase the FDI from foreign countries by considering that the return FDI depends upon the domestic return plus the return on exchange rate. Although much of empirical evidence has been consistent with Froot & Stein (1991) and Blonigen (1997), most of the academic literatures examining the exchange rate effects on FDI have used exclusively US data to test such relationship.

Regardless whether the impact of appreciation in foreign currency is positive or negative, another strand of literatures examines how uncertainty and expectation regarding the future exchange rate movement may impact FDI attraction and decision. Empirical studies examining the relationship between the level and/or volatility of a home country's exchange rates and outward FDI indifferent countries include Blonigen (1997) and Guo and Trivedi

(2002) for Japan, Georgopoulos (2008) for Canada, and Gopinath et al. (1998) and Bolling et al. (2007) for the United States. All of these studies conclude that there is a positive impact of exchange rate and/or exchange rate volatility in home country on FDI decision. For instance, Goldberg and Kolstad (1995) hypothesizes that exchange rate uncertainty would lead the risk-averse multinational companies to increase FDI if such uncertainty is correlated with export demand shocks in other foreign markets they primarily target at. They confirm such hypothesis by empirically analysing the quarterly bilateral data on US FDI with Japan, Canada, and the United Kingdom. Furthermore, Cushman (1985) argues that FDI would increase because enterprises prefer to produce in the foreign currency and sell in other foreign markets, even though the exchange rate volatility leads to the increase in the risk of the foreign investment. By building the firm-level model, he also found the empirical evidence that while the current level of the exchange rate has no significant impact on the level of FDI, an expected real appreciation in home country's currency would have the positive impact on it. Based on the options theory proposed by Dixit (1989), however, Campa (1993) laid out an elegant model to examine the relationship between the exchange rate uncertainty and FDI decision. By using the data on US FDI in the wholesale industry, he concludes that greater uncertainty in exchange rate would depress the current level of FDI because it increases the options for firms wait and evaluate until conducting investment in foreign investment. In assessing such ambiguous relationship between FDI and foreign exchange volatility and/or uncertainty by using extreme bound analysis, Chakrabarti (2001) ascertained that the variable of exchange rate variable in one country is highly sensitive to small alterations in the conditioning information set.

3.3.5. Economic and/or GDP Growth rate

Economic and/or GDP growth rate has always been the subject of empirical studies in

identifying FDI determinants. According to the Lim (1983), the growth hypothesis is that a rapidly growing economy provides relatively better opportunities for making profits than the ones growing slowly or not growing at all. Associated with the labour costs, trade status, and inflation rate, economic growth rate has been identified to have the significant positive impact on FDI. Findlay (1978) argues that FDI would help to elevate economic growth through its impact on technological progress. Both of the empirical studies conducted by Blomstrom et al. (1992) and Borensztein et al. (1998) found that economic growth rate is positively correlated with FDI. Other empirical studies researching on the impact of economic growth on capital formation conclude that gross domestic investment (GDI) has a major influence on the economic rate and development. For example, Levine and Renelt (1992) and De Long and Summers (1991) concluded that the rate of capital formation determines the rate of economic growth. Graham (1995) also concluded that the GDP growth determinant can have both negative and positive economic consequences of FDI in host country. He believed that the positive effect results from the transfer of technology and other firm-specific assets, leading to the increase in production capacity and enhancement in the efficiency of resource allocation, while negative effect results from the political interference in host country by foreign companies or from the market power of multinational enterprises and their associated abilities to make substantial profits through low-cost productions and strong bargaining power.

3.3.6. Political Risk and Institutional Quality

Several academic literatures suggest that general political risk and particular institutional quality are both critical determinants of FDI, especially for developing countries. With respect to quality of institution, poor one would undermine the FDI activity because it would diminish market's ability to well function, and thus, increase the cost of setting up business

for foreign investors. Furthermore, to some extent to say, poor institution would lead to the host country with under-developed infrastructure (e.g. transportation system), resulting in the reduction of expected profitability and FDI activity.

Measuring the political stability by using the index of state capture by local elites on data from 18 transition economies, Jensen (2002) found that political risk negatively impact on foreign direct investment as a share of GDP. In terms of the impact of political risk on FDI flows, Harms (2002) found that poorer countries have more negative and higher coefficient than wealthier ones, implying that low-income countries can gain more benefits from reducing political risk than middle-income ones. The conclusion of a negative relationship between political risk and FDI flows is also reached by Singh and Jun (1995) and Habib and Zurawicki (2002). Contrarily, Globerman and Shapiro (2002) find governance and regulatory burden significantly and positively impact on FDI flows for developing and transition economies with the full-sample and sub-sample cases. The negative relationship between the governance indicator and economic growth suggests that the returns on foreign investment from political stability and governance are diminishing. In a separate empirical study, Harms and Ursprung (2002) find that the impact of indices of political risk and the institutional quality on FDI inflows per capita and decision are not significant.

The impact of stability in other areas on FDI decision has also been studied by several empirical researches. For instance, Kolstad and Tøndel (2002) find that foreign direct investments are significantly reduced by ethnic tensions, religious tensions, and internal conflict. However, Asiedu (2002) argued that there is no significant relationship between the number of assassinations and revolutions and FDI inflows as a share of GDP by researching on the sample of 71 developing countries.

The underlying cause leading to the controversial results regarding to the impact of institutions on FDI flows is because that there are not any measurements for a country's political risk, institutional quality, governance, and other stabilities. Most of the measures are based on the survey responses from governmental officials or enterprises with the investment in the country in order to build the composite index. As a result, comparability across countries still remains to be questionable when survey respondents with different characteristics vary across the countries. Additionally, institutional quality and governance in a country are somewhat persistent that there may be little informative variation over time within a country

3.3.7. Country Default Risk

Country default risk refers to the probability that a specific country is not able to generate enough foreign exchange reserve to enable its legal residents, including both public and private, to meet interest and principal payments to their foreign debts. A *de jure* or *de facto* default indicates that a country is unable to generate the foreign exchange it requires to maintain internal and external economic equilibrium and creates increased uncertainty in the business environment. Hence, it is obvious that country default risk acts as a significant determinant of the cost of foreign borrowing and FDI. It is widely believed that an increase in the probability of country default risk increases the uncertainty in the business environment and reduces the expected return on FDI as a whole. It would cause the reduction in FDI through its three consequences. Firstly, FDI proposals would be acceptable at the higher expected return, but unacceptable at the lower one and, hence, not undertaken. Secondly, increased uncertainty would make it advantageous to delay or postpone FDI that would otherwise be acceptable even at the lower expected return. Such phenomenon is called option

to wait, and documented in the real option literature, such as Dixit and Pindyck (1994). Finally, lower expected return resulting from higher probability of default can accelerate the decision to divest and even abandon the ongoing projects. Typically, country default risk is incorporated into the general concept of country or political risk mentioned above. However, methods of assessing country risk employed by most of the academic literature are mainly based on the subjective criteria, such Haque *et al.* (1997) and Wells (1997). Meldrum (1999) argued that subject process of evaluating a country risk would remain to be a weakest link of the rating process until its link with fully researched because of the nature of being subjective. Further, by creating the two variables of political risk including the political instability and the level of democracy, Balkan (1992) quantified such determinants and found that these factors are significant in extrapolating debt restructuring and rescheduling, but the later research using this methodology in this specific area is quite scarce.

Clark and Kassimatis (2009) proposed to use country financial risk premium as a measure of country default risk where they utilized the structural credit risk model by Merton (1974) and methodology by Clark (1991a, 1991b, 1991c) to measure the default risk for an individual country as a whole rather than a specific categories of loan borrowers within that country. In regards to the Merton (1974) model, it values debt as the difference between the value of a European call option held by the shareholders of company and the value of the assets of company. If the amount of debt to be repaid is higher than the value of company's assets on the debt's maturity date, then the shareholders would default leaving the company's asset to the debt holders. If the amount of debt to be repaid is lower than the value of company's assets on the debt's maturity date, then shareholders exercise the option enabling them to pay off the debt and retain the assets. The countries under investigated include eight Latin American countries (i.e. Argentina, Bolivia, Brazil, Chile, Colombia, Mexico, Peru and

Venezuela) with the data period starting from 1986 to 2000, in which the data on FDI stocks are obtained from the World Investment Report, the data on the debt are obtained from the World Debt Tables, the data on the current account of each country are obtained from the Balance of Payments Statistical Yearbook and all other economic data are obtained from the IMF International Financial Statistics. Clark and Kassimatis concluded that country default risk is a statistically significant and negative determinant of FDI when controlling for standard measure of country/political risk. Their result contributed to the academic literatures regarding FDI with threefold. Firstly, country default risk is found to be a significant explanatory variable for the determinants of FDI. Secondly, default is found to have additional costs in terms of the lost FDI reflected in the traditional country/political risk measures. Thirdly, country default risk does have an impact on FDI at the time when the probability of default is increasing at an increasing rate. Hence, their research proved that country default risk is a strong driving force behind multinational corporate decision on FDI.

3.3.8. Taxation

The issue of the impact of tax rate on FDI activity has long been considerably studied by both international and official macro-economists. The tax hypothesis is that higher taxes would discourage the FDI activity, but the question remains to its magnitude. For instance, De Mooij and Ederveen (2003) found that a median tax-elasticity of FDI of -3.3 across 25 studies. But they also highlighted that such elasticity may vary substantially by measurement of FDI activity (e.g. a share of GDP), type of taxes, and tax treatment in the host and home countries.

Most of the literatures on the international investment do not explicitly evaluate the tax impacts but rather focus on US direct investment abroad, such as Kwack (1972) and Lunn

(1980). However, Hartman (1984;1985) found that taxes, through their impacts on the after-tax rates of return, may significantly affect retained earnings FDI, and transfer FDI may not sensitive to them. Hartman (1984) examines such relationship by evaluating the behaviour of foreign affiliates in the United States. Because Hartman can only gather data on tax rates and returns in host country (US), but no such data in home (foreign) country, he separately regresses retained earnings FDI and new transfer FDI on the host country (US) tax rate, without controlling for these unobservable home country tax rates. He concludes that while transfer FDI does not respond significantly to host country tax rates which can then be explained by not controlling for parent country tax rates and differences in returns, retained earnings FDI responds significantly to the tax rate in host country. The former relationship implies that FDI through new transfer of capital from parent company to the foreign affiliate would potentially react to both parent and host country taxes and rates of return available in both the parent and host markets. The latter relationship implies that firms more tend to finance new via retained earnings as much as possible, before choosing to inject new investment capital from the parent companies or home countries.

In a separate study, Slemrod (1990) confirms that fiscal policies dealing with the double-taxation would affect the FDI responsiveness to tax. So far, there are two tax systems have been implement around the global market, including source jurisdiction and residence jurisdiction. Source jurisdiction, also called territorial tax system, only levies taxes on the income generated within the border and assets transferred within a country, regardless the individuals or companies are citizen or foreign. Residence jurisdiction, also called worldwide tax method, levies tax only on residency and transfer tax on worldwide assets, no matter whether the income is domestic or foreign. Currently, there are three standard treatments dealing with the double-taxation issue for home country, including credit, exemption, or

deduction methods for tax payments paid by the multinational companies to the host country.

As the researchers began to examine the impact of the US tax reform in 1986 on inward US FDI, these different tax treatments affecting the analysis of FDI started to be included in the empirical studies. For instance, Scholes and Wolfson (1990) found that US FDI from multinational companies under the residence jurisdiction systems would likely increase when US tax rates increased. They draw such conclusion by performing econometric tests to show the trend of US FDI after 1986 without controlling for other factors. Furthermore, Auerbach and Hassett (1993) provided evidence against the Scholes and Wolfson hypothesis by developing a model of FDI that predicts the certain types of investments in US. Their model suggests that foreign companies under source jurisdiction tend to have more incentives to focus on the FDI in merger and acquisition (M&A), while foreign companies under residence jurisdiction systems tend to be discouraged from FDI in M&A compared with the investment in new equipment and facilities. He also argued that the substantial increase in FDI after 1986 US tax reform was from the FDI in M&A by foreign companies under residence jurisdiction systems. On the other hand, Swenson (1994) refined a more sophisticated model to examine the differential impact that the US 1986 tax reform had on FDI across industries that had varying changes in tax rates after the reform. He found that greater average tax rates did lead to the increase in US FDI, particularly for the companies under the residence jurisdiction countries.

3.3.9. Agglomeration

Agglomeration effect refers to the concentration and co-location of economic activities that brings about the economies of scale, positive externalities, and network effects, particularly describing the benefits that firms based in urban economics obtain when locating near

between each other. It is argued that the level of agglomeration of a particular country should have positive impact on FDI. Coughlin and Segev (2000) argue that FDI into neighbouring provinces increases FDI into a Chinese province and regards this as evidence for agglomeration externalities. According to the Wheeler and Mody (1992), they measure agglomeration benefits by using the degree of industrialization, infrastructure quality, and accumulated foreign investment. The quality of infrastructure, such as transportation network, is measured by the GDP per square Domestic investment per worker is proxied for the degree of industrialization. The cumulative FDI amount reflects the herding effect among foreign investors. Besides, there are several incentives that lead the positive linkages among the projects to the agglomeration effects. The first incentive for this arises from spillover effects created by research and development. The second incentive belongs to the confidence and the possibility for firms to cluster together. The third incentive is the result of the supply of, and demands for, intermediate goods (Fujita et al., 1999). 'Inter-firm and inter-industry variability in R&D quality, in entrepreneurs animal spirits, in synergistic relationships and the ability to exploit economies of agglomeration can all affect the identity of the efficient firms apparently without reference to national characteristics.' (Gray, 1982, p. 192)The studies of Smith and Florida (1994), and Cheng and Kwan (2000) support the existence of agglomeration effects. Contrarily, Blonigen et al. (2004) suggests that there is a negative relationship between the neighbouring-country FDI and the amount of US FDI received by a European country, while finding that neighbouring GDPs increase FDI level. These two circumstances provide the evidence for the export-oriented FDI. Summary of the studies on FDI determinants effects can be seen from following Table

Table 9: Empirical Results for determinants of FDI

Determinants of FDI	Effects on FDI		
	Non-effect	Negative effect	Positive effect
Market Size			Bandera and White (1968),Swedenborg (1979), Rott and Ahmed (1979), Lunn (1980), Kravis and Lipsey (1982), Nigh (1985), Culem (1988), Pearce (1990), Wheeler and Mody (1992), Dunning (1993), Tsai (1994), Loree and Guisinger (1995), Shamsuddin (1994), Dees (1998),Billington (1999), Pistoresi (2000),Shatz and Venables (2000), Fung et al. (2000)
Degree of Openness	Schmitz and Bieri (1972), Wheeler and Mody (1992)		Kravis & Lipsey (1982), Kravis and Lipsey (1982), Culem (1988), Edwards (1990), Billington (1999), Singh and Jun (1995), Caves (1996), Dees (1998), Pistoresi (2000)
Labour Cost	Owen (1982), Gupta (1983), Lucas (1990), Sader (1993), Tsai (1994), Mody, Dasgupta, and Sinha (1998), Lee and Parker (2000)	Goldsbrough (1979), Flamm (1984), Culem (1988), Schneider and Frey (1985), Shamsuddin (1994), Pistoresi (2000)	Caves (1974), Swedenborg (1979), Wheeler and Mody (1992), Sader (1993), Lipsey (1999), Braunerhjelm and Svensson (1999)
			(continued)

Determinants of FDI	Effects on FDI		
	Non-effect	Negative effect	Positive effect
Economic and/or GDP growth rate	Tsai (1994), Nigh(1988)		Findlay (1978), Lunn (1980), Lim (1983), Schneider and Frey (1985), De Long and Summers (1991), Levine and Renelt (1992), Culem (1988), Blomstrom et al. (1992), Borensztein et al. (1998), Billington (1999), Lim (2001), Durham (2002),
Political Risk and Institutional Quality	Harms and Ursprung (2002)	Jensen (2002), Harms (2002), Singh and Jun (1995), Habib and Zurawicki (2002)	Globerman and Shapiro (2002),
Country Default Risk		Clark and Kassimatis (2009)	
Taxation	Wheeler and Mody (1992), Jackson and Markowski (1995), Yulin and Reed (1995)	Hartman (1984), Grubert and Mutti (1991), Hines and Rice (1994), Loree and Guisinger (1995), Cassou (1997), Devereux and Griffith (1998), Billington (1999), Desai et al. (2002)	Swenson (1994)
Agglomeration		Blonigen et al. (2004)	Fujita et al. (1999), Smith and Florida (1994), Cheng and Kwan (2000), Coughlin and Segev (2000)

Source: The table was developed by taking its one part from A. Chakrabarti (2001) study

4. Methodology and Data

4.1. Methodology

4.1.1. Panel Data Regression Models

Panel data is a combination of time series data and cross-section data. In time series data, the values of one or more variables are observed over a period of time. In cross-section data, values of one or more variables are collected at the same point in time for several sample units or entities. In short, panel data is the same cross-sectional unit surveyed over time. There are several advantages of panel data. For instance, it could give "more informative data, more variability, less collinearity among variables, more degrees of freedom and more efficiency"; and it could be better suited to study the dynamics of change by researching on the repeated cross section of observations (see Baltagi, 2005). Hence, it is believed that panel data analysis provides a robust framework for exploring the determinants of industry-level FDI since it contains both time and space dimension of data. The basic panel data regression model is shown as following:

$$Y_{it} = \alpha Z_i' + \beta X_{it}' + \varepsilon_{it}, i = 1, \ldots, N; t = 1, \ldots, T$$

Within this model, there are K regressors for independent variables without including a constant term. The individual effect is $\alpha Z_i'$ where it contains a constant term and $[1 \times p]$ vector of time-invariant variables that its intercept does not change over time. Such model could be regarded as an OLS model if Z is observed for all individuals. Further, there are two specifications used for panel data regression model, which include fixed-effects models and random-effects models. While the heterogeneity to the constant terms in the regression is confined within these two models, heterogeneity across panel units is allowed. Following is the introduction of these two models.

The Fixed Effect Model (FEM)

If individual effect, Z'_i, is not observed but correlated with individual variables, X'_{it}, the estimators are then biased and inconsistent as a result of omitted variables. Hence, the estimation model would be

$$\mathbf{Y}_{it} = \alpha_i + \beta\mathbf{X}'_{it} + \varepsilon_{it}, \textbf{where } \alpha_i = \alpha\mathbf{Z}'_i$$

and such model embodies all the observable effects and specifies an estimable conditional mean. The error term, ε_{it}, incorporates a common disturbance term and individual level effect correlated with the regressors, β. α_i is taken to be a group-specific constant term in this method.

The Random Effect Model (REM)

If the heterogeneity of unobserved individual is assumed to be uncorrelated with the independent variables, the model could be formulated as

$$\mathbf{Y}_{it} = \alpha + \beta\mathbf{X}'_{it} + \pi_{it}, \textbf{where } \pi_{it} = \mu_i + \varepsilon_{it}$$

where μ_i is specified as a group-specific random element and ε_{it} as individual observation error term. This model assumes that μ_i has zero mean and constant variance, and is independent of ε_{it} and $\mathbf{X}'_{it}$. Since there is a cross-correlation between error terms for a given cross-sectional unit at different points in time, the coefficients could only estimated consistently but not efficiently. Hence, a generalised least squares (GLS) approach should be employed. GLS approach requires a transformation to subtract a weighted mean of the $\mathbf{Y}_{it}$ over time in order to ensure there are no cross-correlations in the error terms.

Even though the FEM is a more appropriate specification than the REM in that the former one does not require assumption that there is no correlation between ε_{it} and $\mathbf{X}'_{it}$, there are still two empirical weaknesses within the FEM. First, it can use up degrees of freedom as it introduces new parameters into the model. Second, variables that are fixed over time cannot

be included, and variables that only change slowly over time are likely to have large standard errors. Nevertheless, Mundlak (1978) criticized the REM in that it ignores "possible correlation between the explanatory variables and the individual-specific effects." In order to choose between the FEM and REM, Hausman (1978) hence proposed a test to examine on the validity of the extra orthogonality conditions imposed by the random effect specification.

4.1.2. Dynamic Panel Data Models

If the FEM or REM includes not only the current but also one or more lagged values of dependent variables, such model is called dynamic panel data model (DPDM) as it can portray the time path of the dependent variable in relation to its past values (see Gujarati, 2004). Further, since the lagged dependent variable is correlated with the disturbance term and static panel data models and leads to the biased and inconsistent estimates, DPDM could mitigate such problem by investigating heterogeneity between different types of individuals from another perspective and considering the possibility that underling microeconomic dynamic which may be obscured by aggregation biases (Nickell, 1981). The first-order DPDM is formulated as follow

$$\mathbf{Y}_{it} = \alpha \mathbf{Y}_{i,t-1} + \beta \mathbf{X}'_{it} + \mu_i + \varepsilon_{it} = \gamma \mathbf{I}'_{it} + \mu_i + \varepsilon_{it}$$

where $\mathbf{I}_{it}$ includes the lagged dependent variable. Since the independent variable, without lagged variables, could explain full information that produce dependent variable, DPDM is able to measure any influence that is conditional on the entire history. Besides, DPDM is employed if there is a high persistency in the explained variables and a temporal autocorrelation in the error term. However, the lagged dependent variable is highly probable to be correlated with the error term even with the assumption that there is no autocorrelation within residual term. Hence, by taking the first difference to remove the constant term and the individual effect, Arellano and Bond (1991) then introduce the instrumental variable

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estimation into the DPDM. Later, Arellano and Bover (1995) and Blundell and Bond (1998) further improve DPDM by including lagged level instruments in addition to the lagged difference instruments. The generalised methods of moments (GMM) estimators are then used for both original and improve DPDM, where the former one is termed difference GMM and the latter is termed system GMM.

4.1.3. Cointegration

Most of the empirical researches based on the time series data assume that characteristics of its data are stochastic stationary. In terms of stochastic property, the explained variable in the time-series regression is assumed to be stochastic or random, which means that it has probability distribution, and explanatory variable is assumed to be fixed in the repeated samples, leading to OLS regression is unbiased and consistent when stochastic regressors are present given that there is no correlation relationship between the regressors and residual terms in the estimated regression. In terms of stationary property, according to Gujarati (2004), 'a stochastic process is said to be stationary if its mean and variance are constant over time and the value of the covariance between the two time periods depends only on the distance or gap or lag between the two time periods and not the actual time at which the covariance is computed. Based on it, explained variable (Y_t) of stochastic time series is weak stationary if it could be found with following three properties: (1) **Mean**: $E(Y_t) = \varepsilon$; (2) **Variance**: $Var(Y_t) = E(Y_t - \varepsilon)^2 = \tau^2 < \infty$; (3) **Covariance**: $Cov_j = E[(Y_t - \varepsilon)(Y_{t+k} - \varepsilon)] \forall\, t, t + k$. In the last condition, it should be noted that Cov_j is the covariance between the values of Y_t and Y_{t+j}, which means that only between two Y variables j periods apart from each other. Therefore, the mean, variance and covariance for each given lag are said to be time invariant as they remain to be equal and the same no matter at which time period it is measured.

According to the Engle and Granger (1987), let Y_t be a $k \times 1$ vector of variables, then the components of Y_t are integratedof order (d, b) if:

(1) All component of Y_t are $I(d)$

(2) There is at least one vector of coefficients $\propto$ such that

$$\propto^{`} Y_t \sim I(d - b)$$

If the relationship is restricted to d=b=1, then a set of variables is defined as cointegrated if a linear combination of them is stationary. This is because time series variables are non-stationary but they move together over time, implying that the two series are bound by certain long-run relationship. A cointegrating relationship may be regarded as a long-term or equilibrium phenomenon. As a result, if we are dealing with time series data, we must sure that the individual time series are either stationary or that they are co-integrated. If this is not the case, we may be open to the charge or engaging in spurious (or nonsense) regression analysis[10]. Co-integration test is a method to solve the non-stationary time-series data. When X_t and Y_t are non-stationary, there are usually two methods to make them stationary: First, taking the first differences on X_t and Y_t. Second, if there is a stationary linear relationship between non-stationary X_t and Y_t and it has a long-term equilibrium, then X_t and Y_t are co-integrated. The method of testing for cointegration in regression is to use a residuals-based approach. The co-integration suggests that, although X_t and Y_t are non-stationary and each has its own trend, the long-term relationship between both variables is stationary. Because of this, the long-term equilibrium of economic variables can be obtained from the regression model. It should be noted that Engle and Granger (1987) have tabulated a new set of critical values for such hypothesis tests and the test is called the Engle—Granger (EG) test. The

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[10]Gujarati，「Essentials of Econometrics」 p.461，second edition，1998

rationale that modified critical values are required is that the test is based on the residuals of an estimated model rather than on raw data. Because the residuals have been constructed from a particular set of coefficient estimates, the sampling estimation error in those coefficients would change the distribution of the test statistic. Besides, Engle and Yoo (1987) tabulate another set of critical values that are larger in absolute value than the DF critical values. The critical values would become more negative as the number of time series variables in the cointegrating regression increases.

4.1.4. Error Correction Model

If two non-stationary variables are proved to be co-integrated, then there may be disequilibrium in the short-run and would have a long-term relationship between them. Hence, according to Sargan (1984), the error term could be treated as equilibrium error, which could be used tie the short-term behaviour of explained variable to its long-term value. It is called error correction model first developed by Sargan and later modified by Engle and Granger as Engle–Granger 2-step method. Firstly, all of individual variables have to be confirmed as being integrated of order 1, I(1). Then OLS should be used to estimate the co-integrating regression, and examine the resulting error terms if they are I(0) or otherwise. If they are I(0), then proceed to the 2nd step. Secondly, the error terms in the 1st step then should be included as one variable in the error correction model suggested as following

$$\Delta \mathbf{y}_t = \alpha + \beta_1 \Delta \mathbf{x}_t + \beta_2 (\varepsilon_{t-1}) + \omega_t, \textbf{where } \varepsilon_{t-1} = \mathbf{y}_{t-1} - (\gamma + \delta \mathbf{x}_{t-1})$$

Such linear relationship of variables of nonstationary time-series data is known as the cointegrating vector. The Engle--Granger 2-step method has three potential weaknesses. Firstly, it is not valid to undertake any hypothesis testing on the actual co-integration relationship estimated in the 1st step. Secondly, there would a typical finite sample problem of co-integration testing and a lack of power in unit root. Thirdly, if there is a causality between

explained and explanatory variables running in both directions, then it could lead to a potentially simultaneous equations bias.

4.1.5. Vector Autoregressive Models

VARs proposed by Sims (1980) have gained popularity in econometrics as a natural generalisation of univariate autoregressive models. In order to analyse the dynamic interaction among macro-economic variables of interest, VARs enable each of variable to be explained by its own lagged values and the lagged values of other variables. Further, VAR could also be considered as a type of combination of the simultaneous equations models and the univariate time series models. The basic structure of VAR of order p model could be formulated as follow:

$$\mathbf{ln}Y_t = \alpha + \beta_1 \mathbf{ln}Y_{t-1} + \cdots + \beta_p \mathbf{ln}Y_{t-p} + \mu_t; t = 1, .., N$$

where both $\mathbf{Y}$ and β_i are VAR estimated parameters, and μ_t is disturbance terms with zero mean and finite variance. Since the purpose of this research topic is to explore how each macro-economic variable response to the shock of other variables within the Taiwan's economic system, both impulse response functions and variance decomposition analysis are used to provide an insight into short-run dynamic interaction among these macro-economic variables. The former one could trace out the responsiveness of the dependent variables in the VAR to shocks to each of the variables in the system. The latter one gives the proportion of the movements in the dependent variables that are due to their own shocks versus shocks to the other variables in the system. Nevertheless, Park and Phillips (1989) and Sims et al. (1990) suggested that traditional asymptotic theory is not applicable to examine in levels VAR if variables are integrated or cointegrated. According to Maddala (1992), if the variables of the interest are I(1) with cointegration, the conventional asymptotic theory is valid for hypothesis testing in restricted VAR with differences and error correction model; if   the

variables of the interest are I(1) with non-cointergration, the conventional asymptotic theory is valid for hypothesis testing in first-order differences VAR; if the variables of the interest are I(1) with full ranks, all of variables are considered as stationary and their interaction is examined on the basis of levels VAR.

In order to examine the cointegration, augmented Dickey-Fuller (ADF) test should be employed for lagged level of all variables in an attempt to detect stationary in the stochastic trend and determine the order of integration of time series data. Once the co-integration is confirmed for each time series variable, there are two methods to estimate long-term equilibrium relationship: single equation proposed by Engle and Granger (1987); systems of equation proposed by Johansen (1988) as well as Johansen and Juselius (1990). The former, according to Gonzalo (1994), is unable to test for multiple numbers of cointegrating vectors since its procedure has biases in estimating the cointegrating vectors. The latter, however, is a more appropriate method since its procedure is fundamentally based on maximum likelihood of a full system and able to determine the number of cointegrating vectors by using Trace statistics. Following the method of Johansen (1988)as well as Johansen and Juselius (1990), if all variables of interest are non-stationary, an unrestricted VAR in levels is an appropriate technique; if variables are all integrated of order one, I(1), but not cointegrated, an unrestricted VAR in first-differences is an appropriate technique (Sims et al. 1990). On the other hand, if cointergration exists between variables, a restricted VAR in difference is an appropriate technique rather than unrestricted VAR in levels (Maddala 1992).A restricted VAR with differences and error correction could be expressed as follow

$$\Delta \mathbf{lnY}_t = \Theta + \Psi_1 \Delta \mathbf{lnY}_{t-1} + \cdots + \Psi_{p-1} \Delta_{t-p-1} + \Omega \mathbf{lnY}_{t-1} + \upsilon_t ; \mathbf{t = 1,..,N}$$

where Δ is the difference operator, Θ and Ψ are VAR estimated parameters, $\mathbf{lnY}_{t-1}$ is an error correction term derived from the long-term cointegration, and υ_t is disturbance terms with

zero mean and finite variance. Ψ_i represents the dynamic short-term interaction of variable. Since VAR estimate is sensitive to the selection of lag length, p, Akaike's Information Criterion (AIC) is used to select an appropriate number of lags. Following the confirmation of cointegration, the VAR is able to be estimated and the impulse responses function and variance decomposition analysis could be established by converting such VAR in to a moving-average specification. It should be noted that impulse responses function and variance decomposition analysis might be severely affected by the choice of order and of number of lags since VARs fundamentally have no basic structure. It is necessary to understand the causality among all variables of interest through weak exogeneity tests and to determine the order of the variables.

4.2.   Data Sources

This section describes the data sources and economic databases used in this thesis. The secondary data used in this study are mainly industry-level in Taiwan over a period of twenty years for empirical research. Along with Taiwan Economic Journal (TEF) database, most of the data in this thesis are obtained from annual Taiwan Statistical Data Book published by Council for Economic Planning and Development (CEPD), Executive Yuan, R.O.C. (Taiwan). Founded in 1990, TEJ provides the in-depth and extensive data on economic and financial market in Taiwan. The Taiwan Statistical Data Book is designed to provide academic and professional researchers with statistical information and comprehensive data on present-day Taiwan. The statistic yearbook covers demographic, economic, social, cultural and physical aspects. The content of both statistic yearbook and economic database includes composite annual statistical data indices for macro- and macro-aspect of national economy; and economic indicators and information on different industries. The data descriptions and sources for each variable of interest are listed in the following table:

Table 10: Data Descriptions and Sources of Research Variable

Code	Variables	Descriptions	Data Source
FDI	FDI	FDI in each industry (US$ 1,000)	Investment Commission, Ministry of Economic Affairs, Taiwan (ROC)
WAGE	Wage	Average wage across industries (USD)	Council Of Labour Affairs Executive Yuan, Taiwan (ROC)
Market	Market Size	Gross industry production, i.e. GDP by industry (NT$ million)	Taiwan Statistical Data Book
ER	Employment	Average number of employment rate across industries (1,000 person)	Council of Labour Affairs Executive Yuan, Taiwan (ROC)
EX	Foreign Exchange rate	Weighted average value of foreign currency against NTD	Central Bank of Taiwan (ROC)
ML	Import Level	Value of trade import in Taiwan (NT$ million)	Taiwan Economic Journal Database
EL	Export Level	Value of trade export in Taiwan(NT$ million)	Taiwan Economic Journal Database
DOP	Degree of Openness	GDP divides the sum of Export and Import	Taiwan Economic Journal Database
PS	Political Stability	World Governance Indicators	World Bank Database

There are many advantages with the database and yearbook used in this thesis. Firstly, these sources are rather comprehensive which covers every aspect of Taiwan's economy and provide exhaustive statistics necessary for research topics in this thesis. Secondly, the data obtained from these sources are more accurate and reliable than those from primary sources, since the former databases are established by professional statisticians of authoritative organizations. Thirdly, these data sources provide up-to-dated information regarding to the national and industry-level statistics. Lastly, the data and indices obtained from these sources meet the requirement for panel data analysis, which is a necessary condition to conduct empirical investigation in this thesis.

5. Modelling the Determinants of Industry-Level FDI

5.1. Introduction

Private foreign investment and public development assistance are the two major types of international capital flow. The former could be subdivided into foreign direct and portfolio investment. Compared with the foreign portfolio investment, which might not involve any direct control over the use of lending funds, FDI conducted mostly by multinational companies carries with it direct control over the borrowing entity.

While international trade has traditionally been the major mechanism linking cross-countries' economies in order to develop a worldwide economic system, FDI is a similar mechanism linking national economies; hence, both of these two mechanisms reinforce and strengthen each other. FDI has enormous effects on a host country's economic development, including on economic growth, price levels, productivity, national income, employment etc. FDI is also significant in helping the economies of host countries, especially less-developed countries (LDCs), to progress into the internationalization and globalization stages. According to the United Nations Conference on Trade and Development (UNCTAD, 2006), the enormous increase in FDI flows across countries is one of the clearest signs of the globalization of the world economy over the past 20 years. FDI outflows represent the degree of controlling global resource and market; and FDI inflows reflect not only the amount of capital that the host countries obtain from the global investment, but also the degree of integration with other world economies. Hence, Kok and Ersoy (2009) conclude that FDI is a key factor for successful economic growth in LDCs, since the fundamental of economic development is the rapid and efficient transfer and adoption of "best practice" across borders, such as technological expertise and managerial experiences. With the integration of worldwide economy and economic interaction between countries, FDI has had a rapid growth in the last

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20 years. However, according to the UNCTAD's World Investment Report 2009, amid a sharpening financial and economic crisis, global FDI inflows fell from a historic high of $1,979 billion in 2007 to $1,697 billion in 2008, a decline of 14%. A slow recovery is expected in 2010, but should speed up in 2011. The crisis has also changed the investment landscape, with developing and transition economies' share in global FDI flows surging to 43% in 2008.

As shown by the investment statistics above, FDI has gained renewed attentions from the academic and practical fields, and become a significant vehicle for transferring resources, capital and technology across national boundaries. Shamsuddin (1994) pointed out that since the access of certain developing countries to international capital in the form of official development assistance and commercial bank borrowing has been shrinking due to a massive flow of funds from the Western developed countries to the newly emerging market-based economies of Central and Eastern Europe, governmental authorities of such developing countries are therefore starting to implement political reform and economic restructure in order to attract FDI from foreign investors. To achieve this target, a country has to identify major factors that determine FDI inflow.

Several empirical studies on FDI in Taiwan have been conducted to evaluate its nature, determinants and impacts. For instance, Liou (2003) found that multinational firms no longer regard Taiwan as a foreign manufacturing country, but as a centre for research and development (R&D) and foreign operation. He also pointed out that improving cross-strait relationships are a significant factor in attracting FDI from foreign companies. Cheng, Fungc, and Lam (1998), using panel data analysis, concluded that factors, including bilateral trade amount and cultural difference, have a positive relationship with FDI. Factors including

geographical distance, relative returns on capital, and foreign exchange rate, have a negative relationship with FDI. Du (1995), using regression analysis over the period from 1960 to 1990, found eighteen factors attracting FDI in Taiwan, including political stability, social environment, rapidity of economic growth, and technique quality. Tsai (1991), using time-series data approach to analyse Taiwan over the period from 1958 to 1985, concluded that it is the supply-side factors that attract FDI in Taiwan rather than demand-side ones. Both economic performance and labour costs are no longer considered to be significant determinants of FDI. This contradicts Riedel (1975) who stated that cheap labour costs are the major determinant attracting FDI from Hong Kong, Japan and USA to Taiwan.

Since FDI has long played a significant role in Taiwan's economic activities and development, such patterns are always a concern for academic scholars and policy makers. Even though the industrial pattern of FDI has a direct and significant impact on host country's economic structure, there is only limited research on the determinants of industrial-level FDI in Taiwan owing to country's ignorance of up-to-date econometric methodology. This research area would be a central contribution to filling such a gap. One could empirically investigate the economic and social variables of Taiwan from 1990 to 2010 in order to identify major factors driving the industry-level FDI inflows to Taiwan, and assist the country's government in implementing the appropriate reforms. The major aims of this research are to investigate the determinants of industry-level FDI in Taiwan from the economic and social perspective, and identify which factors foreign investors would consider the most when evaluating each country and choosing their investment target. Other research aims are to discuss the nature of industry-level FDI and each specific future trend, and to empirically and econometrically assess whether or not industry-level determinants remain significant for aggregate-level FDI.

Given the major importance of FDI activity in Taiwan, our goal is to assess the relative significance of the factors that potentially allow Taiwan to attract FDI. This chapter intends to empirically investigate the evidence for FDI determinants and its impact by evaluating and quantifying these, based on a dataset that covers manufacturing and servicing industries in Taiwan from 1990 to 2010. The second section provides discussion on the FDI theoretical background for the research, and reviews the empirical literature and evidence on the FDI determinants. The third section outlines the empirical methodology, describes the model specifications, and introduces the research propositions. This research utilizes a panel-data approach in order to provide extensions of our empirical models, such as static and dynamic one, and effectively identify the determinative variables of FDI attraction, and evaluate their relevant impacts on FDI concentration. The fourth section provides descriptive statistics of the data for our three research topics. The fifth section presents empirical results for all model specifications. The last section examines the implications of our empirical results, and introduces our research limitations that may be worthwhile for future investigation.

5.2. Literature Review

In the last decades, FDI has been considered as an effective and efficient channel of transferring technology from home to host countries, and fostering economic growth and development in those host countries. Such perspective provides a sheer contrast with the argument that FDI has a harmful impact on the economic performance of less developed countries, which was quite commonly accepted by certain schools of academics and politics in the late 1950s and 1960s. The relevant literature could be broadly divided into two branches: one is to examine the growth effects of FDI, while the other one is to investigate the determinants of FDI. Therefore, the econometric models built under this framework

would provide an interesting background in order to study the correlation between FDI and GDP growth rate (Calvo and Robles, 2003).

In order to investigate the growth effects of FDI, it is necessary to investigate the preconditions for FDI to promote economic growth and identify the mechanisms through which economic growth could be promoted. In the neoclassical growth model where technological progress and labour growth are exogenous variables, FDI inflows would only increase the investment rate, which leads to a transitional increase in per capita income growth but has no long-run growth effect (Hsiao and Hsiao, 2006). Such conclusion is understandable if the assumptions of the model are considered, which include constant economies of scale, decreasing marginal products of inputs, positive substitution elasticity of inputs and perfect competition (Sass, 2003). Solow (1956) expressed a growth model by introducing a simple production function, and found that the existence of diminishing returns in the physical capital would constrain the output growth effect of FDI. Hence, FDI tends to exert a level impact on the output per capita rather than a rate one. Calvo and Robles (2003) concluded that FDI was unable to alter the growth rate of output in the long run. Nevertheless, technological progress was endogenised by the new growth theory in the late 1980s, and FDI, therefore, has been regarded to have a permanent impact on economic growth via technological transfer and spillovers. These different arguments suggest that there is still ongoing discussion on the role played by FDI in the economic and output growth, which could be seen recent literatures such as Fan (2002) and Lim (2001).

On the other hand, endogenous growth theory perceives FDI a new potential role in the economic growth process (Bende-Nabende and Ford, 1998). Under this theoretical framework, investment, including FDI, would affect growth rate via R&D or its impact on

human capital. Wang (1990) argued that FDI could have direct positive impacts through improvement of production and transfer of knowledge, and indirect positive ones through enhancement of quality of workforce in host country. While Balasubramanyam et al. (1996) regarded FDI as one of major drivers of economic growth for less developed countries, relatively similar impact could also be found in the European countries. For instance, Barrel et al. (1997) found evidence that inward FDI has also made a significant contribution to the economic growth in the European countries because foreign firms has a greater propensity to implement R&D projects and higher productivity when investing in Europe than in their domestic market. Furthermore, endogenous growth theory states that FDI may still have a growth effect through externalities even if the returns on investment are decreasing. Those externalities include knowledge leakage into the host country via the subsidiaries, such upgrade of human capital, as well as effects via the various contacts of subsidiary with local firms, such joint ventures. Moreover, externalities would increase the productivity of the subsidiary and of the associated firms in the host country. Since technological transfer and relevant local impacts would prevent marginal productivity of capital from declining, higher growth rates induced by endogenous factors could be facilitated in a longer term. Therefore, Sass (2003) argued that the existence of externalities is one of the preconditions for the positive growth effect of FDI in the host country. Blomstrom and Kokko (1996) found evidence that there are enhancing impacts of FDI on employment level and output rates of host country, and that spillovers effect toward local enterprises in host country tends to be significant. Further, several empirical researchers found that growth effects of FDI are through the channel of new technologies and the subsequent spillovers to local firms (Krugman, 1979), new inputs (Feenstra and Markusen, 1994), and knowledge transfers (de Mello and Sinclair, 1995). The endogenous growth theory has allowed academic scholars to research onto the channel through which economic growth could be positively promoted by

FDI in the long term.

The various schools of theory tend to provide the motivations behind FDI conducted by multinational enterprises. On the other hand, empirical researches also examine several variables that have been proposed to explain FDI. Some of these variables are covered in FDI-related theories or hypotheses, while others are mentioned based on the intuitive rationality. Among the traditional FDI determinants, market-related factors are clearly to be outstanding. Agarwal (1980) found evidence that market size of host country is one of the most significant determinants for a country to attract FDI; especially such host country is a developing country. Subsequent empirical researches echoed such result and supported other market-related variables such GDP per capita and GDP growth rate. Relevant empirical studies include Nigh (1985), Wheeler and Mody (1992), Dunning (1993), Tsai (1994), Loree and Guisinger (1995) and Dees (1998), Billington (1999), and Fung et al. (2000). It is noteworthy that Chakrabarti (2001) found that the correlation between FDI and market size of host country is robust to changes in the conditioning information set while the robustness of other FDI determinants have been questioned by the author. Even though Dunning (1999) argues that the motivations for, and the determinants of FDI may have changed due to that globalization has led to a reconfiguration of the ways in which MNEs pursue FDI during 1990s, UNCTAD's World Investment Report (1998) found the market-related variables remain to be dominant and influential on FDI inflows in the period.

Some other empirical studies examine trade-related determinants of FDI. Singh and Jun (1995) found that exports, particularly manufacturing exports, are a significant determinant of FDI flows and that tests show that there is strong evidence that exports precede FDI flows. However, according to Nunnenkamp (2002), it is somewhat heroic to conclude that their

findings are "in line with the secular trend toward increasing complementarity between trade and FDI". Besides, their research conclusion also supports the tariff jumping hypothesis. In a later study, Gastanaga, Nugent and Pashamova (1998) address the issue on tariff jumping hypothesis by employing panel data analysis on the impacts of reforms on FDI in the host country. While the time-series result suggests that the import tariffs tend to have a negative impact on FDI, the cross-sectional one indicate that tariff jumping tend to be a stronger motivation than potential exports for FDI flows. They conclude that "over time in individual countries trade liberalization has become the more important motive for FDI". Furthermore, Chakrabarti (2001) found that openness to trade, proxied by exports plus imports to GDP, has the highest likelihood of being positively correlated with FDI among all explanatory variables by using the sensitivity analysis. Such results are echoed by Asiedu (2002) who separate Sub-Saharan host countries from host countries in other regions. On the other hand, exchange rate plays a similar role to the openness to trade and is related to the currency area hypothesis. The rationality behind it is that FDI is regarded as an alternative to the exporting form the home country to the host one since, along with tariffs and relevant trade barriers, the strength of the host country's currency, measured by its exchange rate, is an important factor to consider. By using regression analysis which covers a number of annual US aggregate FDI observations, Froot and Stein (1991) found that FDI inflows to host country would increase as its currency experience depreciation. Klein and Rosengren (1994) confirm such result by utilising samples of FDI in USA which are disaggregated by sources of country and type of FDI.

Previous studies have also identified other determinants of FDU when evaluating the host country as an investment destination. Assuming that an investing enterprise would select a particular country to invest only if such action could meet up an objective of profit

maximization, Coughlin et al. (1991) found that labour market conditions could be one of the significant determinants of FDI across the states within the USA. They concluded that higher wage rate in the host country could deter FDI from foreign investors, while higher unemployment rates could help the host country to attract it. It is widely believed that MNEs would take advantage of low wage rate in the developing countries by conducting FDI. Agarwai (1980) confirms such positive relationship between the magnitude of FDI in a host country and the wage differentials between the source and host countries, which means that an increase in the wage rate of host country would discourage FDI inflows to the country. Such result is also confirmed by several other empirical works, including Flarnm and Stein (1984), Schneider and Frey (1985), and Moore (1993). In the case of Taiwan, Wu et al. (1980) and Riedel (1975) found that low wage rate is one of the major factors for the country to attract FDI.

There are only limited numbers of empirical researches on determinants of FDI based on industry-level data, especially in Taiwan. For instance, by employing panel data analysis on 11 investing countries from the period of 1983 to 1995 to examine the determinants of FDI in China, Dees (1998) found that market size, wage rate and real exchange rate tend to be significant motivators for China's inward FDI. Sun et al. (2002) used 30 provincial data from the period of 1986 to 1998, and found that labour quality and infrastructure are significant determinants of FDI and the impacts of GDP and wage rates on FDI in each province are different between prior to and post 1991. Alfaro and Charlton (2007) examined the impact of FDI on economic growth based on industry-level dataset from OECD countries from the period of 1985 to 2000, and found that FDI inflows to each host countries tend to be higher in targeted industries and those FDIs then generates growth.

All in all, since it is quite difficult to collect industry-level data for host countries, especially emerging countries, empirical researches on industry-level determinants of FDI are still at the initial stage which suggests that there is a large research field that could be further explored. This chapter tends to fill such academic gap by examining potential factors which are significant for FDI inflows across manufacturing and service industry in Taiwan. Hence, after reviewing and discussing FDI theories and empirical works on determinants, we could list variables based on them: market size, employment level, wage rate, openness degree, and exchange rate. We then turn to the methodology employed in the topic of industry-level determinants of FDI in Taiwan.

5.3. Methodology

According to the pervious academic literature of FDI, the inward FDI could be categorized into market-oriented and trade-oriented FDI. Hence, high level of GDP and low cost of labour in host country are both significant determinants of inward FDI and such argument has been proved by several empirical researches (Wheeler and Mody, 1992; Dunning, 1993; Chandprapalert, 2000; Feenstra and Hanson, 1997). Apart from these two factors, there are still variables that are considered by previous studies as potential factors that help host country to attract FDI from foreign investors, factors including foreign exchange rate and degree of openness. The exchange rate is regarded as a critical determinant of FDI by the currency hypothesis proposed by Aliber (1970). Aliber argued that certain financial factors can be systematically modelled and fundamentally explain the pattern of FDI, factors including exchange rate, capital market relationship, and preference of the market for holding assets denominated in certain currencies. The appreciation of home country's currency would encourage FDI in host country, especially when lowering capital requirements of FDI in domestic currency unit and reducing the nominal competitiveness of export products. Froot

and Stein (1989), and Blonigen and Feenstra (1996) found that depreciation of host country's currency is significantly related to the FDI inflows. Further, the degree of openness in one country is regarded as a relevant and significant factor in determining FDI provided that most of the investment projects move toward the sectors producing tradable goods and services. A host country with open economy is easier to import capital goods or raw materials necessary for the investment and final products, and thus foreign investors would become more familiar with the investing environment. Furthermore, foreign investors believe that host countries with open economies pursuing FDI and external economic ties are expected to fit more easily into global production and trade patterns, and thus would be more attractive (Vernon, 1966 and Root and Ahmed, 1978). Singh and Jun (1995) found there is a positive relationship between FDI and openness by measuring openness as the ratio of the sum of export plus import to GDP. Ponce (2006) and Chantasasawat et al. (2004) found that degree of openness degree has a significant positive impact on inward FDI in the regions of Latin American and East Asia. Moreover, according to the OLD paradigm proposed by Dunning (1981), political stability is one of the main locational advantages and is a potential factor to be considered in determining where the foreign investors choose to conduct FDI. Brada, Kutan and Yigit (2004) found that political instability tends to reduce FDI inflows to economic transition economies of Central Europe, the Baltic and the Balkans. In other words, political stability in these countries could be a potential attractor of FDI. Nevertheless, Bevan and Estrin (2004) proved that country risk, proxied by political instability, is not a significant determinant of inward FDI in Central and Eastern European countries, while other factors, such unit labour costs, market size, and gravity factors etc. are significant. Furthermore, according to Clark (2001), in order to achieve diversification benefits of foreign portfolio or direct investment in emerging market, investors should not only consider market risk of host country, but political risk as well. Such considerations imply that political stability is a potential determinant of

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FDI and is translated into a practical decision-making process.

In terms of rationality for exchange rate as a controlling variable, Lucas (1993) argued that it might have "a residual role with respect to exchange rate risk, for example, in determining the value of repatriated profits or in threatening restrictions on such remittances" (p. 393). Hence, it is necessary include exchange rate as a controlling variable in order to control such possibility. On the other hand, there are two reasons to include openness as a controlling variable. The first reason is that a country with open economy would encourage foreign investors' confidence and investment. One of the indicators for trade openness is the relative size of trade to GDP. Since trade openness incorporate export activity, the second one is that exports should be included as a control variable because of the higher export propensity of foreign firms (Chen, 1994). While Westphal (1979) questioned such contention by arguing that export activity might be correlated with FDI because foreign enterprises are disproportionately represented in the main export sectors rather than because their investments belong to be export-oriented, Chen (1994) believed that such distinction would not negate the contribution that foreign enterprise made to the relevant export sector. Furthermore, the rationality behind degree of openness is Taiwan's accession to the World Trade Organization on January 1, 2002. It is widely believed that higher degree of openness would help Taiwan to attract inward FDI. Further, there are two main reasons that this chapter uses political stability as a controlling variable in evaluating determinants of FDI. The first is that Taiwan has migrated to a fully democratic country suggested by the direct presidential election in 1996, and such a stage of democracy is believed to stabilise Taiwan's internal political environment, which boosts the confidence of foreign investors when evaluating FDI decision in Taiwan. The second is that the cross-strait relationship with mainland China has started to improve in the early 1990s, which is evidenced by Koo-Wang Talk in 1992, 1993

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and 1998. An improving cross-strait relationship has given a positive signal to foreign investors that Taiwan's external political environment has become more stable than it was prior to 1990s.

Previous empirical studies on determinants of FDI in Taiwan are abundant in the academic field. Lin (2004) investigated the determinants of FDI in Taiwan over the period from 1990 to 2004 by employing OLS regression method, and her empirical results confirmed that market size, Consumer Price Index and export trading volume have significant effects on attracting FDI into Taiwan. Huang (2006) utilised OLS regression model to analyse determinants of FDI in Taiwan over the period from 1995 to 2004, and she found that the wage rate is a significant driving factor of FDI in not only the manufacturing industry but the services industry as well. By applying the Granger Causality test and a VAR model to research the relationship between FDI and unemployment rate in Taiwan over the period from 1993 to 2007, Hu (2007) found that inward FDI tends to have a positive impact on the domestic employment rate, particularly in the short-term. Liao (2002) adopted VAR approach to evaluate FDI in Taiwan from six countries, and its interactions with other five variables over the period from 1992 to 2000. Her empirical evidence confirmed that both the degree of openness and exchange rate are significant determinants of FDI from all those six countries. Liu (2007) employed the OLS regression approach to identify the determinants of FDI in Taiwan over the period from 1994 to 2006, and he concluded that the exchange rate, the wage rate and trade all are significant. Jhan (2006) employed panel data analysis and the GMM estimation method to identify the determinants of FDI in financial services industry in Taiwan over the period from 1993 to 2004. Her empirical results suggested that determinants of market size, relative costs of capital and the exchange rate are all significant. By using the GMM econometric technique to research the relationship between FDI and political risk

based on the dataset covering 91 countries, including Taiwan, over the period from 1995 to 2005, Wang (2010) found an empirical support that political stability is statistically significant, and it has a positive impact on FDI inflows. In the specific case of Taiwan, Huang (1998) used a two-step procedure of causality proposed by Pierce and Haugh (1977) to investigate the relationships among FDI, economic growth and political stability over the period from 1988 to 1998. He reached to an empirical conclusion that while political risk is a significant determinant of FDI, it is nevertheless subordinated to economic growth which is a major concern for foreign investors of FDI.

It is empirically confirmed by in Naudé and Krugell (2007), and Alguacil et al. (2008) that FDI is a dynamic phenomenon. Hence, a dynamic panel methodology has been used to solve the potential resulting problems of serial correlation and endogeneity. Nudé and Krugell (2007) employed a dynamic panel data approach proposed by Arellano and Bond (1991) to research the determinants of FDI in Africa over the period from 1970 to 1990. They concluded that neither the market-seeking nor the re-exporting motive of FDI seems to be a dominant factor of FDI, but good policies made by good institutions are. Anghel (2006) used a dynamic panel analysis to investigate the FDI determinates of nine European transition countries for the period from 1996 to 2002. He found that traditional variables that characterise the macro-economic environment and institutional quality of transition countries have still proved to be significant factors, which include growth rates of GDP, openness to trade, and degree of corruption etc. Further, by using both static and dynamic panel data approaches to focus on the inward FDI determinants of Canada from EU15, Brazil and Japan over the period from 1995 to 2007, Leitão (2010) found that market size, trade openness, wage, and taxes are all significant factors of FDI.

This research topic would be firstly explored by static panel data approach, which gives "more informative data, more variability, less collinearity among variables, more degrees of freedom and more efficiency"; and it could be better suited to study the dynamics of change by researching on the repeated cross section of observations (see Baltagi, 2005). Furthermore, even though Hausman test fails to reject the null hypothesis of random effect, result of fixed effect would still be used and displayed in order to test the robustness of our result. Since static panel data approach has the problems of serial correlation, heteroskedasticity and endogeneity of some explanatory variables, GMM dynamic panel estimator is then introduced by Arellano and Bond (1991), Arellano and Bover (1995) and Blundell and Bond (1998, 2000) to solve those problems by including lagged dependent variable as an additional regressor and dealing with controlling variables which are endogenous. However, inclusion of lagged dependent variable as a regressor still causes estimators to be biased and inconsistent either for FE or RE (Bond, 2002; Baltagi, 2005). Consequently, in an attempt to correct such biasness, Arellano and Bond (1991) proposes to take GMM dynamic panel estimator into first differences, and treats the model as a system of equations, one for each time period. The differences in the endogenous and the predetermined variables are instrumented with suitable lags of their own levels. It is believed that there are two main contributions that could be made by our methodology. The first one is to capture the dynamic nature of the FDI process at industry level based on the GMM dynamic panel estimator. The second one is to disaggregate inward FDI made by foreign investors in Taiwan at the industry and sector level which allows us to better understand their investment behaviour.

This chapter is to analyse determinants of industry-level FDI in Taiwan for the period from 1990 to 2010. It is done by modelling the industry-level FDI and identifying its significant determinants through a static and dynamic panel data regression model for potential key

factors affecting FDI industry selection. The independent variables to be selected for panel data regression are based on the data availability, the economic characteristics of Taiwan, and the research context of topic. The proposed independent variables considered in this chapter then include wage (labour cost), market size (gross industry product), employment (human resources), political stability (political risk). The controlling variables then include exchange rate and degree of openness.

5.3.1. Model Specification

Based on the previous discussion, the estimated model is formulated as below:

$$\textbf{FDI}_{it} = \beta_0 + \beta_1 \textbf{Wage}_{it} + \beta_2 \textbf{Market}_{it} + \beta_3 \textbf{Employment}_{it} + \gamma_k \sum_k \textbf{control}_{kt} + \mu_{it}$$

where i denotes the service and manufacturing sectors and t denotes period of year from 1990 to 2010. $\textbf{Wage}_{it}$, $\textbf{Market}_{it}$ and $\textbf{Employment}_{it}$ represent average wage rate (labour cost), market size (gross industry product), and employment rate for sector i and t, respectively. Further, the control variables include degree of openness, exchange rate and political stability that are lack for individual sectors. In this case, the degree of openness is defined as GDP divides sum of Export and Import (see Fung, Iizaka and Siu, 2004; Ponce, 2006). The exchange rate is defined as real effective exchange rate (REER), a weight average of New Taiwan Dollar (NTD) against currencies of major trading countries that is adjusted for the inflation effects to take account of the real purchasing power of each trading country. The REER could be formulated as below

$$\textbf{REER}_t = \sum_1^i \left[\frac{\textbf{d}_{NTD,t} \times \textbf{EX}_{NTD,i,t}}{\textbf{d}_{i,t}} \right]^{w_i}$$

$\textbf{EX}_{NTD,i,t}$ is the exchange rate NTD against the currency of country i in year t; $\textbf{d}_{NTD}$ and $\textbf{d}_i$ are price deflator of Taiwan and country i that are determined by producer price index or consumer price index if the former one is unavailable; $\textbf{w}_i$ is the weight of each country's

trade to overall trade of Taiwan. Political stability is measured by World Governance Indicators estimated by World Bank, which is scaled from -2.5 to +2.5.

In this study, Hausman test is applied to choose between FEM and REM model, but both results would still be presented with the purpose of robustness check. On the other hand, since the persistence of explained variable is not considered in the estimated model, the lagged explained variables are added to explanatory variables under a dynamic panel data model setting. The inclusion of lagged explained variables is able to remove underlying autocorrelation. The DPDM is formulated as below

$$\mathbf{FDI}_{it} = \beta_0 + \beta_1 \mathbf{Wage}_{it} + \beta_2 \mathbf{Market}_{it} + \beta_3 \mathbf{Employment}_{it} + \delta \mathbf{FDI}_{i,t-1} + \gamma_k \sum_k \mathbf{control}_{kt}$$
$$+ \, \varepsilon_i + \mu_{it}$$

where μ_{it} is a random disturbance and ε_i is a fixed-effect term. There are two reasons that make dynamic FEM is preferred to REM: Firstly, it is likely that a macro-economic panel data contains individuals selected for the specific research, rather than a sample that are randomly selected from a data universe; secondly, it is likely that these individual-specific characters may be correlated with the other regressors in the model if individual effect represent omitted variables. Following this, GMM estimator offers a solution to the autocorrelation between the explained variables and lagged explained variables. In this method, the parameter estimates are selected to minimize the weighted distance between the theoretical and actual values. Hence, the robust two-step GMM model proposed by Blundell and Bond (1998), an extension of the Arellano and Bond (1991) model, is used in this study.

In addition, GMM estimator assumes that the instrumental variables used in the regressions are exogenous. Either Sargan test (1958) or Hansen test (1982) of overidentifying restrictions

could be employed to examine the validity of instruments. However, Roodman (2008) argued that the validity result could not rely too much on these two tests since each has its own strengths and weaknesses. It is believed that the Sargan statistic is a less consistent and robust estimator than Hansen statistics. Nevertheless, Bowsher (2002) argued that the increases in the number of instruments used in the panel regression would weaken the effectiveness of Hansen test. Therefore, while the Hansen test would be used for the purposes of robustness check, the result of over-identifying restrictions by Sargan test would be reported.

Besides, the logarithm terms are used to re-examine both static and dynamic panel data models, where coefficient estimates in each model represent the marginal effects of explanatory variables on the explained variables. The log-linear models enable us to derive the elasticity, measuring the responsiveness of FDI to a change in potential explanatory variables, ceteris paribus. There are other two advantages of using logarithm transformation to create a log-linear model: (1) it might be an appropriate method for certain types of functional form, for instance Cobb-Douglas production function; (2) it is able to avoid the problem of inconsistent magnitude of coefficient estimates between variables of interest since the estimates in the model are expressed in relative terms.

5.3.2. Research Hypothesis

Based on the previous discussion, there are three propositions to be examined in this chapter.

Proposition 1: All other things being equal, the market size of a sector is expected to have a positive impact on the FDI inflows to that sector in Taiwan.

The market size has been proved by previous empirical studies to be a significant determinant

of FDI inflows based upon the motivation that multinational companies invest in the foreign countries is to seek and explore the new market opportunity. Bandera and White (1968) found market size to be a significant determinant of USA FDI. Both Kravis and Lipesey (1982) and Blomstrom and Lipsey (1991) found that the market size in particular region is positively correlated with the FDI that region could attract. Blomström and Lipsey (1991) found that there is a significant size threshold effect for firms' decision to invest abroad. In the case of developing countries, Root and Ahmed (1979), Torrisi (1985), Schneider and Frey (1985), Petrochilas (1989), and Wheeler and Mody (1992) all find market size to be significant. This chapter is to examine whether the market size, proxied by level of GDP, is a significant explanatory variable for a sector to attract FDI.

Proposition 2: All other things being equal, the employment level of a sector is expected to have a negative impact on the FDI inflows to that sector in Taiwan.

It is widely believed that availability of labour force is a potential industry-level determinant of FDI for the host country. Since Taiwan is a developing country with abundant labour forces that are highly and low skilled, it may lead the multinational companies to operate capital-intensive and labour-intensive sector in Taiwan in order to utilize human resources in the country. Previous empirical studies, including Coughlin et al, (1991) and Billington (1999), have found that an availability of labour force, measured by unemployment rate, has a significantly positive relationship with FDI inflows to the host country. Deichman (2001) argued labour-intensive investment find that a country with high unemployment rate may offer a lucrative market for production. Further, market-oriented investment would concentrate on a country whose labour forces have a high level of consumption. Nevertheless, the employment data are only available on the industry level, which measure

the total number of workers and labours in a certain industry. Since unemployment is found to be positively related to the FDI inflow, the employment level, hence, should have a negative impact on the FDI inflows to Taiwan.

Proposition 3: All other things being equal, the wage cost of a sector is expected to have a negative impact on the FDI inflows to that sector in Taiwan.

It is widely considered that lower relative wage costs is a critical determinant of FDI inflows since they would encourage "efficiency-seeking" or "profit-maximising" FDI flows. The recent results of extensive empirical investigations suggest that relative wage costs are a significant determinant of FDI inflows to developing countries. Coughlin, et al (1991) and Hill and Munday (1992) have found a close relationship between labour costs and FDI flows. Feenstra and Hanson (1997) find that low labour cost is the major determinant of US investment in Mexico. Similarly, Wheeler and Mody (1992) find labour costs to be significant influence on US electronics assembly manufacturers. Flamm (1984), Schneider and Frey (1985), Lucas (1993), and Wheeler and Mody (1992) all find a wage cost variable to be significant. Nevertheless, there are some other studies provide a different perspective. Braunerhjelm and Svensson (1996) argued that multinational enterprises are inclined to pay a wage premium to their employees in order to attract workers with high quality, because companies believe that higher wages could be used a mean to attract high-quality workers. In this chapter, the wage cost is proxied by annually average income of an industry.

5.4. Sample and Data Description

Following two tables show the descriptive statistics of data for our three research topics. The first table provides the summary statistics for the pooled data, including number of

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observation, mean, median, maximum and minimum values for all variables of interest. It could be shown that FDI, Market and Employment vary significantly across sectors, implying that there are some sectors have certain degrees of dominating position in Taiwan's economic development of recent years.

Table 11: Descriptive statistics: pool-level data (Taiwan: 1990-2010)

Variables	Observations	Mean	Median	Maximum	Minimum	Std. Dev.
FDI (US\$ 1,000)	210	475,552	90,640	8,019,694	0	1,034,270
Market (NT\$ million)	210	936,392	584,555	4,351,902	39,444	842,701.5
Wage (NT\$)	210	550,597	502,968	1,181,376	202,824	200,716.6
Employment (,000 person)	210	878.21	588	2,886	4	856.56
Exchange Rate	21	5.40	5.40	5.55	5.25	0.09
Openness (%)	21	88.12	83.26	119.26	61.62	18.68
Political Stability (-2.5 to +2.5)	21	0.78	0.84	0.99	0.47	0.20

Further, this section also makes a comparison of summary statistics across all 10 sectors in order to identify the fundamental differences from them. In terms of inward FDI across sectors, General Manufacturing sector has a highest averagely annual FDI from foreign investors in Taiwan, followed by Finance and Real Estate sector and Wholesale and Retail Trade sector, but Education has a lowest. From the perspective of contribution of GDP growth in the last two decades, while General Manufacturing makes the highest contribution to Taiwan's economic development and growth, followed by Wholesale and Retail Trade and Finance and Real Estate, Mining and Quarrying sector makes the smallest contribution. In terms of wage rate across sectors, General Manufacturing sector has the highest average annual salary, followed by Information and Communication sector and Finance and Real Estate sector, but Other Services sector pay the lowest. As for the distribution of country's labour force, General Manufacturing sector is also the one which recruits the largest number of people in the country, followed by Wholesale and Retail Trade sector and Education sector, but Mining and Quarrying sector recruits the least. Even though both openness degree and exchange rate vary in different years, they are acting as control variables and do not change

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across sectors by definition.

Table 12: Descriptive statistics: sector-level data (Taiwan: 1990-2010)

Manufacturing Industry

Sectors	Mining and Quarrying						General Manufacturing				
	Observ.	Mean	Median	Maximum	Minimum	Std. Dev.	Observations	Mean	Median	Maximum	Minimum	Std. Dev.
FDI (US$ 1,000)	21	3204	740	39447	0	8453.75	21	2055269	1470775	8019694	672909	1914579.00
Market (NT$ million)	21	77959	75978	125395	39444	29569.54	21	2344112	2028783	4351902	1343595	872628.80
Wage (NT$)	21	502294	516804	640128	318264	97479.87	21	432515	460944	518028	264132	75617.14
Employment (,000 person)	21	11	11	20	4	5.12	21	2640	2603	2886	2422	133.34

Sectors	Electricity, Gas & Water						Construction				
	Observ.	Mean	Median	Maximum	Minimum	Std. Dev.	Observations	Mean	Median	Maximum	Minimum	Std. Dev.
FDI (US$ 1,000)	21	46246.90	38031.00	198168.00	1329.00	45221.91	21	64242.71	35787.17	254153.1	4183	65707.84
Market (NT$ million)	21	170587.30	164887.00	252427.00	98954.00	49266.31	21	329323.2	324996	373830	278075	29391.65
Wage (NT$)	21	1001997.00	1094208.00	1181376.00	569592.00	183228.30	21	437595.4	452952	500088	296628	50884.07
Employment (,000 person)	21	32.62	35.00	37.00	28.00	3.76	21	817.3333	829	1003	673	87.07659

Service Industry

Sectors	Transportation and Storage						Wholesale and Retail Trade				
	Observ.	Mean	Median	Maximum	Minimum	Std. Dev.	Observations	Mean	Median	Maximum	Minimum	Std. Dev.
FDI (US$ 1,000)	21	55696.8	40225.29	170593	12837.56	38909.54	21	483840.8	476180	990640.2	0	287997.6
Market (NT$ million)	21	324234	344197	425786	198221	72465.72	21	1670871	1751273	2472313	831032	513698.8
Wage (NT$)	21	513633.7	551208	597600	316500	83746.85	21	435524.6	469824	503640	296304	60491.97
Employment (,000 person)	21	443.0952	448	486	402	30.07807	21	2127.476	2163	2474	1621	271.8493

Sectors	Information and Communication						Finance and Real Estate				
	Observ.	Mean	Median	Maximum	Minimum	Std. Dev.	Observations	Mean	Median	Maximum	Minimum	Std. Dev.
FDI (US$ 1,000)	21	260114.7	114150	2047991	0	446505.5	21	1457504	892405	5095035	102707	1565124
Market (NT$ million)	21	274392.6	308755	495781	73831	147519.4	21	1538872	1616339	2072814	783966	400749.4
Wage (NT$)	21	683663.4	723504	773100	442392	94015.48	21	604484.9	627528	688902	438270	63120.46
Employment (,000 person)	21	181.381	190	225	115	31.65672	21	383.0952	410	503	220	90.93839

Sectors	Education						Other Services				
	Observ.	Mean	Median	Maximum	Minimum	Std. Dev.	Observations	Mean	Median	Maximum	Minimum	Std. Dev.
FDI (US$ 1,000)	21	298.9925	0	2075.375	0	676.6628	21	329099	279654	867797.2	67697	203244.7
Market (NT$ million)	21	1246574	1308436	1555112	772236	245675.9	21	1386995	1446626	2060124	673328	413350.8
Wage (NT$)	21	568653.9	603564	675876	361842	92568.35	21	325608	351732	376020	202824	51310.36
Employment (,000 person)	21	1139.095	1107	1436	874	176.3853	21	1006.476	1042	1252	679	173.4043

5.5. Empirical Results

5.5.1. Static Panel Data Regression

Hausman test is applied firstly in order to compare the coefficient estimates between random and fixed effect models, and random effect model is chosen to identify the sector-level determinants of FDI in Taiwan. The first section of following table is the results for random effect model based on FDI in monetary term, and the second section is the elasticity result of such model based on logarithm of all variables of interest. In the first section, Model I is the primary empirical model and suggests that there is a significantly positive relationship between Market size and inward FDI, which is consistent with the previous findings. In the second section, it suggests that one percentage positive change in Market size would lead to an increase of 0.96% in FDI inflows. In terms of Employment, even though the first section suggests that it has a significantly positive relationship with FDI, it does not imply that sectors with larger number of current employment would have a higher calibre to attract investment from multinational enterprises. The positive coefficient of Employment for FDI, however, implies that higher amount of FDI in one sector would increase its number of employment, which could be confirmed by a negative coefficient of previous-term Employment for current FDI when the time dynamics are taken into account. In terms of Wage, both of the results show that it does not have any significant negative impact on FDI. It suggests that higher wage rate would not be a significant deterrent for foreign investors, and implies that multinational enterprises investing in Taiwan may seek for highly skilled and talented workforces to produce sophisticate products and services rather than previous mass manufacturing which only requires cheap labour force. With regards to the three control variables, Exchange rate has a significant negative relationship with FDI as expected, suggesting that higher value of New Taiwan Dollar may lead to lower level of FDI inflows

due to increasing costs of capital on investment and deceasing export-oriented FDI. Further, one percentage positive change in the value of Taiwanese currency would lead to decrease in FDI by 3.77%. In terms of the second control variable, Openness does not have a significant relationship with FDI as expected since Taiwan had already been a market-liberalised country and foreign investors would not consider Openness as a major concern for their investment. In line with the expectation mentioned above, political stability does not have a significant coefficient reflecting that foreign investors no longer regard it as a major concern since Taiwan has a stable political environment democratically and diplomatically. In addition, Model II, III and IV are built in order to test the sensitivities of the control variables, and all of them suggest that primary empirical result of Model I does not change significantly after removing one of the control variables. As a robustness check, Model V shows the fixed effects results.

Table 13: Static Panel Data Regression and Elasticity Analysis (Taiwan: 1990-2010)

Static Panel Data Regression												
Model	**Variables**	**Market size**	**Employment**	**Wage**	**Openness (/10^3)**	**Exchange Rate (/10^6)**	**Political Stability (/10^6)**	R^2	adjusted R^2	Hausman	Observ.	Groups
I	**Random Effect**	0.99***	223.36*	0.49	12.46	-34.54***	21.08	-	0.79	3.47	210	10
		(0.21)	(121.67)	(0.68)	(43.72)	(14.74)	(42.96)					
II	**Random Effect**	0.94***	217.19*	0.37	13.51	-36.63**		-	0.78	3.59	210	10
		(0.12)	(118.59)	(0.34)	(45.91)	(16.88)						
III	**Random Effect**	0.97***	228.46**	0.41		-51.77**	14.16	-	0.76	2.47	210	10
		(0.13)	(114.34)	(0.37)		(24.72)	(31.69)					
IV	**Random Effect**	1.08***	233.41*	0.33	11.82		17.71	-	0.73	2.71	210	10
		(0.26)	(127.43)	(0.59)	(39.28)		(46.65)					
V	**Fixed Effect**	1.19***	-129.72	1.37	15.24*	-89.91	34.67	0.46	0.75	3.47	210	10
		(0.27)	(86.67)	(1.12)	(8.76)	(74.34)	(51.81)					
Elasticity Analysis												
Model	**Variables**	*ln* **Market size**	*ln* **Employment**	*ln* **Wage**	*ln* **Openness**	*ln* **Exchange Rate**	*ln* **Political Stability**	R^2	adjusted R^2	Hausman	Observ.	Groups
I	**Random Effect**	1.15**	0.55**	0.44	7.51	-3.87***	4.82	-	0.43	2.34	210	10
		(0.57)	(0.27)	(1.27)	(8.43)	(1.64)	(3.64)					
II	**Random Effect**	0.96*	0.48**	0.39	6.62	-3.77*		-	0.38	1.89	210	10
		(0.53)	(0.23)	(1.21)	(7.02)	(2.16)						
III	**Random Effect**	1.43***	0.41	1.63		-4.12**	5.37	-	0.37	2.23	210	10
		(0.57)	(0.26)	(1.46)		(1.81)	(4.92)					
IV	**Random Effect**	1.06*	0.33*	0.27	5.47		5.68	-	0.34	2.46	210	10
		(0.57)	(0.19)	(0.33)	(3.96)		(4.31)					
V	**Fixed Effect**	0.89*	1.02	3.87**	1.97	-3.46	4.05	0.35	0.58	2.34	210	10
		(0.48)	(0.93)	(1.86)	(1.64)	(2.76)	(3.46)					

*, **, *** stand for 90%, 95% and 99% significant levels respectively
Standard errors are shown in the brackets

5.5.2. Dynamic Panel Data Regression

After conducting the static panel data model, this research then employs dynamic panel data model proposed by Blundell and Bond (1998). The dynamic model is able to capture the persistent nature of the FDI by incorporating lags of explained and explanatory variables into the model estimation. Further, all of the explanatory variables in the dynamic model, except previous-term FDI, are the same as those in the static model, but they are lagged in the first orders in attempt to minimise the possibility of endogeneity. Inclusion of explanatory variables at the beginning of the year is to examine their effects on FDI in the subsequent year, and to provide better understanding of causalities between explained and explanatory variable. Following table is a summary result for robust one-step generalized method of moments (GMM)-system estimation, which could be validated for all models by the existence of significantly negative first-order auto-correlation in differenced residuals (AR(1)) and nonexistence of second-order auto-correlation in the first-differenced residuals (AR(2)). The result that Sargan test of over-identifying restrictions for all models could be rejected is in line with the finding by Blundell et al (2000) that the Sargan test tends to over-reject when the GMM estimation is employed.

The first section of following table is the results for dynamic panel data model based on the lagged independent variables, and the second section is the elasticity result of such model based on logarithm of all variables of interest. In the first section, Model I suggests that FDI responds significantly and positively to Market size as expected. In the second section, it suggests that one percentage positive change in Market size would lead to an increase of 0.23% in FDI inflows. Along with a positive relationship between Employment and FDI in static model, the existence of a negative correlation between lagged Employment and FDI in

dynamic model confirms that higher level of FDI would increase the number of employment in one sector. The significant positive relationship between FDI and Wage in the dynamic model implies that foreign investors investing in Taiwan may start to seek for highly skilled and talented workforces, which is indicated by higher level of wage. As in line with the previous static result, increase in the value of Taiwanese currency against currencies of major trading countries would decrease FDI inflows to Taiwan since it increase the cost of investment and capitals for foreign investors. Besides, one percentage positive change in Exchange rate would lead to a decrease of 2.73% in FDI inflows. Openness still remains to have non-significant correlation with FDI, and such result implies that Openness was not a major consideration for foreign investors over last two decades since Taiwan had already been a country with international market liberation and economic integration after joining WTO and signing FTA with major trading partners during 1990s. Further, political stability was not a major determinant since Taiwan has had a fully democratic procedure and improving cross-strait relationship with China which have been over the past two decades. Being highly correlated with the year effect in the dynamic model, Model II, III and IV remove either one of the control variables in order to examine the robustness of the primary empirical results, and the result suggests that these three control variables are not the significant drivers of the primary empirical result.

Table 14: Dynamic Panel Data Regression and Elasticity Analysis (Taiwan: 1990-2010)

Dynamic Panel Data Regression

Model	Variables	FDI$_{t-1}$	Market size$_{t-1}$	Employment$_{t-1}$	Wage$_{t-1}$	Openness$_{t-1}$ (/10^3)	Exchange Rate$_{t-1}$ (/10^6)	Political Stability$_{t-1}$ (/10^6)	Year Effects	Instruments	AR(1) p-value	AR(2) p-value	Sargan p-value
I		0.31***	7.89**	-89.18*	29.44**	3.23	-9.47**	8.23	Yes	t-2, t-21; t-1	0.01	0.34	0.00
		(0.12)	(3.79)	(52.69)	(14.56)	(2.89)	(4.76)	(6.22)					
II		0.35***	5.64**	-194.45**	17.44*	2.03	-11.75***		Yes	t-2, t-21; t-1	0.01	0.36	0.00
		(0.12)	(2.61)	(94.01)	(9.63)	(2.23)	(4.07)						
III		0.29**	6.01***	-79.73***	34.28**		-13.71*	10.81	Yes	t-2, t-21; t-1	0.01	0.32	0.00
		(0.14)	(2.19)	(33.47)	(15.14)		(7.95)	(8.81)					
IV		0.37**	7.38***	-93.93*	35.79***	4.14		9.64	Yes	t-2, t-21; t-1	0.01	0.31	0.00
		(0.16)	(2.47)	(49.93)	(5.81)	(3.53)		(6.99)					

Elasticity Analysis

Model	Variables	ln FDI$_{t-1}$	ln Market size$_{t-1}$	ln Employment$_{t-1}$	ln Wage$_{t-1}$	ln Openness$_{t-1}$	ln Exchange rate$_{t-1}$	ln Political Stability$_{t-1}$	Year Effects	Instruments	AR(1) p-value	AR(2) p-value	Sargan p-value
I		0.28***	0.21**	-0.73*	0.35**	5.72	-3.58*	2.91	Yes	t-2, t-21; t-1	0.07	0.65	0.26
		(0.09)	(0.10)	(0.41)	(0.16)	(4.73)	(1.92)	(2.33)					
II		0.32***	0.23**	-0.62*	0.23*	4.64	-2.73*		Yes	t-2, t-21; t-1	0.07	0.66	0.24
		(0.13)	(0.11)	(0.32)	(0.12)	(3.12)	(1.62)						
III		0.27***	0.31*	-0.32**	0.17***		-3.32**	3.48	Yes	t-2, t-21; t-1	0.07	0.64	0.32
		(0.05)	(0.17)	(0.15)	(0.04)		(1.52)	(2.59)					
IV		0.39***	0.29**	-0.49*	0.27**	5.51		2.08	Yes	t-2, t-21; t-1	0.07	0.63	0.35
		(0.05)	(0.14)	(0.28)	(0.13)	(3.99)		(1.57)					

*, **, *** stand for 90%, 95% and 99% significant levels respectively

Standard errors are shown in the brackets

5.6.   Conclusion

The aim of our research is to identify the determinants of FDI inflows in Taiwan using industry-level data from 1990-2010 on ten major sectors (Mining and Quarrying, General Manufacturing, Electricity, Gas & Water, Construction, Wholesale and Retail Trade, Transportation and Storage, Information and Communication, Finance and Real Estate, Education, and Other Services). The empirical model used in this study incorporates independent variables including market size, wage, employment, exchange rate and degree of openness. The summary of empirical results is presented as below where only market size is consistent with the proposition:

Table 15: Summary of Hypotheses and Empirical Results

Hypothesis	Prediction of impact on FDI	Static panel data estimation	Elasticity analysis	GMM estimation	Elasticity analysis for GMM
Market size	Positive	Positive	Positive	Positive	Positive
Employment	Negative	Positive	Positive	Negative	Negative
Wage cost	Negative	None	None	Positive	Positive
Openness	Positive	None	None	None	None
Exchange Rate	Negative	Negative	Negative	Negative	Negative
Political Stability	Positive	None	None	None	None

The coefficients of the market size in static and dynamic panel data models reflect hypothetical and theoretical expectations. As predicted, the results suggest that market size has a significant and positive impact on FDI inflow which is in line with most of the previous empirical studies. Assuming that other things remain constant, the larger the market size of a particular country is, the more FDI the country will be able to attract, since a large market size is likely to increase the country's demand for the products and services provided by foreign investors. Hence, FDI inflows are expected to increase as the Taiwanese economy

becomes larger and the market better-built. In terms of elasticity test in static and dynamic panel data models, the variable in log form has been proved to be significant. Such significance confirms that the relationship between market size and FDI is not a simple linear one, and that industry-level FDI would benefit from the expanding market size of an industry at an increasing rate. In other words, the foreign investors are enticed to invest in Taiwan and explore its potentially new market as the existing market is expanding. Along with the significant negative coefficient of employment in the dynamic model, the significant positive coefficient of variables in the static model reflects that higher amount of FDI in one sector would increase its number of employment when the time dynamics are taken into account. Since employment levels reflects aspect of labour market characteristic, the negative correlation between lagged employment and FDI is consistent with the hypothesis that FDI is positive correlated with labour availability in Taiwan where increase in employment level of previous year would reduce the labour availability of following year. The empirical result contradicts the third hypotheses. The hypothesis follows the traditional FDI rationale that low labour cost is of particular interest for home countries whose wage level is relatively higher than that of the host country, and where MNEs are seeking cost reduction by allocating production to a country where available resources at a lower cost. Our result suggests that the coefficient estimate of wage in static regression is non-significant, but that the estimate of wage in dynamic regression is significantly positive. It implies that foreign investors no longer regard Taiwan as a country with a mass and low-skilled manufacturing industry that only requires cheap cost of labour, but a technical and sophisticated one that requires highly skilled and talented individuals in post-1980s. Even though higher wage levels may have a negative impact on FDI as it makes producing more expensive than trading in Taiwan. The result allows us to argue that higher wage levels

reflect a higher nation level of labour skill and quality and causes foreign enterprises to substitute investing capital for highly-skilled labour pool in the manufacturing and production process, both of which would have a positive impact on FDI in Taiwan.

Both the static and dynamic results suggest that the exchange rate has a significant negative impact on FDI inflows to Taiwan. A possible explanation for this is that the majority of FDI inflows to Taiwan, especially to manufacturing industry, appear to be export-oriented, and appreciation of NTD against foreign currencies would possibly decrease the export level and increase the cost of investing and acquiring assets in Taiwan for multinational enterprises. In terms of the degree of openness, its insignificant impact on FDI inflow to Taiwan, shown by both static and dynamic models, confirms that foreign investors no longer regard openness as an essential and fundamental factor when considering investment in Taiwan since Taiwan has already had a liberated and global-integrated market by joining world trade organization (WTO) and signing free-trade agreements (FTAs) with major trading partners in 1990s and 2000s. Besides, since trade integration is important for the fact that trade and investment could complement each other; such insignificance reflects that Taiwan has already become an attractive destination for export-oriented FDI since Taiwan has been more liberal in its trade approach. With regard to political stability, it is shown to be non-significant by both static and dynamic models. This empirical result confirms that Taiwan is no longer regarded as a potentially dangerous zone by foreign investors as the country has stepped into a fully democratic stage, and political tension with mainland China has been minimised via peace talks and economic cooperation.

The method of using FDI as a tool to develop Taiwan's economic activity is more

sophisticated than traditional wisdom allows. It is widely known that the economic benefits and gains obtained from inward FDI are significant, but it does not come easily from foreign investors. Taiwan is necessary to continuously adjust its economic policies and political agenda to meet the needs of foreign investors in order to benefits and advantages that FDI could offers. Further, there is an observation that a healthy economy and political climate encourages FDI flows to the emerging market system. Macroeconomic problems, including budget deficit and debt-to-GDP ratio, typically prevents foreign investors of developed countries from investing into emerging markets. However, Taiwan has been characterized by outstanding economic improvement and stability over the past few decades, which reduce the possibility of relevant economic and financial crisis in the country. According to OECD (1994), MNEs of developed countries have been impressed at how emerging countries, including Taiwan, have adjusted since the transitional period, and at their determination to the newly adopted market system. The MNEs from developed countries have been keenly interested in investing in Taiwan since Taiwan liberalized its economy in post-1980s. Our research attempts to identify the determinants of industry-level FDI in Taiwan and is based on the belief that FDI is a fundamental tool for Taiwan to accelerate its economic growth and industrial development. The empirical results we have found suggest that market size and employment remain key determinants of FDI in Taiwan, but wage cost does not. Such results reflect that macroeconomic stability and policies on domestic market expansion influence FDI decision of foreign investors. The negative impact of employment levels reflect that FDI still positively correlates with labour availability and it would be reduced by the high level of employment in the previous year. Further, it reflects that Taiwan is no longer regarded as a host country that uses cheap labour relative to that of the home country as a main attraction for foreign investors. In other words, Taiwan has upgraded itself from a

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country with low production costs and service fees to one with a pool of highly skilled workers and technicians.

Our research still omits several areas that are worthwhile for future investigation. First, due to limited data availability, the impact of tax variables on FDI in Taiwan is not considered and evaluated. By not controlling for tax rates of parent country, Hartman (1984) found that retained earnings FDI response significantly to the tax rate of host country. Scholes and Wolfson (1990) hypothesized that inward FDI to USA from MNEs would likely increase when USA tax rates increased. This counterintuitive hypothesis comes from the realization that with a credit system, where MNEs would not face any increase in its tax liability under a world taxation system. Swenson (1994) examined their hypothesis by investigating the differential impact that the US 1986 tax reform had on FDI across industries that had varying changes in tax rates after the reform, and found that industry-level FDI increase with higher average tax rates, especially for MNEs under worldwide taxation system. However, Hines (1996) demonstrated that foreign investments respond negatively to the higher state tax rate in the USA. Second, this paper does not consider the factor of state-owned enterprise and its relevant impact on inward FDI in Taiwan. According to Branstetter and Feenstra (1999), FDI in one host country would compete with the state-owned enterprises of certain industries by allowing foreign investors access to the domestic market and sacrificing the existing economic benefits gained by state-owned enterprises. It is also believed that MNEs may have significant implications for wage rates. By employing the data of state-owned and foreign-owned enterprises in China, Zhao (2001) found that employees in foreign-owned firms are paid a much higher rate than their counterparts with similar levels of education and skills in state-owned ones. Hence, it may be worthwhile to

investigate empirically whether state-owned enterprises have an impact on FDI in Taiwan, and, if significant, to what extent such an impact exists. Third, this paper does not consider the effects of information cost and agglomeration economies on inward FDI in Taiwan. According to Dunning (1998), information is greatly important in the locational choices of MNEs in host economies in the 1990s. Kinoshita and Mody (2001) argued that foreign investors rely both on publicly-available information and privately-held information to make new investment decisions. Public information available to all potential foreign investors includes market size, transportation infrastructure and other aspects of the business environment. On the other hand, Dunning argued that private information is more critical for MNEs' decision-making process. This includes the functioning of labour markets, the practical implementation of foreign investment policies, and strategies for selecting partners. Nevertheless, the information asymmetry faced by foreign investors may potentially be partially offset by different forms of agglomeration economics, such as the positive externalities and economies of scale associated with the spatial concentration of economic activities and co-location of related production facilities (Smith and Florida, 1994). There is much empirical evidence suggesting that MNEs are inclined to invest in a host country where there are a clusters of their own and closely related economic and industrial activities. For instance, He (2002) found empirical evidence that information costs and agglomeration economies are both significant determinants for the locational choices of MNEs. He argued that MNEs would invest in a country and city where they are capable of minimising information costs and maximising the benefit of agglomeration economies.

Our research findings allow us to provide up-to-date determinants of FDI in Taiwan over the past two decades, and provide Taiwanese government with guidance for economic and

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political policies. Policy targeted at domestic market expansion is significant and should not be ignored. Further, labour policy attitudes toward wage rate and welfare could be more positive since this would not discourage foreign investors from conducting FDI in Taiwan. Policy aimed at improving educational and technical development so as to elevate the quality of human capital in Taiwan should be further stressed since the country has become one that provides highly skilled and technical talents rather than labours of mass production. All in all, it could be concluded that a healthy economic system and a stable supply of high-calibre talents are the main attractions for FDI in Taiwan, and it is necessary that such an environment should be maintained in the country especially in the midst of a transitional process.

6. Evaluating the Impact of Industry-level FDI on Economic Growth

6.1. Introduction

International capital flow results from the differentiation of economic conditions in each country. For example, a country with high production costs invests in a country with low production cost, or a country with affluent capital invests in a country with scarce capital. As a result, comparative advantages can be created within the international trade. For the benefit of the home country, it is based upon the increase in competitive advantages of investing companies, and the improvement of return maximization. Furthermore, at a time when investing companies are making profits, the economy of the home country can have a significant growth through various economic behaviours, such sale back and profit repatriation. For the benefit of the host country, it is based upon the increase in employment and tax revenue in terms of the macro-economy, or introduction of new techniques from the joint venture, improvement of management, and market expansion in terms of the micro-economy.

The Taiwanese economy has shown rather high growth rates in the past few decades. In the 1950s, the agricultural sector accounted for an average of 30 percentage of total GDP, and the main exports were agricultural or processed agricultural products, which accounted for 80 percentages of total exports (see Chan, 2000). However, the share of agricultural sector GDP in total GDP declined rapidly to less than 5 percentage in the 1980s and even less than 1 percentage in the 1990s after the government introduced an active policy to encourage FDI by granting tax incentives and establishing export-processing zones in the mid-1960s, and an industrial restructuring in the 1980s. FDI was initially concentrated in labour-intensive industry from the 1960s to the 1980s, and then switched into sophisticated capital-intensive

industry afterward. Hence, the manufacturing sector has experienced an average two-digit GDP growth rate and become the largest single sector in Taiwan's economy in recent decades. This suggests that Taiwan has successfully transformed itself into a newly industrialized county.

According to the economic statistics provided by National Statistics, Republic of China (Taiwan), the percentage of total GDP growth contributed by manufacturing industries increased from 15% in the 1970s to 20% in the 1980s, 30% in the 1990s, and 40% in the 2000s. It is also noteworthy that there was a shift from labour-intensive to capital-intensive sectors within manufacturing industries in 1990s, reflecting the country's trend of industrial restructuring. For instance, capital-intensive industries such as Electronic and Electrical Manufacturing sectors contributed 50% of the manufacturing GDP growth rate in the 1980s, 70% in the early 1990s, and 90% in the late 1990s and 2000s. However, the percentage of manufacturing GDP growth rate contributed by traditional manufacturing sectors, such as mining, construction and textiles etc., became negative in the late 1990s, which could partly be explained by that the labour-intensive sectors moving their production facilities and factories to China and Southeast Asia. Such moves were caused by increasing labour and production costs and the rapid appreciation of Taiwanese currency since the 1990s.

Even though several academic works have discussed the role of FDI inflows in a host country's economic growth (see Chen et al., 1995; Kasibhatla and Sawhney, 1996), there is one issue regarding the impacts of different sector-level FDI inflows that remains unsolved. This centres on whether or not all types of FDI inflows have a positive relation with economic growth, since technology spillovers from foreign investors are discussed mainly

on the manufacturing industries (see Chuang and Lin 1999). Furthermore, do FDI non-manufacturing industries, particularly service ones, share similar effects do manufacturing industries, or have they a heterogeneity that causes a different impact on country's economic growth? By researching data in 12 Asian economies from 1987 to 1997 based on endogenous growth theory (Romer, 1986; Romer, 1990; Aghion and Howitt, 1992), Wang et al. (2009) answered these questions and concluded that while FDI inflows in manufacturing industries do have a significant and positive impact on economic growth of host countries, FDI inflows in non-manufacturing industries do not play a significant role in encouraging such growth in the country. He also found that the positive effect on economic growth from manufacturing FDI is much stronger than the positive effect from total FDI inflows. Additionally, by conducing the empirical research on 47 countries data from 1981 to 1999, Alfaro (2003) suggested that total FDI exerts an ambiguous effect on economic growth, in which primary FDI tends to have a negative impact, manufacturing FDI have a positive impact, and service FDI have an ambiguous and insignificant one.

Although most recent works, including Khawar (2005) and Blonigen and Wang (2004), have proved a positive relationship between economic growth and FDI in the host countries, other literature, including Alfaro, Chanda, Kalemli-Ozcan, and Sayek (2004) and Borensztein et al.(1998), viewed such optimistic results by identifying certain thresholds that host countries would have to reach before they can reap favourable growth effects of FDI, thresholds consisting of financial market development or human capital endowment. Furthermore, Carkovic and Levine (2005) pointed out that the direction of causality underlying the relationship between FDI and economic growth is still ambiguous and controversial. Echoed by Chowdhury and Mavrotas (2006), Nair-Reichert and Weinhold

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(2001) found that such causality of relation could be characterized by a considerable degree of heterogeneity. Although the general statement that FDI contributes to economic growth in the host country could not be denied on the basis of previous literature, it is true, however, that most of this research employs cross-country data analysis rather than host country-specific studies, an appropriate method to consider the host country's degree of heterogeneity and evaluate the role of aggregate or industry-level FDI in its economic growth.

Given the significant change in economic structure and FDI composition in Taiwan, this chapter aims to assess whether or not the growth effect of FDI exists at the aggregate, industry-specific, and cross-industry level by employing the econometric methodology of co integration and causality on a dataset that covers manufacturing and servicing industries in Taiwan from 1990 to 2010. The structure of this paper is as follows. The second section discusses the relevant theoretical background for FDI-growth nexus, and reviews the previous empirical literature and evidence. The third section outlines the empirical methodology, describes the model specifications, and introduces industry-specific proposition. The fourth section presents empirical results for the aggregate, industry-specific, and cross-industry level based on the model specified. The last section analyses the implications of our empirical results, and mentions omitted areas that may be worthwhile for future investigation.

6.2.   Literature Review

As noted in the previous chapter, there are abundant academic researches investigating the growth effects of FDI. Neoclassical growth model, for instance, where technological

progress and labour growth are exogenous variables, FDI inflows would only increase the investment rate, which leads to a transitional increase in per capita income growth but has no long-run growth effect (Hsiao and Hsiao, 2006). On the other hand, endogenous growth theory perceives FDI a new potential role in the economic growth process (Bende-Nabende and Ford, 1998). Under this theoretical framework, investment, including FDI, would affect growth rate via R&D, human capital, and transfer of knowledge. However, several fundamental problems are existent regarding the effect of FDI on economic growth in host countries. Firstly, these academic studies assume that there is one-way causality between FDI and growth, which has been questioned and criticized (Kholdy 1995). FDI flows potentially not only affect the economic growth, but also are affected by the economic growth as well. Biased and inefficient estimations could be caused by the negligence of either way of causal relations. Besides, simulation bias could be a result of such negligence, and could not be solved by a single equation. Secondly, new econometric techniques have further improved the research and analysis on the growth effect of FDI, such as time-series concept of cointegration. Hence, Greenaway and Sapsford (1994) contended that as previous empirical studies are based on classic or neoclassical growth theory and production function model, they tend to neglect such model's endogenous nature despite that certain independent variables of the model may be affected by each other. By utilising Granger causality testing technique proposed by Toda and Yamamoto (1995), Shan, Tian, and Sun (1999) found that a two-way causality between FDI and economic growth exists in China. Further, Du, Ying, and Dong (2004) found the same causality in China but they did not find the significant result of stable or long-run relationship. Both of these results reflect that some biases are existent in the single-equation model used in the previous studies. Nevertheless, these researches only take account of the direction of causality, but not an estimate of

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effectiveness and dynamic relationships between FDI, GDP and other variables, which will be discussed in the following chapter. Lastly, previous studies utilised the cross-sectional data in analysing the growth effect of FDI, and the validity of their results are is subject to be questionable. Methodology based on cross-sectional data implies that different regions or countries share the similar economic system and industrial characteristics, which does not capture the actual reality in general. Enders (1995), hence, stated that the significance of conclusions drawn from cross-section data regarding a long-run causal relationship is questionable. Furthermore, methodology based on cross-sectional data is based on the one-way causality between FDI and economic growth. Provided a two-way causality, different causality could be led by different cross-sectional data. As a result, it can said that causality test based on time-series data produce a more reliable and valid result than the one based on cross-sectional data.

I. Theoretical Framework

i. FDI-Led Growth

The growth effect of FDI in host countries could be analysed in the context of its impacts on growth-driving factors, such as investment, transfer of knowledge, technology, and human capital etc. These factors might be initiated and nurtured to enhance growth through FDI (Zhang, 2001). Graham and Krugman (1995) then integrated FDI into economic growth theories as the "gains-from-FDI" approach. Chenery and Stout (1966) argued that FDI could promote GDP growth in the spirit of the Solow growth model. The model stated that FDI could help the host countries to accumulate capitals, and then has a growth effect on host countries' economies. To the extent that FDI increases the existing level of capital stock, the growth effect of FDI is similar to that of domestic investments (Zhang, 2001), and FDI is

expected to generate non-convex economic growth by encouraging the incorporation of new inputs and foreign technologies in the production function of the recipient economy (Zhao and Du, 2007). As mentioned before, endogenous growth models play the role of technology in growth effect of FDI in host country. Recent studies also suggest that technology transfer and spillover effects could help FDI to augment economic growth of host countries. FDI conducted by multinational firms has a longer investment period and contributes non-tangible assets that are embodied in FDI, such as advanced technologies and managerial experiences. Further, Meyer (1998) believed that FDI could help the host countries to enhance their existing level of knowledge and skill of labour force through training sessions and workshop, novel management practices, and efficient operating and organisational structure. Moreover, Rodriguez-Clare (1996) argued that technology and productivity of domestic companies could be improved by FDI since FDI could create the backward and forward linkages, and multinational companies could provide domestic suppliers and customers with technical assistance and know-how. On the other hand, Blomstrom et al. (1992) contended that competitive pressure from foreign firms could also drive domestics firms to increase their operating efficiencies, and introduce advanced technology. Therefore, FDI plays an important role in increasing host country's productivity and technology level and promoting country's domestic investment and economic growth. The growth effect of FDI in the host country could then be examined under the background of growth theory.

ii. Growth-Driven FDI

According the eclectic theory proposed by Dunning (1981), a company in home country with certain ownership advantages will conduct an investment and start up a foreign subsidiary in host country with locational advantages. Both of these advantages could be

best captured by internalising production through direct investment. Academic studies then focus on how economic performance of host country could be a potentially locational factor and determine the level of FDI inflows. On the other hand, Zhao and Du (2007) argued that rapid GDP growth could usually creates a high level of capital resource gap in a host country, and the host country may hence demand more FDI by offering favourable terms to attract overseas investors because FDI is a source of capital. The growth-driven FDI hypothesis emphasise the importance of growing market size and improving conditions in human capital and infrastructures for attracting FDI from foreign investors (Zhang, 2000). FDI could be encouraged by host country's market size which rises with economic growth. Along with an increasing income per capita, rapid economic growth could lead to an increasing level of aggregate demand that creates profit-making opportunities in the host country and stimulates greater need of domestic and foreign investments. There are two major types of FDI that could explain how economic growth drives FDI inflows to the host country. The first one export-oriented FDI is motivated by factor-price differentials, such as lower labour wage costs, along with human capital and infrastructure conditions (Zhang and Markusen, 1999). The second one is market-seeking FDI made by a multinational companies is induced by market accesses to host countries for efficient utilization of resources and exploitation of economies of scale (Markusen et al., 1996).

iii. Two-way feedback

There is an economic phenomenon that a two-way causal link between FDI and economic growth in the host country is existent. It is plausible that such strong relationship could be caused by either the growth-driven FDI or FDI-led growth, and likely that the two variables move together through feedback (Caves 1996). As mentioned earlier, a host county with rapid economic growth not only leads to an increasing demand for FDI and domestic

investment, but creates more profit-making opportunities for investors as well. These effects would further attract FDI from foreign investors. From another point of view, economic growth of host country could be enhanced and promoted by FDI inflows through positively direct effect and indirectly spillover effects. Both FDI and economic growth are positively interdependent and could lead to a two-way causality (Zhang 2001).

II. Empirical Evidence

As it is discussed, the growth effect of FDI has various types of forms. Through capital accumulation in the host country, FDI inflows are expected to promote economic growth via encouragement of adopting advanced technologies and new inputs. In the case of former factor, FDI inflows could be a potential source of productivity gains through spillovers effect to local enterprises, such as clients and suppliers. In the case of the letter factor, Feenstra and Markusen (1994) believed that output/economic growth is a result of applications of extensive range of intermediate goods in FDI-related manufacturing. Empirically speaking, Blomstrom et al. (1996) found a positive impact of FDI on economic growth by utilising FDI inflows to developing countries as a measure of its interchange with other countries. Balasubramanyam et al. (1996) examined such impact by using cross-sectional data of 46 developing countries from 1970 to 1985, and found empirical evidence supporting Bhagwati's hypothesis that economic growth could be enhanced by FDI inflows to countries adopting export-promoting policy rather than to ones adopting import-substituting polices. This result implies that role of FDI in economic growth varies across countries because of different trade policies. On the other hand, by examining data on FDI inflows to 69 developing countries from OECD (organisation for economic co-operation and development)countries from period 1970 to 1989, Borensztein et al. (1998) found that FDI is

an important vehicle for introduction and adoption of advanced technologies for host countries, and technological absorptive ability may provide explanation for the difference in growth effects of FDI across countries since FDI could relatively contribute more to economic growth than domestic investments. Further, they argued that the level of human capital could determine the ability of host country to adopt new technologies introduced from foreign investors, and found empirical evidence that larger endowments of human capital are able to produce higher economic growth rate given the amount of FDI. The significant positive relationship between growth effect of FDI and the level of human capital only holds if the host country has a minimum threshold stock of human capital. Similarly, Bengoa and Sanchez-Robles (2003) found that host countries require certain levels of human capital, economic stability, and liberalized markets in order to experience the long-term growth effect of FDI. By failing to identify a significant positive growth effect of FDI, Durham (2004) suggested such growth effect is contingent on the absorptive capability of host countries. It is widely considered that developed countries could have benefit more from growth effect of FDI than less developed ones since the former ones have a higher of human capital than the letter one. Xu (2000) investigated the FDI flows from USA to 40countries over the period from 1966 to 1994, and found that technological transfers contribute to productivity growth only in developed host countries rather than in less developed ones. Less developed countries could not economically benefit from FDI is because those countries failed to meet a minimum threshold stock of human capital.

Nevertheless, there is also empirical evidence that the growth effect of FDI are not essentially positively correlated with the level of absorptive ability and human capital stock in host country. Bende et al. (2001) researched growth effect of FDI in ASEAN countries

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from the period 1970 to 1996; found that such effect is significantly positive for Indonesia, Malaysia, and Philippines, but significantly negative for Singapore and Thailand. In a later study, Bende-Nabende et al. (2003)found a long-run growth and output effect of FDI is significantly positive in relatively less developed countries with obvious lower level of absorptive ability and human capital stock, such as Philippines and Thailand, while significantly negative in relatively more developed countries such Japan and Taiwan. Their finding is closely consistent with that of Sjoholm (1999) at firm-level study, who argued that the productivity spillovers effect of FDI are positively related to the technological gap between local and foreign enterprises. Beyond that, UNCTAD (1999) found that the positive or negative growth effect of FDI is also dependent upon on the various variables, including initial black market premium, domestic investment ratio, education attainment, GDP per capita, political instability, state of financial development, and, terms of trade etc. These empirical results suggest that the growth effect of FDI is still inconclusive. The role of FDI in economic growth could be country-based, and is dependent upon the economic, institutional, and technological conditions of host country.

Previous empirical studies have focused on the growth effect of FDI at the aggregate level, which does not consider the sectors in which FDI involved. This framework analysis implicitly assumes that growth effects of FDI are not different across primary, manufacturing and service sectors in the host country. However, World Investment Report (2001) argues, "in the primary sector, the scope for linkages between foreign affiliates and local suppliers is often limited….The manufacturing sector has a broad variation of linkage intensive activities. [In] the tertiary sector the scope for dividing production into discrete stages and subcontracting out large parts to independent domestic firms is also limited." By

using cross-sectional data on country and sectors from the period 1981 to 1999, Alfaro (2003) found evidence that benefits of FDI vary across sectors in the host country, where the growth effect of FDI tends to be negative in the primary sector, positive in the manufacturing sector, and ambiguous in the service sector. Vu et al. (2006) utilised augmented production function specification and analysed the sector-specific FDI inflows for China from the period 1985 to 2002 and Vietnam from the period 1990 to 2002. Their result suggested that manufacturing sector tends to benefit more from sector-specific FDI than other two sectors, because not only does FDI have positively direct effects on economic growth, but also have positively indirect one via its impact on labour productivity. Therefore, this chapter will research both FDI-growth nexus at the aggregate and sector-specific level in order to gain more detailed understanding of relationship between FDI and economic growth in Taiwan.

6.3. Methodology

Although previous academic literatures have recognised and researched on the theoretical two-way feedback between FDI and economic growth in the host country, empirical works under the background of Taiwanese economy fail to provide to provide concluding remarks and evidence on the effectiveness of such two-way feedback at industry-level and cross-industry-level. Furthermore, previous research works are typically lack of an examination of the cointegrated relationship between these two variables. According to Granger (1981), given that time-series variables have the unit root characteristics, results obtained from panel regression framework may be subject to spurious correlation. Hence, in order to better understand relationship FDI and economic growth in the context of changes in economic structure and FDI decomposition, it is necessary to incorporate examinations and analyses

focusing on the cointegration as well as the long-term causal relationship between two variables of interest. To meet such objective, vector error correction model proposed by Granger and Weiss (1983) could then be estimated from cointegrated relationship between the two variables. A panel cointegration framework is also applied to allow for heterogeneity across10 industries in the manufacturing and services industries in Taiwan. Under this methodological framework, we are able to identify whether or not a long-term stable relationship between FDI and economic growth are existent for all of the 10 industries included in the panel.

There are three steps proposed by Basu et al. (2003) in our empirical framework. The first step is to test for nonstationarity in the two variables of FDI stocks level and economic output level in the panel of 10 industries. Given the existence of unit roots in each time-series data, the second step is to utilise panel cointegration method proposed by Pedroni (1999) to examine for a long-term cointegrated relationship between those two variables of interest. After identifying the existence of such long-term cointegrated relationship across the panel, the final step is to apply vector error correction model to explore Granger causality within the relationship.

The empirical methodology employed in this chapter is based on the framework of bivariate relationship between FDI and economic growth. Its weakness of limiting only two variables is rather obvious and common in the previously relevant works that employ similar methodology. For instance, Chowdhury and Mavrotas (2006), and Hansen and Rand (2006) used the used the bivariate approaches to investigate FDI-Growth causal link. Besides, while Clarke and Ralhan (2005), and Sharma and Panagiotidis (2005) used the same approaches to

research the causality between exports and economic growth, Arestis and Demetriades (1997) and Wachtel (2004) used the approach to conduct comprehensive examination on causality between local financial development and economic growth. Nevertheless, Dufour and Renault (1998) argued that bivariate approach employed by these empirical works is able to avoid the complexities caused by indirect causality once the auxiliary variables are taken account of in a multivariate analysis. Further, Konya (2004) considered that bivariate approach provides an advantage that no-causality for one period ahead implies no-causality at, or up to, any horizon. He also reckoned that an examination for causality under a multivariate framework would lead the usable sample size to shrink immensely. Therefore, based on bivariate approach and panel cointegration framework, this chapter could make a significant contribution to the existing academic field by considering the heterogeneity of the causal link between FDI and economic growth across industries in Taiwan, and identifying the accurate direction of causality between them.

On the other hand, it should not a major concern that this chapter does not take total investment, including domestic and foreign ones, as a controlling variable. As argued by Borensztein et al. (1998), the purpose of controlling total investment as a variable is to evaluate and compare FDI and domestic investment in terms of their effectiveness and efficiency in promoting economic growth in the host country. The research objective of this chapter is to assess the growth effect of FDI at aggregate and disaggregate level regardless any types of transmission mechanisms rather than to isolate such effect from the capital-augmenting effect of FDI. Hence, methodology employed in this chapter would follow the framework analysis of Borensztein et al. (1998), which does not control total investment as a variable. Besides, although the bivariate approach tends to omit other potential determinants

of economic growth, it still provides an empirical advantage. Chakraborty and Nunnenkamp (2008) argued that the omitted variable bias could be a serious issue only if there is large and consistently positive effect of FDI on economic growth. In our empirical results, there is a weak result in service industry that FDI could be a determinant of economic growth, and this result suggests that omission of other potential growth determinants may not cause an empirical distortion. This implies that the potential impacts of omitted variables on economic growth might not be captured by FDI.

Lastly, there is also an issue on the use of Granger causality tests within between a panel cointegrated framework and time-series framework. Toda and Yamamoto (1995) believed that the letter one is typically preferable to the former one since time-series framework does not significantly rely on pre-testing. Konya (2004) even argued that the final result of Granger causality would be less reliable if there are ambiguous result of pre-testing on unit-root and cointegration. Nevertheless, such potential drawback may hardly relevant in this chapter since several methods have been employed to conduct pre-testing on unit-root and cointegration, and results of test statistics turn out to be significantly consistent with only minor exceptions. In addition, a panel cointegrated framework is able to serve as a precondition for examining long-term causality between FDI and economic growth. Therefore, it is empirically appropriate to employ Granger causality within a panel cointegrated framework to evaluate the long-term causality between FDI stocks and output level at the aggregated and disaggregated level.

There are several academic literatures on the Granger causal link between FDI and economic growth based on the multi-country framework. By using data from 12 Asian

countries over the period from 1987 to 1997, Wang (2002) tended to uncover what types of FDI mainly and significantly contribute to economic growth. She found that the growth impact of FDI in the manufacturing industry is significantly positive, and such the impact could be attributed to the spillover effect. Ericsson and Irandoust (2001) focused on the Granger causal link in four OECD countries, including Denmark, Finland, Norway and Sweden, over the period from 1970 to 1997. They found that there is a two-way feedback between FDI and economic growth for Sweden, and a one-way causality, running from FDI to economic growth, for Norway. Nevertheless, they were unable to detect any causal relationship between FDI and output growth for Denmark and Finland. On the other hand, there are other literatures that focus on the Granger causal link between FDI and economic growth using specific country data. Fadhil and Yao (2012) adopted Granger causality test to evaluate the growth impact of FDI in Qatar over the period from 1990 to 2010, and they found that there are bi-directional causality and long-run relationships between FDI and economic growth in the country. Feridun and Sissoko (2011) conducted the Granger causality analysis on the growth impact of FDI in Singapore over the period from 1976 to 2002, and found that there is a unidirectional Granger causation from FDI to economic growth. By using the same methodology, Manal and Liu (2011) researching Malaysia over the period from 1970 to 2008, proved that there are bi-directional causality and long-run relationships between FDI and economic growth in the country.

6.3.1. Model Specification

The methodology for this study is restricted to the bivariate relationship between FDI and economic growth. The preference for this is to avoid the complications resulting from

indirect causality once the so-called auxiliary variables are accounted for in a multivariate framework (Dufour and Renault, 1998). Further, Konya (2004) considered that the usable sample size tends to shrink considerably when testing for causality in a multivariate system. By applying standard bivariate approach and panel cointegration analysis, this study could make a contribution that heterogeneity of the FDI–growth link across sectors could be considered, and the accurate direction of causality between FDI and economic growth could be identified. Therefore, the empirical methodology follows the three steps suggested by Basu et al. (2003): firstly, testing the nonstationary for these two variables in the panel data of industry; secondly, if the time series data suggest the unit roots properties, panel cointegration method proposed by Pedroni (1999, 2004) is used to examine for a long-term cointegrated relationship between the variables; thirdly, given that there is an existence of cointegration, error correction model is then used to explore Granger causality within the relationship. The cointegrated relationship is formulated as below:

$$\mathbf{FDI}_{it} = \gamma_i + \beta_i \mathbf{GDP}_{it} + \lambda_t + \mu_{it}$$

where γ_i represents industry-specific effect (manufacturing and service industries) ; λ_t represents time-effects; μ_{it} represents estimated residual. If the μ_{it} is confirmed to be stationary or consistent with I (0), there is an existence of cointegrated relationship between these two variables. Following this, error correction model is used to test for Granger causality in the long-term relationship, such model incorporating the μ_{it} as an explanatory variable and establishing the dynamic error correction model:

$$\Delta\mathbf{GDP}_{it} = \gamma_{1i} + \sum_k \beta_{1ik}\Delta\mathbf{GDP}_{i,t-k} + \sum_k \beta_{2ik}\Delta\mathbf{FDI}_{i,t-k} + \theta_{1i}\mu_{i,t-1} + \mathbf{e}_{1it}$$

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$$\Delta\mathbf{FDI}_{it} = \gamma_{2i} + \sum_{k} \eta_{1ik}\Delta\mathbf{FDI}_{i,t-k} + \sum_{k} \eta_{2ik}\Delta\mathbf{GDP}_{i,t-k} + \theta_{2i}\mu_{i,t-1} + \mathbf{e}_{2it}$$

where k denotes the optimal lag length for each industry in the panel data, which is decided by the comparison of regression results with alternative lag structure (Pindyck and Rubinfeld, 1991). θ_{1i} and θ_{2i} refer to the speeds of adjustment along the long-term equilibrium path, in which θ_{1i} implies the long-term impacts of FDI on economic growth and θ_{2i} implies the long-term impacts of economic growth on FDI. The set of coefficients β_{2ik} and η_{2ik} reflect the adjustment process between the set of variables responding to the random shock. The test of causality could be discussed in further three parts: all industry, industry-level disaggregation, and cross-industry spillovers.

6.3.2. Industry-specific Proposition

Previous empirical literatures have failed to take account of industry-specific effect in Taiwan. Compared with those literatures, there are two reasons that disaggregated FDI and economic growth data are used in this chapter. First, there has been a dramatic change in the industrial structure of FDI in Taiwan. Second, the growth effect of FDI is expected to be significantly different across industry in Taiwan. As seen from the following figure, data on FDI inflows in specific industry suggest a major shift in trend from manufacturing industry to service industry during the mid-1990s. Within the manufacturing industry, General Manufacturing sector accounted for sheer decreasing shares in overall level of inward FDI. On the other hand, within the service industry, Finance and Real Estate sector, followed by Wholesale and Retail Trade sector, accounted for largely increasing shares in overall level of inward FDI.

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Figure 16: Industrial composition of inward FDI in Taiwan from 1989-2010
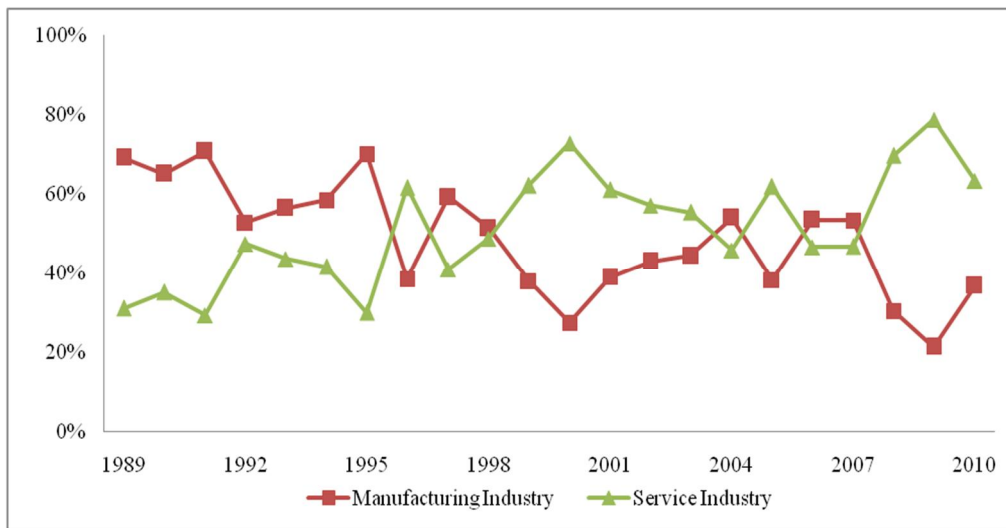
Source: Investment Commission, Ministry of Economic Affairs, Taiwan (ROC)

Such changing composition of inward FDI in Taiwan suggests an implication that the growth effects of FDI could be industry-specific, especially when productivity spillover effects are considered to be different across industry. Compared with the primary and service industry, Alfaro (2003) contended that FDI-related transfers of technology and knowledge primarily occur in the manufacturing sector. Alfaro's contention could be explained by Rodriguez-Clare (1996), who believed that foreign investors of manufacturing industry would intensively use intermediate inputs through which positive externalities can be created and various types of inputs could be drawn on by local producers and suppliers, and host country's productivity, thereby, would increase. Compared with the manufacturing industry, the growth effect of FDI on the service industry tends to be more ambiguous. Alfaro (2003) argued that service industry may be unlike primary industry as to the limited potential linkage and spillovers. Despite that there is an increasing tradability of service; FDI in this industry may still belong to be market-seeking. Aykut and Sayek (2007) believed that the market strength of foreign service provider is usually superior and has significant crowding-out potential. This reflects that linkage of FDI-invested service industry with the

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host country's economy might be weak, and output and growth effects of FDI in the industry might be limited as well.

Researching on the growth effect of FDI in Taiwan based on the industry-level FDI data has two major benefits. According to Blonigen and Wang (2004), this methodology is able to examine for the industry-specific effects of FDI, and could provide an unbiased result which otherwise may be caused by cross-country panel analysis based on the unsuitable pool of heterogeneous host countries. However, industry-specific research still has a minor weakness. If FDI in one specific industry creates spillover effects from which other industry might derive advantage, the resulting estimated growth effect of FDI might inclined to be biased downward.

Moreover, previous literatures researching on intra-industry effect is mainly because the major transmission channels are assumed to operate and function within the same industry, for instance imitation and human capitals. This reasoning could be further emphasized by Jenkins (1990) who believed that local firms tend to adopt similar production skill and techniques with those of foreign firms when both firms are competing with each other in the same market and producing the similar products on the same scale. In terms of inter-industry effect of FDI, previous researches are limited themselves to effect within the manufacturing industry. Lipsey (2002) hence argued inter-industry effect of FDI requires further attentions, examinations and analyses. Since such spillovers across industries may have played a vital role in Taiwan's economic activity and development, this chapter also attempts to test such linkage by conducting pair-wise tests of Granger causality between FDI and economic growth in the services and manufacturing industries in Taiwan.

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6.4. Empirical Results

6.4.1. Panel Unit Root Test

Similar to univariate time series dataset, pooled time series data tend to have a time trend and hence are non-stationary where the variables of interest have time-variant means, variances and covariance. Engle and Granger (1987) pointed out that the direct application of ordinary least square (OLS) or generalised least square (GLS) to non-stationary data would potentially produce mis-specified model or spurious regression. Granger and Newbold (1974) also argued that the statistical results produced by above model tend to be inflated with high coefficient of determination (R2) and t-statistics, leading to the higher possibility of Type I error.

Even though testing of unit roots in panel data framework is rather recent, but it has gained popularity in the empirical literature and become an integral part of econometric methodology. Notable researchers include Hadri (1999), Breitung (2000), Levin, Lin and Chu (2002), and Im, Pesaran and Shin (2003), and the unit roots test for panel data they developed are similar to test for single time series data. Since the information contained in the time-series and cross-sectional data is enhanced between each other, panel unit root test is proved to be less possible for Type II error than unit root test conducted for each individual series. Further, compared with individual unit root which has complex limitation on its statistical distribution, panel unit root test has weaker restrictions and leads to the statistics with abnormal distribution in the limit (see Baltagi, 2001 and 2005).

In regards to the aforementioned panel unit tests except Im, Pesaran and Shin (IPS), Hardi, Breitung and Levin, Lin and Chu (LLC) assume that common unit root process is existent

across the cross-sectional data. Further, a null hypothesis of a unit root employed by LLC and Breitung tests utilise Augmented Dickey Fuller (ADF) specification shown as below:

$$\Delta \mathbf{y}_{it} = \gamma \mathbf{y}_{it-1} + \sum \theta_{ij} \Delta \mathbf{y}_{it-j} + \vartheta \mathbf{X}_{ij} + \varepsilon_{ij}$$

where $\mathbf{y}_{it}$ refers to the pooled variable of interest, $\mathbf{X}_{ij}$ refers to exogenous variables such as individual fixed effects and time trends, and ε_{ij} is assumed to be mutually independent disturbances term. An assumption that common unit root process is existent across the cross-sectional data is suggested by $\gamma = \rho - \mathbf{1}$, however the lag order for the difference terms across cross-sectional data could vary. On the contrary, IPS test is less restrictive in a sense that it separately estimates ADF regression for each of the cross-sectional data, and allows for individual unit root processes.

The panel unit root tests employed in this research is a residual-based ones which evaluate the statistics for FDI and GDP at their levels and first differences. While the null hypothesis for LLC, Breitung, and IPS tests is that the variables of interests have an unit root or are non-stationary, Hadri tests uses the null hypothesis that variables have no unit root or are stationary. Provided that the left tail of the normal distribution for these four tests is used to reject the null hypothesis, the reported results of positive and small negative values would then fail to reject null hypothesis. Following table is a summary of these four panel unit roots on FDI and GDP at their levels and first differences. As it is shown for the first three tests, all of them except LLC test for FDI at its level fail to reject the null of unit root for FDI and GDP at their levels, nevertheless null hypothesis is rejected for them at their first differences. Similarly, Hadri test suggests that null of no unit root could be rejected for the variables at their level form, but null hypothesis fails to be rejected for them at their first difference form. Hence, the result provides evidence that FDI and GDP have a characteristic

of non-stationarity which potentially leads to the biased and inconsistent estimates for OLS or GLS estimation. Further, it could be concluded that FDI and GDP have unit roots and are integrated of order one. In order to examine whether or not long-run relationship is existent between FDI and GDP, it is essential to conduct panel cointegration test on them at their level form.

Table 17: Panel unit root test for GDP and FDI[*] (Taiwan: 1990-2010)

Variables	H₀: Unit root				H₀: No unit root	
	LLC	Breitung	IPS	Decision on H₀	Hadri	Decision on H₀
FDI	-2.093**	1.132	-0.870	Fail to Reject	7.878	Reject
GDP	2.345	1.658	1.761	Fail to Reject	8.127	Reject
ΔFDI	-15.549	-14.659	-8.191	Reject	1.182	Fail to Reject
ΔGDP	-11.430	-12.796	-10.285	Reject	-0.608	Fail to Reject

* The statistics are asymptotically and normally distributed with a left-tail rejection area,
** Exception to all other test statistics

6.4.2. Panel Cointegration Test

After confirming that both FDI and GDP are integrated of order one, then it is necessary to examine whether or not these two variables might be cointegrated, i.e. have a common stochastic trend, by using the panel cointegration methodology proposed by Pedroni (1999) to examine the long-run relationship between FDI and GDP. Pedroni argued that since traditional cointegration test usually ''suffers from unacceptably low power'' when applied on the data series of restricted length, but panel cointegration test is able to solve such problem by allowing to pool information regarding common long-run relationships between a set of variables from individual members of a panel. In addition, not only does it require exogeneity of the regressors, but it also allows for changes in the fixed effects, short-run dynamic, cointegrating vectors of the long-run relationship across the cross-section of panel dataset. The cointegrated relationship is formulated as below:

$$FDI_{it} = \gamma_i + \beta_i GDP_{it} + \lambda_t + \mu_{it}$$

where γ_i represents industry-specific effect; λ_t represents time-effects; μ_{it} represents estimated residual. If the μ_{it} is confirmed to be stationary or consistent with I (0), there is an existence of cointegrated relationship between these two variables. Pedroni's test employs seven statistics to test the null hypothesis of no cointegration between FDI and GDP against alternative hypothesis of cointegration. Of these seven statistics, there are four panel cointegration statistics where the first-order autoregressive term is assumed to be the same across all the cross-sectional data, and the rest are three group mean cointegration statistics where the parameter is allowed to vary across the cross sectional data. Except variance ratio of panel cointegration statistics, all other statistics follow normally distributed with a left tail where large negative values lead to the rejection of null hypothesis. The result suggests that all of the statistics, except group rho statistics, reject the null of cointegration at the 1% level. It could be concluded that both unit root variables of FDI and GDP are cointegrated in the long term, and these two variables are positively associated with each other.

Table 18: Panel Cointegration between FDI and GDP * (Taiwan: 1990-2010)

H0: No Cointegration		
	Panel	**Group**
Variance ratio	2.030	-
rho-statistic	-5.282	-1.639**
PP-statistic	-11.718	-17.917
ADF-statistic	-10.131	-18.212
Decision on H0	**Reject**	**Reject**

* The variance ratio test is right-tail test; the other Pedroni tests are left-tail ones.
** Indicate the failure of rejection of the null of no coinetegration.

6.4.3. Panel Causality Test: Overall Industries

Once the cointegrating relationship between FDI and GDP is confirmed, an error correction model proposed by Engle and Granger (1987) is then used to examine the Granger causality in the long-run relationship between these two variables, and Granger causality test demonstrated by Granger et al. (2000) has a two-stage process of estimation. The first step is to estimate the residual terms, μ_{it}, obtained from the cointegrated relationship model shown above, and the second step is to estimate the dynamic error correction model by incorporate μ_{it} as an explanatory variable in order to draw inferences on Granger causality. A dynamic error correction is formulated as below

$$\Delta \textbf{GDP}_{it} = \gamma_{1i} + \sum_{k} \beta_{1ik} \Delta \textbf{GDP}_{i,t-k} + \sum_{k} \beta_{2ik} \Delta \textbf{FDI}_{i,t-k} + \theta_{1i} \mu_{i,t-1} + \mu_{1it}$$

$$\Delta \textbf{FDI}_{it} = \gamma_{2i} + \sum_{k} \eta_{1ik} \Delta \textbf{FDI}_{i,t-k} + \sum_{k} \eta_{2ik} \Delta \textbf{GDP}_{i,t-k} + \theta_{2i} \mu_{i,t-1} + \mu_{2it}$$

where k denotes the optimal lag length for each industry in the panel data, which is decided by the comparison of regression results with alternative lag structure (Pindyck and Rubinfeld, 1991). In this case, lag length is limited to three periods in an attempt to analyse the relationship from a longer time perspective. θ_{1i} and θ_{2i} refer to the speeds of adjustment along the long-term equilibrium path, in which θ_{1i} implies the long-term impacts of FDI on economic growth and θ_{2i} implies the long-term impacts of economic growth on FDI. Further, according to Engle and Granger (1987), for the ith industry in the panel data, the existence of cointegration between the referred variables indicates causal links among the set of variables as manifested by $|\theta_{1i}| + |\theta_{2i}| > 0$. Hence, the null hypothesis for the first model is that FDI does not Granger cause GDP in the long run for all of industries included in the panel dataset, which is mathematically expressed as $\textbf{H}_0: \theta_{1i} = \textbf{0 for all i}, i = \textbf{1,2,3}\ldots,\textbf{10}$. On the other hand, the null hypothesis for the second model is that GDP does not Granger

cause FDI in the long run for all of industries included in the panel dataset, which is mathematically expressed as $\mathbf{H_0}: \theta_{2i} = \mathbf{0}$ **for all i, i = 1,2,3 …, 10**. The result is shown by following table suggests that the both null hypotheses of no long-run causality for these two linear casual links under cointegrated models are rejected. In the long run, the null of no Granger causality from FDI to GDP, and null of no Granger causality from GDP to FDI are both rejected at 1 percentage level. Therefore, when all 10 industries included in the panel dataset are taken into account, there is a strong evidence of bi-directional causal link s between FDI and GDP.

Table 19: Panel causality test for overall industries* (Taiwan: 1990-2010)

Null Hypothesis:	F-Statistic	P-value	Decision on H0
GDP does not Granger cause FDI	7.7221	0.0001	Rejection
FDI does not Granger cause GDP	30.7476	0.0000	Rejection

* Both the results are significant at 1% level.

6.4.4.   Panel Causality Test: Industry-level Disaggregation

After conducting the Granger causality test between FDI and GDP on the overall industries in Taiwan, we can then carry on conducting such test on manufacturing and services industries separately in order to measure the direction, extent and significance of causal links between those two variables within each industry. Following is a table of result which shows that there is only a minor difference in the casual link between FDI and GDP across manufacturing and services industries. For the manufacturing industry, it indicates that there is a robust bi-directional causal links between FDI and GDP in the long run and both of the links are significant at 1% level. For the services industry, the bi-directional causal links in the long run are not as robust as those indicated by manufacturing industry since its null of no causality from FDI to GDP could only be rejected at 5%. Further, there is a stronger long-

run causality from FDI to GDP than that from GDP to FDI in the services industry.

In terms of the manufacturing industry, the result is in line with expectation that manufacturing benefited from financial deregulation, human-capital enhancement and trade liberalisation in post-1980s in Taiwan. Together with these factors, technological diffusion and transfers of manufacturing industry also assists the industry to become more integrated with international import and export market than in pre-1908s. Further, since many of the FDIs in Taiwan's manufacturing industry belong to trade- and export-oriented ones, such induced competition may have enhanced the productivity spillovers within industry. The capacity of manufacturing industry to absorb foreign technology and then become productivity spillovers may help to explain the slightly marked difference in the FDI-GDP interrelationship between manufacturing and services industries. By evaluating impact of FDI on Taiwan's economic development and growth, our findings tend to be partly in line with the results of Alfaro (2003) and UNCTAD (2001) that services industry, similar with agricultural industry, has a limited potential of foreign linkages and technological spillovers.

Table 20: Panel causality test for industry-level disaggregation* (Taiwan: 1990-2010)

Null Hypothesis:	F-Statistic	P-value	Decision on H_0
Manufacturing			
GDP does not Granger cause FDI	16.0436	0.0001	Rejection
FDI does not Granger cause GDP	7.0763	0.0095	Rejection
Services			
GDP does not Granger cause FDI**	3.356	0.0695	Rejection
FDI does not Granger cause GDP	13.697	0.0003	Rejection

*Results are significant at 1% level
** Result is significant at 5% level

6.4.5. Panel Causality Test: Cross-industry Diffusion

Since the possible impact of FDI in one industry on the other is not taken account of especially when FDI in service industry has been increased in Taiwan during post-1980s, the empirical results in the previous parts may cause the underestimation of impact of service industry on manufacturing industry or vice versa. In addition, it is believed that FDI in service industry could possibly promote the growth and development in manufacturing industry by increasing economic and operating efficiencies of specific sectors and country's overall economic mechanism. Hence, further Granger causality tests should be performed in order to explore the possible diffusions or spillovers across manufacturing and service industries. These causality tests are using the following two cross-industrial pair of data series: manufacturing FDI and service GDP; and service FDI and manufacturing GDP. In the following table, the result for the first pair of variables suggests that while the null of no causality from manufacturing FDI to service GDP could be rejected at 10% level, the null of no causality from service GDP to manufacturing FDI could not be rejected. In the meanwhile, the result for the first pair of variables suggests that while the null of no causality from service FDI to manufacturing GDP could be rejected at 5% level, the null of no causality from manufacturing GDP to service FDI could not be rejected. Both results provide evidences that FDI in one specific industry has stimulated the economic development in the other at a certain significant level in post-1980s. In the other word, FDI either in manufacturing or service industry has a diffusive impact on GDP of cross-industry.

Table 21: Panel causality test for industry-level disaggregation (Taiwan: 1990-2010)

Null Hypothesis:	F-Statistic	P-value	Decision on H_0
Pair of Manufacturing FDI and Service GDP			
Service GDP does not Granger cause Manufacturing FDI	0.5172	0.4737	Fail to reject
Manufacturing FDI does not Granger cause Service GDP*	3.0763	0.0857	Rejection
Pair of Service FDI and Manufacturing GDP			
Manufacturing GDP does not Granger cause Service FDI	0.33086	0.5665	Fail to reject
Service FDI does not Granger cause Manufacturing GDP**	5.77887	0.04396	Rejection

*Results are significant at 10% level
** Result is significant at 5% level

6.5. Conclusion

FDI inflows to Taiwan boomed post-1980s, and their composition and type have also changed significantly. While the manufacturing industry kept attracting FDI at the nominal term since the mid-1990s, its share of overall FDI inflows started decreasing and the service industry began to account for an increasing share of overall FDI inflows. This phenomenon reflects how industry and economic structure have both changed in Taiwan during the 1990s. This is why the growth implications of FDI in Taiwan should be examined and analysed under this circumstance by using industry-level data, employing a panel co integration framework to investigate the dynamics of the relationship between FDI and GDP. An academic gap in the previous literature could then be addressed and filled. Following is the summary of results.

Table 22: Summary of result

Feedback	Overall GDP	Manufacturing GDP	Services GDP
Overall FDI	Two-way feedback	——	——
Manufacturing FDI	——	Two-way feedback	One-way feedback from Manufacturing FDI to Services GDP
Services FDI	——	One-way feedback from Services FDI to Manufacturing GDP	Two-way feedback

For the Taiwanese economy as a whole, FDI and GDP are found to be cointegrated in the long run. At the level of the economy overall, the Granger causality tests identify a strong two-way feedback between FDI and GDP. As expected, such results suggest that economic growth in Taiwan plays a significant role in attracting FDI from foreign investors, and, conversely, that FDI inflows are able to induce a country's economic growth. Furthermore, the impact of FDI inflows in encouraging the country's economic growth is comparatively stronger than that of economic growth in attracting FDI inflow to Taiwan. Hence, it could be said that the main causation runs from inward FDI to economic growth. At the industry-disaggregated level, the economic growth effect of FDI in Taiwan is significant both in manufacturing and service industries. Both industries suggest that FDI and GDP are mutually enhancing in the long term. Similar to results at the aggregate level, the service industry exhibits that the impact of FDI inflows in inducing economic growth is relatively stronger than that of economic growth in attracting FDI. However, the manufacturing industry shows the opposite result, where the impact of economic growth in attracting FDI is relatively stronger than that of FDI inflows in inducing economic growth. Interestingly, the two-way feedback between FDI and GDP in the service industry is slightly weaker than that in manufacturing industry. In addition, the results on the growth effect of FDI partly imply

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that the service industry may benefit more from its inward FDI than the manufacturing industry. At the cross-industry level, the result indicates that GDP growth in the manufacturing and service industries has been induced not only by the inward FDI one industry but also by inward FDI in the other. Moreover, the impact of FDI in the service industry in inducing manufacturing GDP is relatively stronger than that of FDI in manufacturing industry in inducing service GDP. This may stem from the fact that value-added service by foreign investors provided to the manufacturing industry in Taiwan has been phenomenal, and the economic growth effect of service FDI on the manufacturing industry has become materialized.

It should be a concern that the Asian financial crisis in 1997, the credit crunch in 2008 and the Euro-zone crisis in 2010 might affect the relationship between FDI and GDP, especially the empirical results of Granger causality in this chapter. Hence, the data for these three years mentioned are extracted and the results are re-examined. The empirical results are found to be in line with our original ones, reflecting that those crises do not fundamentally pose significant breaks on the relationship of Granger causality between FDI and economic growth in Taiwan, either at the overall, disaggregate, or cross-industry level. It could be potentially explained by the fact that FDI-GDP nexus in Taiwan has been further enhanced by some other underlying factors not covered by the bivariate model, such as investment environment conditions, regulatory framework, and market efficiency etc., during the research period.

Although there are advantages to using methodology to examine causality within a panel co integration framework, this research excludes several areas that are worthwhile for future

investigation. First, since the timeframe of this research only requires a consistent data series of industry-level FDI and GDP from 1990 to 2010, its relatively short period of observation may not fully capture the long-term growth effect of FDI. According to Clemens et al. (2004), such data and timeframe restriction only allows us to opt for attribution rather than comprehensiveness in dealing with the inescapable trade-off between the two. Second, there is also limited data availability, preventing us from further examining the growth effect of corporate-related service FDI on the manufacturing industry. It could be a future research area which potentially complements this industry-level study with particular case studies. Its result is likely to provide a greater understanding of mechanisms through which corporate-related service FDI in Taiwan could contribute greater operating efficiency and output growth of country's manufacturing industry. Lastly, it is potentially viable to build a multivariate framework to further evaluate the direction of causality between FDI inflows and economic growth. Such a framework could provide us with further understanding of the indirect causality which runs FDI through auxiliary variables to economic growth in Taiwan. Nevertheless, it is rather obvious that the multivariate framework requires more strictly defined disaggregate data than the bivariate framework does. The disaggregate data requirement includes physical and human-capital formation.

The research findings are in line with the optimistic view held by some Taiwanese economists who encourage the government to further develop policies and incentives in order to attract FDI from multinational enterprises. This optimistic view is based on the idea that the translation of FDI into economic growth depends not only upon the total stock of FDI Taiwan could attract, but also the structure and composition of FDI inflow. Furthermore, the results of this chapter could be echoed by those of previous literature based

on cross-country analysis, which argued that the growth implication of FDI in the host country could be characterized by several elements, including technology spillover effects, absorptive capacity and capability, orientation and motivation of inward FDI, and the extent of linkages between foreign and domestic companies. All of these elements could be significantly different across industries in the host country. On the other hand, the research findings may also help to relieve the concern held by Taiwan's Investment Commission, who are supportive of vigilant and prudent approval procedures that aim to minimize the risk of certain FDI proposals jeopardizing or even replacing the local firms in a specific industry, and maximize the benefits of certain FDI proposals importing advanced skills and technologies in a specific industry. Since the research results suggest that the growth effects of FDI do not significantly differ across industries and FDI in one industry benefits the economic growth of the other, it does not essentially favour those vigilant and prudent approval procedures which target a specific type of FDI preferred by commissioners and policymakers. Hence, in order to successfully attract FDI to promote economic growth in Taiwan, commissioners and policymakers should evaluate and identify inscribed quality and potential value of each FDI proposal, and its implicit and explicit impact on Taiwan's economic activity.

Our research findings may provide Taiwanese policymakers with the following guidance. First, in order to maximize the economic benefits of FDI in Taiwan, the government should be able to increase the efficiency of FDI by further improving the existing communication system, transport links, and infrastructure development. Second, according to UNCTAD (2004), both the availability of highly skilled workers and the infrastructure of well-developed telecommunications would strengthen the mechanism for FDI spillovers in high-

end manufacturing and value-added service industries, and facilitate the dissemination of the benefits of FDI in the business-related service industry through the Taiwanese industry and economy. If the FDI in business-related service industry could be widely spread throughout Taiwan rather than clustered in small range of sectors, it could potentially increase the operating efficiency of and enhance the spillovers effect in manufacturing industry and other service sectors. Lastly, Taiwanese government should further promote openness to trade, such as expansion of free trade agreement (FTA) with major trading partners, in order to strengthen and consolidate the linkage between foreign and domestic firms in both manufacturing and service industries. Moreover, the government should promote the domestic entrepreneurship in small and medium enterprises (SMEs) and reinforce development in human capital with the intention of further enhancing linkage within and across industries.

7. Framing the Dynamic Value-Chain Interaction among FDI and Macro-economic Variables

7.1. Introduction

In 1990, the Taiwanese government introduced the Six-year National Development Plan, the Asia-Pacific Regional Operations Centre (APROC), and relevant incentive polices in order to attract export-oriented FDI, whose total amount has steadily increased since then. Moreover, the nominal interest rates in Taiwan have continuously been lowered by the Central Bank of the Republic of China (Taiwan) in recent years, leading to the negative real interest rate. This further increases investment momentum in Taiwan and attracts more investors. Since FDI has been playing an increasing role in Taiwan's economic activities and development, it is therefore necessary to evaluate the impact of FDI on the country's macro-economic variables, such as international trade, GDP growth rate and employment rate. Even though a large amount of research such issues has been conducted, there is still no consensus between the empirical results, and research results remain to be debated all the time. For instance, while some studies suggest that FDI has a negative impact on the host country's economic growth and employment levels, others argue that FDI encourages a country's economic growth via spillovers effect, such as innovative technologies and capital accumulation, expanding cross-country trade spectrum, and creating employment opportunities.

Even though several existing studies have contributed to the understanding of interaction between inward FDI and the host country's growth, a methodological issue within econometric approach raises a significant concern. There is an underlying assumption in these studies that FDI responds to or causes economic growth, and only a few authors consider the feedback and the long-run equilibrium relationship between FDI and growth.

Since the causal link between FDI and growth implies development strategies, Zhang (2001) pointed out that if there were an unidirectional causality from FDI to income growth, it would lend credence to the FDI-led growth hypothesis that FDI not only leads capital formation and employment augmentation but also promotes income growth in host economies. On the other hand, if the causal process runs in the opposite direction, it would imply that economic growth may be a prerequisite for developing countries to attract FDI and that the amount of FDI flows into a country depends on the country's absorptive capacity. If the causal process is bi-directional, FDI and growth would have a reinforcing causal relationship. Kose et al. (2006) argued that the impact of FDI on growth is dependent upon on economic foundation of the host country. If the host country meets the thresholds of certain criteria, such as financial market development, institutional development, efficient governance, and macro policies, it is be more probable to reap the fruit of growth and stability from inward FDI.

It is known that endogenous models identify FDI as the major contributor to the host economy's productivity growth, and assume that FDI is more productive than domestic investment. The rationale behind this is that, according to Borensztein, De Gregorio, and Lee (1998), FDI encourages the incorporation of new technologies in the production function of the host economy, leading to technology spillovers across domestic firms and sectors. From this perspective, FDI-related technological spillovers offset the effects of diminishing returns to capital and keep the economy on a long-term growth path (Kotrajaras et al., 2011). Their view implies that FDI could encourage the host country's long-term economic growth by introducing alternative managerial practices and organizational structure, and by increasing the level of knowledge in the country by developing human

capital and providing training schemes (see De Mello, 1997). In addition, FDI might be able to stimulate a country's economic growth through the expansion of international trade channel by helping transfer the technological techniques and innovative product manufacturing for exports, gaining access to the new foreign markets, increasing domestic tangible and intangible assets, and improving the quality of local labour skill and managerial practice. By following a production function model in evaluating the impact of FDI on the host country, Chen et al. (2004) and Liu and Lin (2001) found empirical evidence that there is a substitution relationship between FDI and export levels in Taiwan. Chen et al. (2004) found that the effect of export levels on FDI is significantly weaker than the opposite effect, suggesting that the performance of export levels is a major consideration for foreign companies conducting FDI. Chen and Ku (2000) concluded that FDI is not related to the creation of employment opportunities in the home country, but has a positive effect on domestic industries.

However, most of the previous works fail to consider the potentially dynamic chain-reaction between FDI and other macro-economic variables such as export activities and country's growth. Furthermore, since the Six-year National Development Plan introduced in 1990 has caused a transformation in economic characteristics and industrial structure, the employment rate is worth considering in the light of its causality of relationship with FDI. In addition, the results of previous chapters indicate that employment levels and market size are both significant determinants of inward FDI in Taiwan. Also, it was found that there is a two-way feedback of causation between economic growth and inward FDI at either the economic-wide or industrial level. Nevertheless, these two chapters have failed to take into account certain dynamic interactions viewed through a multivariate framework. Based on Taiwan's

data from 1990 to 2010, this chapter therefore aims to identify the dynamic interactions among inward FDI, GDP growth rate, export activity, and employment levels by using vector auto-regression (VAR) rather than the production function model or foreign investment model, and recognize the causality between these macro-economic variables and evaluate their dynamic value-chain reactions. The result is expected to conclude which types of dynamic interaction among these macro-economic variables, whether value chain reaction or multiplier effects is existent, and whether a stationary long-run relationship tends to be appear. It could also provide a further understanding of dynamic causal links among those macro-economic variables, and guidance for the Taiwanese government and authorities to develop economic policies and strategies. The structure of this paper is as follows. The second section discusses the relevant research background, and reviews the empirical literatures and evidence on FDI-related works. The third section outlines the empirical methodology, describes the model specifications, and introduces nexuses among variables of interest. This research would the employ VAR approach to provide an insightful view on the dynamic value-chain reaction among those variables of interest within the system. The fourth section presents empirical results of variance decomposition percentage analysis and impulse response functions based on the model specified. The last section analyses our empirical results, and addresses areas not looked at in this chapter that may be worthy of future investigation.

7.2. Literature Review

Previous academic researches and studies have been focused on the relationship between FDI and several aspects of host country's economy. Nevertheless, little efforts have been made to empirically investigate the casual link or dynamic inter-relation between inward

FDI and other macro-economic variables, e.g. export, economic growth, and employment, under a multivariate framework of analysis, especially in Taiwan. Besides, compared with studies investigating on main determinants of economic growth and FDI, researches focusing on such dynamic interaction in FDI host country are rather limited and inadequate. It is hence that understanding such inter-relation between these variables is one of significant steps for Taiwanese authority and government to further develop FDI-related economic policies. Previous empirical focuses and methodologies could be categorically categorized into following five groups.

The first group of researches focuses on identifying the significant determinants of inward FDI by employing either time-series or panel data methodologies (see Wang and Swain, 1997, and Sun and Parikh, 2001). To some extent, these researches suggest that economic growth and external trade could help to explain trend of inward FDI in host country. Based on the implicit assumption that there are one-way causalities from degree of openness and economic growth, proxied by external trade and GDP, respectively, to inward FDI, previous studies then estimate the significant determinates of FDI based on such implicit causalities, and indicate that expanding economic growth and increasing degree of openness are the main determinants of FDI for the host country. It is, however, that the approach employed by these studies tends to ignore the endogenous nature of host country's economic growth process since the impact of FDI could not be effectively evaluated by utilizing a single equation model which assumes one-way causality.

The second group of researches focuses on examining the impact of external trade (export) and FDI on economic growth, where the empirical results fail to reach a consensus. For

instance, Bende-Nabende and Ford (1998) and Dees (1998) found that FDI has a significant and positive impact on economic growth via technological transfer and spillovers, whereas Woo (1995) found that economic growth could not be significantly affected by FDI, and Bende-Nabende et al. (2003) even found that economic growth could be significantly and negatively affected by FDI in some host countries. Wei (1995) and Wei et al. (2001) found evidence that both export and FDI have significant and positive influences over economic growth, and Wei (1995) argued that the contribution of FDI to economic growth could be potentially overstated since there is a correlation between FDI and total factor productivity growth. Despite that all these researches did not fail to take into account the possibility of both directions of causality, they did not explicitly examine and evaluate for bi-directional links among the variables of interest.

The third group of researches focuses on evaluating the relationship between FDI and export, and between FDI and economic growth, separately. In line with the empirical results of the second group, those of third group also are rather mixed, including complementary and substitutive impacts. For instance, Gopinath et al. (1998) found evidence that while FDI is positively correlated with economic growth, FDI is negatively correlated with export. Among other things, Hejazi and Safarian (2001) and Marchant et al. (2002) argued that there is a positively direct relationship between FDI and economic growth, implying that economic growth is a potential and significant driver for inward FDI in host country.

The fourth group of researches focuses on assessing the correlation between (un)employment levels and economic growth based on Okun's law which states that 1% reduction in the unemployment rate would produce approximately 3% more output. If the

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country's economy is in the form of imperfect competition and in the different periods of structural change, Schaik and Groot (1998) argued that there would be a negative correlation between unemployment and economic growth, and degree of such effect could be evaluated by examining for structural stability.

The last group of researches focuses on investigating the causal relationship between export and economic growth. Such researches aim to discover whether booming economic growth boosts expanding export activities, or, higher level of economic growth could be pushed by higher degree of openness. Both Shan and Sun (1998) and Liu et al. (1997) found evidence of bi-directional causality between trade and economic growth in China, reflecting that two variables of the country reinforced each other. Furthermore, other researches, including those conducted by Sun and Parikh (2001) and Bende-Nabende et al (2003) found that the relationship between these two variables of interest is dependent upon the level of economic structure and industrial development. That is, exports expansion might not exert significant influence over economic growth when the country is at an extremely low level of economic-related development and structure. It should be noted that inward FDI is not taken into account in these studies.

All in all, empirical works mentioned above typically employ two econometric methodologies to identify the determinants of FDI or evaluate the relationship between FDI, economic growth, export and employment. The first one is to apply time series data and approach, including Granger causality, and simultaneous equation model, whereas the second is to utilize cross-sectional data and approach based on orthodoxical ordinary lease square (OLS) regression. Furthermore, according to Liu, Burridge, and Sinclair (2002), most

of the previous studies mentioned above are also subject to two empirical limitations, which includes that (1) bivariate causality tests may be seriously biased if relevant covariates are omitted, and (2) that empirical outcomes from models estimated in levels may be unreliable if data are non-stationary. Such limitation could be exemplified by Du, Ying, and Dong (2002), who employed Granger causality tests to examine the relationship between FDI and economic growth. Even though their researches found an empirical evidence of two-way causality between the variables, any stable or long-term relationship is not disclosed. Besides, their research only considered the direction of causality without taking into account the estimate of effectiveness and dynamic features of FDI, GDP, export, and employment. In order to evaluate such effectiveness of and dynamic interaction between variables of interest, Sims (1980) proposed vector autoregression (VAR) method as an alternative since simultaneous equation model incorporate a large number of arbitrary decisions. Further, Gujarati (1995) argued that since VAR only requires less a priori information, it could essentially treat each variable of interest as endogenous when a priori information regarding the variables could not be fundamentally offered by economic principles and theories. It is therefore that VAR model could be employed to explore the dynamic interaction among FDI, GDP, export and employment so as to fill the gap within existing academic researches and literatures.

7.3. Methodology

According to Geenaway and Sapsford (1994), the previous researches focusing on the relation between FDI and economic growth, which is similar as previous chapter, tend to ignore and overlook the endogenous nature of a growth process. That is, some important variables within a growth may affect to each other, but are not taken into account.

Researches that do not consider such endogenous nature are liable to be in a simultaneity bias. It is hence that Sims (1980) proposed vector autoregression (VAR) method as an alternative, and Gujarati (1995) contended that the use of VAR method has been proved to generate more valid and reliable estimates within an endogenous research background. VAR method is proposed and developed by Sims (1980) to evaluate causal orderings and dynamic interactions among macro-economic variables, such as money supply, price level, and interest rate. It is later used by other several academic scholars in various fields. For instance, Marin (1992) and Ghartey (1993) employed the VAR method to evaluate the dynamic relationship between export activities and economic growth in a country; whereas LeSage and Pan (1995) and Coulson (1993) applied the method to asses USA regional economies. All of these have reflected that VAR method has become one of standard econometric methodology in economic and FDI analysis. In brief, according to Enders (1995), VAR method is based upon a multiple-equation time-series model in which all variable of interests are treated symmetrically. Further, each variable is expressed as a linear function of constant terms and lagged values of itself and others. The VAR modelling results could therefore be used to evaluate dynamic interactions and causal inter-relations among variables of interests. There are four variables of interest in this chapter, including foreign direct investment (FDI), economic growth (GDP), export level (EL), and employment level (ER). The same period of research uses annual time series data from 1990 to 2010, which could be obtained from relevant official Taiwanese statistic database (see Chapter 3). The major aims of this research are to evaluate how response of each variable of interest is shocked by those of other variables within the system. Innovation accounting of VAR, including impulse response functions and variance decomposition analysis, could therefore be able to provide insightful views on short term dynamic relations among those variables of

interests within the system. While the impulse response functions allow us to trace the response of each variable to shocks of others during the period, the variance decomposition analysis then could be applied to derive the proportion of one variable's movement in sequence that is due to shocks to other variables within the system, or to shocks to itself. Besides, by plotting the impulse response functions, we are allowed to further evaluate how a variable responses to shocks immediately or subsequently with certain lags.

On the other hand, the use of VAR method has been regarded as being controversial by some academic scholars. Their major concerns include the selection of lag length, problem of using less a priori information, and difficulty of ensuring all variables of interest included in the VAR system to be jointly stationary. However, Enders (1995) argued that, if those issues are managed and handled with scrutiny, then VAR method could be an effective tool to examine and explore the dynamic inter-relations among macro-economic variables in a country. In order to manage the concerns mentioned above and ensure the robustness of empirical results, it is proposed that Akaike's Information Criterion (AIC) could be employed to optimally select the lag length, and estimate VAR with several lag structures. In addition, Gujarati (1995) believed that since VAR method only requires few a priori information, it could potentially provide itself with an edge of treating each variable of interest as an endogenous one when economics could not offer theoretical bases for variable in the system. Further, it is necessary to examine time series data by testing the unit root and cointegration since Granger (1988) argued that long run equilibrium could be existent at the time when two or more non stationary time series are integrated of order (0). Lastly, Sims et al. (1990) suggested that the conventional asymptotic theory is valid for hypothesis testing in first-order differences VAR if variables of interests in the system are to be integrated of

order (1) without cointegration; whereas the theory is valid for hypothesis testing is level VAR if variables are to be integrated or cointegrated. On the other hand, Maddala (1992) suggested that the conventional asymptotic theory is valid for hypothesis testing restricted VAR with differences and error correction model if variables are to be integrated of order (1) with one cointegrating vector; whereas variables could be considered as stationary and dynamic inter-relation could be examined by testing in levels VAR if variables are to be integrated of order (1) with full ranks.

Since a single equation approach may be subject to a simultaneity bias, there are a number of empirical studies using VAR approach to analyse FDI and other macro-economic variables of interest based on a specific country data and multivariate framework, in order to both evaluate the direction of causality, and investigate the dynamic movements among variables. By adopting VAR approach to investigate four variables for India over the period from 1991 to 2006, Sharma (2011) found that there is a two-way feedback between FDI and economic growth. While there is a one-way feedback from exports to FDI, a two-way feedback is also existent between FDI and import. Shan (2002) employed the VAR approach to research the nine variables of China over the period from 1986 to 1998, and concluded that previous empirical work employing a single equation approach may have over-estimated the impact of FDI on the Chinese economy. He also confirmed that output growth is the most significant determinant of FDI in China. Using the same approach on the four variables of China over the period from 1981 to 1997, Liu, Burridge and Sinclair (2002) confirmed that there are long-run relationships among those variables and found the existence of two-way feedback between FDI, economic growth and exports. Rather than focusing on economic growth and trade, Ramasamy and Yeung (2010) utilised a VAR

approach to research the dynamic interaction among FDI, wages and productivity in China over the period from 1988 to 2007. They confirmed that the cheap labour costs argument still holds for FDI in China, particularly in the inland provinces. Their empirical results also suggested that FDI tends to positively affect wage rates, especially in the coastal provinces, and productivity.

7.3.1. Model Specification

Since this study is to research the dynamic value chain-reaction among inward FDI and macro-economic variables, such variables relevant to past and recent literatures include economic growth (GDP), export level (ER) and employment rate (ER)[11]. After using Johansen (1988) and Johansen and Juselius (1990) method to examine the non-stationary of each time-series data, we then test for cointegration and long-term relationship among these variables. In order to conduct such test, it is necessary to investigate whether the stochastic trends of these variables with unit roots possess a long-term relationship. The variables of interest imply the existence of long-term relationship among themselves at the time when they are examined to be I(1) and cointegrated. While an unrestricted VAR in levels is an appropriate method if all variables of interest are non-stationary, an unrestricted VAR in first-differences is an appropriate one if such variables are I(1) but not cointegrated (Sims et al. 1990). Contrarily, a restricted VAR in difference is an appropriate method if all variables display cointegration (Maddala 1992). Hence, a restricted VAR with an error correction term for these endogenous variables in level and k lags in each variable could be formulated as below:

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[11]This studyis specifically focused onthe interplay of four variables of interest; however, other economic variables could also potentially be included and researched, e.g. Production (Leichenko, 2000), Import level (Liu, Burridge, and Sinclair, 2002), Investment and Energy (Shan, 2002), Wages and Productivity (Ramasamy and Yeung, 2010), etc.

$$\text{DlnFDI}_{1t} = \alpha_1 + \theta_1 \mathbf{E}_{t-1} + \sum_{i=1}^{k} \beta_{11,i} \text{DlnFDI}_{t-i} + \sum_{i=1}^{k} \beta_{12,i} \text{DlnEL}_{t-i}$$

$$+ \sum_{i=1}^{k} \beta_{13,i} \text{DlnGDP}_{t-i} + \sum_{i=1}^{k} \beta_{14,i} \text{DlnER}_{t-i} + \varepsilon_{1t}$$

$$\text{DlnEL}_{2t} = \alpha_2 + \theta_2 \mathbf{E}_{t-1} + \sum_{i=1}^{k} \beta_{21,i} \text{DlnFDI}_{t-i} + \sum_{i=1}^{k} \beta_{22,i} \text{DlnEL}_{t-i} + \sum_{i=1}^{k} \beta_{23,i} \text{DlnGDP}_{t-i}$$

$$+ \sum_{i=1}^{k} \beta_{24,i} \text{DlnER}_{t-i} + \varepsilon_{2t}$$

$$\text{DlnGDP}_{3t} = \alpha_3 + \theta_3 \mathbf{E}_{t-1} + \sum_{i=1}^{k} \beta_{31,i} \text{DlnFDI}_{t-i} + \sum_{i=1}^{k} \beta_{32,i} \text{DlnEL}_{t-i}$$

$$+ \sum_{i=1}^{k} \beta_{33,i} \text{DlnGDP}_{t-i} + \sum_{i=1}^{k} \beta_{34,i} \text{DlnER}_{t-i} + \varepsilon_{3t}$$

$$\text{DlnER}_{3t} = \alpha_4 + \theta_4 \mathbf{E}_{t-1} + \sum_{i=1}^{k} \beta_{41,i} \text{DlnFDI}_{t-i} + \sum_{i=1}^{k} \beta_{42,i} \text{DlnEL}_{t-i}$$

$$+ \sum_{i=1}^{k} \beta_{43,i} \text{DlnGDP}_{t-i} + \sum_{i=1}^{k} \beta_{44,i} \text{DlnER}_{t-i} + \varepsilon_{4t}$$

Where D denotes the first difference operator; $\mathbf{E}_{t-1}$ denotes an error-correction term derived from cointegration equation; ε_t denotes random errors with zero mean and finite variance. $\mathbf{E}_{t-1}$ is included to provide an additional channel and detect an existence of cointegration. Akaike's Information Criterion (AIC) is employed to choose an optimal number of lags. Further, residual autocorrelation and heteroskedasticity could be examined by Lagrange multiplier test and White test, respectively. Following that cointegration is confirmed, the impulse responses function and variance decomposition analysis could be

established by converting VAR into a vector moving-average specification based on Sims

(1980) and Hamilton's method (1994). The reduced form of VAR could be formulated as

below:

$$\mathbf{DlnY}_t = \sum_{i=0}^{\infty} \mathbf{C}_i \delta + \sum_{i=0}^{\infty} \mathbf{C}_i \varepsilon_{t-i} \mathbf{;} \mathbf{C}_o = \mathbf{I}$$

where D denotes the first difference and $\mathbf{C}_i$ denotes a coefficient matrix. Then a vector

moving-average specification could be transformed in to following by Cholesky

decomposition:

$$\mathbf{DlnY}_t = \sum_{i=0}^{\infty} \mathbf{C}_i \delta + \sum_{i=0}^{\infty} (\mathbf{C}_i \mathbf{P})(\mathbf{P}' \varepsilon_{t-i})$$

Where P represents the inverse of the lower triangular Cholesky factor of the residual

covariance matrix and $\mathbf{PP'} = \Sigma$. According to Engle and Granger (1987), the cointegration

could be suggested as follow if $\beta' \mathbf{C(1)} = \mathbf{0}$ where $\mathbf{C(1)} = \sum_{i=0}^{\infty} \mathbf{C}_i$

$$\mathbf{z}_t = \beta'(\mathbf{lnY}_t) = \sum_{i=0}^{\infty} \beta' \mathbf{C}_i \delta + \sum_{i=0}^{\infty} \beta' (\mathbf{C}_i \mathbf{P})(\mathbf{P}' \varepsilon_{t-i})$$

Therefore, the orthogonalized impulse responses functions of $\mathbf{lnY}_t$ and $\mathbf{z}_t$ with respect to a

variable-specific shock in the jth equation is given by

$$\varphi_{\mathrm{lnY},j}\,(\mathbf{n}) = \mathbf{C}_n \mathbf{Pe}_j \mathbf{;}\ \varphi_{z,j}\,(\mathbf{n}) = \beta' \mathbf{C}_n \mathbf{Pe}_j \mathbf{;} \mathbf{n} = \mathbf{0,1,2,3} \dots$$

where $\mathbf{e}_{t-i} = \mathbf{P}' \varepsilon_{t-i}$ and $\mathbf{C}_n = \sum_{j=0}^{n} \mathbf{C}_j$ are the cumulative effect matrix. Such matrix could be

obtained from the underlying VAR coefficient matrices $(\aleph_i)$ by applying the recursive

relationship:

$$\mathbf{C}_n = \aleph_1 \mathbf{C}_{n-1} + \aleph_2 \mathbf{C}_{n-2} + \aleph_3 \mathbf{C}_{n-3} + \dots + \aleph_p \mathbf{C}_{n-k} \mathbf{;} \mathbf{n} = \mathbf{1,2,\dots,}$$

impulse response functions can be utilised to trace how each variable responses over the

time period to a shock in other variables, and its responses is then compared with that of

every other endogenous variable in the VAR system. For instance, if the impulse response function suggests that GDP has a higher degree of response with a longer time period to a shock in export levels, then it could be concluded that export activities causes GDP. Likewise, the hypothetical contention that GDP causes export activities could be examined by comparing and evaluating the responses of export levels to a shock in GDP and other variables of interest within the VAR system. Further, the percentage of the forecast error variance could be obtained if the disturbance at all lags is contemporaneously uncorrelated. The percentage of the n-step ahead forecast error variance of variable i is accounted for by the innovations in variable j in the VAR. Based on the impose response function, the forecast error variance decompositions could be expressed as below:

$$\beta_{ij}(n) = \frac{\sum_{i=0}^{\infty}(e'Pe_j)^2}{\sum_{i=0}^{\infty}(e'C_i \Sigma C'e_j)}$$

7.3.2. Framework of Analysis and Propositions

I. FDI and Economic Growth Nexus

As mentioned in the previous chapter, FDI and economic growth nexus could be categorised in three forms: growth-driven FDI, FDI–led growth, and two-way feedback. The growth-driven FDI hypothesis emphasise the importance of growing market size and improving conditions in human capital and infrastructures for attracting FDI from foreign investors (Zhang, 2000). Besides, Zhao and Du (2007) argued that rapid GDP growth could usually create a high level of capital resource gap in a host country, and the host country may hence demand more FDI by offering favourable terms to attract overseas investors because FDI is a source of capital. Since economic (output) growth is regarded as one of significant determinants of inward FDI in the host country, growth-driven FDI hypothesis is then also called market-size hypothesis. The FDI–led growth hypothesis could be analysed in the

context of its impacts on growth-driving factors, such as investment, transfer of knowledge, technology, and human capital etc. These factors might be initiated and nurtured to enhance growth through FDI (Zhang, 2001). Chenery and Stout (1966) argued that FDI could promote GDP growth in the spirit of the Solow growth model, which states that FDI could help the host countries to accumulate capitals, and then has a growth effect on host countries' economies. The two-way feedback hypothesis argues that such phenomenon could be caused by either the growth-driven FDI or FDI-led growth, and likely that the two variables move together through feedback (Caves 1996). Hence, both FDI and economic growth are positively interdependent and could lead to a two-way causality (Zhang 2001).

II.   FDI and Export Nexus

The development of theories regarding FDI and trade has been traditionally divergent. While FDI theory attempt to explain why multinational enterprises invest and produce in a particular country, trade theory aims to rationalise trading activities between countries. By assuming the perfect competition and constant economies of scale based on the neoclassical theory, Mundell (1957) applied Heckscher-Ohlin-Samuelson (HOS) model and argued that perfect substitution between capital movements and trade of commodities could be generated by tariff protection. Similar to Mundell's work and methodology, Wei, Wang and Liu (2001) argued that trade can substitute for international movement of factors of production including FDI. On the other hand, based on the assumptions of imperfect competition, the economies of scale, the difference in production technologies etc., some other scholars contended that either a substitute or complementary relation between FDI and trade. There are two main types of FDI under their focuses. The first one is horizontal FDI in which the overall production processes are duplicated by investing firms in several host countries, but headquarters activities are not. The second one is vertical FDI in which

investing firm is separated in several host countries based on its different phases of value-added chain (Miankhel, Thangavelu, and Kalirajan, 2009). Further, Helpman (1984) and Helpman and Krugman (1985) argue that if trading countries are symmetric, substitution effect would be existent, and capital intensive goods are exchanged for labour intensive goods. Nevertheless, if trading countries are asymmetric, capital intensive country would provide labour intensive country with headquarter services and activities via FDI so as to exchange for finished varieties of differentiated goods. In terms of bidirectional links, Vernon (1966) classified FDI based product life cycle, where FDI in the early stage should belong to substitute and FDI in the mature stage then to complement. Later, Gray (1998) specified that efficiency seeking FDI should belong to complement and market seeking FDI then to substitute. Recently, Hsiao and Hsiao (2006) contended that export could be reduced by FDI when investing firm establishes production facilities in the host country and serves the local or foreign markets. Whereas, FDI could be increased export by when investing firm attempts to gather economic information of host country in order to minimise transaction cost and pave the way for further FDI. Therefore, FDI and export nexus is as complicated as the other nexus when it comes to discussion on bidirectional causal link.

III. FDI and Employment Nexus

According to UNCTAD (1994), multinational enterprises account for around one-fifth of direct employment and indirectly create at least one-to-two job opportunities in non-agricultural activities in developed countries and some developing countries. With regard to the link between FDI and employment, quantitative assessment employment may be difficult to conduct and qualitative evaluation may be subject to conceptual problem. Despite that, Lall (1995) argued that some direct and indirect employment effects could still be identified and evaluated. In terms of direct employment effects, Lall believed that it consists of both

initial and subsequent direct effects. The initial effects are dependent mainly upon two factors: the size and mode of entry and nature of the technique chosen. The first factor could be further classified as greenfield or acquisition. Greenfield investment project establishes a new unit of production and therefore immediately increase the capacity, hence increasing the number of employment opportunities. Being dependent upon the conditions of the contract, acquisition investment project is to acquire an existing firm, and it might or might not increase capacity subsequently and create employment opportunities. The second factor could be reflected by factor prices in the host economy, the nature and flexibility of the technologies concerned, the competitive environment and the market orientation. On the other hand, the subsequent effects rely upon other different set of factors. At the when investing firm's FDI project becomes more export-oriented, the production capacity and employment would therefore become more fast-growing. Further, subsequent effects could also be influenced by corporate integration strategy of investing firm, which is categorised by UNCTAD as stand-alone, shallow integration, and deep integration. Lastly, both macroeconomic policies and market conditions of host country fundamentally affect the characters of foreign firm's FDI project and the resulting employment effects. In terms of indirect employment effects, FDI is able to promote employment opportunities in the rest of the economy through investing firm's suppliers, buyers, and subcontractors etc. There will be positive effects when investing firm increases the demands for local inputs, products and service. On the other hand, there will be both positive and negative indirect effects when local firms compete with foreign firms. In the former case, the participation of foreign firms into the host country would drive local firms to increase their competitive edges, including operating efficiency, technical know-how and managerial skills. In the latter case, local firms may be driven out of market by foreign competition, and it might cause a decrease in local

employment opportunities. Further, indirect employment could significantly affected by spillover effects of foreign firms. Spillovers effects will be positive impacts on employment if they effectively promote local technological development, improve operating efficiency, and elevate quality of human capital etc. Whereas, they will be little or no contribution if investing firms operate as enclaves of relatively efficient operation in otherwise backward economies.

IV.   Export and Economic Growth Nexus

There is a large body of literature discussing the role played by export in economic growth in developing countries. According to Balassa (1985, 1988) and Tyler (1981), expansion of export could contribute a country's overall economic growth since it could increase resource allocation efficiency and capacity utilisation, allowing country to promote technological shift and productive capability, and take advantage of scale economies. Jones (1998) proposed the modern endogenous growth theory, and argued that spillover effects of knowledge from the export sector to the non-export sector could be considered as an externality. The export sector in a developing country is the one with advanced and novel technology. The traditional literatures believe that the non-export sector is able to gain the spillover effects of novel technology from export sector, and those effects could regarded as positive externalities. Further, it is believed that export sector could not fully capture the benefits produced to the non-export one. The modern endogenous growth theory believed that researches focusing on productivity increase with the bulk of innovations and idea. Since certain knowledge has spillover effects on researchers, the advancement or distortion created by market could be also regarded as knowledge spillovers. Whereas, the market could possibly misses the opportunity of taking advantage of those novel advancements because they are valued by market based on the projection of profits that could be

potentially realised from them. The export-led growth has gained wide acceptance among academic fields (see Chenery, 1980, Krueger, 1990). It is however that up-to-dated empirical researches present rather mixed results in different regions and country. Such mixture of observed results has been explained several academic scholars, such as Moschos (1989), Poon (1995), and Yaghmaian and Ghorashi (1995). They contended that the relation between export and economic growth in a country is dependent upon country's level economic structure and industrial development. Their contention indicates that economic growth could be positively affected by export expansion if the country reaches to a certain minimum level of development. On the other hand, export expansion could only make insignificant contributions to economic growth if the country reaches to a certain high level of development. Later, McNaband Moore (1998) argued that different impact of export expansion on economic growth across countries is dependent not only upon country's level of development, but also upon country's dynamic interaction and process of structural change in economic and industrial development.

V. Export and Employment Nexus

According to the export base theory, trade could be a significant driver of economic growth in a country since both externalities and productivities which are beneficial to country's economy could be provided by export expansion. Based on the assumption that there is a perfect elasticity for each supply for input and demand for export, the theory indicates that country's economic growth and employment opportunities are both a function of exogenous demand for country's export. In addition to export expansion, a Keynesian income multiplier could be a driving factor of economic growth which states that growth in income associated with that in export could lead to a further increase in demand for local goods and services, and, in turn, to a further growth in income and employment opportunities. By extending the

export base theory, North (1975) argued that while a necessary condition for economic growth and employment opportunities is foreign demand for export, sufficient conditions include locational conditions and supply-side factors. The first term refers to country's comparative advantage in production and transferring price and cost, whereas the second term refers to advancement in technology and innovation, and development of external market and economies. Further, he suggested that export expansion plays a role in moderating the cyclical sensitivity of country's economy and affecting the nature of country's employment and workforce. Nevertheless, other academic scholars criticised North's version of export base theoretical model by specifying that the model ignores the role played by supply factors, such as quality of workforce, input prices, and costs of transportation, in explaining different impacts of export on growth in economy and employment in different countries. For instance, Tiebout (1975) argued that export base theoretical model should be primarily based upon the scale and scope of a country's economy. He believed that while the theory is primarily applicable to the country that is economically dominated by only a few sectors, it is less applicable to economically diversified where export sector only accounts for insignificant fraction of overall output, and the residentiary sector is the main driver of country's economic growth. Further, he reckoned that it is only valid in the short run for export expansion to be a driving factor of growth in economy and employment. In terms of long run, residentiary sector contributes more to growth since it could influence certain industries that are attracted and invested in the country, and certain innovations that are created within the country. Hence, with regard to the causality between export and employment, he contended that although it would be the country's ability to develop export sector that drives country's short-term growth in economic output and employment opportunities, the characters of residentiary industry

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would be one of main determinants for country's long-term development and growth. In spite of these criticisms, export base theory still remains to be a widely used basis for analysing the correlation between export and employment.

VI.   Economic Growth and Employment Nexus

The concept of employment and unemployment could be firstly explained by the classical economic theory based on Walrasian general equilibrium model. Within the model, price flexibility plays a key role in not only correcting any labour market disequilibrium, but also maintaining the system-wide market clearing equilibrium. It is therefore that movement of wage rate is able to deal with labour surplus or shortage in the classical labour economics. Wage rate rises above equilibrium when labour market has excess demands, whereas wage rate falls below equilibrium when the market has excess supplies. Even though the phenomenon of involuntary unemployment could be removed from the labour market through above adjustment, voluntary and frictional unemployment are still existent when the market is at the ruling market clearing wage. On the other hand, Keynesian economics rejects classical economic views on wage flexibility, and argues that market's invisible hands could help output and employment reach to their levels of equilibrium. The assumption underlying Keynesian economics is that labour suppliers would not accept reduced nominal wage rate in order to secure employment opportunities even if they would accept reduced real wage rate caused by increasing price level at constant nominal wage rate. Further, the economics contends that government's macro-economic policies play an influential role in the level of aggregate demand in the country's economic system and market. Full employment would therefore be restored not through reducing wage rate, but through increasing level of aggregate demand. The rationality behind such contention is that wage rate could be rather inflexible when it comes to downward adjustment since labour

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unions and coalitions would collaboratively resist such downward revision. Along with the influences of labour unions and coalitions, labours' determined resistance to reduction in wage rate, and the fact that price of products and services would possibly be reduced at the percentage level with wage reduction, would potentially leave real wage rate to be unchanged which causes classical economics to be unrealistic. Hence, Keynesian economics recommends government and authority to implement fiscal policy focusing on public expenditure, and economic policy focusing on market expansion and liberalisation. By implementing such policies and measures, the county would potentially bolster aggregate demand, and thereby experience booming economic growth and increasing employment opportunities. Nevertheless, Ayoyinka and Isaiah (2011) argued that Keynesian recommendations and remedies on economic growth and employment may be subject to two challenges when it comes to the case of developing countries. While the first one refers to the fact that the nature and characteristic of employment and growth are essentially different between developed and developing countries, the second one refers to that Keynesian idea may only deal with open unemployment issue rather than with disguised one which is assumed to be prevalent in the developing countries. Despite their criticisms, it is widely believed that Keynesian economics still reflects certain aspects of labour market movement and economic growth process in the developing countries.

7.4. Empirical Results

7.4.1. Unit Root Test

Firstly, it is necessary to apply Augmented Dickey-Fuller tests in order to examine the integration order of individual variables of interest, and existence of stochastic non-stationarity within each time series data. Further, according to Mohsen and Rhee (1997) and

Narayan (2003), all the time series data are required to be integrated of the same order before they could be examined for a long-run relationship between the series by using Johansen's method of cointegration tests(1988, 1991). Hence, all time series data are taken the first difference of level to ensure all variables to be integrated of the same order in the cointegration test. Following is table of results with trend and intercept for the variables of interest at their levels and first differences where it suggests that the null of unit root for all variables, including FDI, GDP, Export, and Employment, at their levels could not be rejected. On the other hand, the null of unit root for all variables at their first difference could be rejected at 1%, reflecting that all variables at their first difference are found to be stationary and integrated of order one.

Table 23: Unit root test for macro-economic variables (Taiwan: 1990-2010)

Augmented Dickey-Fuller tests				
H0: Unit root				
Variables	**Levels**	**Decision on H0**	**First Difference**	**Decision on H0**
ln FDI	-1.579	**Fail to Reject**	-4.632	**Reject**
ln GDP	-1.858	**Fail to Reject**	-6.846	**Reject**
ln Export	-0.784	**Fail to Reject**	-5.359	**Reject**
ln Employment	-1.241	**Fail to Reject**	-5.803	**Reject**

* The results are significant at 1% level of significance

7.4.2. Panel Cointegration Test

Once all time series data are confirmed to have unit roots and be integrated of order one, Johansen's maximum likelihood method of cointegration tests (1988, 1991) could be employed to examine whether or not a long-run relationship is existent among macro-economic variables of interests. Under Johansen's method, λ_{Max} and *Trace* statistics are used to examine the number of cointegrating vector (*r*) of the time series data, and *r* is defined as

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$0 \leq r < n$ where $n \geq 1$. While the null hypothesis for λ_{Max} and Trace tests is $r = n - 1$, the alternative hypothesis is $(n - 1) < r \leq n$ In the following table of results, it indicates that the null of zero number of cointegrating vector could be rejected at 1% significant level since the Trace (114.578) and λ_{Max}(74.826) are both above the relevant critical value 54.682 and 32.715, respectively. However, the second null of one against two cointegrating vectors could not be rejected since both tests are below their 1% critical values, respectively, implying that there is one significant cointegrating vector among these macro-economic variables. Further, variables of GDP, Export and Employment have statistically significant positive impacts on FDI based on the estimates of the normalized cointegrating vector. Therefore, the co-movement among the variables of interest could confirm the existence of the long-run equilibrium or cointegration relationship. Due to this, the restricted vector autoregressive (VAR) with error-correction term and the first difference could be estimated by inverting the VAR into a moving-average representation in order to obtain the results of impulse responses and variance decomposition.

Table 24: Panel cointegration test* (Taiwan: 1990-2010)

H0	Ha	Trace Statistic	Trace - critical value 1%	λMax	λMax - critical value 1%	Decision on H0
r = 0	r ≥ 1	71.578**	54.682**	64.826	32.715	Rejection
0 < r ≤ 1	r ≥ 2	29.752	35.458	23.320	28.861	Fail to Reject
1 < r ≤ 2	r ≥ 3	16.432	19.937	15.532	18.520	Fail to Reject
2 < r ≤ 3	r ≥ 4	3.899	6.635	3.899	6.635	Fail to Reject
Normalized cointegrating coefficients	FDI 1	GDP 8.891 (0.549)***	Export 10.463 (0.489)***	Employment 90.713 (4.439)***		

*Akaike information criterion is minimised for choosing the optimal lag of 5
** The results are significant at 1% level of significance
*** Numbers in parentheses are the standard error value

7.4.3. Residual Diagnostic Tests

A VAR model in first-differences of the macro-economic variables of interest could be employed once cointegrating relationship among them is confirmed. Besides, Akaike information criterion sets the optimal lag length of restricted VAR in first-differences of variables to be 5, which equals to the 5lags for such VAR in level. The residual diagnostic tests for restricted VAR are hence should be performed in order to examine whether or not those residuals are subject to the statistical problems of autocorrelation and heteroskedasticity. Following table is a summary of diagnostic results where it suggests that the residuals of restricted VAR in first-differences are free from both autocorrelation and heteroskedasticity. The null hypothesis of white noise residual could not be rejected at 5% level of significance under the Lagrange multiplier (LM) test on 1 and 12 order autocorrelation of residuals. Further, the null hypothesis of homoskedasticity (no heteroskedasticity) could also not be rejected at 5% level of significance under White heteroskedasticity test on the residuals.

Table 25: Residual Diagnostic Tests* (Taiwan: 1990-2010)

Ho: White noise residual			
Lagrange multiplier test	**LM-Statistic**	**P-value**	**Decision on H0**
1-lag	21.072	0.176	Fail to Reject
12-lag	16.424	0.424	Fail to Reject
H0: Homoskedasticity			
White heteroskedasticity test	χ^2	**P-value**	**Decision on H0**
Chi-sq	163.301	0.413	Fail to Reject

* All the results are significant at 5% level of significance

7.4.4. Variance Decomposition Percentage Analysis

In order to build the framework for the dynamic value-chain interaction among FDI and other macro-economic variables including GDP, Export and Employment, it is necessary to apply forecast error variance decomposition to analyse the proportion of the movements in the dependent variables that are due to their 'own' shocks compared with shocks to the other variables, and apply impulse response functions to track the responsiveness of the dependent variables in the VAR to shocks to each of the variables (see Brooks, 2008). Following table is estimated results for variance decomposition which evaluate the forecast error components of a certain variable originating from the orthogonalized innovations within the system, and analyse relative significance of the macro-economic variables in the Taiwanese economic system. The numbers reported in the table indicates the percentage of the forecast error in each variable of interests that are attributable to the innovations in other variables in three different time horizon: 1st year, 5thyear and 10th year.

As indicated by the first part of results, the innovation of FDI growth is only explained by a large percentage of the forecast error variance of its own innovations (100% in the 1ˢᵗyear). Further, change in GDP nearly explains 8.76% of change in FDI, and 7.57% and 2.07% in

Export and Employment, respectively. Hence, the result suggests that the innovation in FDI growth could be mainly explained by its own innovation, GDP, Export and Employment, respectively. This result is in line the empirical conclusion of Chapter 5 that FDI in Taiwan follows the market size hypothesis. In the second part of result, the variability of GDP growth change is mainly explained by its own innovation (90.74%) and FDI (9.26%) in the 1st year period. Nevertheless, the percentage of the forecast error variances of its own innovation is decreased to 43.40% in the 5th year, but those of FDI, Export, and Employment are increased to 18.95%, 34.78% and 2.88%, respectively. Further, the forecast error variance could be explained by 17.33% of FDI, 36.15% of Export and 3.87% of Employment in the long term. Hence, the innovation in the GDP growth could be mainly explained by its own innovation, FDI, Export and Employment. It is also noteworthy that the two-way feedback between FDI and GDP based on the single equation model in the previous chapter might be over-estimated when it is compared with such feedback based on the multivariate framework in this chapter. In the third part of result, the innovation of Export growth is mainly explained by GDP (55.38%), FDI (20.56%), and its own change (24.05%). Nevertheless, while the percentages of the forecast error variance of its own innovations and Employment are increased to 34.68% and 5.17%, respectively, in the 5th year, percentages of FDI and GDP are decreased to 17.36% and 42.79%, respectively. After another 5 year, 43.85% of variance is explained by GDP, followed by its own innovation (35.25%), FDI (15.66%), and Employment (5.24%). Hence, it could be concluded that the innovation in Export growth is explained mainly by its own innovation, GDP, FDI and Employment. In addition, the result implies that the export levels is more sensitive to the GDP growth than the other macro-economic variables, and it also confirms that growths of GDP and inward FDI are necessary pre-conditions for expanding activities of Export in

Taiwan. In the last part of result, the variability if Employment growth is explained by its own shock (44.74%) in the 1styear, while 42.37% is due to change in GDP, 8.85% to FDI, and 4.04% to Export. In the 5th year, while the explanatory proportion of its own innovation and GDP are both decreased to 18.16% and 34.81%, respectively, the percentages of FDI and Export are increased to 13.89% and 33.41%, respectively. After another 5 years when the forecast error variances of FDI and Export remain to be at the similar level, the percentage of GDP is increased to 36.32%, but its own innovation is decreased to 16.82%. Hence, it could be concluded that Employment growth is mainly driven by GDP and Export, and partly by FDI. It could also be considered that FDI is able to contribute the employment growth through the channel of Export and GDP, which help us to further clarify the empirical results in Chapter 5 that shows how FDI increases the employment opportunities in Taiwan.

Therefore, one of conclusion drawn from variance decomposition analysis is that the sensitivities of GDP, Export and Employment to change in FDI are strong than the sensitivity of FDI to other variables. In terms of dynamic relationship between GDP and Export, Export is sensitive to change in GDP and vice versa, but the former suggests a stronger sensitivity than the latter one. Such result provides supporting evidence that there is a casual relationship between country's export levels and economic growth, and an existence of export-driven economic growth. Further, the Employment level is very sensitive to the FDI, GDP and Export, but not conversely. This provides evidence that increases in FDI, GDP and Export could help to boost the Employment participation and opportunities.

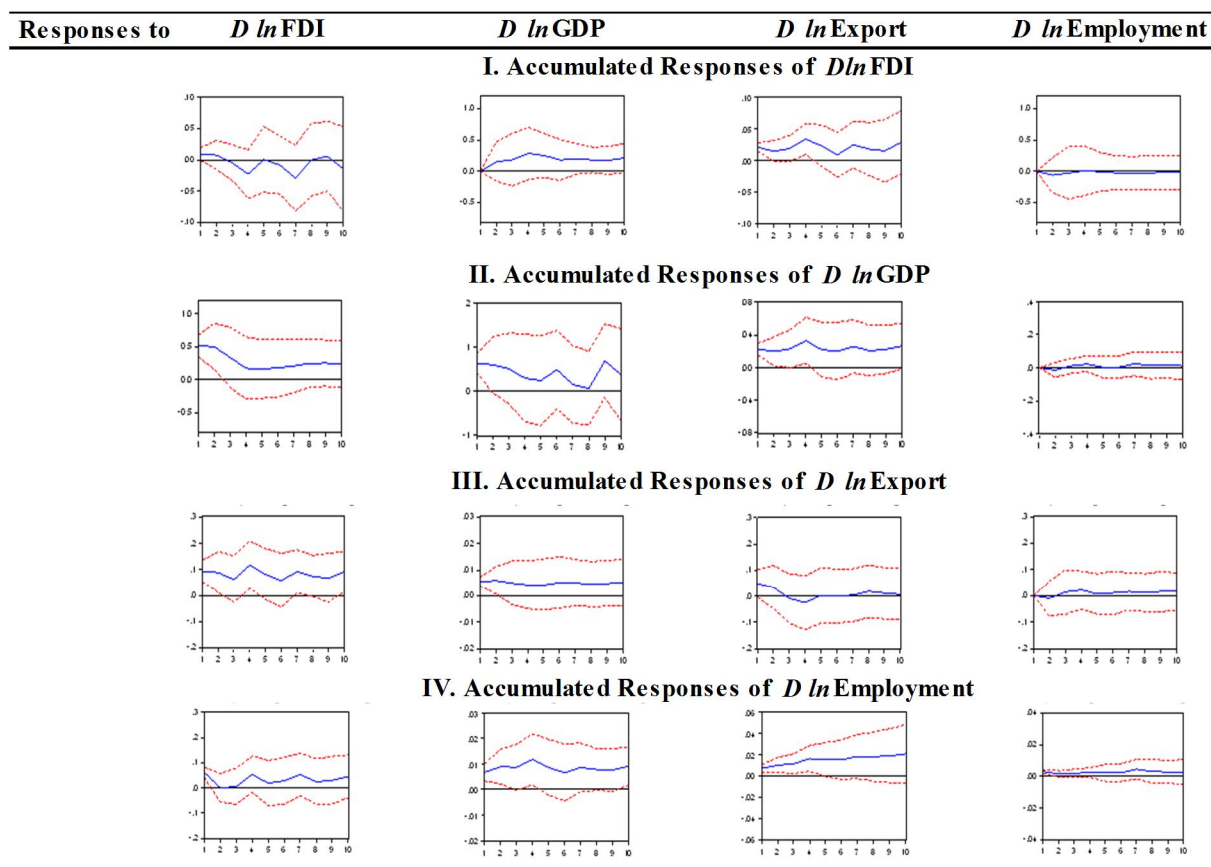**Table 26: Variance Decomposition Percentage Analysis (Taiwan: 1990-2010)**

Year	Standard Error	$D \ln$ FDI	$D \ln$ GDP	$D \ln$ Export	$D \ln$ Employment
		I. Variance decomposition percentage of $D \ln$ FDI			
1	0.53	100.00	0.00	0.00	0.00
5	0.62	85.12	6.53	6.33	2.02
10	0.64	81.59	8.76	7.58	2.07
		II. Variance decomposition percentage of $D \ln$ GDP			
1	0.02	9.26	90.74	0.00	0.00
5	0.04	18.95	43.40	34.78	2.88
10	0.05	17.33	42.65	36.15	3.87
		III. Variance decomposition percentage of $D \ln$ Export			
1	0.13	20.56	55.38	24.05	0.00
5	0.19	17.36	42.79	34.68	5.17
10	0.21	15.66	43.85	35.25	5.24
		IV. Variance decomposition percentage of $D \ln$ Employment			
1	0.01	8.85	42.37	4.04	44.74
5	0.01	13.89	34.81	33.14	18.16
10	0.01	13.65	36.32	33.21	16.82

7.4.5. Impulse Response Functions

In order to track the responsiveness of the dependent variables in the VAR to shocks to each of the variables and the direction of such impact, it is necessary to derive impulse response functions from VAR model. Following table is a summary of impulse responses which are plotted with thin dashed lines of two standard error bounds, and time interval for dynamic response is defined with 10 years. In the first part of graph which shows the response of FDI to the disturbances of other three macro-economic variables, it suggests that while there is no major positive or negative shock of Employment on FDI, the shocks of an impulse in GDP and Export have positive impacts on FDI. The result implies that inward FDI could be increased and induced by positive real GDP growth and expanding export activities. Such result is consistent with market size hypothesis proposed by Moore (1993) which states increasing income per capita is beneficial for the host country to attract FDI from foreign countries and multinational enterprises. In the second part of graph, both the shocks of an impulse in FDI and Export have immediate positive impact on real GDP growth, and those

responses of GDP belong to a quick dynamic adjustment. Compared with them, the shock of an impulse in Employment has slightly positive impact on real GDP growth but with a slow quick dynamic adjustment. In the third part of result, the shock of an impulse in FDI and GDP have a significantly short-run impact on Export level, but such positive impact become less significant in the latter period. It implies that Export activities could be further boosted by a positive shock in FDI and GDP where shock of the former one has a strong impact than that of the latter one. The result could provide evidence that export, which is one of the major economic activities in Taiwan, is led by FDI and GDP. Further, a positive impact of the shock of an impulse in Employment on Export is consistent with Okun's law and Solow's growth theory where increasing employment levels of labour force could further boost country's economic growth and activity. In the last part of graph, all the shocks of an impulse in FDI, GDP and Export have positive impacts upon Employment, which proves the fact that increasing FDI, rising GDP growth and expanding Export activities could lead to the improvement of Employment level especially for the labour force with skills.

Table 27: Impulse Response Functions* (Taiwan: 1990-2010)

Responses to	*D ln* FDI	*D ln* GDP	*D ln* Export	*D ln* Employment

I. Accumulated Responses of *Dln* FDI

II. Accumulated Responses of *D ln* GDP

III. Accumulated Responses of *D ln* Export

IV. Accumulated Responses of *D ln* Employment

*two standard error bounds are specified as thin dashed lines

7.5. Conclusion

We employ VAR methodology, including variance decomposition and impulse response function analysis, to identify and evaluate dynamic value-chain interaction among FDI and macro-economic variables, including GDP, Export and Employment, from 1990 to 2010. Panel co integration tests indicate that there is one cointegration among these four variables of interest, suggesting that a long-run equilibrium exists between them. The summary of results follows.

Table 28: Summary of results

a. Variance Decomposition Percentage Analysis				
Variable	**FDI**	**GDP**	**Export**	**Employment**
FDI	Major	Medium	Medium	Minor
GDP	Medium	Major	Major	Minor
Export	Medium	Major	Major	Minor
Employment	Medium	Major	Major	Medium

* Strong two-way causal and dynamic interactions among FDI, GDP and Export

** FDI, GDP and Export are all found to positively affect number of Employment, but the reverse relationship is rather minimal

b. Impulse Response Functions				
Variable	**FDI**	**GDP**	**Export**	**Employment**
FDI	Volatile	Positive	Positive	Neutral
GDP	Positive	Positive	Positive	Neutral
Export	Positive	Positive	Volatile	Neutral
Employment	Positive	Positive	Positive	Neutral

The inward FDI is positively affected by the shocks in GDP and Export. These two variables could jointly explain 16% of variation in FDI, suggesting that Taiwan's inward FDI is rather sensitive to changes in economic growth and export levels. In terms of the dynamic relationship between FDI and GDP, it is found that there is a two-way feedback between them, whose strength is nevertheless somewhat imbalanced. The impact of FDI on GDP is relatively stronger and more significant than that of GDP on FDI, which is reflected both by variance decomposition analysis and impulse response functions. That is, in the former analysis, change in FDI could explain more forecast error variance in GDP than GDP could explain variance in FDI. The response of GDP to a shock in FDI is relatively more dynamic than the response of FDI to a shock in GDP. Further, GDP is rather more sensitive to shocks in its own past values and export activities than to shocks in FDI. Also, FDI is rather more sensitive to shocks in its own past values than to shocks in GDP and export activities. It could be inferred that the results of the previous chapter based single equation methodology

might over-estimate the strength of two-way feedback between FDI and Taiwanese economic growth. Despite this, economic growth can still be regarded as a significant determinant of inward FDI in Taiwan. On the other hand, the shocks in FDI inflows have positive impacts on GDP, Export and Employment, and the impacts of FDI are able to explain more than 10% of variation changes in these three variables. Such results imply that inward FDI could potentially increase the country's economic growth, export levels, and employment via capital accumulation, knowledge transfer and productivity spillovers. In addition, we find that there is a rather strong two-way feedback between GDP and export activities, reflecting that these two variables are able to promote each other, especially in the short term. Hence, it is advisable for government to develop further incentive policy and strategy to promote export activities in order to boost the country's economic growth and attract foreign investment.

The empirical result confirms the existence of two-way causal and dynamic interactions among FDI, GDP and Export. The two-way causal links from economic growth and export activities to FDI are in line with previous studies and chapters, and reflect that external trade and economic prospect have made Taiwan an attractive FDI destination for multinational enterprises. Moreover, such two-way feedback among variables implies that FDI could be a growth determinant in Taiwan, which can also be found in sixty-nine other developing countries (see Borensztin et al., 1998). While it might be rather too bold to infer that FDI is a fundamental driver of economic growth in Taiwan, it could reflects that FDI could still be considered a close proxy for the degree of openness of the macro-economic policy and position of the Taiwanese government. Further, there is evidence in the impulse response function that an increasing level of inward FDI in Taiwan in post-1980s has been reflected

majorly in economic growth and export activities, but slightly in employment levels. It might be reasonable to argue that aggregate inward FDI in Taiwan has reached a significant level for any types of spillovers to be effective at the overall economic level.

In addition, while FDI, GDP and Export are all found to positively affect employment; the reverse relationship is rather minimal. It is noteworthy that both economic growth and export levels could jointly explain more than 30% of variation change in employment levels, and FDI could only explain 13% in the long run. This result suggests that increasing FDI, growing economy and expanding export are all able to induce output growth by demanding a more skilled labour force to produce products. Therefore, it is necessary for government to devise certain educational policies in order to equip the labour force with advanced technical skills and meet future human resources demand. On the other hand, the VAR framework nevertheless suggests that there is a stronger evidence of two-way causal links between FDI, GDP and Export than that of such links from Employment to the other three variables of interests. Such circumstances could be explained by the possibility that dynamic inter-relations between the former three variables might potentially generate spurious results of causality in the analysis of interactions among all four variables of interests. This possibility also exists in the previous related research works (e.g. Liu, Burridge and Sinclair, 2002).

It is a potential concern that the Asian financial crisis in 1997, the credit crunch in 2008 and the Euro-zone crisis in 2010 may have significant impacts on Taiwanese economic environment, and distort the empirical result of dynamic interactions among FDI and other macro-economic variables conducted in this chapter. Because of these unusual circumstances, data of these three years are dropped and re-examine the result. The

empirical results are not found to have a large and significant difference from the original results, and such non-significant difference shows that those crises do not cause a continuous structural break of interactions among macro-economic variables of interest in Taiwan. Further, it could also potentially prove that macro-economic system and business environment in Taiwan are fundamentally sound during the examination period, and such high degree of stability of system and environment could be essentially underpinned by other several forces and factors, missed from this research, e.g. public policy and regulatory framework for FDI, market liberalisation, that soften the FDI volatility and market fluctuation.

Although there are advantages to using VAR method to examine dynamic value-chain inter-relationship between these macro-variables, this research still neglects several areas that are worthy of further consideration and future investigation. First, according to Leichenko and Coulson (1999), the VAR method is still subject to criticism even if it is a relatively simple and parsimonious tool to closely examine the dynamic causal links and inter-relations among variables of interest. While Cooley and Le Roy (1985) criticized the VAR method as being primarily driven by empirical base rather than theoretical foundation, Leamer (1985) pointed out that the definition of causality in the VAR method might be misleading. The former criticism stems from the fact that only a few theoretically derived a priori assumptions and restrictions are imposed on the VAR model, and an economic story and explanation are simply told by dataset. Hence, as argued by Marin (1992), it is necessary to evaluate empirical result so as to determine whether dataset are consistent with theoretical foundation. The second criticism exists because the basis on which Granger defines causality is the existence of simple and temporal relations among variables of interest. Even

though the VAR approach allows us to empirically investigate the dynamic inter-relations among the macro-economic variables in Taiwan, it is essential for us to recognize that relevant theories still play a fundamental role in selecting variables for the VAR model. Thirdly, in addition to export levels, economic growth, and employment levels, other macro-economic variables could potentially have association with inward FDI. It is nevertheless that all variables of interests should essentially have a priori relations among them within VAR system. Through the isolation of four variables in this chapter, we are only able to offer certain detailed insights on how the inter-relations among our variables affect each other, without providing an insightful view and analysis on overall economy in Taiwan. Lastly, it is obvious that this research is not based on a disaggregate perspective but an aggregate one. It is without doubt that a disaggregate dataset; including industry, sector, or corporate level, might be able to provide another insightful view and analysis on nexus among those variables of interests. In spite of these limitations mentioned, our research chapter and empirical results could still play an essential role in furthering understanding of dynamic value-chain inter-relations among inward FDI, economic growth, export activities, and employment levels in Taiwan.

8.   Conclusion

Over the last decade, there has been an increasing trend and force of globalisation for multinational enterprises which focuses on promoting international trade in goods and services between countries, and expanding international sales and production to other countries. As one of the Four Asian Tigers, the Taiwanese government has kept developing and implementing a series of economy-reforming policies and industry-promoting plans since the 1990s, e.g. the Six-year National Development Plan, so as to transform itself from manufacturing-cantered to a balanced economy with a service industry, in an attempt to maintain its leading position in the economic performance and innovative development. Taiwan attracted inward FDI with a grand total of USD 99.86 billion from 1990 to 2010, and benefited significantly from tangible and intangible assets, such as techniques, know-how, machineries, and managerial experience, which are associated with inward FDI. Along with these large inflows of FDI into the market during this period, Taiwan's economy has experienced an average growth rate of more than 5% annually. There are only a limited number of emerging countries in the 20th century which have had such remarkable economic performance and benefited from inward FDI by multination enterprises as much as Taiwan. Hence, there has been an extensive body of academic literatures and professional studies on the Taiwanese economy over the last few decades with the purpose of identifying and evaluating the nature of inward FDI and its impact on Taiwan's economic and industrial development (e.g. Tsai (1991), Satoru (1994), Chen (1996), Bende-Nabende and Ford (1998), Kuo and Li (2003), Lien, Piesse, Strange, and Filatotchev (2005), Hung and Chiang (2009)).

As mentioned in the introduction, this thesis intends to model the post-1980s determinants

of FDI inflow distribution in Taiwan, investigate the impact of FDI on economic growth based on the country's industry-level data, and identify dynamic value-chain reaction among FDI and economic variables from the macro-economic perspective. It consists of a review of Taiwan's FDI development and economic performance (Chapter 2), a comprehensive overview of academic literature on the FDI theories and empirical works (Chapter 3), a detailed introduction and discussion of research methodologies and data sources (Chapter 4), and three independent empirical chapters that addresses research aims, objectives, and contributions (Chapter 5, 6 and 7). This concluding chapter intends to provide insight on the research findings by discussing the implications and contributions of empirical results. Further, this chapter will discuss the research limitations and raise future areas that could possibly extend from this research.

8.1. Research Findings

This thesis was undertaken to provide comprehensive and detailed analyses on inward FDI in Taiwan in post-1980s, and its potential impacts on Taiwan's economic growth and other macro-economic variables. The key findings in this research could be generically summarised into the following three points. Firstly, at the static level of panel data, FDIs by multinational enterprises are positively influenced by market size and employment level; whereas, at the dynamic level of panel data, FDI inflows are positively determined by market size and wage cost, but negatively determined by employment level. Secondly, based on the Granger causality test, a two-way feedback between inward FDI and economic growth is recognizable at the overall economic and industrial level (manufacturing and service) in Taiwan. In terms of the cross-industry level in the country, FDI in the manufacturing industry could significantly contribute to the GDP of services industry, and

FDI in service industry has the same impact on the GDP of the manufacturing industry. Thirdly, from the perspective of dynamic value-chain interaction, not only has inward FDI in Taiwan significantly and positively contributed to economic growth, export activities, and employment levels over the past decade, but also have both economic growth and export activities have been significant driving factors of FDI inflows to the country.

The research objective of chapter 5 is to identify the factors that are significant to multinational enterprises when evaluating FDI proposal and decision in Taiwan. With an aim of providing up-to-date research determinants of FDI in Taiwan, and evaluating the impacts of those variables of interest, Chapter 5 addresses the research question by using to static and dynamic panel data approaches based upon the industry-level data in Taiwan from 1990 to 2010. The variables of interest covered in this chapter include market size, wage cost and employment level, whereas the controlling variables include degree of openness, exchange rate and political stability. In contrast to previous studies on FDI determinants in Taiwan, the dynamic panel data approach allows us to solve the econometric problems of autocorrelation and endogeneity. The empirical results suggest that market size and employment level are significant factors in explaining FDI inflows to Taiwan, while wage cost is not a significant factor of investment decision-making process for foreign investors. Such results reflect that macroeconomic stability and policy on domestic market expansion would influence FDI decision of foreign investors. Further, the negative impact of the employment level reflects that FDI still positively correlates with labour availability and it would be reduced by the high level of employment in the previous year. On the other hand, the insignificant coefficient of wage cost implies that foreign investors no longer regard Taiwan as a country with a supply of cheap labour for mass production, but one with a supply of highly skilled

and sophisticated talents for the high-end manufacturing and servicing industries.

The research objective of chapter 6 is to assess whether or not the growth effect of FDI is existent at the aggregate, industry-specific, and cross-industry level by employing the econometric methodology of panel cointegration and Granger causality on a dataset that covers 10sectors in the manufacturing and services industries in Taiwan from 1990 to 2010, given the significant change in economic structure and FDI composition in Taiwan. Since panel cointegration framework allows for heterogeneity across10 industries in the manufacturing and services industries, it is able to assist us in identifying whether or not a long-term stable relationship between FDI and economic growth existents at the aggregate, industry-disaggregated, and cross-industry level. As expected, the empirical result reflects a strong two-way feedback between FDI and GDP in the long run at the aggregate level based on the Granger causality test. At the industry-disaggregate level, even though there is a significant two-way feedback between FDI and GDP in the long run in the manufacturing and services industries respectively, the feedback of the manufacturing industry is slightly stronger than that of services one. It is a surprising result that, at the cross-industry level, GDP growth in manufacturing and service industries has been significantly induced by inward FDI in the other one. Moreover, the impact of FDI in the service industry in inducing manufacturing GDP is relatively stronger than that of FDI in manufacturing industry in inducing service GDP. This result could be explained by the fact that the value-added service provided by foreign investors to manufacturing industry in Taiwan has been phenomenal, and the economic growth effect of service FDI on manufacturing industry has become materialized.

Since the previous two empirical chapters fail to consider dynamic interaction among FDI and other macro-economic variables of interest based on a multivariate framework, the research objective of chapter 7 is to identify the interactions among inward FDI, GDP growth rate, exports activity, and employment level based on the data from 1990 to 2010 by using vector auto-regression (VAR) in order to recognize the causality between these macro-economic variables and evaluate their dynamic value chain-reactions. The result suggests that Taiwan's inward FDI is rather positively sensitive to the changes in economic growth and export activity, and the shocks in FDI inflows have a positive impact on economic growth, export activity and employment level. Furthermore, there are significant and positive two-way causal links from economic growth and export activity to FDI, and this result reflects that external trade and economic prospect have made Taiwan an attractive FDI destination for multinational enterprises over the last two decades. It is also found that there is a rather strong two-way feedback between economic growth and export activity, reflecting that these two variables are able to promote each other. It is also noteworthy that while FDI, economic growth, and export activity are all found to positively affect employment level, the reverse causal links from employment level to other variables are rather minimal. This phenomenon suggests that increasing FDI inflows, growing economy and expanding export are all able to induce output growth by demanding more skilled labour force to produce products.

8.2. Contributions

This thesis conducts systematic research and investigation on inward FDI in Taiwan from various perspectives. It empirically identifies the significant determinants of FDI in Taiwan based on the static and dynamic panel data approaches, evaluates the causal links between

FDI and economic growth based on the bivariate approach and panel cointegration framework, and assess the dynamic value-chain interaction among FDI and other macro-economic variables based on the multivariate framework and VAR methodology. Not only does this research contribute to the current academic field by applying the well-established and advanced econometric methodologies to the most recent overall- and industry-level data, but it also provides academic scholars and governmental authorities with the different roles played by FDI in Taiwan's economic system and industrial development. In comparison with the previous academic works and empirical studies, this thesis is able to fill the academic gap and extend the scope of existing literature in the following ways.

The first contribution is the use of the most recent panel data covering aggregate economic and disaggregate industrial levels, and advanced and solid econometric methodologies so as to provide the up to dated researches on the role of FDI in Taiwan. Traditional econometric methodology used by previous empirical works on inward FDI is mainly ordinary least squares estimation. Nevertheless, this methodology tends to overlook the essential nature of macro-economic dataset, which is comprised of both spatial and temporal dimensions. Hence, the first two empirical chapters employ the panel data approach, allowing us to take into account the nature of time-series data, and then yield more accurate and robust estimates so as to investigate the determinants of FDI and the growth impact of FDI in the post-1980s period of economic and industrial transformation in Taiwan. It is firmly believed that the resulting empirical conclusions are capable of filling the academic gaps by furthering understanding of the role of FDI in Taiwan, and assisting the governmental authorities in devising ground-breaking and far-reaching policies.

The second contribution is made by conducting industry-level research in Taiwan in the first two empirical chapters, in that all of the previous academic studies on Taiwan tend to be focused on the total volume of FDI whose results only provided a limited understanding of the factors considered by foreign investors when evaluating investment. Further, the industrial distribution of FDI inflows has a significant direct impact on the host country's sectoral structure and economic development. Furthermore, compared with previous research results on the pre-1980s period, this thesis, focusing on the post-1980s period, allows us to identify the newly changing attitude foreign investors have had toward Taiwan, since the country is already experienced the economic and industrial transformation from a traditional manufacturing industry to the service and high-tech industries during the period. Therefore, the empirical conclusions of all three empirical chapters are able to provide strong implications of future trends and the role of FDI in Taiwan for academic scholars, professional practitioners, and policy-makers.

The third contribution is the systematic review and investigation of the role of inward FDI in Taiwan from three perspectives, including its determinants, growth impact, and dynamic value-chain reaction to other macro-economic factors. The first empirical chapter aims to investigate the determinants of FDI in Taiwan based on the industry-level dataset, where variables of interests include market size, employment level, wage cost, and identify which significant factors foreign investors would consider the most during the investment decision-making process. It is believed that chapter 5 has two main contributions made by the static and dynamic panel data approach. The first is to capture the dynamic nature of the FDI process at industry level based on the GMM dynamic panel estimator. The second is to disaggregate inward FDI made by foreign investors in Taiwan at the industry and sector

level which allows us to better understand their investment behaviour. Additionally, the second empirical chapter aims to assess whether or not the growth effect of FDI exists at the aggregate, industry-specific, and cross-industry levels by employing a bivariate framework and the Granger causality approach on a dataset that covers manufacturing and servicing industries in Taiwan. It is considered that chapter 6 could make a significant contribution to the existing academic field by taking into account the heterogeneity of the causal link between FDI and economic growth across industries in Taiwan, and identifying the accurate direction of causality between them. The third chapter aims to identify the dynamic interactions among inward FDI, economic growth, exports activity, and employment levels by using vector auto-regression (VAR) rather than a production function model or foreign investment model, and recognize the causality between these macro-economic variables and evaluate their dynamic value-chain reactions. It is thought that the key contributions made by chapter 7 are to address the weakness of previous chapters by taking into account the dynamic interactions among those four variables of interest based on a multivariate framework, and to provide a further understanding of Taiwan's macro-economic system through the variance decomposition percentage analysis and impulse response functions.

8.3. Research Limitation and Recommendation

Even though the topics covered in this thesis have substantially and widely extended an academic area from several aspects, our research determinants of FDI, its growth impact and its interaction with other macro-economic factors could be furthered if the following limitations could be addressed.

When investigating the FDI determinants in chapter 5, our research does not include several

other factors, such as the variables of tax, state-owned enterprises, and information cost and agglomeration economies, due to limited data availability. In terms of the tax variable of parent and host countries, its impact has several practical implications on the returns on FDI, attraction of Taiwan to FDI, and effectiveness of Taiwan's FDI-related policy. For instance, while Hartman (1984) found that the retained earnings of FDI respond significantly to the tax rate of the host country by not controlling for tax rates of the parent country, Hines (1996) demonstrated that foreign investments respond negatively to the higher state tax rate in the USA. In terms of the factor of state-owned enterprises, it is believed by Branstetter and Feenstra (1999) that FDI in one host country would compete with state-owned enterprises of certain industries by allowing foreign investors have an access to the domestic market and sacrificing the existing economic benefits gained by state-owned enterprises. Further, Zhao (2001) concludes that multinational enterprises may have a significant implication on wage rates by discovering that employees in foreign-owned firms are paid a much higher rate than their counterparts with similar levels of education and skills in state-owned ones. In terms of the factor of information cost and agglomeration economies, whilst Dunning (1998) argues that information, especially private information, appears to be increasingly important in the locational choices of MNEs in host economies in the 1990s, He (2002) found empirical evidence that information costs and agglomeration economies are both significant determinants for locational choices of MNEs. Therefore, multinational enterprises have a greater inclination to invest in a host country and city where they are capable of minimizing information costs and maximizing the benefit of agglomeration economies.

When investigating the growth impact of FDI at aggregate, industry-specific, and cross-industry level in chapter 6, our research is faced with the following limitations. First, the

relatively short period of observation in this research may not fully capture the long-term growth effect of FDI, since the methodology used only requires a consistent data series of industry-level FDI and GDP from 1990 to 2010. According to Clemens et al. (2004), such data and timeframe restriction only allows us to opt for attribution rather than comprehensiveness in dealing with the inescapable trade-off between the two. Second, limited data availability prevents us from further examining the growth effect of corporate-related service FDI on the manufacturing industry. It could be a future research area which potentially complements this industry-level study with particular case studies. Its result is able to provide more understanding of mechanisms through which corporate-related service FDI in Taiwan could contribute greater operating efficiency and output growth of country's manufacturing industry. Lastly, it is potentially viable to build a multivariate framework to further evaluate the direction of causality between FDI inflows and economic growth. Such a framework could provide us with further understanding on indirect causality which runs FDI through auxiliary variables to economic growth in Taiwan. Nevertheless, it is rather obvious that multivariate framework requires more strict disaggregate data requirement than bivariate framework does. The disaggregate data requirement include physical and human-capital formation.

When investigating on the dynamic value-chain inter-relationship among FDI and other macro-economic variables in chapter 7, our research still neglects several areas that are worthwhile for further consideration and future investigation. First, it is the simplicity and parsimony to which VAR method is subject since the method only requires few a priori assumptions and restrictions. For instance, while Cooley and Le Roy (1985) complained that the VAR method is primarily driven by an empirical base rather than a theoretical foundation, Leamer (1985) criticised that the definition of causality in the VAR method

might be misleading. Hence, as argued by Marin (1992), it is necessary to evaluate empirical results so as to determine whether dataset are consistent with the theoretical foundation. Second, the basis on which Granger defines causality is the existence of simple and temporal relations among variables of interest. Even though the VAR approach allows us to empirically investigate the dynamic inter-relations among the macro-economic variables in Taiwan, it would be essential for us to recognize that relevant theories still play a fundamental role in selecting variables for the VAR model. Third, besides export levels, economic growth, and employment levels, other macro-economic variables could potentially have association with inward FDI. Nevertheless, all variables of interest should essentially have a priori relations within the VAR system. Through the isolation of four variables in this chapter, our empirical results is only able to offer certain detailed insights on how the inter-relations among those variables in the system affect each other, without providing an insightful view and analysis on overall economy in Taiwan. Fourth, it is obvious that this research is not based on a disaggregate perspective but an aggregate one. It is clear that disaggregate dataset, including at industry, sector, or corporate level, might be able to provide another insightful view of the nexus among those variables of interests. In spite of the limitations mentioned, our research chapter and empirical results could still play an essential role in providing a further understanding of dynamic value-chain inter-relations among inward FDI, economic growth, export activities, and employment levels in Taiwan.

Last but not least, the overall thesis lacks investor-level country data, which might be necessary to provide further examination on industry-level distribution of FDI in Taiwan. Since some factors that have a substantial impact on the total FDI inflow may have different or even no influence on a foreign investor from a certain country, it would be an area to be researched on the FDI from a specific country in a specific industry or sector. Moreover,

even though the overall thesis utilizes several advanced and solid econometric methodologies to analyse dataset and derive conclusions, a case study approach could be employed in order to provide another perspective of in-depth and insightful analysis on a certain industry or foreign investor. It is widely known that econometric techniques may potentially lead to a generalized conclusion based on large-scale data, but a case study approach may be used to investigate on specific types of investment, such as investor-level, industry-level or even corporate-level.

9. References

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