1. Introduction

1.1 Background and motivation

United Nations Conference on Trade and Development (UNCTAD) defines foreign direct investment (FDI) as an investment involving a long-term relationship and reflecting a lasting interest and control by a resident entity in one economy in an enterprise resident in an economy other than that of the foreign direct investor. The deregulation of capital outflow by the Taiwanese government in 1987 created a watershed in the pattern and amount of FDI by Taiwan. The policy permitted a business or an individual to annually send up to 5 million US dollars abroad without governmental approval. As a result, FDI surged. Between 1987 and 1988, both the number of Taiwanese FDIs and their total value surpassed those of the FDI coming into Taiwan. (In the remainder of this paper, unless specified otherwise, FDI refers to outgoing FDI, that is, FDI flowing from Taiwan to another country.) Taiwan has since become a net capital exporter. However, after the Asian Financial Crisis of 1997, Taiwan's FDI destinations changed dramatically. This is particularly evident in the rebalancing of FDI funds between crisis-affected Southeast Asian countries on the one hand and China on the other. Not only has the FDI flow from Taiwan to China increased over the last ten years, but since 1997 so has the ratio of Taiwan's FDI in China to its FDI in Southeast Asia.

The growth of FDI in China s ince the beginning of China's economic reforms in 1978 has been striking. Since 2002, China has become the largest recipient of foreign capital in the world. After Taiwan and China started to exchange visits across the Taiwan Straits in the 1980s, direct investment by Taiwanese businessmen in China began to rise rapidly. Even though Taiwan and China share a very similar cultural background, and despite their different economic and political systems, China has a

distinct advantage over Taiwan in attracting FDI; this advantage cannot be attributed solely to economic factors.

It is well recognized that the electronics industry is a key driver of Taiwan's economic growth. Since 1983, this industry has transformed itself from an original equipment manufacturer (OEM) to an original design manufacturer (ODM). With the emergence of China as a more attractive low-cost production and exporting platform, many companies have established production sites in China as a way to become more involved in global logistics management (GLM). According to Taiwan's Mainland Affairs Council, the cumulative number of Taiwanese FDIs in China, which began in the 1980s, reached 36,459 by 2007. The aggregate value of this FDI was 63.3 billion US dollars. In fact, China has now become the primary destination for Taiwanese enterprise funds. The FDI for manufacturing from Taiwan's various industries is distributed as follows: 15.8% for electrical equipment; 15.4% for computers, electronics, and optical products; and 6.8% for basic metals. These data show two things: (1) the ties between manufacturing in Taiwan and China are strong; and (2) Taiwan's electrical equipment manufacturing industry is the primary contributor to this capital outflow.

The degree of the government involvement on outward FDI in most Asian countries is more significant than the involvement of those governments in the U.S. and European countries. There is an upper limit of amount and regulations about the approved items for investment in outward FDI from Taiwan. Therefore, the parent country determinant should not be neglect.

In recent years, issues related to FDI have attracted much attention from scholars in international business and economics. It has been well documented that FDI provides various benefits to the host county. These include productivity gains, technology transfers, and economic growth (Ang, 2008; Baltagi *et al.*, 2007;

Chowdhury and Mavrotas, 2006; Gholami *et al.*, 2006). Numerous studies have found that the identity of the host country is the key factor driving FDI (Ang, 2008; Cheng and Kwan, 2000; Eichengreen and Tong, 2007; Hooper and Kim, 2007; Jinjarak, 2007; García-Herrero and Santabárbara, 2007; Giner and Giner, 2004; Mina, 2007; Xu *et al.*, 2008; Zhang, 2005). However, the role of the parent country's government as another determinant has been largely ignored in these studies. Previous studies of FDI by Taiwanese industries have addressed issues such as performance evaluation, technology forecasting, and location selection (Chen and Ku, 2000; Lee *et al.*, 2007; Li and Hu, 2002). However, the parent country's perspective is not considered. Some literatures try to discuss the factors of FDI, such as Deng (2007) examined the motivation underlying China's FDI from an asset-seeking perspective. Demirbag *et al.* (2007) adopted an integrated perspective incorporating both the host country and firm levels to examine the factors that influence perceptions of FDI success. Hsiao and Hsiao (2004) designated regional distribution, geographic proximity, and cultural similarity as important reasons why Taiwanese industry considers China to be such a good investment opportunity. Zhang (2005) considered the primary determinants of direct investment in China by Hong Kong and Taiwan (HKT) to be their export-promotion strategy. Compared to European Union, the US, and Japan their advantages in terms of export-oriented FDI, their unique linkage with China, and China's cheap labor. Ng and Tuan (2006) studied the geographical concentration of firms in China, especially the impact of this concentration on China's economic growth and how the decision of where to locate is related to institutional factors, such as government preferential or regional FDI-led policy. Xu *et al.* (2008) argued that the FDI chaos in China might be governed by the intervention of the Chinese government (host country policy). Unfortunately, none of these studies addressed FDI from the parent country's perspective. Although García-Herrero and Santabárbara (2007)

incorporated capital flow, the home country, the host country, and global factors into their FDI model, they considered the impact on FDI primarily from the viewpoint of the host country.

It is commonly noted that governments impose various types of regulation on FDI. This has been particularly true for Taiwan with respect to China. In response to the political tensions between China and Taiwan prior to 2008, Taiwan's government took steps to limit capital and technology outflow and to protect the country's employees in manufacturing and related areas. Specifically, it set an upper limit on FDI, while at the same time listing products made in China that Taiwanese firms were allowed to invest in. The upper limit for investment by any Taiwanese firm in China was defined as 40% of the investing firm's available capital or net value, whichever was lower. Both business leaders and academia continually complained about these regulations. On the other hand, unskilled workers and some political factions supported the government's FDI policies. These disputes remain unresolved. In any event, no solid empirical evidence has been offered thus far concerning whether the government's upper limit has had any effect on Taiwanese FDI in China. If there is an effect, how large is it? If there is not an effect, why not? Studying the behavior of outward FDI is not only beneficial to the investigation and planning of medium and long capital flow for the firms, but it also helpful for the government of the parent country in forecasting and managing the capital account and establishing FDI policy. Further, if the government is considering easing restrictions on Taiwanese industry investment, it would be an era for the cooperation of both sides under free market. It is worth our while to pay much attention to this issue, and it is also the motivation for this dissertation.

1.2 Purpose

The discussion in background and motivation showed that the determinants of outward FDI are many and diverse. The primary purpose of this dissertation is to develop an integrated FDI model for Taiwan's industry on outward FDI decision. In this dissertation, hypotheses regarding the effects of the Taiwanese government's FDI policy on firms' investment decisions, the macro environment of the parent country and the host country, comparative advantage determinant and firm-specific determinant are then developed and tested, by using partial least squares (PLS) path method.

1.3 Methodologies and Scope

Path analysis and causal modeling were introduced by Wright in the 1920s (Falk and Miller, 1992; Wright, 1921). Though developed by Herman Wold (1966, 1981, 1985) for econometrics, partial least squares (PLS) first gained popularity in chemometric research and later in industrial applications, such as computer information and management (Johansson and Yip, 1994; Raymond *et al*, 2001a, 2001b; Wixom and Waston, 2001). Now it has spread to research in education, marketing, and the social sciences. PLS path modeling can be used for analyzing multiple-block structure of variables when data has the following features: causal relationship, small sample, missing values, or displaying multicollinearity. Such a general and flexible framework also enriches the data analysis methods with non-parametric validation procedures (such as bootstrap, jackknife and blindfolding) for the estimated parameters and fit indices for the different blocks that are more classical in a modeling approach than in data analysis (Fornell and Bokksten, 1982; Tenenhaus *et al*, 2005).

In this dissertation, the collected data comes from the investment commission of the ministry of economic affairs (MOEA) and the database of Taiwan Economic Journal (TEJ). We will focus on high-tech industry of Taiwan, taking the integrated circuit (IC) initial public offerings (IPO) firms as an example, using seasonal data for

the period 1998-2007.

1.4 Contribution According to the empirical result, we found no significant evidence supporting the effectiveness of the upper limit. The most influential of the model's five determinants of Taiwan's FDI in China are factors specific to individual firms. The second most influential is the macroeconomic environment of the host country. The contributions of this dissertation are as follows:

(1) Developing a new structure (PLS path model) to study the effectiveness of outward FDI policy (upper limit regulations);

(2) It is based on an integrated perspective incorporating the parent country, the host country, and the firm-specific determinants, in particular, considering the of FDI policy (upper limit regulations) of the parent country that has been less mentioned in various literatures.

1.5 Structure

The idea of the dissertation originates from the comprehensive perspective on a firm's financial structure by Ogden et al. (2003) and as shown in Figure 1-1. The top panel depicts the components of a firm's business environment and external governance, the second panel identifies the firm's two internal constructs: internal governance structure and business strategy. The two constructs determine the firm's operational and financial structure, depicted in the third panel. Together the firm's business environment and external governance, internal governance structure, business strategy, and operational and financial structure determine the firm's risks, performance and contingencies. The factors in the final panel can be viewed from either an *ex ante* or *ex post*.

In this dissertation, business environment and contingencies are emphasized to analyze the effectiveness of Taiwan's upper limit regulations.

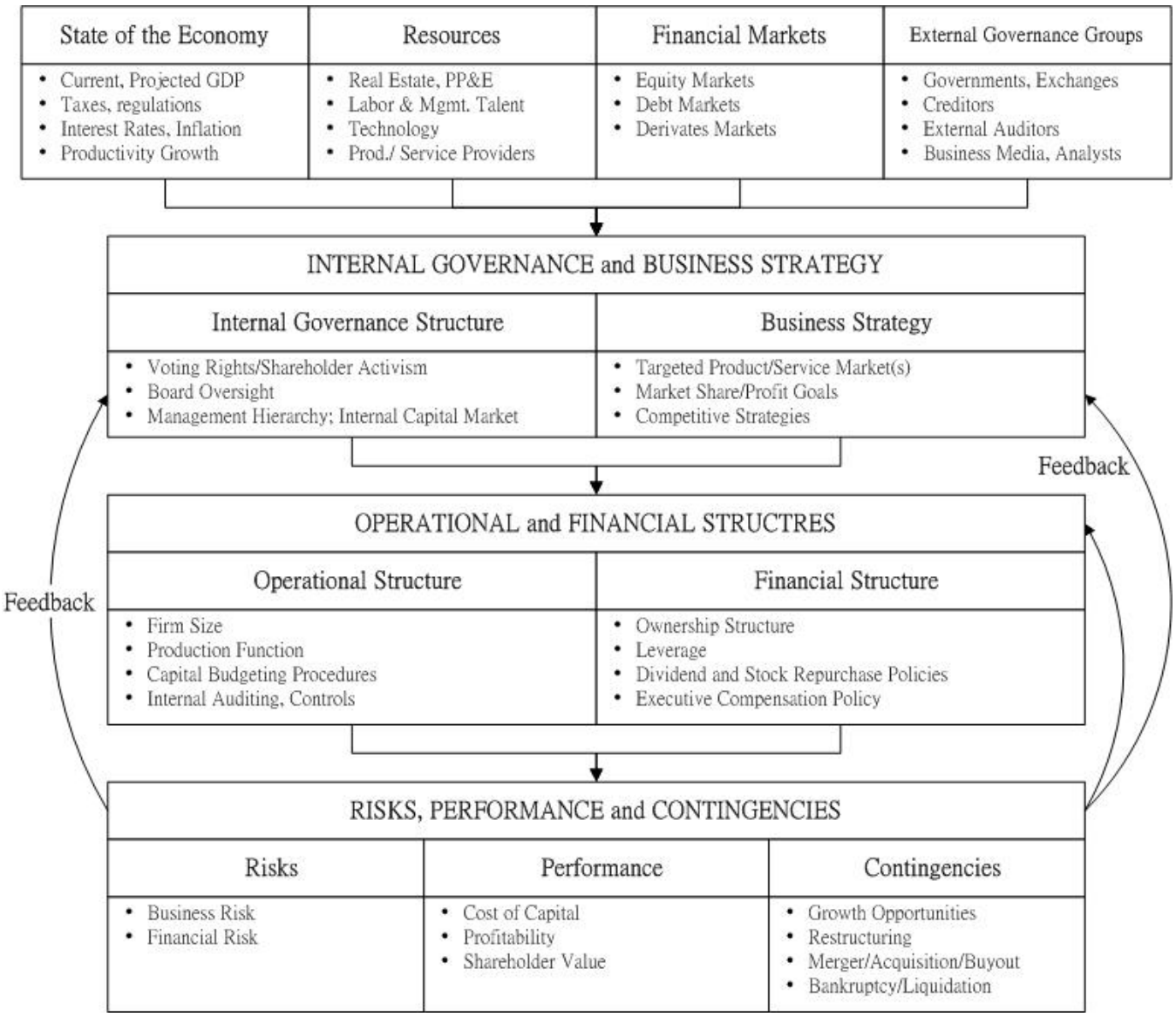


Figure 1-1. The comprehensive perspective on firm's financial structure
Resource：Ogden *et al*., Advanced Corporate Finance, 2003

The framework of the dissertation (as shown in Figure 1-2.) is the following. Section 2 is devoted to literatures review on FDI model and hypothesis development. Section 3 deals with methodologies, including PLS, path analysis literatures, and the PLS path modeling. Section 4 shows the investigated results and contains the

discussion. Section 5 shows the result of using a combined PLS and MCDM approach. Section 6 discuss the upper limit issue. The last section contains the conclusion and further research suggestions.

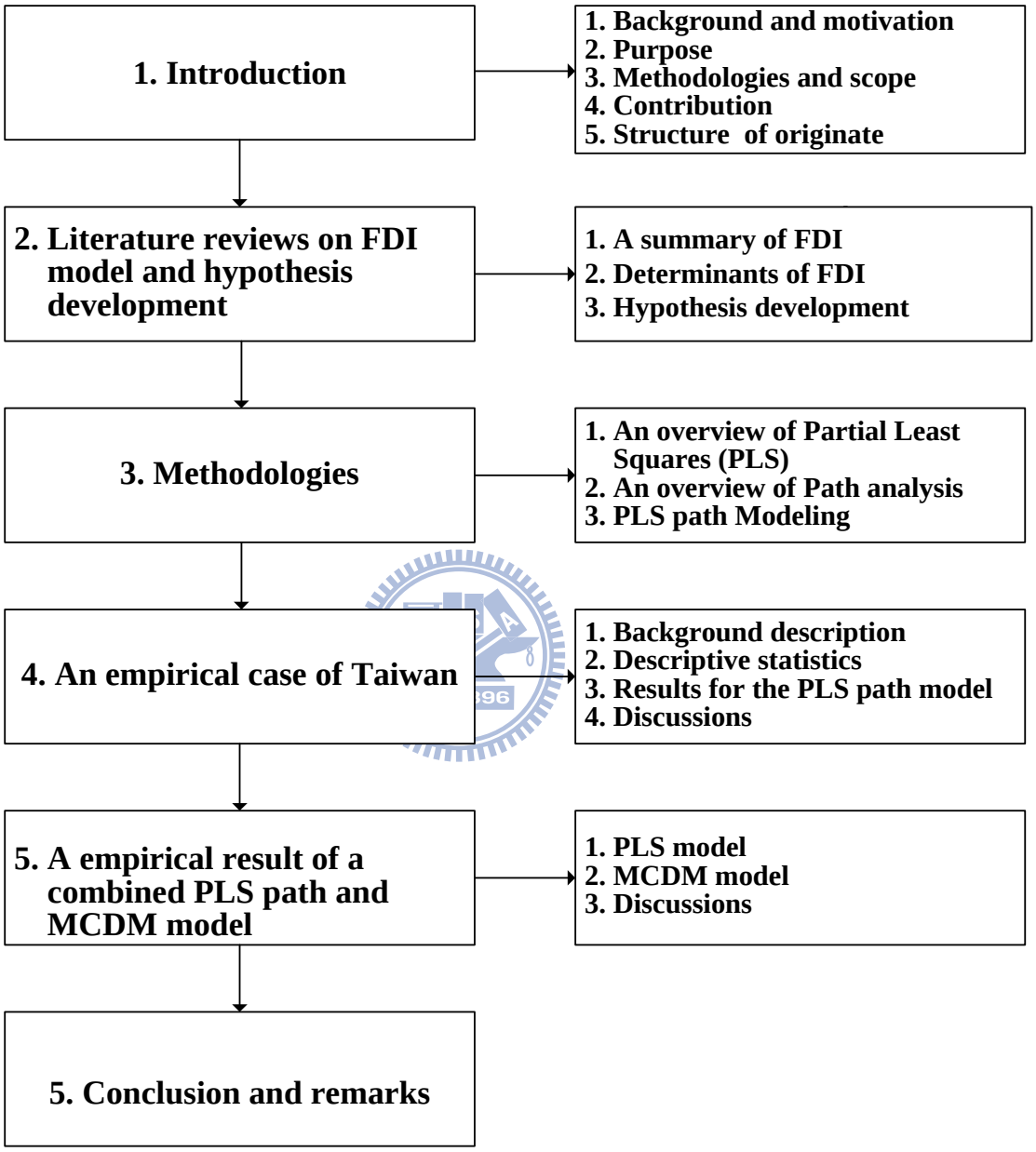


Figure 1-2. The research structure and organization of the dissertation

2. Literature review on FDI model

There are three parts in this chapter. The first part is a summary of FDI, covering

the definitions, features, modes, theories, and the econometric models of FDI, etc. The second is a summary of the determinants on FDI.

2.1 A summary of FDI

2.1.1 Capital flow and definition of FDI

(1) Capital flow

There is few literature study capital flow. For example, Alfaro and Hammel (2007) focus on imports of capital goods because of their effect both on the quantity and quality of investment. Technological advances, in the form of world production of capital equipment and world R&D activity, are highly concentrated in a small number of countries. Only a few countries do much R&D, the benefits may spread around the world through exports of capital goods that embody new technology. In other words, imported machinery may be a crucial mechanism for transmitting knowledge spillovers across borders.

David (2007) evaluates the effects of those policies on net fixed-income capital flows and on total portfolio flows using Generalized Method of Moments (GMM) techniques. Edwards (2007) analyze whether restrictions to capital mobility reduce vulnerability to external shocks. He finds that the marginal effect of higher capital mobility on the probability of a capital flow contraction is positive and statistically significant, but very small. However, they almost focus on the relationship between capital flow and macro economic variable, not from an integrated .perspectives.

(2) D**efinition of FDI**

UNCTAD and World Development Indicators (WDI) use the following FDI definition: FDI inflows comprise capital provided (either directly or through other related enterprises) by a foreign direct investor to an FDI enterprise, or capital

received by a foreign direct investor from an FDI enterprise. FDI includes the three following components: equity capital, reinvested earnings and intra-company loans. FDI is net inflows of investment, and is the sum of equity capital, reinvestment of earnings, other long-term capital and short-term capital as shown in the balance of payments.

FDI has been identified in the literature as another important channel for technological diffusion (Grossman and Helpman, 1991; Helpman, 1993). FDI as important channels for acquiring imported knowledge, especially in developing countries (World Bank, 1998).

(1) According to Hansen and Rand (2006), FDI is net inflows of investment, and is the sum of equity capital, reinvestment of earnings, other long-term capital and short-term capital as shown in the balance of payments.

UNCTAD: FDI inflows comprise capital provided (either directly or through other related enterprises) by a foreign direct investor to an FDI enterprise, or capital received by a foreign direct investor from an FDI enterprise. FDI includes the three following components: equity capital, reinvested earnings and intracompany loans. FDI flows with a negative sign indicate that at least one of the three components of FDI is negative and not offset by positive amounts of the remaining components. These are called reverse investment or disinvestment.

(2) WDI 2002

FDI, net inflows (per cent of GDP and per cent of gross capital formation, respectively). FDI is net inflows of investment to acquire a lasting management interest (10 per cent or more of voting stock) in an enterprise operating in an economy other than that of the investor. It is the sum of equity capital, reinvestment of earnings, other long-term capital and short-term capital as shown in the balance of payments.

FDI is an investment involving a long-term relationship and reflecting a lasting interest and control by a resident entity in one economy in an enterprise resident in an economy other than that of the foreign direct investor. FDI flows are recorded on a net basis in a particular year, and comprise equity capital, reinvested earnings and intra-company loans (Mina, 2007).

2.1.2 Features of FDI

There are many literatures discuss the feature of FDI, we summary the content as follow.

(1) In 1998, FDI accounted for more than half of all private capital flows to developing countries. This change in the composition of capital flows has been synchronous with a shift in emphasis among policymakers in developing countries to attract more FDI, especially following the 1980s debt crisis and the recent turmoil in emerging economies (Alfaro, *et. al*, 2004).

(2) Cross-border investment by multinational firms is one of the most salient features of today's global economy. Many countries see attracting FDI as an important element in their strategy for economic development because FDI is widely regarded as an amalgamation of capital, technology, marketing, and management. An important question for policy makers is what are the factors that attract FDI (Cheng and Kwan, 2000)

(3) According to Baltagi, *et al*. (2007), FDI is one of the most dynamic phenomena in the recent wave of globalization. The World Investment Report and the United Nations' World Trade Data Base suggest that during the last decade worldwide

outward FDI stocks rose almost 1:5 times faster than exports, even faster than exports of intermediate goods. For the last two decades, the theory of trade and multinational firms has paid attention to this phenomenon, in particular to the organization of firms across international borders.

(4) A large number of empirical studies on the role of FDI in host countries suggest that FDI is an important source of capital, complements domestic private investment, is usually associated with new job opportunities and enhancement of technology transfer, and boosts overall economic growth in host countries (Chowdhury and Mavrotas, 2006).

(5) Most governments believe inward FDI can contribute to the growth of the host country's economy. Attracting FDI has been one of the most important policy goals of developing countries. These economies have not only liberalized restrictions on the inflows of FDI but also provided incentives to attract foreign investors (Gholami, *et al*., 2006).

(6) FDI has been seen as a key driver underlying the strong growth performance experienced by the Malaysian economy (Ang, 2008). Apart from these policy factors, it is generally believed that sound macroeconomic management, sustained economic growth, and the presence of a well functioning financial system have made Malaysia an attractive prospect for FDI. While this pattern of development has become a major concern of researchers and policy makers, there has been little attention paid to the understanding of what determines FDI in Malaysia. Hence, this warrants an investigation into what are the key forces that stimulate FDI in Malaysia.

(7) In most countries, FDI is considered to be an important component of development strategy and policies are designed accordingly in order to stimulate inward flows (Crespo and Fontoura, 2007). A strong motivation for this interest is the possible existence of FDI productivity spillovers, a concept that embodies the fact that MNEs (multinational enterprises) own technology, interpreted in a broad sense that includes "both product, process, and distribution technology, as well as management and marketing skills" (Blomström and Kokko, 1998), which can be transmitted to domestic firms and thereby raise their productivity level.

(8) Cross-border business activities in various forms have been facilitated by trade liberalization and the development of information technology. Global activities, especially FDI, require larger fixed entry costs, but bring in higher gross profits for productive firms. Empirical studies on the globalization decisions of heterogeneous firms remain limited, however, partly because of constraints in the availability of micro data. Though several studies have examined the exporting-FDI choice, Tomiura (2007) is aware of no studies weighing the relative importance between FO (foreign outsourcing) and FDI. "A firm-level data analysis is needed to answer this question, and no such analysis is available at this point in time". However, a integrated perspectives including the parent and the host country determinant may provide another point of views to understand the FDI decision.

(9) FDI has been widely recognized as a growth-enhancing factor in investment receiving (host) countries. FDI not only brings in capital but also introduces advanced technology that can enhance the technological capability of the host country firms, thereby generating long-term and sustainable economic growth (Kohpaiboon, 2006).

The expectation of gaining from technology spillover persuades many developing countries to offer various incentives in order to attract FDI.

2.1.3 Modes of FDI

The brief reviews are as follow.

(1) According to Chen and Ku (2000), FDI can be roughly separated into an expansionary type and a defensive type. Expansionary FDI seeks to exploit the firm-specific advantage in the host country whereas defensive FDI seeks cheap labor in the host country to reduce the cost of production.

(2) Early stages of this theory distinguish between two modes of multinational enterprises (MNEs) (Baltagi, *et al.*, 2007): Vertical MNEs engage in trade and seek to exploit international factor price differentials. They locate their headquarters in the skilled labor-abundant parent country and engage in unskilled labor-intensive production in an unskilled labor-abundant host. This type of MNEs serves the parent market via foreign affiliate exports (Helpman, 1984; Helpman and Krugman, 1985). Horizontal MNEs seek to save on trade costs by serving markets locally rather than trading. This results in higher fixed investment costs than those incurred by exporting national firms (Markusen, 1984; Markusen and Venables, 2000).

(3) According to Ramirez (2006), recent country studies also suggest that export-oriented FDI, such as that undertaken by transnational corporations (TNCs) in Chile, Mexico, and China, may promote exports (and economic growth) by establishing assembling plants and helping host firms access international markets for exports (Aitken and Harrison, 1997; De Mello Jr., 1997; Zhang, 2001). Other country studies, notably by Chakraborty and Basu (2002) and De Mello Jr. (1997), have found

no support for the FDI-Led Growth (FLG) hypothesis; their empirical work suggests that the line of causality runs from GDP growth to FDI-a finding consistent with the market-seeking FDI hypothesis of Dunning (1988) and Mortimore (2003), viz., that FDI is attracted to growing internal markets for services such as telecommunications, gas and electricity, retail commerce, and financial services.

(4) Vernon's (1966) product-cycle hypothesis remains the dominant explanation of the North-South trade dynamics. In his formulation, a new product is first invented and manufactured in the advanced North. Once technology becomes routine and standardized, production is moved to the low-cost South through FDI. The South now manufactures and exports the product, which reverses the earlier trade pattern. Krugman (1979) first formalized product-cycle trade by describing how the exogenous processes of innovation and imitation give rise to cycles. Subsequent papers have contributed to the literature by formulating these processes; for examples, Dollar (1986), Jensen and Thursby (1986, 1987), Segerstrom *et al*. (1990), Grossman and Helpman (1991b, hereafter the GH model), and Glass and Saggi (2002, hereafter the GS model). The GH model incorporates Poisson process to capture endogenous innovation and imitation processes. In the same spirit, the GS model creatively introduces FDI as an additional channel for technology transfer. Chia-Hui Lu (2007) utilizes the essences of the GH and the GS models and assumes that FDI is the vehicle that allows firms whose products have less room for improvement and can no longer be competitively produced in the North to move the South.

FDI involves the costly and risky process of transplanting Northern technology to suit Southern conditions. The cost to ensure a newly invented blueprint performs in the South with the same yield as in the North is assumed to be extremely expensive. As a result, leading-edge technology is always utilized in-house in the North, and only

old technologies are presented with the option of moving South. When a new innovation displaces this leader, the firm, which becomes a follower, has two choices to either invest in R&D to upgrade product quality, or to shift production to the South to exploit lower production costs. I refer to the first strategy as moving-up and to the second as moving-out. It is shown that firms' choices between these two strategies are dependent on industry-specific R&D productivity and the relative Northern production cost.

2.1.4 Theories of FDI

Theories of FDI can essentially be divided into two categories: Micro (industrial organization) theories, and (2) macro (cost of capital) theories.

The micro theories include the industry organization theory, the factor endowment theory, the product cycle theory, the eclectic theory, the location theory, the transaction cost theory and the industrial cluster theory. The conventional theories explain the motivations of FDI in microeconomic terms and focus on firm-specific advantages, the location advantage, or cost advantage (Caves, 1971; Dunning, 1980; Dunning *et al.*, 2007; Hymer, 1960; Li and Hu, 2002; Mina, 2007; Tuan and Ng, 2004; Vernon, 1966).

In macroeconomic terms, most scholars examine the relationship between FDI and macroeconomic variables, such as consumer welfare (Branstetter and Feenstra, 2002), poverty or distribution effect (Tsai and Huang, 2007), business and interest rate cycles (Yeyati *et al.*, 2007), real exchange rates (Choi and Jeon, 2007), economic growth (Chen and Ku, 2000; Chowdhury and Mavrotas, 2006; Hansen and Rand, 2006; Schneider, 2005), and domestic investment (Herzer and Schrooten, 2008; Kugler and Rapoport, 2007; Ramirez, 2006; Ran *et al.*, 2007; Tomiura, 2007).

The brief reviews are as follow.

(1) Grossman and Helpman (1995) suggest that FDI can potentially help disseminate technology to the host country. Finally, a country's ability to absorb foreign technology embodied in imports might depend on its level of infrastructure. Bardhan (1995) argues that the flow of technology through FDI to a developing country is often constrained not so much by restrictive government policies in the host country as by its lack of infrastructure.

(2) Subject to a number of crucial factors, such as the human capital base in the host country, the trade regime and the degree of openness in the economy- FDI has a positive impact on overall economic growth. FDI is now becoming quite crucial for many developing countries (Chowdhury, *et al*., 2006). It should also be noted that FDI has potentially desirable elements that affect the quality of growth with significant implications for poverty reduction. It may reduce adverse shocks to the poor that stem from financial instability and help to improve corporate governance. Furthermore, FDI generates revenues that may support the development of safety nets for the poor (Klein, *e. al*., 2001). Vast literature on the determinants of FDI in developing countries clearly indicates the importance of infrastructure, skills, macroeconomic stability and sound institutions for attracting FDI flows. The importance of ICT has also been documented in recent empirical work (Addison and Heshmati, 2003).

(3) Attracting FDI can be beneficial in diversifying income source (diversification of economic activities). In addition to increasing the industries capital stock, FDI can enhance their access to technology, adoption of innovation in the production process, and therefore productivity. FDI can also bring new expertise and managerial know-how, and expand production, marketing, transport, and communication networks (Mina, 2007).

(4) The rationale for increased efforts to attract more FDI stems from the belief that FDI has several positive effects which include productivity gains, technology transfers, the introduction of new processes, managerial skills, and know-how in the domestic market, employee training, international production networks, and access to markets. These benefits, in addition to the direct capital financing it generates, suggest that FDI can play an important role in modernizing the national economy and promoting growth. Based on these arguments, governments often have provided special incentives to foreign firms to set up companies in their country (Alfaro, *et al*, 2004).

The empirical evidence of these benefits both at the firm level and at the national level remains ambiguous. For example, examining plant level data in Venezuela, Aitken and Harrison (1999) find that the net effect of FDI on productivity is quite small-FDI raises productivity within plants that receive the investment but lowers that of domestically owned plants-thus seriously putting in doubt the 'spillover' theory. At the macroeconomic level, growth regressions carried out by Borensztein *et al*. (1998) and Carkovic and Levine (2003) find little support that FDI has an exogenous positive effect on economic growth. According to Alfaro, *et. al*., (2004), these externalities might be limited by local conditions.

(5) According to Ramirez (2006), in standard economic theory FDI inflows to developing countries increase their stock of capital which, in turn, raises the host country's labor productivity and incomes, a process that eventually translates into higher levels of output, employment creation, and potential tax revenues. In addition to the direct effects of FDI, De Mello Jr. (1997) and Huang (2004) observe that indirect positive spillover effects on overall efficiency may arise from the enhanced

competition generated by foreign firms, the transfer of needed technology and managerial knowhow to local firms, and trade-induced learning-by-doing effects as local firms attempt to overcome competition in the global market.

2.1.5 Knowledge; technology diffusion and FDI

The brief reviews are as follow.

(1) The "spillovers" arising from technological innovation can cross national boundaries, the effect of innovation on national comparative advantage depends on the geographic scope of its diffusion. Patent citations have thus come to be used as a way of tracking the influence of past inventions cross time and space. These data have been used to investigate patterns of knowledge spillovers (Caballero and Jaffe, 1993; Jaffe *et al*., 1993; Jaffe and Trajtenberg, 1999).

(2) The channels for diffusion studied here include: Technology, Geographic distance, Geographic distance, Telephone Calls, Imports, FDI (MacGarvie, 2005). FDI by multinational corporations is thought to be an important conduit for technical knowledge, through competitive pressure on firms in the receiving country, by transferring technology to foreign subsidiaries, or by hiring foreign workers. Investment is a channel of diffusion for all pairs of countries, but trade enhances knowledge diffusion only when countries have similar distributions of patents across technology classes. (MacGarvie, 2005).

(3) FDI as important channels for acquiring imported knowledge, especially in developing countries (World Bank, 1998b). FDI has been identified in the literature as another important channel for technological diffusion (Grossman and Helpman, 1991; Helpman, 1993). Grossman and Helpman (1995) suggest that FDI can potentially help

disseminate technology to the host country. Bardhan (1995) argues that the flow of technology through FDI to a developing country is often constrained not so much by restrictive government policies in the host country as by its lack of infrastructure.

(4) FDI is also likely to be a significant channel for international knowledge transfer. There is little empirical evidence on the relative effectiveness of international knowledge spillover channels. Lee (2006) examines the significance of international knowledge spillovers through four different channels: Inward FDI, outward FDI, intermediate goods imports, and a disembodied direct channel. In addition to the channels discussed above, human capital mobility, scientific papers, patent licensing, technical conferences, industrial spying, and so on may also serve as substantial conduits for knowledge spillovers between countries.

(5) In fact, as Grilliches (1979) points out, such consideration of additional channels might not be desirable due to the problem of multi-collinearity. That is, knowledge spillovers through such channels are very likely highly correlated to those that occur through the channels discussed above.

(6) Technology diffusion plays a central role in the process of economic development. The growth rates in developing countries are explained by a 'catch-up' process in the level of technology. In a typical model of technology diffusion, the rate of economic growth of a backward country depends on the extent of adoption and implementation of new technologies that are already in use in leading country.
Technology diffusion can take place through a variety of channels that involve the transmission of ideas and new technology and acquisition of human capital through product, adoption of foreign technology and acquisition of human capital through

various means are certainly important conduits for the international diffusion of technology.

(7) Baltagi, *et al*. (2007) apply knowledge-capital model and rectify this situation by considering not only bilateral determinants, but also spatially weighted third-country determinants of FDI.

(8) The "efficiency hypothesis" highlights the effects of globalization on the supply side of the political market: competition between countries to attract FDI leads to a reduction in taxation, particularly capital taxes, and the size of the public sector, and a restructuring in the composition of government expenditure towards privately productive public inputs). The "compensation hypothesis" in contrast, highlights the effects of globalization on the demand side of the political market: voters pressurise governments to provide more social insurance to mitigate the exposure to greater levels of external risk induced by globalization, thereby increasing social welfare expenditures (Gemmell, *et al*., 2007).

FDI apply more widely and impact on public expenditure choices, it might be expected that it is the stock rather than the flow of FDI that best captures this. Larger stocks of inward FDI have a positive effect on social welfare spendingand a negative effect on spending more likely to be "privately productive" (e.g. on education, health, transport and communication and housing). Increased welfare spending appears to be primarily financed by reduced productive expenditures, with the strongest (negative) effects observed for spending on transport and communication and housing.

(9) According to Crespo and Fontoura (2007), the literature on the determinants of FDI emphasizes that multinational firms generally have firm specific advantages that might be related to their large endowments of intangible assets, such as superior

technologies, patents, trade secrets, brand names, management techniques, and marketing strategies, among others (Dunning, 1993). Obviously, FDI presents a greater potential for knowledge transfer through spillover effects if MNEs display higher productivity levels than the domestic firms. Since the pioneering study of Caves (1974), the occurrence of FDI productivity spillovers has been widely investigated.

FDI spillovers can occur through five main channels: (a) demonstration/imitation, (b) labor mobility, (c) exports, (d) competition, and (e) backward and forward linkages with domestic firms. Determinant factors of FDI spillovers (five categories): (a) absorptive capacity and technological gap, (b) regional effect, (c) domestic firm characteristics, (d) FDI characteristics, and (e) other factors.

(10) Technology spillover is not automatic, but depends on both country-specific factors and policy environment (Kohpaiboon, 2006). One such important factor is the nature of the trade policy regime. Starting with the pioneering paper by Bhagwati (1973), a sizable theoretical literature has attempted to explain how the restrictiveness (openness) of the trade policy regime conditions the gains to host countries from FDI (Bhagwati, 1978, 1985, 1994; Brecher and Diaz-Alejandro, 1977; Brecher and Findlay, 1983). A key hypothesis arising from this literature (which is referred to as the "Bhagwati hypothesis") is that technology spillover is likely to be far less or even negative under an import substitution (IS) regime, compared with a policy regime geared to export promotion (EP).

2.1.6 The econometrics models of FDI

Several scholars are researching FDI by means of econometrics or time-series models. Overall, different approaches have their own fit and constraints. We briefly

review the most common models—the gravity model, the VAR model and the ECM model in what follows.

(1) Gravity models

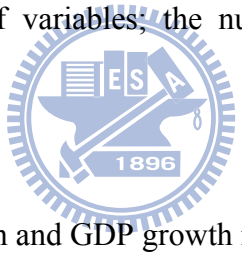
Gravity models postulate that bilateral international flows (goods, FDI, etc) are positively related to the size (e.g. population, GDP) of the two countries: negatively related to the distance—physical or otherwise (such as tariffs, information asymmetries, etc.)—between them. Loungani *et al.* (2002) and Razin (2003) provided empirical evidence of the gravity model and showed that FDI flows do play an important role in the process of skimming high productivity investment projects and contributed significantly to domestic investment in both the quantity and the quality dimensions. Eichengreen and Tong (2007) analyze how China's emergence as a destination for foreign direct investment is affecting the ability of other countries to attract FDI, using a revised gravity model and OLS approach that accounts for the endogeneity of China's FDI. Yeyati *et al.* (2007) examine how the business and interest rate cycles in developed countries affect FDI flows to developing countries, by using a modified version of the standard gravity model. In general, the variables discussed in the conventional gravity model are too much simplified. It is necessary to extend or modify them (the variables) according to the research purpose.

(2) VAR model and ECM model

The Vector auto-regressive (VAR) model is applicable under the assumption that all variables are endogenous. It can overcome the definitional problems of whether variables are endogenous or exogenous. Applying this augment the Dickey-Fuller (ADF) test accompanied by the error-correction model (ECM) can avoid non-state variables from leading to spurious regression; the reason being that correlation does

not imply causation. Dees (1998) assessed the determinants of FDI in China and its effects on the entire economy. Hansen and Rand (2006) examined the causal links between FDI and growth in developing countries. Gholami *et al.* (2006) applied ECM and VAR models to examine the existence and nature of any causal relationship between information and communication technology (ICT) and FDI inflows and its implications for economic growth. Choi and Jeon (2007) focused on the impacts of financial variables on FDI outflows for the four largest industrial countries; Herzer and Schrooten (2008) focused on outward FDI and domestic investment in US and Germany, by using the co-integration and causality analysis.

It is known that there are some solving methods of the non-state variables, such as deterministic trend and dealing with the variables by difference, in order to eliminate the stochastic trend of variables; the numerical method belongs to this category.



(3) The innovation regression and GDP growth regression model

The innovation regression proposed by Schneider, P. H. (2005) is:

$$I_{it} = \beta_0 + \beta_1 \mathrm{HK}_{it} + \beta_2 \mathrm{HDC}_{it} + \beta_3 \mathrm{R\&D}_{it} + \beta_4 \mathrm{GDP}_{it} + \beta_5 \mathrm{IPR}_{it} + \beta_6 \mathrm{FDI}_{it} + \beta_7 \mathrm{INF}_{it} + \mu_{it},$$

$$\mu_{it} = \alpha_i + \varepsilon_{it}, \qquad (1)$$

where I*i* is the innovation rate in country *i*, HK*i* is the level of human capital stock, and HDC*i* is the real import level of high-technology goods from developed countries. R&D*i* is the level of R&D expenditures in country *i*. GDP*i* is the real gross domestic product scaled by population, IPR*i* is the Ginarte and Park (1998) patent protection index for country *i*, and FDI*i* measures inflows of FDI into country *i*. Finally INF*i* is a measure of the country's infrastructure. All variables are measured in natural logs. In the fixed effects regressions, αi represents an individual effect which

is unknown.

GDP growth regression: the growth of real per capita GDP (cY*i* , in ln differences) as a function of the growth in the per capita physical capital stock (cK*i*), the innovation rate (I*i*), the growth of real per capita import levels of hightechnology goods (cHDC*i*), and foreign direct investment inflows (FDI*i*). I also consider an alternative specification in which the level of intellectual property protection (IPR*i*) is included in place of the innovation rate.

$$\gamma_{Y_{it}} = \beta_0 + \beta_1 \gamma_{K_{it}} + \beta_2 I_{it} + \beta_3 \gamma_{\mathrm{HDC}_{it}} + \beta_4 \mathrm{FDI}_{it} + \mu_{it}, \quad (2)$$

$$\gamma_{Y_{it}} = \beta_0 + \beta_1 \gamma_{K_{it}} + \beta_2 \mathrm{IPR}_{it} + \beta_3 \gamma_{\mathrm{HDC}_{it}} + \beta_4 \mathrm{FDI}_{it} + \mu_{it}, \ \mu_{it} = \alpha_i + \varepsilon_{it}. \quad (3)$$

(4) error-correction model (ECM) of causal relationship between ICT and FDI inflows

According to Gholami and (2006), an error-correction model (ECM) should be used to establish a true causality relationship. The residual of the cointegrating vector becomes the error-correction term (ECT) that is used in the error-correction model to eliminate the spurious results. The method need to apply the augmented Dickey-Fuller (ADF) test to determine the variables' stationarity and order of integration (Dickey and Fuller, 1979 and 1981). If variables have a different order of integration, then obviously they are not cointegrated and no further investigation of cointegration is needed. Otherwise, if they are integrated, we use the Johansen (1988) model, which was extended by Johansen and Juselius (1990) for conducting the cointegration test.

2.1.7 Domestic investment and FDI

The brief reviews are as follow.

(1) There is an ongoing debate on whether or not outward foreign direct investment (OFDI) reduces domestic investment. One of the central arguments in this

debate is that OFDI substitutes foreign activities for domestic activities and thus domestic investments when firms shift parts of their production abroad. A second argument abstracts from potential interdependencies between foreign and domestic investments through the production process and refers to investment interactions on the financial side. Accordingly, investments in different locations compete for scarce funds due to the rising costs of external financing (Gemmell, *et al*., 2007).

Unfortunately, the macroeconomic relationship between OFDI and domestic investment has hardly been investigated. A major problem with cross-country studies, however, is that they implicitly assume similar economic structures across countries. In fact, production technologies, institutions, and policies differ substantially between countries, so that the effects of OFDI on domestic investment may also differ

(2) FDI flows may also have a negative effect on the growth prospects of a country if they give rise to substantial reverse flows in the form of remittances of profits and dividends and/or if the TNCs obtain substantial tax or other concessions from the host country (Ramirez, 2006). These negative effects would be further compounded if the expected positive spillover effects from the transfer of technology are minimized or eliminated altogether because the technology transferred is inappropriate for the host country's factor proportions (e.g., too capital intensive); or, when this is not the case, as a result of overly restrictive intellectual property rights and/or prohibitive royalty payments and leasing fees charged by the TNCs for the use of these "intangibles" (see Ram and Zhang, 2002).

2.1.8 Economic growth and FDI

The brief reviews are as follow.

(1) Economic Growth theory

The literature on growth theory may be categorized into four broad branches (Ran, *et al*. 2007):

A. Harrod–Domar model;

B. Solow model;

C. The new growth theory;

D. the endogenous growth theory.

Harrod–Domar model and its variants emphasize the role of saving and investment in promoting growth Solow model and its variants focused on technical progress; The eoclassical growth model (Solow, 1956; Swan, 1956) was the main theoretical framework used to explain economic growth (Schneider, 2005).

The new growth theory represented by Romer- Lucas prototypes emphasize the role of R&D, human capital accumulation, and externalities or spillovers; New growth theory maintains that even though the traditional factors such as labor and capital may exhibit diminishing returns, the innovative knowledge of using these factors in production must have increasing returns or else it is difficult to comprehend the tremendous growth inherent especially in developed world. Such knowledge must have a cradle to create, a channel to transmit, and a target area to apply. New growth theory thus recognizes FDI as a major source of technology and know-how channeling to developing countries. FDI is anticipated to carry with it the innovative knowledge which yields positive externalities or spillover effects accruing to host countries because FDI is able to transfer not only technical know-how, but also brand and reputation effect, demonstration power, and managerial skills. Hence, production output is a function of not only traditional and local labor and capital, as in Solow model, but also other factors such as human capital and FDI. The new growth theory treats FDI as one of the factor inputs.

The development of endogenous growth models (Romer, 1990; Grossman and Helpman, 1991; Rivera-Batiz and Romer, 1991; Aghion and Howitt, 1992) provides such link and suggests different channels through which trade could affect economic growth (Schneider, 2005).

(2) The literature on growth theory may be categorized into four broad branches (Ran, e*t al*. 2007): : Harrod–Domar model and its variants emphasize the role of saving and investment in promoting growth; Solow model and its variants focused on technical progress; new growth theory represented by Romer– Lucas prototypes emphasize the role of R&D, human capital accumulation, and externalities or spillovers; and the endogenous growth theory.

New growth theory maintains that even though the traditional factors such as labor and capital may exhibit diminishing returns, the innovative knowledge of using these factors in production must have increasing returns or else it is difficult to comprehend the tremendous growth inherent especially in developed world. Such knowledge must have a cradle to create, a channel to transmit, and a target area to apply. New growth theory thus recognizes FDI as a major source of technology and know-how channeling to developing countries. FDI is anticipated to carry with it the innovative knowledge which yields positive externalities or spillover effects accruing to host countries because FDI is able to transfer not only technical know-how, but also brand and reputation effect, demonstration power, and managerial skills. Hence, production output is a function of not only traditional and local labor and capital, as in Solow model, but also other factors such as human capital and FDI.

The new growth theory treats FDI as one of the factor inputs.

(3) The traditional neoclassical growth theory has been supplanted by the so

called ‘new growth’ theory. Theoretical developments since Romer’s (1990) seminal work on human capital-driven growth have generated several classes of models in which long-run growth of per capita income can be affected by a variety of permanent policy changes.

Proponents of the new growth theory have concluded that, unlike the neoclassical model, the new theory may actually explain growth.

(4) The relationship between FDI and economic growth

FDI by multinational corporations (MNCs) is considered to be a major channel for the access to advanced technologies by developing countries. Wang (1990) incorporates this idea into a model more in line with the neoclassical growth framework, by assuming that the increase in knowledge applied to production is determined as a function of FDI. (Borensztein, *et al*., 1998)

The endogenous growth theory model implys that the rate of technological progress is the main determinant of the long-term growth rate of income. Technological progress takes place through a process of ‘capital deepening’ in the form of the introduction of new varieties of capital goods (as in Romer (1990), Grossman and Helpman (1991) and Barro and Sala-i-Martin (1995)). MNCs posses more advanced ‘knowledge’, which allows them to introduce new capital goods at lower cost (Borensztein, *et al*., 1998).

(5) Foreign technology has a stronger impact on per capita GDP growth than domestic technology (Schneider, 2005). The neoclassical growth model (Solow, 1956; Swan, 1956) was the main theoretical framework used to explain economic growth. However, that framework does not offer a formal link between trade policies and long-run growth.

The development of endogenous growth models (Romer, 1990; Grossman and Helpman, 1991; Rivera-Batiz and Romer, 1991; Aghion and Howitt, 1992) provides such link and suggests different channels through which trade could affect economic growth. One idea is that imports may embody innovations that are not available in the local economy, and local researchers may gain insights from these innovations. Therefore, by providing access to foreign innovations, trade can promote technological diffusion and economic growth.

In its Development Report, the World Bank emphasizes the importance of openness, stronger intellectual property rights (IPRs) and foreign direct investment (FDI) as important channels for acquiring imported knowledge, especially in developing countries (World Bank, 1998b).

(6) De Mello (1997) lists two main channels through which FDI may be growth enhancing. First, FDI can encourage the adoption of new technology in the production process through capital spillovers. Second, FDI may stimulate knowledge transfers, both in terms of labor training and skill acquisition and by introducing alternative management practices and better organizational arrangements. OECD (2002) have found FDI to contribute positively to income growth and factor productivity. Blomstrom, *et al*. (1994) argue that FDI has a positive growth effect when a country is sufficiently rich in terms of per capita income. Balasubramanyam, *et al*. (1996) emphasize trade openness as being crucial for acquiring the potential growth impact of FDI. Borensztein, *et al*. (1998) find that FDI raises growth, but only in countries where the labour force has achieved a certain level of education. Alfaro, *et al*. (2004) draw attention to financial markets as they find that FDI promotes economic growth in economies with sufficiently developed financial markets. Carkovic and Levine (2002) conclude that FDI has no impact on long-run growth. Another strand of the literature

has focused more directly on the causal relationships between FDI and growth: Zhang (2001), Chowdhury and Mavrotas (2006), Toda and Yamamoto (1995), De Mello (1999), Nair-Reichert and Weinhold (2001), Choe (2003). Basu, *et al*. (2003) addressed the question of the two-way link between FDI and growth. Hansen and Rand (2006) reformulate the model and look at FDI as a percentage of gross capital formation (GCF). The idea is that the FDI/GCF ratio "isolates" the knowledge and composition effects of FDI inflows as we condition on gross capital formation. They find FDI/GCF to Granger-cause GDP, indicating a statistical significant composition effect of FDI.

(7) There is a large literature on effects of FDI on economic growth in recipient countries. Two views are in sharp contrast to each other: one believes in the propitious effect of FDI while the other denies it (Ran, 2007).

(8) FDI by multinational corporations (MNCs) is considered to be a major channel for the access to advanced technologies by developing countries. Wang (1990) incorporates this idea into a model more in line with the neoclassical growth framework, by assuming that the increase in knowledge applied to production is determined as a function of FDI.

It appears that the main channel through which FDI contributes to economic growth is by stimulating technological progress, rather than by increasing total capital accumulation in the host economy (Borensztein, *et al*., 1998).

2.2 The determinants on FDI

What is the main driving force of foreign direct investment (FDI)? Cheng and

Kwan (2000) applied Chow's (1967) partial adjustment model to analyze the Chinese FDI data from 1986 to 1995 by estimating the following variables: (a) access to national and regional markets, (b) wage costs adjusted for the quality of workers or labor productivity, and other labor market conditions such as unemployment and the degree of unionization; (c) policy toward FDI including tax rates; (d) availability and quality of infrastructure; and (e) economies of agglomeration.

Branstetter and Feenstra (2002) applied Grossman and Helpman model to discuss trade and FDI in China. Factors such as Restrictions on export requirements, localization requirements, requirements for technology transfer, and domestic market access are examined. However, Alfaro, *et al.* (2004) place emphasis on the role of institutions.

The key determinants frequently appearing in the literature and their expected impact (in parentheses), include natural resources, market size, sociopolitical stability, tied business operating conditions, low wage costs, favorable exchange rate, trade barriers, export orientation, openness of developing host countries, democratisation, risk, and in addition one should control for several other observable and unobservable time-specific and country-specific effects (Root and Ahmed, 1979; Dunning, 1980; Lunn, 1980; Dollar, 1992; and Chakrabarti, 2001). ICT is considered as the main new determinant of FDI by Gholami, *et al.* (2006). Chowdhury and Mavrotas (2006) examine the causal relationship between FDI and economic growth. The relationship is studied by explaining four main channels: (a) determinants of growth; (b) determinants of FDI; (c) role of multinational firms in host countries, and (d) direction of causality between the two variables. As for the determinants of FDI, the quality of human capital (the human capital base), infrastructure, institutions (the trade regime and the degree of openness in the economy), governance, legal framework (macroeconomic stability), ICT and tax systems are examined.

Demirbag, *et al.* (2007) adopts an integrative approach to incorporate institutional, host country and firm variables as determinants of the factors influencing perceptions of foreign affiliate performance. Institutional factors include political risk, government regulations, financial incentives and perceived environment-specific factors within the host country (market potential, cost and quality of inputs, cultural distance). Firm specific factors include resource dependency, parent diversity, ownership mode and foreign parent size. Jinjarak (2007) studying the association between institutions, macroeconomic risks, and FDI.

Mina (2007) empirically examines the influence of location determinants on FDI inflows. Host countries location advantages are one of three hypotheses that Dunning's (1981) ownership–location–internalization (OLI) paradigm identifies in explaining FDI. Building on Dunning's location advantage hypothesis and the GCC location factors are discussed including, oil price, market size, institutional quality, trade openness, human capital and infrastructure development.

Based on Ang (2008), the empirical model of FDI determinants includes 8 items: financial development, size of the domestic market, adequate infrastructure, trade openness, a diminished currency value, corporate tax rate, macroeconomic uncertainty and Asian financial crisis.

Table 2-1 is a summary of the determinants of FDI.

Table 2-1. A summary of the determinants on FDI

Authors / Year	Determinants
Cheng and Kwan (2000)	Preferential policy, Large regional market, infrastructure, wage rate
Branstetter and Feenstra (2002).	Restrictions on export requirements, localization requirements, requirements for technology transfer, and domestic market access.
Chowdhury and Mavrotas (2006)	the quality of human capital (the human capital base), infrastructure, institutions (the trade regime and the degree of openness in the economy), governance, legal framework (macroeconomic stability), ICT and tax systems
Gholami, *et al.* (2006)	Openness policy, Local financial market/ institutions, rich ICT infrastructure of the host country
Demirbag, *et al.* (2007)	Institutional factors: political risk, government regulations, financial incentives. Perceived environment-specific factors within the host country (market potential, cost and quality of inputs, cultural distance). Firm specific factors: resource dependency; parent diversity; ownership mode of affiliate; cultural distance; foreign parent size
Edwards (2007)	Flexible exchange rate, macroeconomic policy
Jinjarak (2007)	Institutions, policy regime, macroeconomic risks
Mina (2007)	Host countries location advantages; oil price, market size, institutional quality, trade openness, human capital and infrastructure development
Ang (2008)	Financial development, size of the domestic market, adequate infrastructure, trade openness, a diminished currency value, corporate tax rate, macroeconomic uncertainty and Asian financial crisis

3. Methodologies

There are three parts in this chapter. The first part is an overview of partial least squares (PLS), the second part is an overview of path analysis review the econometric models of FDI, the third part is the PLS path modeling and the last is the hypothesis development.

3.1 An overview of Partial Least Squares (PLS)

3.1.1 Principle

Partial least squares (PLS) method developed by Herman Wold (Wold, 1981, 1985) for econometrics, first gained popularity in chemometric research and later for industrial applications. It has since spread to research in education, marketing, and the social sciences. PLS analysis is a multivariate statistical technique that allows comparison between multiple response variables and multiple explanatory variables. PLS is one of a number of covariance-based statistical methods which are often referred to as structural equation modeling (SEM). It was designed to deal with multiple regression when data is presented in a small sample, and when the data suffers from missing values, or multicollinearity.

PLS is sometimes called “projection to latent structures” because of its general strategy. The *X* variables (the predictors) are reduced to principal components, as are the *Y* variables (the dependents). The components of *X* are used to predict the scores on the *Y* components, and the predicted *Y* component scores are used to predict the actual values of the *Y* variables. In constructing the principal components of *X*, the PLS algorithm iteratively maximizes the strength of the relation of successive pairs of *X* and *Y* component scores by maximizing the covariance of each *X*-score with the *Y* variables. This strategy means that while the original *X* variables may be multicollinear, the *X* components used to predict *Y* will be orthogonal. Also, the *X*

variables may have missing values, but there will be a computed score for every case on every *X* component. Finally, since only a few components (often two or three) will be used in predictions, it does not matter whether there were more original *X* variables than observations. In contrast, any of these three conditions (multicollinearity, missing values, and too few cases in relation to variables) may well render traditional OLS regression estimates unreliable (as well as estimates by other procedures in the general and generalized linear model families).

3.1.2 Features

The advantages of PLS include the ability to model multiple dependents as well as multiple independents; the ability to handle multicollinearity among the independents; robustness in the face of data noise and missing data; and creating independent latents directly on the basis of crossproducts involving the response variable(s). These characteristics of PLS make for stronger predictions.

Disadvantages of PLS include greater difficulty of interpreting the loadings of the independent latent variables (which are based on crossproducts relations with the response variables, and are not based as in conventional factor analysis on correlations among the manifest independents) and because the distributional properties of estimates are not known, the researcher cannot assess significance except through bootstrap induction. Overall, the mix of advantages and disadvantages means PLS is favored as a predictive technique and not as an interpretive technique, except for exploratory analysis as a prelude to an interpretive technique such as multiple linear regression or structural equation modeling.

3.1.3 Assumptions

(1) Multicollinearity. Since the PLS factors are orthogonal, by definition

mathematical multicollinearity is not a problem in PLS. This is a major reason why PLS models may be preferred over OLS regression models or structural equation modeling. Note, however, that this does not mean that multicollinearity just "goes away". To the extent that the original *X* variables are multicollinear, PLS will lack a simple factor structure and the factor cross-loadings will mean PLS factors will be difficult to label, interpret, and distinguish.

(2) Distribution-free. PLS is a distribution-free approach to regression and path modeling, unlike structural equation modeling using the usual maximum likelihood estimation method, which assumes multivariate normality (Lohmoller, 1989).

(3) Independence of observations is not required. (Lohmoller, 1989).

(4) Bootstrap estimates of significance. As the distribution of PLS is unknown, conventional significance testing is impossible. However, testing may be accomplished by bootstrap methods such as the jackknife, as illustrated by Davies (2001) and implemented in *Unscrambler* software. Resampling methods like the jackknife do not have specific sample size requirements, but the smaller the sample, the more likely that fitted confidence limits will be fitted to noise in the data rather than to a true underlying distribution.

(5) Proper use of dummy variables. The dummy variable representing a desired reference category must be omitted in the model. Coefficients for the remaining dummy variables in the set for a given categorical variable must be interpreted with respect to the reference category.

(6) Standardized variables. When interpreting output, keep in mind that all variables in the model have been centered and standardized, including dummy variables for categorical variables.

(7) Assumptions of linear regression. As an extension of the multiple linear regression model, PLS shares most of the other assumptions of multiple regression,

with the notable exception that lack of multicollinearity among the independents is not required in PLS. In particular, the researcher must be concerned with outliers and nonlinear data relationships.

3.1.4 Models

PLS embraces two rather distinct modeling approaches, regression models and path models (Vinzi *et al*, 2008). The former is an alternative to OLS regression or canonical correlation, while the latter is an alternative to structural equation modeling. That is, PLS path modeling is a method of modeling the relationship among latent variables. Authors may combine both approaches. For instance, Tenenhaus *et al*. (2004, 2005) in a marketing study, used PLS regression to obtain a graphical display of products and their characteristics, with a mapping of consumer preferences; then they used PLS path modeling to obtain a detailed analysis of each consumer group by building a causal model involving consumer preference, physico-chemical, and sensory blocks of variables.

3.2 An overview of Path analysis

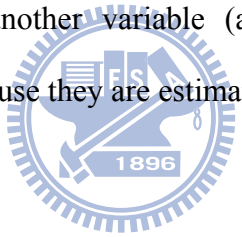
3.2.1 Principles

Path analysis was developed as a method of decomposing correlations into different pieces for interpretation of effects. Path analysis is closely related to multiple regression; we might say that regression is a special case of path analysis. Some people call this stuff (path analysis and related techniques) “causal modeling”.

Path analysis is an extension of the regression model, used to test the fit of the correlation matrix against two or more causal models what are being compared by the researcher. The model is usually depicted in a circle-and-arrow figure in which

single-headed arrows indicate causation. A regression is done for each variable in the model as a dependent on those others that the model indicates are causes. The regression weights predicted by the model are compared with the observed correlation matrix for the variables, and a goodness-of-fit statistic is calculated. The best-fitting of two or more models are selected by the researcher as the best model(s) for advancement of theory.

A path model is a diagram relating independent, intermediary, and dependent variables. Single arrows indicate causation between exogenous or intermediary variables and the dependent(s). Arrows also connect the error terms with their respective endogenous variables. Double arrows indicate correlation between pairs of exogenous variables. A path coefficient indicates the direct effect of a variable (assumed to be a cause) on another variable (assumed to be an effect). Path coefficients are standardized because they are estimated from correlations.



3.2.2 Assumptions

Path analysis requires the usual assumptions of regression. It is particularly sensitive to model specification because failure to include relevant causal variables or inclusion of extraneous variables often substantially affects the path coefficients, which are used to assess the relative importance of various direct and indirect causal paths to the dependent variable. The assumptions for the type of path analysis we will be perform, are

(1) All relations are linear and additive; the causal assumptions (what causes what) are shown in the path diagram;

(2) The residuals (error terms) are uncorrelated with the variables in the model and with each other;

(3) The causal flow is one-way;

(4) The variables are measured on interval scales or better;

(5) The variables are measured without error (perfect reliability).

3.2.3 Limitations of path analysis

Obviously, path analysis can evaluate causal hypotheses, and in some (restricted) situations can test between two or more causal hypotheses, but it cannot establish the direction of causality. As should also already be clear, path analysis is most likely to be useful when we already have a clear hypothesis to test, or a small number of hypotheses all of which can be represented within a single path diagram. It has little use at the exploratory stage of research.

We cannot use path analysis in situations where "feedback" loops are included in our hypotheses: there must be a steady causal progression across (or down) a path diagram. All the relationships in the path diagram must be capable of being tested by straightforward multiple regression. The intervening variables all have to serve as dependent variables in multiple regression analyses. Therefore each of them must be capable of being treated as being on an interval scale. Nominal measurement, or ordinal measurement with few categories (including dichotomies), will make path analysis impossible. Although there are types of analysis that will handle such dependent variables (as we shall see in the next two sessions), there are no accepted ways of mixing different kinds of analysis to produce the analogue of path analysis.

3.3 The PLS path modeling

3.3.1 Features

According to Hsu (2008), the research model was tested using PLS, a structural equation modeling technique that is well suited to highly complex predictive models (Wold, 1985). PLS method has several strengths that made it appropriate for this study, including its ability to handle both reflective and formative constructs, and the nonnormality of the data, and the limited sample size. PLS is used to test the soundness of our research model. PLS is preferred to LISREL because one of the chief advantages of PLS over LISREL is that sample sizes can be as low as 30 observations still with robust results (Gary and Terry, 2003). PLS makes no prior distributional assumption about the data and provides a good approach for testing structural models when the sample size is limited (Fornell and Bookstein, 1982). In general, PLS path modeling is used for analyzing the structure of variables organized in multiple blocks, even in the presence of causal relationships, a small sample size, missing values, and/or multicollinearity (Matlzer and Renzl, 2007). Such a general and flexible framework also improve data analysis methods that employ nonparametric validation procedures (such as bootstrap, jackknife, and blindfolding) to estimate parameters. Also, the indices they assign to individual blocks are more common in modeling than in data analysis (Fornell and Bokksten, 1982; Tenenhaus *et al.*, 2004, 2005; Vinzi *et al.*, 2008). These points are well described in Chin's (1998) review paper on the application of PLS to SEM.

3.3.2 Applications

In recent years, PLS path modeling has been successfully applied to a variety of areas, such as: assessment of a complementary cyber learning system to offline teaching (Sohn, et al., 2009), studying the effects of knowledge sharing and learning

behaviors on firm performance (Law and Ngai, 2008), performing a trust-based consumer decision-making model in electronic commerce (Kim et al., 2008), examination of relating information technology infrastructure with firm performance (Byrd, et al., 2008), developing an index for online customer satisfaction (Hsu, 2008), making decisions for resource allocation (Andreou and Bontis, 2007), assessing the performance of business unit managers (Bouwens and Vanlent, 2007), discussing competitive and cooperative positioning in supply chain logistics relationships (Klein et al., 2007), predicting the financial performance index of technology fund for SME (Sohn, et al., 2007), examining the determinants of students' satisfaction and their perceived learning outcomes (Eom et al., 2006), arguing the issue of strategic sourcing (Kocabasoglu and Suresh, 2006), investigating the relationship between interpersonal trust, employee satisfaction, and employee loyalty (Matzler and Renzl, 2007), performing the technological aspect of environmental scanning (Raymond et al., 2001), examining the impact of poor performance on risk-taking attitudes (Lee, 1997), and so on.

3.3.3 Contents

A PLS path model is actually two models: (1) a measurement model relating manifest variables (MVs) to their corresponding latent variables (LVs), and (2) a structural model relating some endogenous LVs to other LVs. The measurement model is also called the outer model (MVs → LVs) and the structural model the inner model (LVs → LVs) (Hulland, 1999). The hypothesized causal relations are represented by arrows. PLS requires a minimum sample size of 30 (Wixom and Watson, 2001). In the measurement model, reliability and validity are tested by examining: (1) the reliability of individual items, which is called the composite

reliability (CR), and (2) the convergent validity of the measures associated with the individual constructs, which is called the average variance extracted (AVE). In general, CR should be greater than 0.7 and AVE greater than 0.5 (Fornell and Larcker, 1981). In the structural model, it is determined by estimating the paths between pairs of constructs in the model. For this study, statistical significance was defined as t greater than or equal to 1.96 ($p = 0.05$, two-tailed).

The research procedure in this dissertation for outward FDI PLS path model is shown in Figure 3-1.

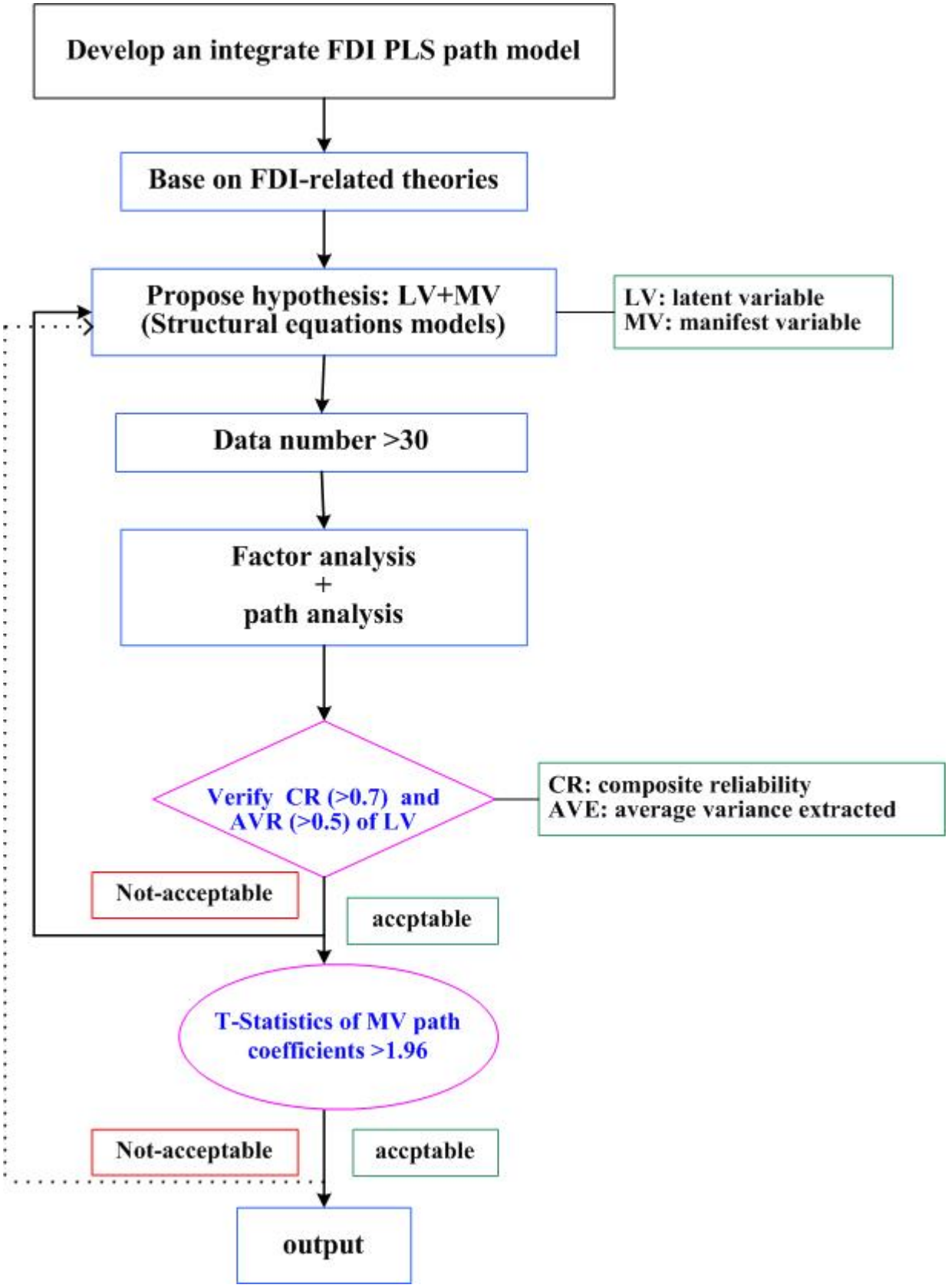


Figure 3-1. A research flow for outward FDI PLS path methodology

3.4 Hypothesis development

As mentioned above, various factors have been proposed as determinants of FDI. These include, among others, government regulations, trade openness, political risk (sociopolitical instability), financial incentives, business operating conditions, corporate taxes and incentives, size of the market, financial development, real exchange rates, changes in wages, and interest rates (Ahmed *et al.*, 2002; Akhter and Lusch, 1988; Alfaro *et al.*, 2004; Ang, 2008; Branstetter and Feenstra, 2002; Brouthers *et al.*, 2000; Choi and Jeon, 2007; Chen and Ku, 2000; Chowdhury and Mavrotas, 2006; Crespo and Fontoura, 2007; Dees, 1998; Deng, 2007; Dunning *et al.*, 2007; Gholami, *et al.*, 2006; Hansen and Rand, 2006; García-Herrero and Santabárbara, 2007; Giner and Giner, 2004; Kobrin, 1976; Li and Hu, 2002; Mina, 2007; Schneider, 2005; Tsai and Huang, 2007; Yeyati *et al.*, 2007; Zhang, 2005).

Supportive government policies create a more favorable investment environment and tend to have a positive impact on FDI. In contrast, nonsupportive or restrictive policies favor FDI coming into a country, as does a favorable macroeconomic environment. In this paper, we argue that the practices of not only the host country, but also of the parent country, play a vital role in determining the amount of FDI. There are at least three firm-specific factors that are also relevant to Taiwanese FDI.

To investigate the effect of the of the parent country's upper limit for FDI on capital flow, we treat the effect of this policy separately. Based on the above arguments, the following hypothesis is proposed:

H_1: *The amount of FDI is negatively related to the upper investment limit of the parent country.* That is, Taiwan's FDI policy does affect outward FDI into China

A favorable macroeconomic environment in the parent country tends to draw

more FDI from abroad. Conversely, an unfavorable macroeconomic environment in a parent country will lead to FDI by that country. That is, whether FDI flows into or out from a country may be influenced by macroeconomic variables such as the country's real GNP, the value of its exports, government investment, trade, GDP, savings, and consumption. Based on the above considerations, the following hypotheses are proposed:

H_2: *The amount of FDI is positively related to the favorability of the macroeconomic environment determinant in the parent country.*

H_3: *The amount of FDI is positively related to the favorability of the macroeconomic environment determinant in the host country*.

The microeconomic factors that influence FDI must also be considered. Relevant theories include industrial organization theory, factor endowment theory, product cycle theory, eclectic theory, location theory, transaction cost theory, and industrial cluster theory. Most conventional theories explain FDI in microeconomic terms, focusing on the advantages of individual firms in terms of their location or costs (Caves, 1971; Dunning et al., 2007; Hooper and Kim, 2007; Hymer, 1960). That is, a favorable microeconomic environment or advantage over the parent country will cause FDI to flow in. Conversely, an unfavorable microeconomic determinant or a comparative disadvantage will promote the outflow of FDI. Factors such as the two country's relative bank lending rates, average wages in the electronics industry, incremental taxes on land values, value-added taxes, economic growth rates (market accessibility), and exchange rates are all related. Given these considerations, the following hypothesis is proposed:

H_4: *The amount of FDI is positively related to the favorable comparative advantage determinant between the parent and host countries.*

Resource dependency is apparent in any parent-subsidiary relationship. A strong parent-subsidiary relationship allows the subsidiary to utilize internal resources from its parent company. Therefore, from a resource-based perspective (Madhok, 1997), and according to factor endowment theory, the willingness or performance of the subsidiary firm depends not only on the parent firm's capabilities, but also on the location and intangible asset-specific resources that complement these capabilities. The IC manufacturing industry is known to be high-capital, high-technology, and labor-intensive. Thus, the greater the amount of FDI, the more the firm can invest in capital, technology, R&D, and patent rights issues. Total assets or growth in net value often serve as an indicator of whether there are opportunities for growth or for the parent country's firm to seize the host country's firm. At the same time, the price to book (P/B) ratio may give an indication of what investors think of the company's past performance and future prospects. A high ratio of business orders to overseas production suggests an incentive for FDI because of reduced costs and a shorter time to market (Deng, 2007; Dunning *et al.*, 2007; Gholami, *et al.*, 2006; Giner and Giner, 2004; Li and Hu, 2002; Tsai and Huang, 2007). Given this line of reasoning, the following hypothesis is proposed:

H_5*: The amount of FDI is positively related to the favorability of firm-specific determinants.*

When it comes to capital flow, the parent country can be considered the push and the host country the pull. The two processes reinforce each other. In general, the

macroeconomic environment of a country is strongly dependent on the size of its economy. China has become Taiwan's biggest trading partner over the last ten years. This leads us to expect that the macroeconomic environment of a parent country is strongly affected by the macroeconomic environment of the host country. Although this issue is tangential to the main purpose of this paper, we nonetheless propose one final hypothesis:

H_6: *The favorability of the macro environment of the parent country is positively related to that of the host country.*

The dissertation's conceptual framework - PLS path relationships among these constructs are shown in Figure 3-2.

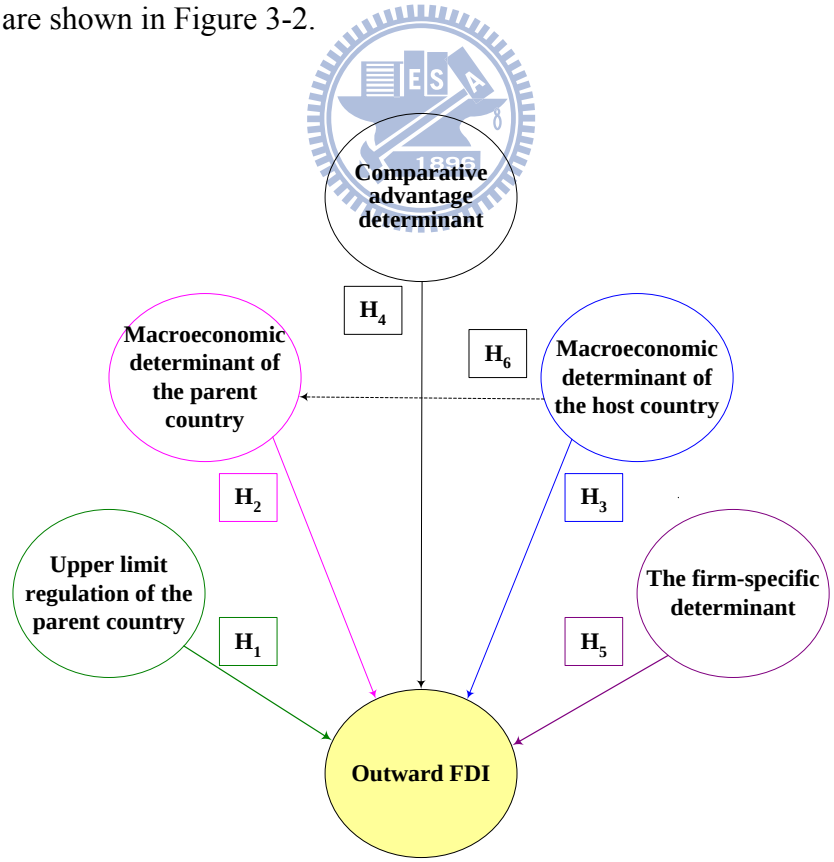


Figure 3-2. The dissertation's conceptual framework

4. An empirical case of Taiwan

4.1 Background descriptions

The growth of FDI in China s ince the beginning of China's economic reforms in 1978 has been striking. Since 2002, China has become the largest recipient of foreign capital in the world. After Taiwan and China started to exchange visits across the Taiwan Straits in the 1980s, direct investment by Taiwanese businessmen in China began to rise rapidly. Even though Taiwan and China share a very similar cultural background, and despite their different economic and political systems, China has a distinct advantage over Taiwan in attracting FDI; this advantage cannot be attributed solely to economic factors.

It is well recognized that the electronics industry is a key driver of Taiwan's economic growth. Since 1983, this industry has transformed itself from an original equipment manufacturer (OEM) to an original design manufacturer (ODM). With the emergence of China as a more attractive low-cost production and exporting platform, many companies have established production sites in China as a way to become more involved in global logistics management (GLM). According to Taiwan's Mainland Affairs Council, the cumulative number of Taiwanese FDIs in China, which began in the 1980s, reached 36,459 by 2007. The aggregate value of this FDI was 63.3 billion US dollars. In fact, China has now become the primary destination for Taiwanese enterprise funds. The FDI for manufacturing from Taiwan's various industries is distributed as follows: 15.8% for electrical equipment; 15.4% for computers, electronics, and optical products; and 6.8% for basic metals. These data show two things: (1) the ties between manufacturing in Taiwan and China are strong; and (2) Taiwan's electrical equipment manufacturing industry is the primary contributor to this capital outflow.

In this section, we present a PLS path model for outward FDI. This integrated model includes factors related to the host country, the parent country, and the individual firm as determinants. Hypotheses regarding the effects of Taiwan's FDI policy (upper limit regulations) on firms' investment decisions are then developed and tested, by using industry data from the Taiwanese Integrated Circuit (IC) for the years 1998 to 2007.

The data were collected from the Investment Commission of the Taiwanese Ministry of Economic Affairs (MOEA) and the database assembled by the *Taiwan Economic Journal* (TEJ), a for-profit organization in Taiwan. The Taiwan Stock Exchange (TWSE) listed 109 integrated circuit firms as an IPO (including TSE and OTC firms) that were in existence from 1998/03 to 2007/09. As the characteristics of IC design firms differ from those of IC manufacturing, IC packing, and IC testing firms, we omitted from our sample IC design firms and firms whose subsidiaries were created within the last 5 years. The final sample consisted of 68 firms, and there were 39 ratings or data points per firm. SmartPLS 2.0 software, developed by Hansmann and Ringle (2005), was used to estimate the model.

4.2 Descriptive statistics

Of the 109 IC firms, 56% were TSE firms and 44% were OTC firms. Most of the parent companies (54%) had been in existence for 11~ 20 years (54%), and 72% had fewer than 1,000 employees. Regarding ownership structure, we defined a firm as a partnership or joint venture (JV) if the foreign ownership was between 10% and 90%. If a firm's foreign equity holdings were over 90%, it was considered to be a sole proprietor or wholly-owned subsidiary (WOS). Table 4-1 summarizes these characteristics of our sample firms.

Table 4-1. Characteristics of the sample firms

Market category	*N* (%)
TSE	38 (56%)
OTC	30 (44%)
Total	68 (100%)
Age of parent company	
< 10 years	19 (28%)
11~20 years	37 (54%)
21~30 years	7 (10%)
31~40 years	4 (6%)
> 40 years	1 (1%)
Total	68 (100%)
Firm size (employment)	
< 1000 employees	39 (72%)
1000~2000 employees	4 (6%)
2000~3000 employees	6 (9%)
3000~4000 employees	3 (4%)
> 4000 employees	6 (9%)
Total	68 (100%)
Ownership structure	
JV	7 (10%)
WOS	61 (90%)
Total	68 (100%)

Based on a review of previous studies, we initially chose more than 40 commonly used variables. Variables having a low correlation with FDI were then deleted. Table4-2 shows the definition of the 27 manifest variables we retained. Table 4-3 presents the descriptive statistics for these variables.

We originally had 27 MVs in the model. Given the initial values of CR and AVE for the comparative advantage and firm-specific factors respectively, and the fact that the statistical significance for Growth Ratio and NVG did not reach the required 0.05 significance level and their weights were less than 0.3, we omitted these two MVs from the measurement model. This left 25 MVs and 6 LVs.

Table 4-2. Definitions of the manifest variables

LV	MV	Definition
Upper Limit	A	FDI outflow approved by the Taiwanese government
	M	Maximum FDI outflow allowed by the Taiwanese government
Parent Macro	Depend	Export dependence of Taiwan on China and Hong Kong
	Ginvest	Investment by the Taiwanese government
	NC	Domestic consumption in Taiwan
	Real GNP	Real gross national product of Taiwan
	Trade	Trade by Taiwan
Host Macro	C-CPI	Consumer price index in China
	C-GDP	Gross domestic product in China
	C-Invest	Investment by Taiwan in China
	C-Save	Savings in China
	C-Trade	Trade by China
Comp. Adv.	Rate Ratio	Relative bank lending rate
	Exchange	Relative exchange rate-NTD per RMB
	LVIT Ratio	Relative increase in the land-value tax
	Growth Ratio	Relative rate of economic growth
	VAT Ratio	Relative value-added tax
	Wage Ratio	Relative average wage in manufacturing
Firm-specific	ASG	Growth in total assets
	NVG	Growth in net assets
	Exorder	Ratio of export orders to overseas production
	PB Ratio	Ratio of stock price to book value
	RD-R	R&D revenue
	Royalties	Expenses for patent rights
	K	Capita
FDI	N	cumulative amount of FDI
	N	current amount of FDI

Table 4-3. Summary of descriptive statistics Unit: Million NTD, %

Variable	N	N	A	M	Depend	Ginvest
Mean	13,524,799	2,438,502	17,805,443	76,258,776	32.20	109,864
Median	6,112,709	1,138,292	9,393,335	66,189,079	34.12	109,543
Min	115,920	47,334	360,000	205,680	22.44	77,549
Max	46,186,505	12,649,823	66,058,474	210,357,112	44.09	160,518
Std. Dev.	15,065,073	2,984,700	19,406,179	72,022,029	1.16	2,939
Variable	NC	RealGNP	Trade	Rate Ratio	Wage Ratio	Growth Ratio
Mean	1,946,457	2,739,677	26,200	0.97	0.79	0.49
Median	1,944,212	2,646,841	24,162	1.00	0.76	0.55
Min	1,673,802	2,210,963	16,917	0.59	0.45	-0.53
Max	2,246,721	3,399,463	41,261	1.38	1.18	1.04
Std. Dev.	146,912	328,290	6,919	0.32	0.23	0.34
Variable	LVIT Ratio	VAT Ratio	Exchange	ASG	PB Ratio	RD-R
Mean	0.05	2.72	0.33	29.65	2.55	3,480,415
Median	0.05	1.80	0.22	19.16	2.12	3,494,982
Min	0.02	0.86	0.09	4.56	1.03	1,956,444
Max	0.07	8.11	1.19	207.61	6.76	5,542,763
Std. Dev.	0.02	1.93	0.27	32.80	1.23	1,090,121
Variable	Exorder	Royalties	K	NVG	C-GDP	C-Trade
Mean	21.52	468,619	16,753	43.03	12,904,773	266,299
Median	16.39	0	8,781	20.24	10,851,040	204,316
Min	5.84	0	249	1.13	6,359,760	89,312
Max	45.81	3,645,108	53,237	683.88	30,418,400	602,080
Std. Dev.	12.92	945,148	17,879	107.04	5,854,441	158,514
Variable	C-Invest	C-Save	C-CPI			
Mean	24,439,229	458,188	99.85			
Median	17,399,964	286,407	99.60			
Min	11,362,468	140,510	96.60			
Max	52,799,136	1,433,611	104.90			
Std. Dev.	13,464,975	374,034	2.20			

4.3 Results for the PLS path model

4.3.1 AVE, CR, and R^2

The correlations among the constructs are reported under the diagonal in Table 4-4. Table 4-5 shows AVE, CR and R^2 for the model. All of the CR and AVE values reach the threshold level for significance, suggesting that all the variables in the model are reliable and that each construct has high convergent validity. As can be seen in Table 4-5 and Figure 4-1, R^2 for the model is 0.921, indicating that the explanatory power and discriminant validity of the model is very high.

Table 4-4. Latent variable correlations

	Comp. Adv.	Firm-specific	Host Macro	FDI	Parent Macro	Upper Limit
Comp. Adv.	1.000					
Firm-specific	-0.862	1.000				
Host Macro	-0.880	0.962	1.000			
FDI	-0.804	0.953	0.934	1.000		
Parent Macro	-0.931	0.907	0.949	0.990	1.000	
Upper Limit	-0.879	0.949	0.989	0.918	0.951	1.000

Table 4-5. AVE, CR, and R^2

	AVE	CR	R^2
Comp. Adv.	0.8094	0.9547	
Firm-specific	0.5402	0.7008	
Host Macro	0.8944	0.9769	
FDI	0.8609	0.9252	0.9205
Parent Macro	0.7892	0.9083	0.8997
Upper Limit	0.9647	0.9820	

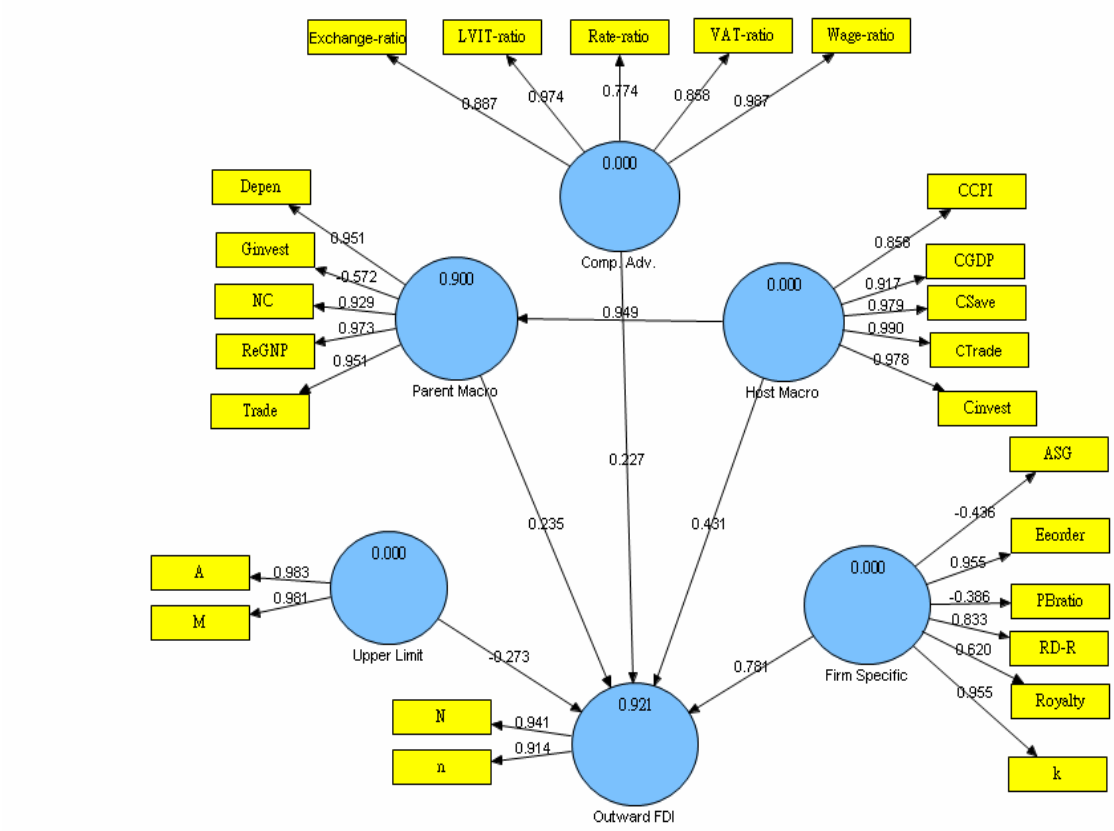


Figure 4-1. Results for the PLS path model: path coefficients for the structural model and weights for the measurement model

4.3.2 Structural model

The path coefficients for the structural model and the weights for the measurement model are shown as Figure 4-1. The results of the bootstrap resampling technique (300 runs), which was used to determine the statistical significance of the paths, show that all the paths meet the $p < 0.05$ criterion, except for Upper limit. Table 4-6 shows the path coefficients and their significance levels. The path coefficients are ranked as follows (from highest to lowest): Firm-specific → FDI (0.781), Host Macro → FDI (0.431), Upper limit → FDI (0.237), Parent Macro → FDI (0.235), and Comp. Adv. → FDI (0.227). The path coefficient for Host Macro → Parent Macro is 0.949. For all five constructs, t exceeds 1.96 ($p < 0.05$), indicating that the model is confirmed by the data.

Table 4-6. Path coefficients (Mean, Standard deviation, t)

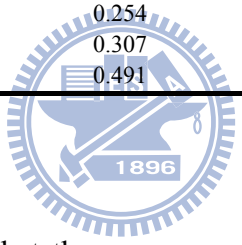
	Sample Mean (M)	Standard Deviation (STDEV)	t
Comp. Adv. → FDI	0.230	0.054	4.170
Firm-specific → FDI	0.771	0.138	5.662
Host Macro → FDI	0.441	0.210	2.049
Host Macro → Parent Macro	0.949	0.006	156.830
Parent Macro → FDI	0.236	0.090	2.606
Upper Limit → FDI	-0.270	0.177	1.541

4.3.3 Measurement model

The results of applying the bootstrap resampling technique to the measurement model are shown as Table 8. All the t values for the outer weights exceed 1.96, indicating that the measurement model is significant and thus confirmed by the data. A summary of the aggregate results for the model is presented in Table 9.

Table 4-7. Weights for the structural model (Mean, Standard Deviation , *t*)

	Sample Mean (M)	StandardDeviation (STDEV)	*t*
A ← Upper Limit	0.520	0.007	73.932
ASG ← Firm-specific	-0.103	0.011	8.668
C-CPI ← Host Macro	0.191	0.005	37.088
C-GPD ← Host Macro	0.204	0.003	74.549
C-Invest ← Host Macro	0.218	0.003	64.795
C-Save ← Host Macro	0.217	0.004	59.396
C-Trade ← Host Macro	0.226	0.004	57.872
Depend ← Parent Macro	0.248	0.005	47.658
Exchange ← Comp. Adv.	0.182	0.005	37.497
Exoder ← Firm-specific	0.309	0.011	27.446
G-Invest ← Parent Macro	-0.090	0.020	4.428
LVIT Ratio ← Comp.Adv.	0.258	0.008	32.688
M ← Upper Limit	0.498	0.003	145.326
N ← Outward FDI	0.582	0.016	36.493
NC ← Parent Macro	0.220	0.006	38.493
PB Ratio ← Firm-specific	-0.087	0.022	3.973
RD-R ← Firm-specific	0.257	0.014	19.104
Rate Ratio ← Comp. Adv.	0.245	0.010	24.273
Re-GNP ← Parent Macro	0.265	0.006	41.784
Royalty ← Firm-specific	0.188	0.022	8.795
Trade ← Parent Macro	0.263	0.006	44.256
VAT Ratio ← Comp. Adv.	0.168	0.007	24.256
Wage Ratio ←Comp.Adv.	0.254	0.007	35.364
K ← Firm-specific	0.307	0.012	25.098
n ← FDI	0.491	0.005	96.426



4.4 Discussions

In this example, we found that the macroeconomic environments of the parent and host countries, the comparative advantage, and firm-specific factors have had a strong influence on Taiwan's FDI. The R^2 for our proposed model is 0.921, lending it strong support. Structural relationships from the proposed model is shown as Table 4-9.

Most previous studies have focused only on the host country when analyzing FDI, while ignoring the parent country. The results of our study show that firm-specific factors have a much stronger impact on FDI than the upper limit (0.781 vs. 0.273). Further, we found that the macroeconomic environment of the host country (0.431), the macroeconomic environment of the parent country (0.235) and the comparative advantage (0.227) have also affected FDI. Thus, our study contributes to the literature

by demonstrating that firm-specific determinants, the parent country determinants and the comparative advantage determinants also matter in outward FDI.

Table 4-8. The aggregate results for the model

	CR	AVE	Weight	t^a
Upper Limit	0.982	0.964		
A			0.983	229.845
M			0.981	186.031
Parent Macro	0.908	0789		
Depend			0.951	126.679
G-Invest			-0.572	7.667
NC			0.929	71.374
Re-GNP			0.973	283.549
Trade			0.951	14.836
Host Macro	0.976	0.733		
C-CPI			0.858	32.321
C-GDP			0.917	48.812
C-Save			0.979	401.096
C-Trade			0.990	741.116
C-Invest			0.978	339.152
Comp. Adv.	0.954	0.809		
Exchange Ratio			0.887	48.315
LVIT Ratio			0.974	303.980
Rate Ratio			0.774	27.003
VAT Ratio			0.858	38.932
Wage Ratio			0.987	626.263
Firm-specific	0.701	0.540		
ASG			-0.436	7.716
Exorder			0.955	131.164
PB Ratio			-0.386	4.247
RD-R			0.833	22.211
Royalty			0.620	9.247
K			0.955	138.939
FDI	0.925	0.861		
N			0.941	104.150
n			0.914	54.671

[a]All t values are $p < .05$

Table 4-9. Structural Relationships from the Proposed Model

Link in the model	Hypothesis	Sign	Parameter	Significance	Conclusion
Upper Limit → FDI	H_1	-	-0.273	p>0.05	Not Supported
Parent Macro → FDI	H_2	+	0.235	p<0.05	Supported
Host Micro → FDI	H_3	+	0.431	p<0.05	Supported
Comp. Adv. → FDI	H_4	+	0.227	p<0.05	Supported
Firm-specific → FDI	H_5	+	0.781	p<0.05	Supported
Host Macro → Parent Macro	H_6	+	0.949	p<0.05	Supported

Given that the standardized path coefficients indicate the strengths of the direct effects, it is worth noting that the firm-specific factors (0.781) have the greatest effect on FDI. As shown in Figure 4-1 and Table 4-8, the weights for RD-R, Royalty and K

are 0.833, 0.620, and 0.955 respectively. These values indicate that IC manufacturing firms exist in a highly capital-intensive, highly technology-intensive industrial environment, in which the availability of working capital, the expenses for royalties and revenue associated with R&D, or technology transfers are inevitable. The weight for Export Order is 0.955, indicating that the higher ratio of business orders (in Taiwan) compared to overseas production (in China) implies a higher incentive in Taiwan for FDI; this conclusion is based on the factors of geographical clustering of industries, low costs of operation, and short times to market. Due to technology protection and ownership control, Taiwanese IC manufacturing firms tend to engage in FDI instead of outsourcing. However, the weight of only -0.436 for ASG suggests that as the rate of total asset growth in Taiwan decreased, IC firms faced a bottleneck in their attempts to increase their capacity. This situation accelerated their capital outflow to China.

The weight for the PB ratio is notable. A positive PB Ratio would mean that firms' actions are consistent with market expectations. However, the negative PB Ratio of -0.386 indicates that firms' actions ran counter to investors' expectations; although the firms may have wanted to engage in FDI, they did not do so because of the upper limit.

The path coefficient for the host country (0.431) ranks second. According to Figure 4-1 and Table 4-8, the weights for C-CPI, C-GDP, C-Save, C-Trade, and C-Invest are 0.858, 0.917, 0.979, 0.990, and 0.978 respectively. These values indicate that FDI is positively related to the favorability of the host country's macroeconomic environment. Since 2002, China has become the largest recipient of foreign capital in the world, showing that China has become a magnetic force attracting FDI from abroad.

The path coefficient for the parent country (0.235) ranks third. According to

Figure 4-1 and Table 4-8, the weights for NC, Re-GNP and Trade are 0.929, 0.973, and 0.951 respectively. It is well known that the IC industry was the foundation of Taiwan's economic miracle. As mentioned by the theory of the international product life cycle, following a period of growth there was a demand for IC firms to invest and further enlarge their capacity and product diversification. The weight for Depend (0.951) suggests that the greater Taiwan's export dependence on China and Hong Kong, the greater the incentive for Taiwanese FDI in China. Again, investment and production in China has provided the incentive for IC firms. This incentive is based on geographical clustering, low cost of operation, and short time to market. The weight of G-Invest is -0.572, suggesting that the Taiwanese government's investment in the IC industry is insufficient. As the preferential treatment provided by the parent government declines and environmental impact protection gradually increases, IC firms are pressured to increase capital outflow to China.

The path coefficient (0.227) for the comparative advantage determinants ranks fourth. This result suggests that the electronics industry exists in an era of microprofits, a time when cost reduction is an IC manufacturing firm's primary goal. As shown in Figure 4-1 and Table 4-8, the weights for Wage Ratio, VAT Ratio, Rate Ratio, LVIT Ratio, and Exchange Ratio are 0.987, 0.858, 0.774, 0.974, and 0.887 respectively. Because IC manufacturing firms exist in a highly labor-intensive and cost-sensitive environment, as the endowment costs (including relative wages, relative increments in the tax on land values, the relative lending rates of banks, and relative value-added taxes) increase in Taiwan, the incentive for Taiwanese FDI in China increases.

The path coefficient for the parent country's upper limit is 0.273. As shown in Figure 4-1 and Table 4-8, the weights for A and M are 0.983 and 0.981 respectively. Given that the significance level for the upper limit fails to reach 0.05, H_1 (the amount of FDI is negatively related to the upper investment limit of the parent

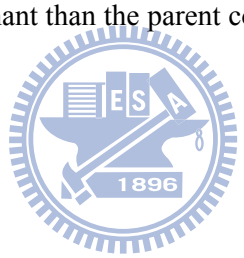
country) is rejected. This result seems consistent with the free-market economic philosophy; that is, other firm-related factors affecting FDI deter the effect of the upper limit. Because of the trends toward globalization and liberalization, the government's policy is shown to be insufficient. Because the available capital or net value of most IC manufacturing firms is generally high, an investment of 40% of this available capital may suffice for Taiwan to maintain the technological status quo in China. The rejection of H_1 suggests that the upper limit is not a barrier to investment. Likewise, technology protection and control have been delayed by the Taiwanese (parent) government, as illustrated by the case of the Taiwan Semiconductor Manufacturing Corporation's desire to build a 12" wafer fabrication plant in China.

In a similar vein, the path coefficient for the host country's macroeconomic environment is 0.949, which suggests that China's macroeconomic environment indeed affects Taiwan's. Further, this path coefficient for the host country is higher that that for the parent country (0.431 vs. 0.235), possibly due to a greater comparative advantage determinants for production in China. This result suggests that the relationship between Taiwan and China is very close, and the pressure for Taiwan to provide FDI comes more from China than from Taiwan.

Above all, these results highlight the importance of considering not only the influence of the host country but also that of the parent country. They also have important policy implications for the Taiwanese government's investment authority, because they show that the upper limit on investment is not a key factor in determining whether Taiwanese IC manufacturing firms decide to invest abroad. The government's policy of keeping Taiwan's capital and technology in Taiwan, or encouraging Taiwanese companies located in China to return or reinvest their capital in Taiwan, can be achieved more effectively by improving the macro- and microeconomic circumstances that most firms face.

5. A empirical result of a combined PLS path and MCDM model

In this section, we propose a combined partial least squares (PLS) path model and multiple criteria decision-making (MCDM) approach to study Taiwan's outward FDI to China. The main purpose of this study is to investigate the determinants of Taiwanese firms' decisions in making FDI into China. Using data from Taiwanese optoelectronics firms doing business in Taiwan between 1998 and 2007), the results of the proposed model show that the outward FDI policy of the parent country is a key factor in Taiwan's outward FDI into China. It is also found that the macroeconomic environment of the host country was a stronger determinant than the parent country on Taiwan's outward FDI into China.



5.1 Background description

In this respect Taiwan distinguishes itself as a particularly interesting case. Studying the successful Taiwanese lessons could shed useful light on the ways of attacking poverty in other developing economies. After the government decisively reoriented its development strategy from import substitution toward export promotion at the end of the 1950s, the exceptional economic growth has not only brought with it the well-known record of income distribution, but has also resulted in rapid poverty reduction.

Aside from being open to foreign trade, we define openness to include open to inward and outward foreign direct investment (FDI) as a liberal inward foreign direct investment regime is among the essential ingredients of Taiwan's overall export-oriented development strategy.

We focus the analysis of Taiwan's FDI on China. First of all, its sheer size is of significance to the whole world and its stellar growth has been attributed to enormous FDI inflow, among others. In 2002, FDI to China exceeded that to the US and in 2003, the total amount reached 53.5 billion US dollars. It has since become the country with the largest inflow of FDI. Secondly, many developing countries believe that FDI can help to promote economic growth via technology spillover from foreign to domestic firms. For years, China has vehemently subscribed to this view. Since the economic reform in 1979, China strives to attract FDI by setting up special economic zones and coastal regions, opening up three delta areas, amending enterprise legislations, implementing tax reduction/remission policies, and devolving the authority of the Central Government, among other things. Now it is time to reconsider the rationale of these favorable policies. Thirdly, there is paucity of research on contemporary China, especially one that utilizes actual industry and provincial data. Previous studies have pointed to the positive effect of FDI, by applying limited scope of data from the early economic reform in China.

China's high rate of economic growth since the adoption of more liberal economic policies under Deng Xiao-Ping in the late 1970s. In the space of less than a generation, China has transformed itself from a poor nation almost completely cut off from the global economy to one of the world's most important suppliers of labor-intensive manufactures. Its arrival into the ranks of trading nations will be complete when it has implemented the conditions for joining the World Trading Organization (WTO). A comprehensive description of Chinese economic reform, even one focused solely on the evolution of China's FDI regime, is well beyond the scope of this paper.

The variation across regions is quite striking, with Guangdong province and

neighboring Fujian together maintaining a dominant position as the most important site of FDI activity. These two provinces are the sites of the 'special economic zones' (SEZ), established in 1979 and giving preferential tax and administrative treatment to foreign firms locating there. It is noteworthy that none of the original special economic zones were developed industrial centers in 1979. In fact, these zones were established outside the state's industrial centers to prevent 'contamination' of Chinese heavy industry by outside influences. These 'experiments' in attracting FDI were quite successful.

The next major regulatory change in FDI came in 1986, with the implementation of the so-called 'Twenty-two Regulations'. These changes represented a major liberalization which applied throughout China. Foreign invested enterprises (FIE) were made eligible for reduced tax rates regardless of location, and were given increased managerial autonomy. The establishment of an FIE was still subject to the approval of local and central agencies, and in practice, there continues to be a considerable degree of local autonomy in regulating FIEs.

Much of the foreign investment, especially that in the SEZs, has been for the purpose of 'processing trade' rather than 'ordinary trade'. Under the former activity, intermediate inputs are imported, incorporated into other products, and are then exported again'processing trade'.

A number of studies suggest that the Chinese government, both national and local, is acutely aware of this competition, and has taken steps to impede the ability of foreign firms to compete in the Chinese market (e.g. Rosen, 1998). For example, multinationals regularly confront a nexus of restrictions on their operations, including export requirements, localization requirements, requirements for technology transfer, and restrictions on domestic market access. Provincial and even local governments also regularly attempt to extract funds from foreign firms through both legal and

illegal surcharges and taxes. While on paper foreign firms get favorable tax and import treatment, in practice it is clear that foreign firms are often operating with a government-engineered disadvantage.

As the focus of government development efforts shifts from the coast to the Western provinces, it is already clear that one of the barriers will be the deeply entrenched role of state-owned enterprises in this region of the country. Real liberalization, market-oriented development, and successful attraction of foreign direct investment would all bring about a decline in the state-owned sector of the economy–and we can expect this to be resisted, especially in the inland provinces.

5.2 PLS model

5.2.1 Hypothesis of PLS model

Given the above mentioned argument, four hypotheses in this section are proposed as follows:

H_1: *Outward FDI is positively related to the FDI policy (upper investment limit regulation) of the parent country.* That is, Taiwan's FDI policy does affect outward FDI into China.

H_2: *Outward FDI is positively related to an unfavorable macroeconomic environment of the parent country.*

H_3: *Outward FDI is positively related to a favorable macroeconomic environment of the host country.*

H_4: *Outward FDI is positively related to the favorable firm specific determinant.*

The PLS path model of outward FDI is shown in Figure 5-1.

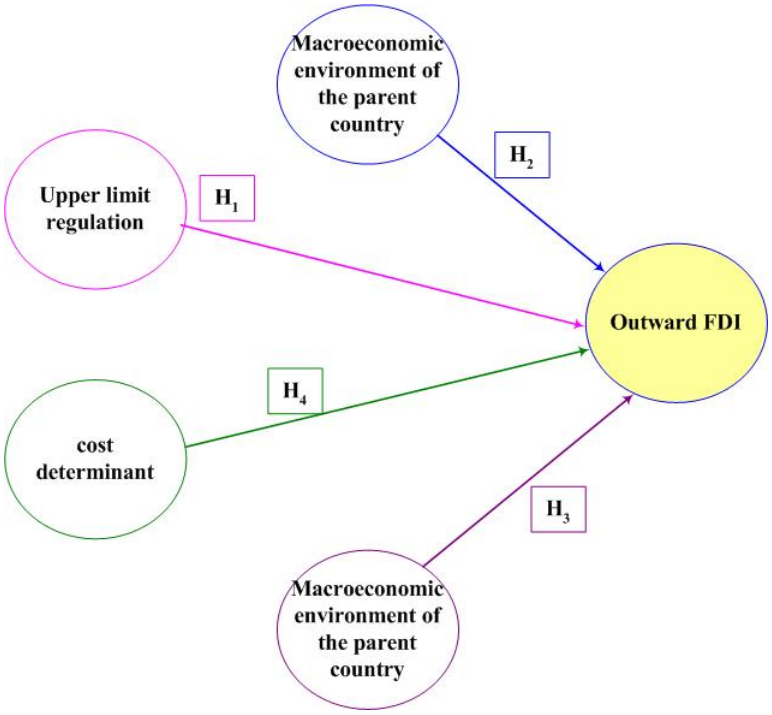


Figure 5-1. The PLS path model of outward FDI

5.2.2 Data description

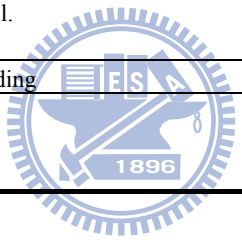
The relationships between the outward FDI and the four aspects of determinants were analyzed using the PLS path modeling approach. Data used in this study were collected from the Investment Commission of the Taiwanese Ministry of Economic Affairs (MOEA), and the database assembled by the *Taiwan Economic Journal* (TEJ), a for-profit organization in Taiwan. The research sample consisted of optoelectronics firms listed in the Taiwan Stock Exchange during the period from 1998 to 2007. The final sample size was 82 firms, and the numbers of observations was 39. SmartPLS 2.0 was employed to estimate the model.

From 1998-2007, amongst the sample as a whole, the ratio of TSE firms was 59% and OTC firms 41%. Most of the parent company's ages ranged from 11~20 years (49%). In terms of firm size, 57% of the firms had less than 1,000 employees. As for the stockholding mode, wholly owned subsidiaries (WOS) were preferred over

joint ventures (JV). Table 5-1 summarizes the characteristics of our sample firms. (there is no mention of stockholding mode in table 5-1 nor percentages of WOS or JVs)

Table 5-1. The characteristics of sample firms

Market Category	Number	(%)
TSE	48	(59%)
OTC	34	(41%)
Total	82	(100%)
Age of the parent company		
Less than 10 years	20	(24%)
11 ~ 20 years	40	(49%)
21 ~ 30 years	15	(18%)
31 ~ 40 years	7	(9%)
Total	82	(100%)
Firm Size by employment		
Less than 1000 empl.	57	(70%)
1000 ~ 2000 empl.	13	(16%)
2000 ~ 3000 empl.	2	(2%)
3000 ~ 4000 empl.	6	(7%)
Above 4009 empl.	4	(5%)
Total	82	(100%)
Ratio of stockholding		
JV	38	(46%)
WOS	44	(54%)
Total	82	(100%)



Based on a review on previous studies, we first chose several variables that were commonly used. Items with low correlations were then deleted. Table 5-2 shows the definition of manifest variables. Table 5-3 lists the descriptive statistics of each manifest variable for our sample firms.

Table 5-2. Definition of manifest variables

LVs	MVs	Definition
Upper Limit	A	the amount of FDI outflow approved by the government
	M	the maximum amount of FDI outflow restricted by the government
Parent Macro	Depend	the export dependence on China and Hong Kong
	Ginvest	the investment amount of the government
	NC	the domestic consumption of Taiwan
	ReGNP	the real GNP of Taiwan
	Trade	the trade amount of Taiwan
Host Macro	CCPI	the consumer price index of China
	CGNP	the GNP of China
	CInvest	the investment amount of China
	CSave	the savings amount of China
	CTrade	the trade amount of China
Cost	Rateratio	the relative lending rate of bank
	LVITratio	the relative land value increment tax
	Exchangeratio	the relative exchange rate-NTD per RMB
	VATratio	the relative value added tax
	Wageratio	the relative wage of the manufacturing industry
FDI Outflow	N	the accumulated amount of FDI outflow
	n	the current amount of FDI outflow

Table 5-3. Summary of descriptive statistics Unit: Million NTD, %

Variable	N	n	A	M	Depend	Ginve
Mean	22,306,524	4,660,922	31,899,057	107,315,021	32.20	109,86
Median	14,050,484	3,039,423	24,234,455	105,734,762	34.12	109,54
Minimum	115,920	0	0	0	22.44	77,54
Maximum	46,186,505	21 161,879	115,439,231	366,674,407	44.09	160,51
Std.Dev	15,065,073	5,546,838	34,415,245	101,520,343	1.16	2,93
Variable	NC	ReGDP	Trade	Rateratio	LVITratio	Exchangerati
Mean	1,946,457	2,739,677	26,200	0.97	0.05	0.33
Median	1,944,212	2,646,841	24,162	1.00	0.05	0.22
Minimum	1,673,802	2,210,963	16,917	0.59	0.02	0.09
Maximum	2,246,721	3,399,463	41,261	1.38	0.07	1.19
Std. Dev	146,912	328,290	6,919	0.32	0.02	0.27
Variable	VATratio	Wageratio	CGDP	CCPI	CInvest	CSave
Mean	2.72	0.79	12,904,773	99.85	24,439,229	458,188
Median	1.80	0.76	10,851,040	99.60	17,399,964	286,407
Minimum	0.86	0.45	6,359,760	96.60	11,362,468	140,510
Maximum	8.11	1.18	30,418,400	104.90	52,799,136	1,433,611
Std. Dev	1.93	0.23	5,854,441	2.20	13,464,975	374,034
Variable	CTrade					
Mean	266,299					
Median	204,316					
Minimum	89,312					
Maximum	602,080					
Std. Dev	158,514					

5.2.3 Results for the PLS path model

We analyzed and interpreted the proposed PLS model in two stages. In the first stage, the measurement (outer) model was tested by performing both validity and reliability analyses on each of the measurements obtained using the model.

Reliability and validity were tested by looking at: (1) the reliability of individual

items, known as Composite Reliability (CR), and (2) the convergent validity of the measures associated with individual constructs, known as Variance Extracted (AVE). In general, an acceptable level is CR>0.7, AVE>0.5. The results of the proposed PLS path model are reported in Table 5-4 and shown in Figure 5-1. All CRs had loading values higher than 0.9 and all AVEs were above 0.8. It can thus be concluded that individual items were reliable and each construct had high convergent validity. Discriminant validity was assessed using a latent variable correlations matrix, where the square root of the values of the average variance was extracted and calculated for each of the constructs along the diagonal. As can be seen in Table 5-4, discriminant validity was satisfactory. The explanatory power of the model (R^2 values) in our study was 0.948. Thus, it can be concluded that the explanatory power of the model was quite strong. In general, all the measures showed very good reliability and validity. Additionally, according to Table 5-7, all *t* statistics of the outer weights were more than 1.96, indicating that the measurement (outer) model was also significant.

Table 5-4. AVE, CR and the R square values

	AVE	CR	R Square
Firm Specific	0.811	0.955	
Host Macro	0.894	0.976	
FDI Outflow	0.933	0.965	0.948
Parent Macro	0.788	0.908	
FDI Policy	0.988	0.994	

Table 5-5. Latent Variable Correlations

	Firm Specific	Host Macro	FDI Outflow	Parent Macro	FDI Policy
Firm Specific	1.000				
Host Macro	-0.875	1.000			
FDI Outflow	-0.794	0.952	1.000		
Parent Macro	-0.928	0.951	0.863	1.000	
FDI Policy	-0.880	0.981	0.961	0.938	1.00

Table 5-6. Path Coefficients (Mean, STDEV, *t*)

	Sample Mean (M)	Standard Deviatio (STDEV)	*t*
Firm Specific → Outward FDI	0.064	0.048	1.458
Host Macro → Outward FDI	0.650	0.161	3.968
Parent Macro → Outward FDI	-0.422	0.095	4.411
FDI Policy → Outward FDI	0.774	0.146	5.414

Table 5-7. Outer Weights (Mean, STDEV, *t*)

	Sample Mean (M)	Standard Deviation (STDEV)	*t*
A ← Upper Limit	0.509	0.002	211.027
M ← Upper Limit	0.497	0.002	273.420
CCPI ← Host Macro	0.187	0.004	41.998
CGNP ← Host Macro	0.215	0.005	47.562
CSave ← Host Macro	0.220	0.003	65.427
CTrade ← Host Macro	0.220	0.004	57.512
CInvest ← Host Macro	0.213	0.003	63.856
Depen ← Parent Macro	0.253	0.005	50.488
Ginvest ← Parent Macro	0.077	0.022	3.497
NC ← Parent Macro	0.206	0.009	23.054
ReGNP ← Parent Macro	0.273	0.007	39.668
Trade ← Parent Macro	0.270	0.007	40.729
Exchange ← Firm-specific	0.188	0.004	42.940
LVITratio ← Comp. Adv.	0.258	0.007	35.435
Rateratio ← Firm-specific	0.231	0.008	28.933
VATratio ← Comp. Adv.	0.175	0.006	27.565
Wageratio ← Comp. Adv.	0.256	0.007	35.894
N ← Outward FDI	0.548	0.016	33.663
n ← Outward FDI	0.488	0.005	90.391

In the second stage, the structural (inner) model was tested by estimating the paths between the constructs in the model to determine the significance as well as the predictive ability of the model. The significance level of the *t* statistics should be equal to, or more than, 1.96. The results of the bootstrapping re-sampling technique (300 runs), which was used in PLS to determine the significance of the paths, showed that all the paths were significant except for "Firm Specific → Outward FDI". We can thus conclude that, with the exception of H_4, the hypothesized model was confirmed by the data shown in Table 5-6. Given that the standardized path coefficients indicate the strengths of the direct effects, it is worth noting that the FDI policy (upper limit regulation) of the parent country determinant dominated (path coefficient = 0.789) the effect on outward FDI. That result was consistent with the expectations of H_1. Hence, the effect of the FDI policy of the parent country does, indeed, matter.

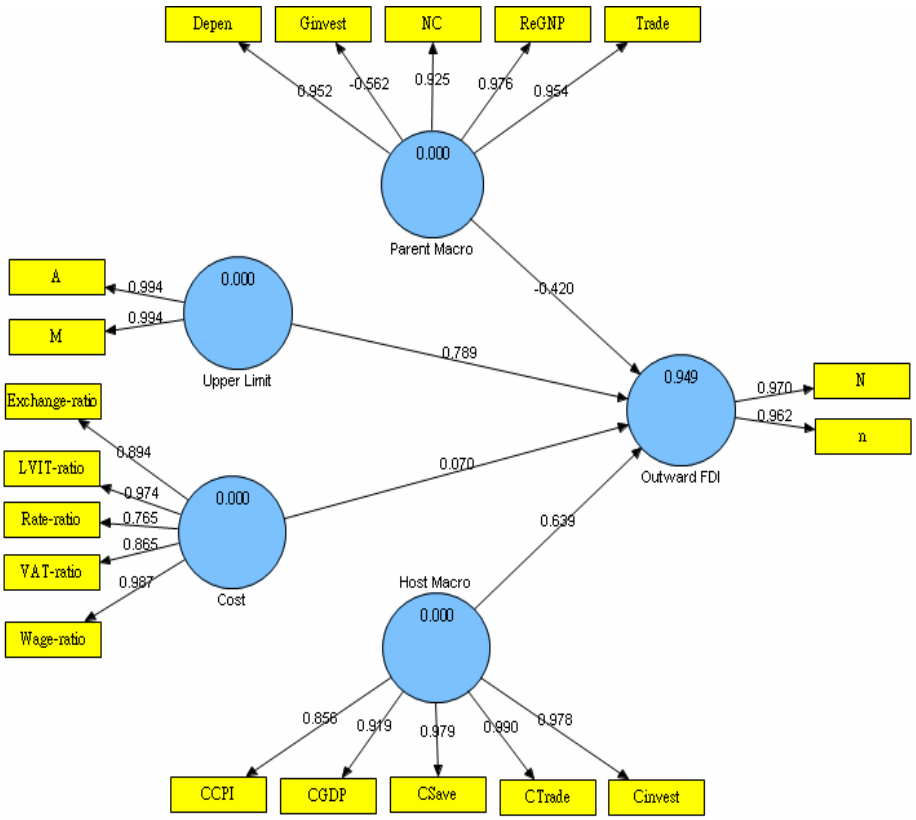


Figure 5-2. The result of the proposed PLS path model

Table 5-8. Structural relationships of the proposed model

Link in the model	Hypotheses	Parameter	*t*	Conclusion
FDI Policy → Outward FDI	H_1	0.789	5.414	Supported
Parent Macro → Outward FDI	H_2	-0.420	4.411	Supported
Host Macro → Outward FDI	H_3	0.639	3.968	Supported
Firm Specific → Outward FDI	H_4	0.070	1.458	Not Supported

5.3 MCDM model

A typical multiple criteria evaluation problem examines a set of feasible alternatives and considers more than one criterion to determine a priority ranking for alternative implementation. Multiple criteria decision-making (MCDM) techniques have been used in recent years to solve a wide variety of problems (Chen and Liao, 2004; Hung and Chiang, 2008; Tesng, et al., 2008; Tsaur, et al., 2002; Tzeng et al., 2002).

In this paper we applied an MCDM approach to examine the determinants on outward Taiwanese FDIs. We constructed an MCDM model of the determinants of Taiwan's outward FDI to China based on the four aspects of determinants from the above PLS path model. The hierarchical structure is shown in Figure 3. That is, there are four dimensions and seventeen criteria in the model. The four dimensions are the FDI policy (investment upper limit regulation) of the parent country, the macroeconomic environment of the parent country, the macroeconomic environment of the host country and firm-specific determinants. To deal with the qualitative attributes in subjective judgment, we employed an analytic hierarchy process (AHP) to determine the weights of decision criteria for each of the optoelectronics firms.

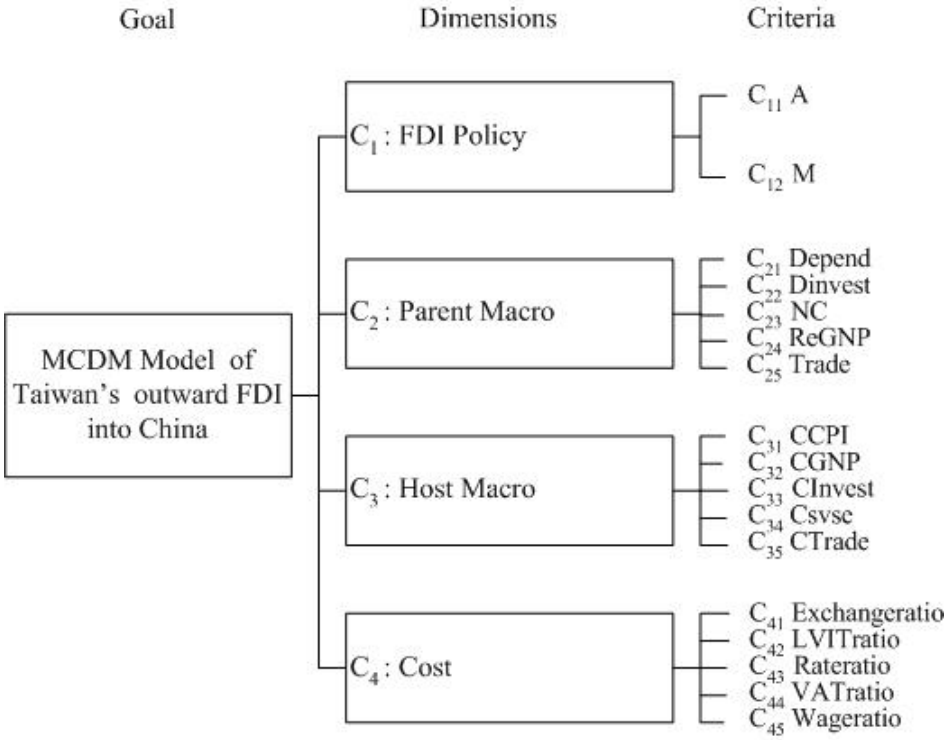


Figure 5-3. The MCDM model of Taiwan's outward FDI to China

5.3.1 Analytic hierarchy process

The analytic hierarchy process (AHP; Saaty, 1977, 1980) solves complicated and subjective decision making problems. In AHP, multiple paired comparisons are based on a standardized evaluation scheme (1 = equal importance; 3 = weak importance; 5 =

strong importance; 7 = demonstrated importance; 9 = absolute importance). The AHP uses pair-wise comparisons to compare "n" elements under given conditions.

Using AHP, we were able to convert vague verbal responses into a 9-point linguistic scale. The results of the pair-wise comparisons were then used to construct a judgment matrix, and the normalized eigenvector corresponding to the maximum eigen-value (λ_{max}) was calculated. The consistency index (C. I.) served as the indicator of "closeness to consistency". C. I. = (λ_{max}-n) / (n-1), with λ_{max} as the eigen-value for the pair-wise comparison matrix of size "n". In general, if the value of C.I. turned out to be < 0.1, our judgments could be considered to be satisfied.

5.3.2 Results for AHP method

After asking five CFOs of optoelectronics firms, by questionnaire, about their firms' decisions in making FDI into China, we used ECPRO (Team expert choice) 9.5 to construct and calculate the weight of the MCDM model. The average C. I. of the study was 0.05. The weighting factors of the seventeen evaluation criteria for outward FDI are listed in Table 5-9. After adding the value of weighting factors of the evaluation criteria, we arrived at weight values for each of the four dimensions. The weighting factors affecting the dimensions of outward FDI are: (1) "FDI Policy" (weighting = 0.386); (2) "Host Macro" (weighting = 0.327); (3) "Parent Macro" (weighting = 0.134); and (4) "Firm Specific" (weighting = 0.110). The results of the MCDM model are shown in Table 5-10.

Table 5-9. Weights obtained by the AHP method for each expert

Experts	C_{11}	C_{12}	C_{21}	C_{22}	C_{23}	C_{24}	C_{25}	C_{31}	C_{32}	C_{33}	C_{34}	C_{35}	C_{41}	C_{42}	C_{43}	C_{44}	C_{45}
01	0.150	0.299	0.046	0.046	0.019	0.017	0.028	0.075	0.047	0.103	0.247	0.060	0.022	0.014	0.010	0.017	0.015
02	0.263	0.088	0.022	0.020	0.047	0.044	0.057	0.102	0.059	0.045	0.194	0.068	0.019	0.024	0.013	0.018	0.035
03	0.139	0.139	0.038	0.016	0.021	0.049	0.039	0.059	0.102	0.068	0.249	0.089	0.018	0.049	0.031	0.024	0.041
04	0.312	0.156	0.028	0.014	0.019	0.062	0.037	0.024	0.051	0.038	0.354	0.082	0.010	0.039	0.014	0.008	0.025
05	0.208	0.208	0.031	0.023	0.027	0.052	0.052	0.032	0.048	0.048	0.083	0.083	0.012	0.032	0.017	0.015	0.03
average	0.214	0.178	0.033	0.024	0.027	0.045	0.043	0.058	0.061	0.060	0.071	0.076	0.016	0.032	0.017	0.016	0.029
	$C_{11}+C_{12}=C_1$ =0.392		$C_{21}+C_{22}+C_{23}+C_{24}+C_{25}=C_2=0.171$					$C_{21}+C_{22}+C_{23}+C_{24}+C_{25}=C_2=0.328$					$C_{21}+C_{22}+C_{23}+C_{24}+C_{25}=C_2=0.110$				

Table 5-10. The result of outward FDI MCDM model

Dimensions/ Evaluation Criteria	Weighting Factors of Dimensions	Rank of Dimensions	Weighting Factors of Evaluation Criteria	Rank Across Dimensions
C_1 FDI Policy	0.386	(1)		
C_{11}:A			0.214	(1)
C_{12}:M			0.178	(2)
C_2 Parent Macro	0.134	(3)		
C_{21} Depend			0.033	(10)
C_{22} Ginvest			0.024	(14)
C_{23} NC			0.027	(13)
C_{24} ReGNP			0.045	(8)
C_{25} Trade			0.043	(9)
C_3 Host Macro	0.327	(2)		
C_{31} CCPI			0.058	(7)
C_{32} CGNP			0.061	(5)
C_{33} CInvest			0.060	(6)
C_{34} CSave			0.071	(4)
C_{35} CTrade			0.076	(3)
C_4 Firm Specific	0.110	(4)		
C_{41} Rateratio			0.016	(16)
C_{42} LVITratio			0.032	(11)
C_{43} Exchangeratio			0.017	(15)
C_{44} VATratio			0.016	(16)
C_{45} Wageratio			0.029	(12)

5.4 Discussions

In this section, by using a combined PLS path model and MCDM approach, we have shown that the outward FDI policy (upper limit regulation) and the macroeconomic environment of the parent country are strong determinants on outward FDI from Taiwan into China. The findings lend strong support to the model constructed in this study.

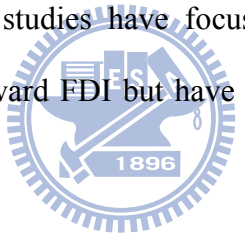
The results of PLS path model showed that the FDI policy determinant of the parent country (path coefficient =0.789) have much stronger impacts on the outward FDI than does the macroeconomic environment of the host country (path coefficient = 0.639). And, the pull force coming from the host country (China; path coefficient =0.639) is higher than that the push force of the parent country (Taiwan; path coefficient =0.420). Thus, FDI policy dominates the various factors affecting Taiwan's outward FDI into China and highlights the importance of considering not only the determinant of the host country, but also the parent country determinant.

Also, from the results of the MCDM model, it was found that when the

optoelectronics firms decided to make FDIs into China, the weight of the determinants was as follows: “FDI Policy” (weighting = 0.442) which ranked first; “Host Macro” (weighting = 0.235) which ranked second, and “Parent Macro” (weighting = 0.134) which ranked third. This indicates that “FDI Policy” is the priority determinant considered by the firms in making investments into China; that is; the FDI policy dominates the effect on Taiwan’s outward FDI into China.

Above all, the results of the two models are consistent with each other. The results of the study show that the FDI policy (investment upper limit regulation) of Taiwan’s government does, indeed, matter on outward FDI into China, not only from an objective viewpoint but also from a subjective one.

Hopefully, the results of this study will contribute to the research data available on FDI studies, since previous studies have focused mainly on the host country determinant when analyzing outward FDI but have paid scant attention to the parent country determinant.



6. Does the investment upper limit regulation matter?

In this section, we developed a partial least squares (PLS) path model to investigate the outward foreign direct investment (FDI) of Taiwan into China. The main purpose of this study is to answer a question: “How much has the investment upper limit regulation interfered with Taiwanese firms’ decisions in making FDI into China?” The question will be answered by testing six hypotheses on the determinants of the model. The results of our study, using data of Taiwanese communication and internet firms between 1998 and 2007 showed that the regulation indeed affects the FDI outflow. However, it is also found that firm specific factors had much stronger effects than did the investment upper limit regulation on Taiwanese firms’ FDI into China.

6.1 Background description

The deregulation of capital outflows by the Taiwanese government in 1987 caused a watershed in the pattern and frequency of FDI emanating from Taiwan. The policy permitted a business or an individual to send annually up to US$5 million abroad that needed no governmental approval. As a result, outward FDI surged. In the period between 1987 and 1988, both the flow and the stock of Taiwan’s outbound FDI surpassed those of inbound FDI. Taiwan has since become a net capital exporter. However, after the occurrence of the Asian Financial Crisis in 1997, the destinations of Taiwan’s FDI outflows changed dramatically. This is particularly evident in the re-balancing of FDI funds between those crisis-affected Southeast-Asian countries on one hand and China on the other. Not only have the FDI flows from Taiwan to China increased over the last ten years, but the ratio between the FDI flowing to China and the FDI flowing to those Southeast-Asian countries has also increased steadily after

1997.

According to Taiwan's Mainland Affairs Council, the cumulative number of cases of Taiwanese FDI into China has come to 36,459 by 2007, while the aggregate amount of FDI had reached at 63.3 billion US dollars. In fact, China has now become the primary area where the funds of Taiwanese enterprises are mostly drawn to. Further, the weights of outward FDI for Taiwan's various industries are as follows: 15.8% for electrical equipment manufacturing; 15.4% for computers, electronics, and optical products manufacturing; and 6.8% for basic metal manufacturing. These data showed two things: (1) the tie between Taiwan's manufacturing industries and China's is strong; (2) the electrical equipment manufacturing industry is the top contributor of these capital outflows.

It is well documented that FDI provides various beneficial effects to the host county. These include productivity gains, technology transfers, and economic growth, (Ang, 2008; Baltagi *et al*, 2007; Chowdhury and Mavrotas, 2006; Gholami *et al*, 2006). Issues on FDI have attracted much attention in recent years from scholars in the area of international business and economics. Regarding the factors driving FDI, numerous studies found that the host country factor was the key driver (Ang, 2008; Cheng and Kwan, 2000; Eichengreen and Tong, 2007; Hooper and Kim, 2007; Jinjarak, 2007; García-Herrero and Santabárbara, 2007; Giner and Giner, 2004; Mina, 2007; Xu *et al*, 2008; Zhang, 2005). However, the role of the parent country's government as one of the factors has been largely ignored in these studies. It is common to observe regulations of various natures imposed by many governments on the outward FDI. However, this is particularly true in Taiwan concerning outward FDI to China. Given the political tension between China and Taiwan in the period from 1998 to 2007, regulations were set up by the Taiwanese government not only on the upper limit amount but also on the items approved for Taiwanese firms to invest in

China. Complaints have since been raised from both of business leaders and the academia regarding the merits of the regulation. However, no solid empirical evidence on this matter has been offered thus far. It is not clear whether the investment upper limit regulation has any effect on the actual outward FDI from Taiwan to China. And, if there is any effect, the question is then by how much.

Previous studies related to the FDI of the Taiwanese industries addressed issues regarding performance evaluation, technology forecasting, and location selection (Chen and Ku, 2000; Lee *et al.*, 2007; Li and Hu, 2002), etc. Deng (2007) examined the motivation of outward FDI from China from an asset-seeking perspective. Demirbag *et al.* (2007) examined factors influencing perceptions of FDI performance, based on an integrated perspective that incorporates both host country and organizational levels; Hsiao and Hsiao (2004) considered some important characteristics, including the regional distribution, geographic proximity, and cultural similarity of these countries to explain that China is an attractor of FDI. Zhang (2005) identified the determinants that dominant the behavior of Hong Kong and Taiwan (HKT) direct investment are China's export-promotion strategy and cheap labor; HKT's specific advantages in export-oriented FDI and their unique link with China. Ng and Tuan (2006) aimed at understanding the spatial dimension of firm concentration and its economic interactions with growth in China as well as how firm locality is related to institutional factors; Xu *et al.* (2008) argued that the FDI behavior of China could be controlled by the intervention of the Chinese government (host country policy). All these studies, unfortunately, did not consider the issue of FDI outflows from the parent country's perspective. García-Herrero and Santabárbara (2007) incorporated capital flows, home country, host country and global factors variables into FDI model. However, they focused on the impact of FDI from the viewpoint of the host country.

In this section, for the first time, we proposed a partial least squares (PLS) path model for a nation's outward FDI. The integrated FDI model incorporated both the parent country and the host country along with other firm-specific determinants. Hypotheses regarding the effects of FDI policy on firms' investment decisions are then developed and tested. We found evidence to support the argument that the investment upper limit regulation did affect firms' decisions in making FDI in China, though; factors unique to firms dominated the effects. The remaining of the paper is as follows: section 2 consists of hypothesis development; section 3 describes the methods and data used in applying the PLS path model; and lastly section presents the results of the study and discusses on the findings.

6.2. Hypotheses and model

Various factors have been proposed as determinants of the outward FDI. These include government regulations, trade openness, political risk (sociopolitical instability), financial incentives, business operating conditions, corporate taxes and incentives, size of the market, financial development, real exchange rates, changes in wage rates, interest rates, etc (Ahmed *et al.*, 2002; Akhter and Lusch, 1988; Alfaro *et al.*, 2004; Ang, 2008; Branstetter and Feenstra, 2002; Brouthers *et al.*, 2000; Choi and Jeon, 2007; Chen and Ku, 2000; Chowdhury and Mavrotas, 2006; Crespo and Fontoura, 2007; Dees, 1998; Deng, 2007; Dunning *et al.*, 2007; Gholami, *et al.*, 2006; Hansen and Rand, 2006; García-Herrero and Santabárbara, 2007; Giner and Giner, 2004; Kobrin, 1976; Li and Hu, 2002; Mina, 2007; Schneider, 2005; Tsai and Huang, 2007; Yeyati *et al.*, 2007; Zhang, 2005).

Supportive policies of a country constitute to a more favorable environment and tend to have a positive impact on FDI inflow. In contrast, non-supportive or restrictive policies will lead to FDI outflow. Moreover, a favorable macroeconomic environment

of a country tends to draw more FDI inflow. In contrast, FDI outflow increases in response to a rise in corporate tax rates, a decline in the GDP or consumption. In addition to these two facets of determinants, in the current paper, we argued that factors not only of the host country, but of the parent country, play vital role in the determination of outward FDI.

Therefore, there are at least three facets of factors relevant to Taiwanese FDI outflow. In order to investigate the effect of the upper limit regulation of the parent country on the capital flow, we treat the policy effect separately. Given the above mentioned argument, three hypotheses are proposed as followed:

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H_1: *Outward FDI is negatively related to the upper investment limit regulation of the parent country.*

H_2: *Outward FDI is positively related to a non-favorable macroeconomic environment of the parent country.*

H_3: *Outward FDI is positively related to a favorable macroeconomic environment of the host country.*

Resource dependency is apparent in any parent-subsidiary relationship. A strong parent-subsidiary relationship allows the subsidiary to utilize internal resources from its parent company. According to the resource-based view (Madhok, 1997) and the factor endowment theory, the willingness or performance of the affiliate firm, therefore, depends not only on the parent firm's capabilities, but also on location-specific resources that complement the parent firm's capabilities. Outward FDI is positively related to firm specific determinants including capital, book

value, EPS, etc (Deng, 2007; Dunning *et al.*, 2007; Gholami, *et al.*, 2006; Giner and Giner, 2004; Li and Hu, 2002; Tsai and Huang, 2007). Given this line of reasoning, the following hypothesis is proposed:

H_4: *Outward FDI is positively related to firm-specific determinants.*

In the real world, the macroeconomic environment of a smaller economy is always strongly affected by a larger economy. China has become the largest trade partner of Taiwan in recent ten years. Thus, we expect that the macroeconomic environment of the parent country is strongly affected by the macroeconomic environment of the host country. This leads to our fifth hypothesis regarding the model.

H_5: *The macro environment of the parent country is positively related to the macro environment of the host country.*

According to the regulatory code of MOEA, the upper limit for outward investment for any Taiwanese firm is determined by a fix percentage of the underlying firm's actual capital or net value, whichever is lower. Thus, the actual amount of outward FDI is approved by the government authority and is based on the capital of the applicant. Thus, we propose the final hypothesis of the model as follows:

H_6: *The upper investment limit regulation of the parent country is positively related to firm-specific determinants.*

The conceptual framework of PLS path relationships between these constructs

are shown in Figure 6-1.

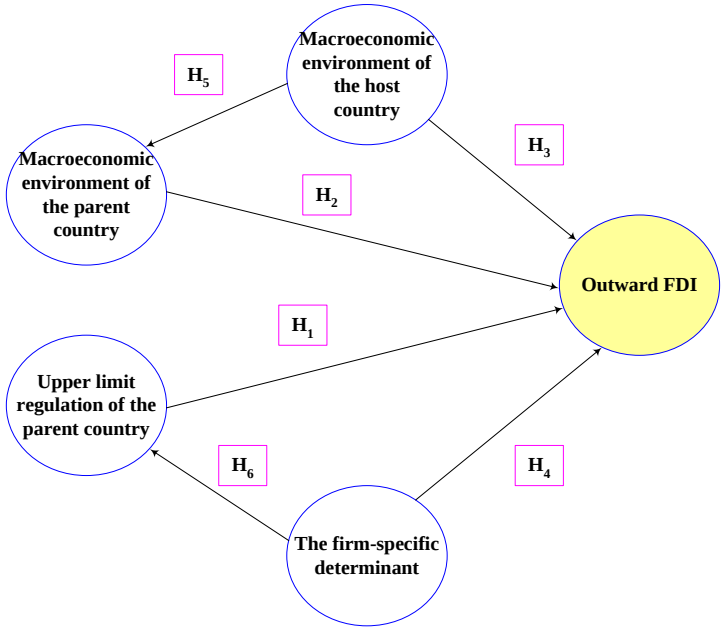

Figure 6-1. The conceptual framework

6.3 Data and results

The relationships between the outward FDI and the three facets of determinants were analyzed using the PLS path modeling approach. Data used in this study were collected from the Investment Commission of the Taiwanese Ministry of Economic Affairs (MOEA) and the database assembled by the *Taiwan Economic Journal* (TEJ), a for-profit organization in Taiwan. The research sample consisted of communication and internet firms listed in the Taiwan Stock Exchange during the period from 1998 to 2007. The sample size is of 72 firms, aggregated numbers of observations is 39. SmartPLS 2.0 was employed to estimate the model (Hansmann and Ringle, 2005).

6.3.1 Data description

Amongst the sample as a whole, during 1998 to 2007, the ratio of TSE firms is 49% and the ratio of OTC firms is 51%. Most of the parent company's ages range

around 21~30 year (54%). In term of firm size, 81% of firms had employee less than 1,000. A venture is defined as a partnership or joint venture (JV) where the foreign ownership ranges between 10% and 90%. If a venture's foreign equity holding is over 90 %, it is then considered as a sole proprietor or wholly owned subsidiaries (WOS). Table 6-1 summarizes the characteristics of our sample firms.

Table 6-1. The characteristics of sample firms

Market Category	Number	(%)
TSE	35	(49%)
OTC	37	(51%)
Total	72	(100%)
Age of the parent company		
Less than 10 years	13	(18%)
10 ~ 20 years	16	(22%)
21 ~ 30 years	39	(54%)
31 ~ 40 years	4	(6%)
Total	72	(100%)
Firm Size by employment		
Less than 1000 empl.	58	(81%)
1000 ~ 2000 empl.	4	(6%)
2000 ~ 3000 empl.	6	(8%)
3000 ~ 4000 empl.	2	(3%)
Above 4009 empl.	2	(3%)
Total	72	(100%)
Ratio of stockholding		
JV	8	(11%)
WOS	64	(89%)
Total	72	(100%)

Based on the review on previous studies, we first chose several variables that were commonly used. Items with low correlations were then deleted. Table 6-2 shows the definition of manifest variables. Table 6-3 lists the descriptive statistics of each manifest variable for our sample firms. Coefficients of correlation among variables are presented in Table 6-4. A PLS model is commonly analyzed and interpreted in two stages as follow.

Table 6-2. Definition of manifest variables

LVs	MVs	Definition
FDI Policy	A	the amount of FDI outflow approved by the government
	M	the restrictive maximum amount of FDI outflow set by the government
Parent Macro	EGDP	the GDP of the electronics industry
	NC	the domestic consumption of Taiwan
	RealGNP	the real GNP of Taiwan
	Tax	the corporate tax rate of Taiwan
Host Macro	CCE	the export amount of China
	CCPI	the consumer price index of China
	CGrowth	the economic growth rate of China
	CSave	the savings amount of China
Firm Specific	BV	the book value of the firm
	K	the capital of the firm
FDI Outflow	N	the accumulated amount of FDI outflow
	n	the current amount of FDI outflow

Table 6-3. Summary of descriptive statistics

Variable	N	n	A	M	BV	k	EGDP
Mean	7,788,557	1,142,387	10,326,492	36,478,356	8,568,222	9,618,572	118,732
Median	4,234,858	634,808	6,443,894	26,218,822	5,411,791	5,007,123	114,999
Minimum	16,729	14,121	300,000	343,400	364,417	1,270,120	58,783
Maximum	22,025,533	5,822,441	26,863,975	85,670,998	25,112,225	28,404,635	234,403
Std. Dev	7,731,707	1,375,049	9,649,585	33,566,513	8,158,976	8,883,462	38,168
Variable	NC	RGDP	Tax	CCE	CCPI	CGrowth	CSave
Mean	1,946,457	2,739,677	47.345	355.73	99.85	8.77	458,188
Median	1,944,212	2,646,841	46.151	264.34	99.60	8.30	286,407
Minimum	1,673,802	2,210,963	4.708	219.78	96.60	6.50	140,510
Maximum	2,246,721	3,399,463	40.373	122.65	104.90	11.90	1,433,611
Std. Dev	146,912	328,290	57.031	842.69	2.20	1.43	374,034

Table 6-4. Coefficients of Correlations among variables

	K	BV	n	N	A	M	EGDP	NC	Tax	RGNP	CCE	CCPI	CGrowth	CSave
K	1.000													
BV	0.984	1.000												
n	0.633	0.657	1.000											
N	0.997	0.983	0.635	1.000										
A	0.990	0.986	0.658	0.994	1.000									
M	0.961	0.948	0.680	0.967	0.977	1.000								
EGDP	0.762	0.780	0.560	0.762	0.785	0.747	1.000							
NC	0.788	0.800	0.460	0.803	0.805	0.811	0.819	1.000						
Tax	0.796	0.802	0.811	0.800	0.816	0.817	0.757	0.672	1.000					
RGNP	0.950	0.955	0.656	0.956	0.957	0.937	0.853	0.871	0.836	1.000				
CCE	0.993	0.977	0.639	0.992	0.985	0.953	0.798	0.817	0.803	0.963	1.000			
CCPI	0.808	0.845	0.648	0.798	0.828	0.797	0.782	0.703	0.742	0.837	0.813	1.000		
CGrowth	0.885	0.890	0.515	0.887	0.886	0.834	0.710	0.757	0.732	0.877	0.899	0.794	1.000	
CSave	0.980	0.961	0.517	0.973	0.955	0.906	0.750	0.791	0.719	0.928	0.978	0.769	0.888	1.000

6.3.2 Results for the measurement (outer) model

In the first stage, reliability and validity were tested by looking at: (1) the

reliability of individual items, known as Composite Reliability (CR), and (2) the convergent validity of the measures associated with individual constructs, known as Variance Extracted (AVE). The result of the proposed PLS path model is reported in Table 6-5 and shown as Figure 6-2. All CRs have loadings higher than 0.9 and all AVEs were above 0.8. It thus can be concluded that individual items are reliable and each construct has high convergent validity.

Table 6-5. AVE, CR and the R square values

	AVE	CR	R Square
FDI Outflow	0.813003	0.896708	0.905988
FDI Regulation	0.988440	0.994187	0.963034
Firm Specific	0.991848	0.995907	
Host Macro	0.893748	0.971102	
Parent Macro	0.851572	0.958204	0.838039

Table 6-6. Latent Variable Correlations

	FDI Outflow	FDI Regulation	Firm Specific	Host Macro	Parent Macro
FDI Outflow	1.000000				
FDI Regulation	0.945402	1.000000			
Firm Specific	0.939079	0.981343	1.000000		
Host Macro	0.906546	0.952432	0.976640	1.000000	
Parent Macro	0.894855	0.914215	0.907030	0.915445	1.000000

Discriminant validity was assessed using the latent variable correlations matrix (Table 6-6), where the square roots of the values of the average variance extracted and calculated for each of the constructs along the diagonal is reported. The coefficients of correlations between the constructs are reported in the lower left, off-diagonal elements in the matrix. Fornell and Larcker (1981) suggest that the average variance shared between a construct and its measures should be greater than the variance shared between the constructs and other constructs in the model. Discriminant validity is given, when the diagonal elements (square root AVE) are greater than the off-diagonal elements in the corresponding rows and columns. As can be seen in Table 6-6, discriminant validity is satisfactory. Over-all, all the measures show very good reliability and validity.

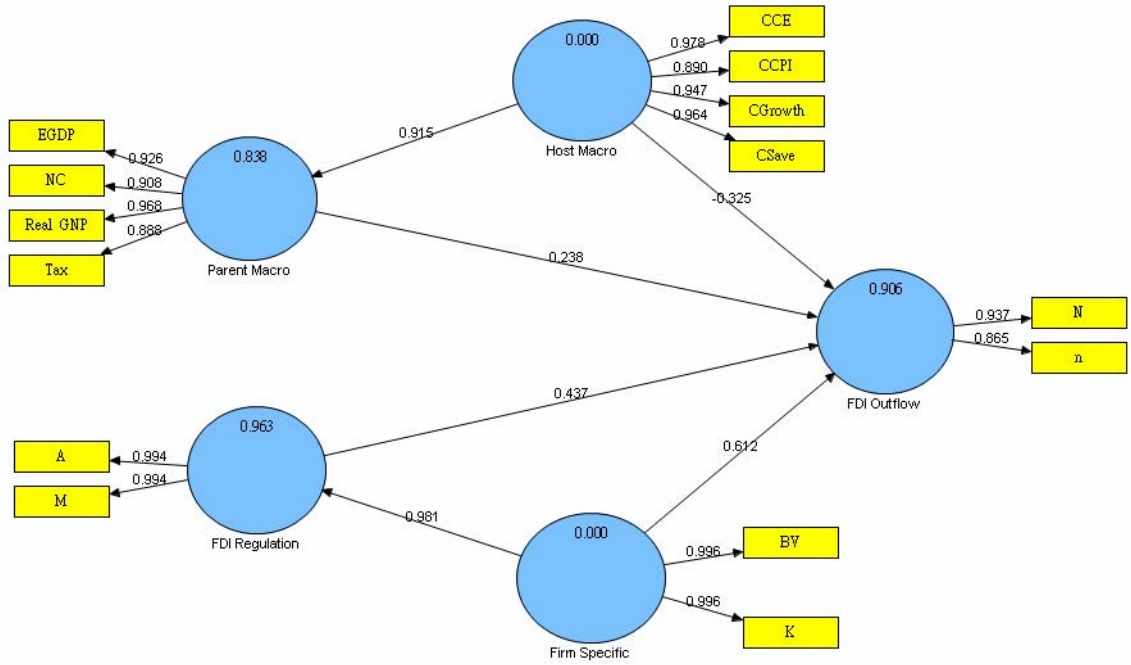

Figure 6-2. The result of the proposed PLS path model

6.3.3 Results for the structural (inner) model

In the second stage, the structural model was tested by estimating the paths between the constructs in the model. The significant level of the T statistic should be more than or equal to 1.96. The result of the bootstrapping re-sampling technique (300 runs), which is used in PLS to determine the significance of the paths, shows that all the paths are significant except for factors of the macroeconomic environment of the host country. Table 6-7 shows the path coefficients and their significance level. On the other hand, according to Table 6-8, all T statistics (*t*) of the outer weights are more than 1.96, indicating the measurement (outer) model is also significant. In summary, the aggregated result of the proposed model is arranged and shown in Table 6-9.

Table 6-7. Path Coefficients (Mean, STDEV, *t*)

	Sample Mean (M)	Standard Deviation (STDEV)	*t*
FDI Regulation → FDI Outflow	0.421023	0.194274	2.250373
Firm Specific → FDI Outflow	0.612003	0.257862	2.373361
Firm Specific → FDI Regulation	0.981762	0.001806	543.478571
Host Macro → FDI Outflow	-0.318147	0.125497	2.592120
Host Macro → Parent Macro	0.918273	0.014830	61.730764
Parent Macro → FDI Outflow	0.248060	0.072370	3.286783

Table 6-8. Outer Weights (Mean, STDEV, *t*)

	Sample Mean (M)	Standard Deviation (STDEV)	*t*
A ← FDI Regulation	0.508307	0.001629	312.000810
BV ← Firm Specific	0.501247	0.001414	354.349007
CCE ← Host Macro	0.284288	0.004280	66.534237
CCPI ← Host Macro	0.252523	0.004914	51.408869
CGrowth ← Host Macro	0.253407	0.004528	55.898873
CSave ← Host Macro	0.266466	0.004342	61.376702
EGDP ← Parent Macro	0.252555	0.006593	38.358674
K ← Firm Specific	0.502742	0.001622	310.108911
M ← FDI Regulation	0.497449	0.001445	344.261226
N ← FDI Outflow	0.645214	0.026983	24.105832
NC ← Parent Macro	0.251733	0.004703	53.434290
Real GNP ← Parent Macro	0.303709	0.008463	36.027740
Tax ← Parent Macro	0.273342	0.006979	39.153189
n ← FDI Outflow	0.454840	0.012119	37.255605

Table 6-9. The aggregated result of the proposed model

	CR	AVE	Weights	T-Value	Test Result
FDI Regulation	0.994	0.988			
A			0.994	1250.966	significant
M			0.994	1175.491	significant
Parent Macro	0.958	0.851			
EGDP			0.926	59.986	significant
NC			0.908	65.675	significant
RealGNP			0.968	199.214	significant
Tax			0.888	57.164	significant
Host Macro	0.971	0.893			
CCE			0.978	391.078	significant
CCPI			0.890	45.198	significant
CGrowth			0.947	95.010	significant
CSave			0.964	165.451	significant
Firm Specific	0.995	0.991			
BV			0.996	1818.653	significant
K			0.996	1894.190	significant
FDI Outflow	0.897	0.813			
N			0.937	154.212	
n			0.865	41.643	

6.4 Discussions

In this section, we have shown the result of the proposed outward FDI model. Four of the six hypotheses are strongly supported. That is, outward FDI is positively related to a non-favorable macroeconomic environment of the parent country; outward FDI is positively related to firm-specific determinants; the macro environment of the parent country is positively related to the macro environment of the host country; the upper investment limit regulation of the parent country is positively related to firm-specific determinants.

Most previous studies have focused only on determinants of the host country when analyzing outward FDI and ignored those factors of the parent country. The results of our study showed that factors of the macroeconomic environment of the parent country indeed had influence on FDI outflow. Thus, this study contributes to the literature in pointing out that factors of the parent country also matter.

Table 6-10. Structural relationships of the proposed model

Link in the model	Hypothesis	Sign	Parameter	Significance	Conclusion
FDI Regulation → FDI Outflow	H_1	-	0.437	$p<0.05$	Not Supported
Parent Macro → FDI Outflow	H_2	+	0.238	$p<0.05$	Supported
Host Macro → FDI Outflow	H_3	+	-0.325	$p<0.05$	Not supported
Firm Specific → FDI Outflow	H_4	+	0.612	$p<0.05$	Supported
Host Macro → Parent Macro	H_5	+	0.915	$p<0.05$	Supported
Firm Specific → FDI Regulation	H_6	+	0.981	$p<0.05$	Supported

Given that the standardized path coefficients indicate the strengths of the direct effects, this result highlights the importance of considering not only the determinant of the parent country, but also the firm specific determinant. It is worth of noting that the firm specific determinant has a much stronger impact on the outward FDI than the macroeconomic environment of the parent country (0.612 vs. 0.238) has. The parameter of FDI regulation is 0.437. It means that outward FDI is not negatively

related to the upper investment limit regulation of the parent country. We can conclude that, for FDI outflow of Taiwanese communication and internet firms, the upper investment limit regulation of the parent country does not matter. Further, this finding also has an important policy implication for the investment authority of the Taiwanese government. Since the evidence showed that the investment upper limit regulation is not a key factor on firms' decisions in making FDI abroad, the policy goal of retaining Taiwan's capital within the country boundary can be achieved more effectively by improving the other factors most firms faced.

Regarding the explanatory power of the model, it is common to treat the absolute value of R^2 that is less than 0.3 as not significant, while a value that is greater than 0.5 as significant. Since the R^2 values of the inner constructs in our study are 0.838 for the macro determinant of the parent country, 0.953 for FDI policy with the upper limit of regulated investment determinant, and 0.914 for FDI outflow. Furthermore, R^2 values of the outer constructs are between 0.886 and 1.00. Thus, it can be concluded that the explanatory power of the model is quite strong.

6. Conclusions and remarks

In this example, we found that the macroeconomic environments of the parent and host countries, the comparative advantage, and firm-specific factors have had a strong influence on Taiwan's FDI. Recognizing that the competitive nature and unique characteristics of many other industries in Taiwan is quite different from that of the IC industry, the implications of our results cannot, and should not, be extended to the whole spectrum of Taiwanese FDI. Moreover, the results of our study do not undercut the objectives of the regulations: after all, a parent country's laissez-faire policy on FDI is effective only if the relations between the parent and host countries are friendly. However, it is well known that there was severe tension between China and Taiwan when the upper limit was established. Fortunately, relations between China and Taiwan have improved significantly since the inauguration of Taiwan's new president, Mr. Ma Ying-jeou, in May 2008.

There are some further research remarks as follow. (1) Employment and unemployment data could be included to understand the policy effectiveness. (2) The macro environment data of the parent country and the host country could be consistent with each other, in order to gain the more general result. (3) The result of PLS could be compared with the result of the regression, in order to gain the more general conclusion. (4) As we known, there is time lag effect of the policy. Researcher may incorporate the variable to gain the more accurate result. (5) Someone could study Taiwan's outward FDI in east-south Asian, such as Vietnam, Philippine and Thailand, in comparison with China to gain the comprehensive perspective on Taiwan's FDI decision.

The results of this study contribute to the literature from an integrated perspective, as they address the influence of the host country, the parent country, and firm-specific

factors. In contrast, previous studies have paid little attention to the parent country when analyzing FDI. We encourage further research applying our FDI PLS model to other Taiwanese industries, so as to better understand the effects of the government's FDI policy on them, thereby allowing the development of propositions that are generalizable.

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Curriculum Vitae

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Work experience

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- ✧ Lecturer, the Department of International Trade, Ling-Dong Institute of Technology (1995.8-1998.1)
- ✧ Partime Lecturer, the Department of Economics, National Tsing Hua University (NTHU) (1996- 1997)
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Publication

A. Journal Papers

A-1 Foreign Journal Papers

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B. Conference Papers

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