

# THE EFFECTS OF OFDI ON HOME COUNTRY INVESTMENT: THE ROLES OF CHINA AND INDUSTRY CHARACTERISTICS

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## ABSTRACT

This paper pursues the idea that the relationship between foreign and domestic investment may be not as uniform as many studies suggest. By examining the case of Taiwanese outward foreign direct investment (OFDI), this paper is marked out from existing studies in the following three respects. First, it examines the extent to which the relationship between OFDI and domestic investment varies with the location of investment. Second, this research allows the results to vary between Heckscher-Ohlin industries and Schumpeter industries. Finally, its breakdown of data will reveal sub-relationships in the data that up to now have remained hidden within the aggregate relationships reported in most studies.

New evidence from analyses of Taiwanese FDI suggests that OFDI in China has a positive impact on domestic investment in Heckscher-Ohlin industries while OFDI in other countries has a negative impact on domestic investment in the same industries. These findings are in marked contrast with Schumpeter industries where a positive effect is observed only for OFDI in other countries. Our findings also suggest that Taiwanese government should design policies to adjust the level of liberalization for overseas investment through legislation on an industry-by-industry basis in order that OFDI stimulates domestic investment in relevant industries more effectively.

Keywords: Outward FDI, home domestic investment, foreign investment location

## I. INTRODUCTION

The question of whether and to what extent OFDI affects fixed capital formation of the home country has been the subject of extensive public debate in the industrialized world (Arndt et al., 2007). Some argue that OFDI reduces home investment because the decision to invest scarce resources abroad inevitably reduces the likelihood of concurrent investments at home (e.g., Stevens and Lipsey, 1992; Chen and Ku, 2000). Others, however, maintain an opposite view, contending that foreign and home investment are complementary because of the potential interdependencies and interactions between the two types of investment through the production process (e.g., Braunerhjelm et al., 2005; Desai et al., 2005). Although highly relevant for public policy, scholars have paid only scant attention to empirical examination of this issue (Arndt et al., 2007). This is in stark contrast to the large body of empirical work on the export and employment effects of OFDI.

The relatively limited number of empirical studies provides inconclusive results. For example, using time-series data at the industry level for the USA during the early 1970s, Herring and Willett (1979) and Noorzoy (1980) report a positive relationship between investment at home and abroad. Stevens and Lipsey (1992) confirmed the same finding for a sample of seven US MNEs for a period of 20 years. On the other hand, Braunerhjelm et al. (2005) found a complementary relationship between foreign and home investment. A

significant drawback of these studies is that the information only emanates from a limited number of firms or industries, and therefore the sample is often constrained by range restrictions. This leads to a problem of generalization because the results would be biased and sample-sensitive. Furthermore, these studies, except for Braunerhjelm et al. (2005), ignored the roles played by industry-specific characteristics, and hence the averages derived by these studies mask significant heterogeneity across different industries. Although Hejazi and Pauly (2003) differentiated the motives to undertake FDI and the ensuing relevant different effects on domestic investment, their focus is on the motives of OFDI, not on its effects on domestic investment at home.

Macroeconomic studies in general tend to find a negative relationship between the two types of investment. Belderbos (1992), who analysed Dutch food and metal and electronic companies for the period 1978-84, showed a negative relationship between foreign and domestic investment. Feldstein (1994) found that a one-to-one dollar relation exists between foreign investment and domestic investment in the case of the USA. More recent studies show a similar result (Desai et al., 2005). These two latter studies used aggregate cross-country data and hence overcame the problem of sample selection bias because they were not constrained by range restrictions that characterized previous studies. A major drawback of these studies however is that they ignored differences across industries and regions. There are reasons for believing that the pattern of FDI and its effects are influenced by factors such as differences in factor intensities and the nature of the way in which production is organized (e.g., horizontally or vertically), calling for an analysis disaggregated at the industry level.

These research gaps motivate our contributions in this chapter. Following Braunerhjelm and Oxelheim (2000), who argue that the effect of FDI is influenced by the specialisation of the firms and the way in which they are organized, we pursue the idea that the relationship between foreign and domestic investment may be not as uniform as many studies suggest. In examining the relationship in the case of Taiwanese FDI, this chapter is marked out from existing studies in the following three respects. First, we examine the extent to which the relationship between OFDI and domestic investment varies with the location of investment. This is based on the argument that the conditions of host countries are different and that MNEs with different ownership advantages invest in different locations, thereby producing different effects on domestic investment. Second, we allow the results to vary between Heckscher-Ohlin (henceforth denoted as HO) industries and Schumpeter industries (henceforth denoted as SCH). It is generally agreed that the competitiveness of firms in the Schumpeter industry is based on R&D activities, while firms in Heckscher-Ohlin industries base their competitiveness to a large extent on country-specific factors, namely traditional comparative advantages (Braunerhjelm, et al., 2005). This classification is also in line with Dunning (1988) who argues that MNEs with different ownership advantages invest abroad in different industries, so producing distinctive patterns of FDI. We can further infer that these different patterns of FDI will exhibit contrasting profiles in terms of the effects on domestic investment.

If significant between-group effects are captured through the above procedures, it would imply that studies conducted only at aggregate level are deficient. It is quite possible that in aggregate analysis different industries may offset one another, leading to the washing out of important industrial effects. We expect that our breakdown of data will reveal sub-relationships in the data that up to now have remained hidden within the aggregate relationships reported in most studies. In this way, we aim to complement and deepen the

state of knowledge on the effects of OFDI on domestic fixed capital investment, which in the main has been confined to general conclusions.

## **II. LITERATURE REVIEW**

One of the most important lines of research on the home country effects of outward FDI concerns the relationship between foreign and home investment. At the core of the issue is whether outward FDI complements or substitutes domestic investment at home. Some argue that there are complementary effects of FDI on domestic investment which can be presented in several ways (Noorzoy, 1979; Brainard, 1997; Herzer and Schrooten, 2008). These authors assert that complementarities arise from potential interdependencies and investment interactions between foreign affiliates and domestic investments through the production process. OFDI in the host country may result in an increase in demand for imports from the home country, hence stimulating investment in the exporting industries at home. In other words, OFDI allows firms at home to import intermediate goods from foreign affiliates at lower costs and/or to generate exports of intermediate goods used by foreign affiliates. This stream of literature suggests that firms combine home production with foreign production to reduce costs and raise the returns to domestic production, which in turn increases domestic output and domestic investment (e.g., Desai et al., 2005). For instance, when OFDI occurs in resource industries it is likely to expand investment in related industries at home. More generally, domestic investment may also increase because OFDI occurs in industrial segments that might potentially forge industrial linkages with firms at home.

Substitution of OFDI for domestic investment occurs when multinationals finance investment projects on world markets and make extensive use of their internal capital market (Desai et al., 2005). Noorzoy (1979) suggests that domestic investment will fall by an equivalent amount and may lead to further adverse effects on domestic investment through possible losses in complementary effects via forward and backward linkages. In other words, domestic investment may decrease if OFDI reduces the funds that would be otherwise available for financing investments at home. Additionally, there is also a possibility that higher levels of foreign investment might be associated with higher levels of domestic investment by parents at home but lower levels of investment by other firms in the source country (Desai et al., 2005). In this situation, the net effects of OFDI on domestic investment would depend on which of the two effects prevails.

Recent studies have gone beyond merely analysing the direct complementary or substitutionary relationship between foreign and domestic investment and have begun to reveal the black box in the middle that encapsulates the moderating factors. Desai et al. (2005), for example, argue that the relationship between OFDI and domestic investment depends on the nature of the investment. They argue that it is important to distinguish between horizontal and vertical OFDI. According to Desai et al. (2005), to the degree domestic exports are substitutes for output produced by horizontal FDI, such FDI substitutes domestic investment as it represents diversion of home activity. On the other hand, horizontal investments may complement domestic investment because foreign operations make use of functions performed by headquarters (Desai et al., 2005). Desai et al. (2005) suggest that vertical investments might substitute foreign activity for domestic activity if firms are shifting the location of activities that have been performed domestically. However, once the production process has been split up, foreign and domestic activities are likely to complement

one another because vertical foreign investments permit greater exploitation of intangible assets produced by domestic activity. Therefore, substitution and complementarities can be operative for different firms at different times (Desai et al., 2005), implying that research must take into account moderating factors. In a similar vein, Hejazi and Pauly (2003) address the moderating role of the underlying motivation for investment in shaping the link between OFDI and domestic investment. They discussed three motivations including market access, factor endowment differences and access to natural resources. For example, they hypothesize that outward FDI to gain market access, increases or leaves unchanged domestic investment in the home country, whilst outward FDI motivated by factor price differences can reduce, leave unchanged, or increase home country domestic investment.

Early empirical work (Caves and Reuber, 1971; Herring and Willett, 1973; Noorzoy, 1980) tends to find a complementary relationship between OFDI and home country fixed capital formation. Caves and Reuber (1971) reported that one dollar of outward FDI generates around three dollars of domestic investment. Employing time-series data at the industry level for US firms during the early 1970s, Herring and Willett (1973) confirmed their conclusion. The above findings were replicated by Noorzoy (1980), who also used US data and found a similar pattern of results. Employing a much larger sample, Desai et al. (2004, 2005) found higher levels of capital expenditures by foreign affiliates of parent firms to be associated with greater levels of domestic investment by American MNEs, suggesting that foreign and domestic investment are complements rather than substitutes.

Other studies, however, have shown a negative causal relationship between OFDI and home country investment (Belderbos, 1992; Stevens and Lipsey, 1992). Stevens and Lipsey (1992), for instance, found that a firm's capital constraints will make a FDI crowd out domestic investment. Feldsten (1994) conducted industry level research and found that a one-to-one dollar relation exists between foreign and domestic investment, meaning a full substitution effect between the two types of investment.

The above findings, especially early ones, however, should be treated with some caution. Early studies suffered from data restrictions as the analyses only comprised a limited number of firms, industries and years (Braunerhjelm et al., 2005). Also, early firm-level studies focused on analysing a limited number of large MNEs, and they did not indicate the overall effect on domestic investment when all (small, medium and large) firms increased their OFDI (Herzer and Schrooten, 2008). To summarize, the effect of OFDI on domestic investment is theoretically indeterminate and empirically needs further work.

### **III. DATA AND METHODOLOGY**

The study uses a panel dataset for fifteen distinct Taiwanese manufacturing industries (two-digit ISIC) during the period between 1991 and 2007, i.e., the period during which Taiwanese FDI entered a more active phase and was gaining credibility<sup>1</sup>. The data were

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<sup>1</sup> The fifteen industries include: (1) food, beverage, tobacco, (2) textiles, mills, (3) wearing apparel and clothing accessories, (4) wood and bamboo products, furniture, (5) pulp, paper and paper products, printing and reproduction of recorded media, (6) plastic products, and (7) non-metallic mineral products. Schumpeter Industries include: (8) leather, fur and related products, (9) chemical materials and products, petroleum and coal

obtained from two different databases, both of which were published by the Ministry of Economic Affairs (MOEA) of Taiwan. FDI-related data were collected from several issues of Monthly Report, published by the Investment Commission (ICM), MOEA. Data on the other variables can be found at the website of the MOEA Economic Statistics Database (ESD) and National Statistics (NS, <http://www1.stat.gov.tw>). Official data from MOEA are the most detailed and reliable to date for studying the outward FDI made by Taiwanese firms.

The datasets contain a wide range of data for each industry, including sales, employment, capital, export, R&D, and, most importantly, the amount of direct capital investment in both foreign countries and Mainland China as two separate measures. Together with a range of other sectoral attributes, the datasets provide a rich statistical source that is directly amenable to economic analysis. Disaggregated data that can be used to study the source-country effects of OFDI made by firms from newly industrialized economies (NIEs), such as Taiwan, for a heterogeneous set of industries is rarely found in a comprehensive and comparable form. To the best of our knowledge, this is the first study to use such detailed industry-level data from a NIE country.

Employing industry-level data presents several unique advantages. First, industry-level study considers the impact of both the investing firms and the non-internationalized domestic firms. Firm-level data disregards the general equilibrium effects of FDI on the investments of other firms (Arndt, et al., 2007). If some firms engage in offshoring, other firms at home might be affected, as well. However, firm-level data looks only at the impact of offshoring on the home operations of the investing firm (e.g., Lipsey, 2002). In fact, MNEs may also impact non-internationalized home firms (Castellani & Zanfei, 2006). Indeed, it is possible that a substitution at the firm level may be accompanied with complementarities at the industry level when spillover effects between the firms are taken into account (Seo & Suh, 2006). Second, many of the determinants of exports, employment, investment, productivity, and R&D are industry-wide, implying that a substantial part of the OFDI effect may occur at the industry level at which the firm operates and carries out most of its external relations. For instance, the degree of competition and the technology policy are regarded as important factors that influence productivity, but they cannot be adequately captured in firm-level research. Third, a firm's industry is an important part of the milieu within which government policies are framed and executed. While government agencies in NIE countries have adopted a generally favourable attitude towards OFDI, policy-making is often implemented at the industry level. In fact, the Taiwanese government determines sector-specific restrictions on OFDI to China on an industry-by-industry basis. Hence, there is more variation in the OFDI variables in industry-level data as a result of the discriminating industry-by-industry policy towards OFDI. The industry-level data thus presents an opportunity to evaluate the effects of a variety of policy initiatives on the FDI outflow.

Following Braunerhjelm and Oxelheim (2000), we have also developed the following models to examine the effect of Taiwanese FDI on investment in Taiwan:

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products, medical products, (10) rubber products, (11) basic metal products, fabricated metal products, (12) machinery and equipment, manufacturing not elsewhere classified, (13) electronic parts and components, computers, electronic products and equipment, (14) motor vehicles and parts, other transport equipment, and (15) precision, optical products, medical equipment, watches and clocks.

$$DINV_{it} = \alpha_0 + \alpha_1 TOFDI_{it-1} + \alpha_2 IFDI_{it} + \alpha_3 RDV_{it} + \alpha_4 EXPORT_{it} + \alpha_5 VAD_{it} + \alpha_6 SIZE + \alpha_7 D + \varepsilon \quad (1)$$

$$DINV_{it} = \alpha_0 + \alpha_1 OFDIC_{it-1} + \alpha_2 OFDIO_{it-1} + \alpha_3 IFDI_{it} + \alpha_4 RDV_{it} + \alpha_5 EXPORT_{it} + \alpha_6 VAD_{it} + \alpha_7 SIZE + \alpha_8 D + \varepsilon \quad (2)$$

Where, the subscript  $t$  denotes time, while subscript  $i$  refers to industry. DINV is domestic investment in each industry at home, while TOFDI, OFDIC, and OFDIO use the same definitions as in previous chapters. Because theories do not offer clear arguments for the employment effect of OFDI, the effect of these predictor variables may be positive or negative.

In the empirical study, we controlled for possible confounding effects by including various relevant control variables widely employed by similar studies (e.g., Hejazi and Pauly, 2003). The literature suggests that inward FDI (IFDI) is also associated with domestic investment (e.g., Zhang and Song, 2001). We therefore include IFDI in the models. However, the sign of this variable is ambiguous because theoretically inward FDI can either induce or crowd out home investment. We controlled for the effect of R&D on domestic investment by including R&D-value-added ratio (RDV). Since numerous studies have concluded that R&D is positively related to firms' internationalization (e.g., Yiu et al., 2007), we expect the sign of this variable to be positive. Since foreign markets can also be served by exports, EXPORT is therefore included in the regressions to isolate the effect of FDI on home country investment (Lipsey and Weiss, 1984; Blomstrom and Lipsey, 1989; Braunerhjelm et al., 2004). We expect export to be positively associated with home country investment (Zhang and Song, 2001; Sun, 2001).

Moreover, we include an industry output variable (VAD) to account for business-cycle effects that are not fully correlated over time or industries (Sethi et al., 2003). We expect a positive causal relationship between the levels of domestic output and domestic investment. There are strong grounds for believing that the average scale of firms in an industry is associated with the intensity of home investment. We therefore include SIZE variables in both models. Finally, we include a time dummy (D) in order to allow for the effect of the transition of power from the China Nationalist Party (CNP) to the pro-independence Democratic Progressive Party (DPP) in 2000. Table 1 describes the measurement, mean and standard deviation of all the dependent and independent variables. In both equations, the data are transformed into natural logarithms; therefore both models should be taken as being linear in the logarithmic data. Since we work with panel data, both FE and RE models are estimated. The Hausman test (Hausman, 1978) is then implemented to choose between FE and RE models.

{Table 1 goes about here}

Egger and Pfaffermayr (2003) consider the issue of endogeneity of the outward FDI variable when analysing the impact of investing abroad on the domestic fixed capital formation behaviour of Austrian manufacturing firms. The same problem may arise in our models. In particular, the correlation between OFDI and DINV in both equations could arise from an endogenous determination of OFDI. There are two possibilities. First, OFDI itself may be influenced by domestic investments in the stochastic process governing domestic investments. For example, economic reforms in home countries could increase both domestic investments and the outflow of FDI simultaneously. In this case, the presence of a correlation between OFDI and the country-specific error term would bias the estimated coefficients.

Second, OFDI is likely to influence a firm's investment at home but the intensity of OFDI may itself depend on the investment by the company at home. Similarly, a firm's OFDI activities could be high because of outward orientation or vice versa. For instance, it may be the case that firms which conduct OFDI are more likely to have above average investment intensity at home.

A large number of studies that have examined the determinants of OFDI overlook the problem of simultaneity (Noorzoy, 1980; Belderbos, 1992). Therefore, econometric estimates of the OFDI effect on home-country investment could be biased and inconsistent. This makes it rather difficult to put much reliance on the performance of individual variables. We have addressed this potential issue by adopting the one-year lag structure for OFDI variables in the model. The one-year lag structure reflects the time needed for investments overseas to produce an impact on domestic investment in Taiwan. Following the same logic, we have adopted a one-year lag structure for all explanatory variables. Such a measure also helps to overcome possible problems of heteroscedasticity and first-order autocorrelation. An alternative would be to employ instrumental variable techniques. However, the difficulty with this exercise is finding appropriate instruments: exogenous variables that have a direct effect on OFDI but do not belong in the domestic investment equations. It is difficult to find such an instrumental variable in our database owing to data limitations.

Table 2 shows the correlation matrix for the independent variables. Among the correlations we concern, there is only one which is higher than 0.70, indicating that there are no serious problems of multi-collinearity. This enhances confidence that the results are not distorted by spurious correlations between variables.

{Table 2 goes about here}

## IV. RESULTS

Table 3 shows the results of estimation of both equations (6.1) and (6.2). Columns (1) and (2) display the results of equation (6.1). The Hausman test (Hausman, 1978) result shows that the RE model is preferred over the FE model. Columns (3) and (4) show the results of estimation of equation (6.2). The Hausman test (Hausman, 1978) result indicates that the FE model is preferred over the RE model. Nevertheless, the results using the two estimation techniques are qualitatively the same. The explanatory power of the regressions is satisfying with adjusted R<sup>2</sup> ranging from 0.74 to 0.98.

{Table 3 goes about here}

Column (2) shows the general positive effects of total OFDI on domestic investment in Taiwan. This finding is consistent with Desai et al. (2005) who argue that expanded foreign operations encourage firms to expand their domestic operations<sup>2</sup>. The literature has offered several possible explanations for this finding. The complementary effect may arise primarily from the impact of FDI on investment in the parent company, but also from the indirect effects that encompass related domestic suppliers of goods and services (Braunerhjelm and Oxelheim, 2000) which theorize a complementary investment pattern for industries dependent on traditional comparative advantage factors. Investment overseas by Taiwanese multinationals may result in an increase in demand for imports from Taiwan, thereby

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<sup>2</sup> This finding is also consistent with that of Desai et al. (2004a) which uses foreign economic growth as an instrument for foreign investment by multinational firms.

stimulating investment in the exporting industries in Taiwan. Another explanation is that OFDI is considered by Taiwanese multinationals to be a logical extension of the Taiwanese market. Overall, the finding of a complementary relationship provides no support for the simple and common perception that foreign investment diverts resources from the domestic investment. Recalling the results in Chapter 4, the positive relationship between foreign and domestic investment suggests the existence of a similar relationship between FDI and home country exports. It is likely that an increase in exports implies that an expansion of the domestic production capacity will ensue (Braunerhjelm and Oxelheim, 2000).

Compared with the role of OFDI, inward FDI has played no part in enhancing domestic investment in Taiwan. This result is reasonable because Taiwan has attracted only a small amount of FDI over the last decade or so (as shown in Chapter 2). In fact, many foreign MNEs have even withdrawn from Taiwan in recent years largely owing to a lack of direct transportation links between the Taiwan Strait for various political reasons popularly known. The results show that R&D-value-added ratio (RDV) has a positive link with domestic investment, indicating that R&D investment generates new products which require investment for commercialization. The positive association between exports (EXPORT) and domestic investment (DINV) is expected because export expansion justifies continual investment. There is a large amount of literature on international technology spillovers from exporting (Kokko, 1996; Blalock and Gertler, 2004; Salomon and Shaver, 2005; MacGarvie, 2006) which contends that exporting firms provide information about technology and international markets to non-exporting firms at home. The non-exporting firms then become exporting firms through investment.

Economic theory suggests investment is a key driver of output expansion at the macro level. Our industry level result also suggests a feedback effect running from domestic output (VAD) to domestic investment (DINV). This finding highlights the importance of controlling causality in a conventional economic growth model where the direction of the causality is assumed to run from investment to growth. We should note, however, that the coefficient of the variable is very small, meaning that though domestic output impacts on domestic investment, its effect is virtually of negligible magnitude. The coefficient of the SIZE variable is positive and significant, suggesting that large firms contribute more to domestic investment than small firms in Taiwan. Finally, the time dummy (D) is positive and significant, implying that the domestic investment expanded substantially since 2000 when the Democratic Progressive Party (DPP) took office from the China Nationalist Party. This result is a little striking, because the prevalent view is that the DPP government performed rather poorly economically compared with the previous government of the China Nationalist Party (CNP). Nevertheless, this finding may reflect somehow the effect of policies that restricted OFDI by Taiwanese firms in China during the rein of DPP, which seemed to result in the rise of domestic investment in Taiwan.

Turning to column (3), we see that the effects of outward FDI in China (OFDIC) are significant. The estimated complementarities in the case of OFDI in China imply that Taiwanese firms indeed combine home production with production in mainland China through industrial chains to generate final output at lower cost than would be possible with production in just Taiwan. Put differently, domestic investments in Taiwan may increase because OFDI in China occurs in industrial segments that might potentially forge industrial linkages with firms in Taiwan. Some Taiwanese firms have indeed invested in resource industries in China, leading to the expansion of investment in related industries in Taiwan. Therefore, the significant effect of OFDI in China can be somehow interpreted as an industry effect. Another explanation is that OFDI in China results in an increase in demand for exports



from Taiwan to China, thereby stimulating investment in the exporting industries in Taiwan. This later interpretation has some value because the expansion of Taiwanese OFDI in China in the last decade has been accompanied with a dramatic increase in exports from Taiwan to China, as shown in Chapter 2. In stark contrast with OFDI in China, such an effect is not observed for OFDI in other countries. The geographic and cultural distance between the USA and Taiwan and transportation cost considerations may reduce the likelihood of forging industrial linkages between American firms and Taiwanese firms. Our result does not lend support to Braunerhjelm and Oxelheim (2000) who suggest a substitution relationship between foreign and home country investment in R&D-intensive, horizontally organized industries, but it does suggest that any theorizing of the OFDI effect must consider the role of the location of investment.

The performance of other variables in column (3), except for EXPORT, is qualitatively the same as those in column (2). The insignificant role of exports is difficult to explain and it may be caused by aggregation/disaggregation error. Owing to the high correlation between some of our variables, we employed several sensitivity analyses to ensure the robustness of our findings. The correlation between EXPORT and VAD is 0.79, and perhaps this is the reason for a lack of significance for the EXPORT variable in column (3). We ran model regressions without EXPORT but the results did not change qualitatively. Further research is needed to disentangle the true effect of exports on domestic investment in the home country.

The discussion in the literature review suggests that industry characteristics are likely to moderate the relationship between foreign and domestic investment. Accordingly, we collapse our sample into ‘Heckscher-Ohlin Industries’ and ‘Schumpeter Industries’. According to Braunerhjelm et al. (2005), in the vertically organized Heckscher-Ohlin industries, the link with the home country-based production of intermediates implies that an increase in the final-stage production necessarily increases home country investment. In contrast, the production in the Schumpeter industries is more footloose and less entangled with the home country. Therefore, we expect different effects of OFDI in the two different types of industries. We use the median of R&D expenditure per employee to break the full sample into two groups of industries. We label the group with low value R&D expenditure per employee as ‘Heckscher-Ohlin Industries’ and the group with a high value R&D expenditure per employee as ‘Schumpeter Industries’. In our sample, the Heckscher-Ohlin industries comprise: (1) food, beverage, tobacco, (2) textiles, mills, (3) wearing apparel and clothing accessories, (4) wood and bamboo products, furniture, (5) pulp, paper and paper products, printing and reproduction of recorded media, (6) plastic products, and (7) non-metallic mineral products. Schumpeter industries include: (1) leather, fur and related products, (2) chemical materials and products, petroleum and coal products, medical products, (3) rubber products, (4) basic metal products, fabricated metal products, (5) machinery and equipment, manufacturing not elsewhere classified, (6) electronic parts and components, computers, electronic products and equipment, (7) motor vehicles and parts, other transport equipment, and (8) precision, optical products, medical equipment, watches and clocks. Table 4 shows the results from the estimation of equation (2) for both groups of industries.

{Table 4 goes about here}

Table 4 reveals some intriguing findings. First, outward FDI in China (OFDIC) is significant in Heckscher-Ohlin industries, whereas it is insignificant in Schumpeter industries. The significant effect in the Heckscher-Ohlin industries suggests that Taiwanese production in China may be connected with the exploitation of raw materials and involves investment in process-oriented production systems, which stimulates relevant activities in Taiwan. Braunerhjelm and Oxelheim (2000) suggest that in less R&D-intensive industries, different

parts of the value-added chain are processed in different units at different locations. This finding is consistent with Braunerhjelm et al. (2005) who found that FDI in the Heckscher-Ohlin industry has a complementary and positive impact on domestic investment in the home country. It is also consistent with the descriptive information shown in Chapter 2 which indicates that Taiwanese investment is concentrated in labour-intensive industries rather than technology-intensive industries in China.

Outward OFDI in other countries (OFDIO), in contrast, has a negative impact on domestic investment in Heckscher-Ohlin industries, indicating that foreign investment substitutes rather than complements home investment in this group of industries. It is possible that OFDI in these countries, because of its capital-intensive nature, competes with domestic investment head-to-head for scarce funds in terms of retained corporate earnings (Stevens and Lipsey, 1992). Put differently, it is possible that outward investments in foreign countries have taken resources that would otherwise have been used for investments by firms in Heckscher-Ohlin industries in Taiwan. In contrast, OFDI in other countries (OFDIO) exerts a positive impact on domestic investment in Schumpeter industries, suggesting a complementary relationship. This finding is consistent with those of Belderbos (1992), Stevens and Lipsey (1992) and Feldstein (1994), whilst it does not support that of Braunerhjelm and Oxelheim (2000) which predicts a relationship of substitution between foreign and home investment in R&D-intensive industries. The different roles of OFDI in other industries support our theoretical prediction that the industry-specific effect moderates the relationship between foreign and home investment. These findings are broadly consistent with Hejazi and Pauly (2003) who conclude that one cannot predict whether growth in outward FDI will increase or decrease domestic investment as they may depend on many conditioning factors. Finally, the estimates for other variables remain stable across sectors, in line with the results in Table 3. This suggests that the roles of these variables do not differ greatly between the two types of industries.

## **V. CONCLUSIONS**

The central question posed in this paper is the relationship between OFDI and domestic investment in the home country. New evidence from analyses of Taiwanese FDI suggests that greater foreign investment is associated with higher levels of domestic investment at home. We therefore conclude that the relationship between foreign and domestic investment is not necessarily one of substitution as is often proposed in the conventional wisdom. It seems that the common intuition that outward FDI reduces domestic investment is only a special case of a broader set of possible effects of FDI on domestic economic activity. The finding of the complementary relationship implies that OFDI can be considered as a mechanism that can be expected to foster an improved allocation of capital likely to benefit both the host and home countries.

This finding is broadly consistent with the positive role of OFDI in enhancing exports in Taiwan found in Chapter 4. The finding suggests that OFDI by Taiwanese firms may result in an increase in demand for imports from Taiwan, hence stimulating investment in the country. Overall, our results are consistent with a growing body of evidence providing no support for the simple and common perception that OFDI diverts resources from domestic investment. Although one might find individual cases where firms set up affiliates overseas which crowd out investments of old plants back home, the notion that, in the aggregate, OFDI in developing countries is substituting for domestic investment at home is farfetched.

Furthermore, we find that this complementary effect is mainly accounted for by investment in China. This China effect corroborates the argument that the nature of the investment by multinationals differ between different host countries, leading to different patterns of the relationship between OFDI and domestic investment. In a marked contrast, OFDI in other countries does not seem to be related to domestic investment in Taiwan. One way of interpreting the different effect between different host countries is that there are no universal relationships between production abroad and domestic investment at home. There may be circumstances in which foreign production tends to stimulate domestic investment and circumstances in which it tends to stifle domestic investment. Hence, our findings provide strong support for the allegation that host country- and industry-specific effects should be taken into consideration for better understanding the effect of OFDI on domestic investment. Moreover, this also explains the seemingly inconclusive results in previous studies, i.e., it is likely to have reflected differences in the industrial structure. These results clear up some of the mixed findings from previous empirical studies and add insights to otherwise unexpected questions.

Having emphasized what we believe to be the strengths of our research, it is appropriate equally to underline its limitations. First, due to data constraints, we can not control some other factors that may also be important determinants of domestic investment. For example, relative labour cost (China vs. Taiwan) should be an important control variable because increases in relative production costs in Taiwan compared to China are expected to have a negative effect on domestic investment in Taiwan. Similarly, high OFDI overseas might also be the result of poor investment opportunities and restrictive policies at home, which leads to reduction of domestic investment and an increase in investment overseas (Desai et al., 2005). Second, although this analysis shows a complementary effect of OFDI on domestic investment, the estimation fails to reveal how such effects are actually realized. In other words, the mechanism linking OFDI and domestic investment has not been explained in this chapter. Our interpretations are therefore unavoidably somewhat speculative.

Our findings signal that it is possible that foreign and domestic investments are complements in one country, whereas they are substitutes in other countries. Future study thus could replicate this analysis to other host and home countries to check whether the findings in this study are specific products relating to Taiwan and China only. Future study should also go beyond examining a one-way relationship, that is, the impact of outward FDI on domestic investment at home towards focusing on the interactions between foreign and domestic investment. Theoretically, interdependence between the two types of investment may occur where an increase in investment in either location will reinforce or raise the cost of capital for investment in the other location.

Our findings give rise to a number of conceivable policy implications. First, the general complementary relationship between OFDI and domestic investment suggests that the Taiwanese government should further liberalize the regime of outward investment rather than maintaining tight control over it. The government should especially encourage investments in China because such investments can stimulate domestic investment in Taiwan. Second, the Taiwanese government should design policies to adjust the level of liberalization for overseas investment through legislation on an industry-by-industry basis in order that OFDI stimulates domestic investment in relevant industries more effectively. In particular, the government should encourage investments in Heckscher-Ohlin industries in China, while discourage investments in Heckscher-Ohlin industries in other countries. However, this does not mean investments in other countries are not important. Rather, our results suggest that the government should also have a policy package in place to encourage investments in

Schumpeter industries in other countries. This will help to cultivate investments in high technology industries in Taiwan.

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## APPENDIX

**Table 1: Description of variables**

Variable	Measurement	Mean	S. D.
DINV	Domestic fixed capital employed	25264.42	43718.04
TOFDI	Total annual OFDI outflows from Taiwan to foreign countries	321494.10	612716.80
OFDIC	Annual FDI outflows from Taiwan to China	245355.30	480176.20
OFDIO	Annual FDI outflows from Taiwan to other countries	76138.83	173628.10
IFDI	Annual FDI inflows to Taiwan	141789.00	490825.60
RDV	R&D expenditure/Value added	34.59	39.16
EXPORT	Value of direct exports from Taiwan	2.08E+08	4.34E+08
VAD	Value added	169064.50	218338.20
SIZE	Fixed capital employed/number of firms	4.14	5.18
D	Dummy, D=0 before 2000 and D=1 after 2000		

**Table 2: Correlation matrix of variables**

	2	3	4	5	6	7	8
1.TOFDI	0.92	0.66	0.60	0.17	0.45	0.43	0.39
2.OFDIC		0.46	0.58	0.11	0.42	0.42	0.38
3.OFDIO			0.49	0.16	0.35	0.32	0.27
4.IFDI				0.28	0.44	0.46	0.41
5.RDV					0.23	-0.09	0.13
6.EXPORT						0.79	0.37
7.VAD							0.50
8.SIZE							

**Table 3: The impact of OFDI on domestic investment**

Dep. Var: LEMP	FE model	RE model	FE model	RE model
	(1)	(2)	(3)	(4)
C	1.974 (28.11)***	1.931 (27.391)***	1.877 (27.65)***	1.785 (26.25)***
TOFDI	0.004 (3.37)***	0.003 (3.21)***		
OFDIC			0.003 (2.92)***	0.003 (2.70)***
OFDIO			0.001 (1.56)	0.001 (1.50)
IFDI	-0.000 (-0.04)	0.000 (0.16)	-0.000 (-0.43)	-0.000 (-0.10)
RDV	0.004 (1.98)**	0.005 (2.15)**	0.005 (2.37)**	0.007 (3.21)***
EXPORT	0.008 (1.96)**	0.010 (2.61)***	0.000 (0.03)	-0.001 (-0.21)
VAD	0.000 (2.27)**	0.000 (2.34)**	0.021 (3.47)***	0.031 (5.27)***
SIZE	0.055 (11.73)***	0.055 (11.98)***	0.053 (11.22)***	0.052 (11.37)***
D	0.011 (3.58)***	0.011 (3.54)***	0.011 (3.67)***	0.011 (3.65)***
Adjusted R <sup>2</sup>	0.984	0.741	0.985	0.750
F value	680.035***	92.349***	673.886***	84.672***
N	255	255	255	255
Hausman test ( $\chi^2(10)$ )	$\chi^2(7)=0.000$		$\chi^2(8)=36.956***$	

Figures in parentheses are t statistics (two-tailed tests); \*, \*\*, and \*\*\* denote significance at the 10%, 5% and 1% levels respectively.

**Table 4: The impact of OFDI on domestic investment by classification (RE model)**

Dep. Var: LEMP	Heckscher-Ohlin Industries	Schumpeter Industries
	(1)	(2)
C	1.196 (35.33)***	0.849 (29.77)***
OFDIC	0.007 (5.15)***	-0.009 (-0.693)
OFDIO	-0.003 (-4.52)***	0.001 (2.01)**
IFDI	0.001 (1.41)	0.001 (1.75)*
RDV	0.052 (17.44)***	0.014 (6.99)***
SIZE	0.055 (18.29)***	0.025 (9.13)***
VAD	0.070 (23.11)***	0.111 (48.29)***
Adjusted R <sup>2</sup>	0.845	0.961
F value	95.413***	491.37***
N	105	120

Figures in parentheses are t statistics (two-tailed tests); \*, \*\*, and \*\*\* denote significance at the 10%, 5% and 1% levels, respectively.